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MINISTERUL EDUCAȚIEI ȘI CERCETĂRII

AUTORITATEA NAȚIONALĂ PENTRU CERCETARE

Proceedings of
The 18th Edition of

EUROINVENT

EUROPEAN EXHIBITION OF CREATIVITY AND INNOVATION

EURO INVENT ®

2026

Editor: Andrei Victor SANDU

ISSN Print: 2601-4564
Online: 2601-4572

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Romanian Inventors Forum / Forumul Inventatorilor Romani

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IFIA
Founded 1968
INTERNATIONAL FEDERATION OF INVENTORS' ASSOCIATIONS

Date: 04. May. 2026
Ref. No.: 2026-121
Subject: Message of IFIA President- EUROINVENT 2026

Dear Distinguished Innovators, Esteemed Researchers, and Honored Participants,

On behalf of the International Federation of Inventors' Associations (IFIA), I am pleased to convey my highest regards and sincere appreciation to the **Romanian Inventors Forum (FIR),** Europe Direct Iași, "Gheorghe Asachi" Technical University of Iași, and "Alexandru Ioan Cuza" University of Iași for their exemplary commitment to organizing the **18th edition of EUROINVENT®, the European Exhibition of Creativity and Innovation.**

Over nearly two decades, EUROINVENT has established itself as a prominent international platform that brings together the intellectual capital of inventors, scientists, and academic institutions. It plays a vital role in advancing innovation ecosystems by promoting the exchange of knowledge, encouraging interdisciplinary collaboration, and showcasing high-impact inventions within a European and global context.

The 2026 edition, to be held from May 28 to 30 at the Palace of Culture in Iași, represents a significant opportunity to further strengthen connections between research, industry, and society. By presenting the achievements of both established academic institutions and independent inventors, EUROINVENT continues to reinforce the essential contribution of creativity to scientific progress and technological advancement.

At a time when global economic uncertainties and societal challenges persist, innovation remains a fundamental pillar for sustainable development, economic resilience, and social wellbeing. Initiatives such as EUROINVENT demonstrate how creativity and research-driven solutions can effectively address these challenges and contribute to a more prosperous and balanced future.

IFIA reaffirms its unwavering commitment to supporting platforms that empower inventors, facilitate international cooperation, and promote the recognition and protection of intellectual achievements. We strongly believe that fostering innovation is indispensable to shaping a knowledge-based global society.

I encourage all participants and stakeholders to actively engage in this distinguished event and to take full advantage of the opportunities it offers for collaboration, visibility, and impact.

Please accept my best wishes for the continued success of EUROINVENT 2026.

Sincerely,
AlirezaRastegar

Rastegar

President
International Federation of Inventors' Associations (IFIA)

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LETTER OF RECOMMENDATION

Dear Inventors, Innovators and Young Students Around the World,

On behalf of World Invention Intellectual Property Associations (WIIPA), I would like to advance my deepest gratitude and appreciation to Romanian Inventors Forum for the great deal of effort they have devoted into organizing their annual event: 2026 European Exhibition of Creativity and Innovation (EUROINVENT 2026) in Iasi, Romania.

Throughout the last 18 years, it was evident to see that **EUROINVENT** has truly made one of the biggest cultural impacts for the global community of inventors and innovators by merging many creative minds and souls from **2008 to 2026.** The Romanian Inventors Forum Team's hard work and dedication for promoting inventors and entrepreneurs while facilitating social exchange, innovation marketing, licensing, and manufacturing have truly been remarkable and effective.

WIIPA fully supports this spectacular event 2026 European Exhibition of Creativity and Innovation and our honorable cooperation partner, Romanian Inventors Forum in Romania. Accordingly, **we highly recommend all member states of WIIPA as well as inventors, students, researchers, scientists, entrepreneurs, and enterprises to take their best shot to grasp the opportunity to participate in EUROINVENT 2026** and capitalize all fruits of beneficial means in this excellent competition in Romania.

Sincerely Yours,

Manli Hsieh
President
World Invention Intellectual Property Associations (WIIPA)

World Invention Intellectual Property Associations (WIIPA)

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The Best Design Award
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Special Awards from other participant Institutions

EXHIBITS CLASSIFICATION

1	Environment - Pollution Control
2	Energy and sustainable development
3	Agriculture and Food Industry
4	Medicine – Health Care – Cosmetics
5	Industrial and laboratory equipments
6	Mechanical Engineering – Metallurgy
7	Buildings and Materials
8	Aviation, car industry and transportation
9	Chemical and Textile Industry
10	Information Technology and Communication
11	Printing and advertising
12	Safety, protection and rescue of people
13	Sports, Games and Leisure
14	Other
X	Innovative Research

PREAMBLE

Invention exhibitions—whether national or international—represent a vital catalyst in the innovation ecosystem. They are dynamic platforms that foster creativity, provide visibility to novel ideas, and enable meaningful interactions between inventors, researchers, and potential stakeholders. As interactive and competitive environments, such exhibitions not only stimulate new ideas but also serve as scientometric benchmarks, attracting applicants, collaborators, and invention owners alike.

Over the past three decades, Romanian inventors have proudly showcased their breakthroughs at international exhibitions, receiving countless medals, awards, and accolades. Despite challenges in scientific publishing, Romania consistently ranks among the top countries in terms of awarded patents, proving the immense value and potential of applied research. These results reaffirm the importance of organizing and supporting such exhibitions, as they offer inventors real opportunities to transform ideas into impactful innovations.

EUROINVENT stands as a hub for interdisciplinary collaboration, where education, research, and production converge. It is not only a celebration of creativity, but also a nurturing ground for future inventors. Inventics, as a science and educational field, has the mission to shape skills, character, and vocation, especially among the younger generations. Special attention should be given to inventics schools, which play a crucial role in stimulating technical creativity and sustaining innovation culture.

This event also calls attention to important societal challenges. A significant percentage of Romania's top specialists are now contributing abroad. Events like EUROINVENT must continue to offer platforms that encourage their engagement and reintegration, showcasing the value of their expertise and achievements on home ground.

It is also worth highlighting that Romanian inventors are increasingly recognized worldwide—not just for their inventions, but as respected jury members, organizers, and leaders within international innovation communities. A beloved tradition at global exhibitions is the “Romanian Inventors’ Day,” where Romanian participants celebrate and share their contributions in a festive and symbolic manner.

This edition of EUROINVENT brings together over 600 inventions and research projects from more than 30 countries. It is an honor to host such a diverse gathering of inventors, including a growing number of young innovators from schools and universities, alongside experienced professionals. Despite global challenges such as the pandemic and geopolitical instability, the spirit of innovation remains strong.

With sincere appreciation, we thank all participants, partners, and supporters of EUROINVENT—especially the Romanian Inventors Forum, EUROPE DIRECT Iași, “Gheorghe Asachi” Technical University of Iaşi, and “Alexandru Ioan Cuza” University of Iași—for their dedication, collaboration, and shared vision in making this event possible.

Prof. Ion SANDU – Honorary President of Romanian Inventors Forum

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WIIPA Family

World Invention Intellectual Property Associations

Introduction

In 2010, it was founded by Mr. Hsieh Hsin-Ming. At the moment, 50 member countries and partners have joined the "WIIPA Family" with the goal of promoting invention, innovation and intellectual property rights around the globe.

Founder

Since 1993, Mr. Hsieh Hsin-Ming has formed "TIPPA" Successfully, opened up a way for Taiwan's products to be in line with international standards and also laid the foundation for the establishment of WIIPA.

History

In 2000, Mr. Hsieh Hsin-Ming felt that the main axis of TIPPA is limited to Taiwan. With a vision to gain access in the international stage, he dedicated his time and effort to gather transnational forces to put his vision at work.

Fueled with a vibrant ideology, he continued to open doors of opportunities for young and talented inventors to a global level and thrived on gaining international attention for the establishment of WIIPA as a multinational organization.

Our Goal

WIIPA upholds the spirit of globalization and extends its vision across the globe. With technology, using network interface allows a fluid communication pattern for a more innovative exchange of ideas and information among stakeholders.

Members

WIIPA member states span across continents. The member countries in the "WIIPA Family" currently has 50 member states and partners.

WIIPA put great emphasis on "common concept" and "substantial participation". WIIPA members have certain privileges other associations aspire for. One of them is taking part in WIIPA meetings, conferences as well as exchange activities from time to time to have a full understanding and mastery of the development and complexity of international inventions.

www.wiipa.org.tw +886-2-87723898 wiipa@wiipa.org.tw

World Invention Intellectual Property Associations

WIIPA Family
Create Your Minds
Explore Your Life

www.wiipa.org.tw

Oficiul de Stat pentru Invenții și Mărci

Str. Ion Ghica Nr.5 Sector 3, Bucuresti
office@osim.ro; www.osim.ro
Telefon centrală – 021.306.08.00 / Relații cu publicul – 037.282.59.85

Oficiul de Stat pentru Invenţii şi Mărci (OSIM), autoritate unică pe teritoriul României în acordarea protecției proprietăţii industriale, are ca principală misiune susţinerea inovării, competitivității și profitabilității ca factori de creștere economică.

OSIM furnizează servicii de specialitate de calitate prin acordarea drepturilor de proprietate industrială, promovează proprietatea industrială prin toate mijloacele și asigură cooperarea României în relaţiile internaţionale, în conformitate cu tratatele, convențiile și acordurile în domeniu, la care țara noastră este parte.

Atribuţiile OSIM :

- înregistrează şi examinează cererile din domeniul proprietăţii industriale, eliberând titluri de protecţie care conferă titularilor drepturi exclusive pe teritoriul României;
- este depozitarul registrelor naţionale ale cererilor depuse și ale registrelor naţionale ale titlurilor de protecţie acordate pentru invenţii, mărci, indicaţii geografice, desene şi modele, topografii de produse semiconductoare, modele de utilitate şi certificate suplimentare de protecţie;
- editează și publică Buletinul Oficial al Proprietăţii Industriale al României;
- editează şi publică fasciculele brevetelor de invenţie;

- administrează şi conservă Colecţia naţională de proprietate industrială, întreţine şi dezvoltă baza de date informatizată în domeniul său de activitate, inclusiv prin schimburi internaţionale;
- efectuează, la cerere, servicii de specialitate în domeniul proprietăţii industriale;
- publică on-line, pe site-ul oficial al instituţiei, la cerere, în mod gratuit şi fără acordarea de drepturi de autor, articole destinate promovării domeniului proprietăţii industriale;
- atestă consilierii în domeniul proprietăţii industriale şi ţine evidenţa acestora în registrul naţional al cărui depozitar este;
- acordă, la cerere, consultanţă de specialitate în domeniul proprietăţii industriale şi organizează cursuri de instruire, seminarii şi simpozioane în domeniu;
- asigură armonizarea cadrului legislativ naţional cu reglementările internaţionale şi europene în domeniul protecţiei proprietăţii industriale;
- iniţiază, negociază şi participă, în condiţiile legii, la încheierea de convenţii, acorduri, protocoale şi alte înţelegeri interne şi internaţionale în domeniul protecţiei proprietăţii industriale;
- participă şi implementează prin specialiştii Oficiului de Stat pentru Invenţii şi Mărci proiecte europene şi regionale în domeniul proprietăţii industriale, finanţate parţial sau integral de către organisme cu care oficiul dezvoltă relaţii de cooperare;
- îndeplineşte orice alte atribuţii în domeniul proprietăţii industriale, care decurg din dispoziţiile legale în vigoare şi din acordurile internaţionale la care România este parte.

STATE AGENCY ON INTELLECTUAL PROPERTY OF THE REPUBLIC OF MOLDOVA

24/1, Andrei Doga str.
MD-2024, Chișinău, Republic of Moldova
Phone: +373 (22) 400-500
E-mail: office@agepi.gov.md
URL: www.agepi.gov.md
www.facebook.com/AGEPI/

The State Agency on Intellectual Property of the Republic of Moldova (AGEPI) is an administrative central authority subordinated to the Government, responsible for promoting and implementing activities in the field of legal protection of intellectual property.

Through AGEPI you can effectively protect your intellectual property (IP) in the territory of the Republic of Moldova:

- Inventions, plant varieties, topographies of integrated circuits, product and service trademarks, industrial designs, geographical indication, appellations of origin, traditional specialties guaranteed;
- Literary, artistic, scientific works, computer programs and other objects of copyright and related rights.

AGEPI issues titles of protection for IP objects, provides information and legal advice about protection and enforcement of IP rights, publishes the Official Bulletin of Intellectual Property (BOPI), promotes and propagates intellectual property, organizes the attestation of patent attorneys, conducts trainings and professional development courses, provides IP pre-diagnosis and other related services.

Since 2015, it is possible to validate European patents in the Republic of Moldova through the European Patent Office (EPO). The single procedure for issuing European patents provides for simpler and more cost-effective protection of inventions in the EPO Member States but also in extension and validation states, including in the Republic of Moldova.

AGEPI services are provided according to the Quality Management System ISO 9001:2015, which ensures a quality according to international standards.

AGENȚIA DE STAT PENTRU PROPRIETATEA INTELECTUALĂ A REPUBLICII MOLDOVA

Agenția de Stat pentru Proprietatea Intelectuală a Republicii Moldova (AGEPI) este o autoritate administrativă centrală din subordinea Guvernului, responsabilă de promovarea și realizarea activităților în domeniul protecției juridice a proprietății intelectuale.

Prin intermediul AGEPI vă puteți proteja eficient proprietatea intelectuală (PI) pe teritoriul Republicii Moldova:

- Invenții, soiuri de plante, topografii ale circuitelor integrate, mărci de produse și de servicii, desene și modele industriale, indicații geografice, denumiri de origine, specialități tradiționale garantate;
- Opere literare, artistice, științifice, programe pentru calculator, alte obiecte ale dreptului de autor și drepturilor conexe.

AGEPI eliberează titluri de protecție a obiectelor de PI, oferă informații și consultații juridice ce țin de protecția și realizarea drepturilor de PI, editează Buletinul Oficial de Proprietate Intelectuală (BOPI), promovează și popularizează proprietatea intelectuală, organizează atestarea mandatarilor autorizați, cursuri de instruire și perfecționare a specialiștilor în domeniu, acordă servicii de prediagnoză a PI și alte servicii aferente.

Din 2015 este posibilă validarea brevetelor europene pe teritoriul Republicii Moldova prin intermediul Oficiului European de Brevete (OEB). Procedura unică de eliberare a brevetelor europene asigură obținerea printr-o modalitate mai simplă și cu mai puține costuri a protecției invențiilor în statele membre ale OEB, dar și în statele de extindere și validare, inclusiv în Republica Moldova.

Serviciile AGEPI sunt prestate conform Sistemului de Management al Calității ISO 9001:2015, ceea ce garantează calitate în conformitate cu standardele internaționale.

Romanian Inventors Forum

2003 – 2026

23 years of creativity

Romanian Inventors Forum (FIR) is a professional association which aims to support, stimulate the development and valorization of scientific and technical creative activities, and cultural - artistic, but also copyright problems of its members, diversification of research and technological development, design, scientific investigation, micro-production etc.
Research and development institution **certified** by the National Authority for Scientific Research (ANCS), according to HG. 551/2007, Decision ANCS no. 9708/29.07.2009.
FIR was established in 2003 by a group of university professors, elite inventors and researchers from the University Center in Iasi.

FIR is official delegate yearly for more than 20 international invention shows

www.afir.org.ro

Gheorghe Asachi" Technical University of Iași

POLYTECH - TECHNOLOGY TRANSFER CENTER

Coordinator: Prof.univ.dr.ing. Romeo Ciobanu
https://www.ctt.tuiasi.ro e-mail: rciobanu@yahoo.com

The Technology Transfer Center (CTT) POLYTECH is a structure without legal personality, with financial autonomy, established within the Technical University "Gheorghe Asachi", initially authorized in 2018 for a period of one year and then, in 2019, it was accredited for a period of five years (2019-2024). In 2024, CTT POLYTECH was accredited as an Entity in the Innovation and Technology Transfer Infrastructure in three areas: Digital Economy and Space Technologies, Energy and Mobility and Advanced Functional Materials.

The main services offered are: direct assistance to SMEs to identify their needs and requirements, identification of research, knowledge and technology transfer needs, identification and definition of problems to be solved and innovation needs, design of a personalized knowledge transfer plan based on the demand/supply ratio, creation of individualized transfer tools, according to the requirements of each beneficiary, cooperation in the development of IT products, technologies, services, applications together with the end user, technical consulting and monitoring services, environmental consulting, production planning, optimization of industrial processes and design, access of companies to CTT POLYTECH's technical equipment, assistance services in intellectual property management, protection of industrial rights, internationalization and access to new markets, strategic business development consultancy, internal/external market analyses, training and assistance services in the field of innovation and analysis of technological trends.

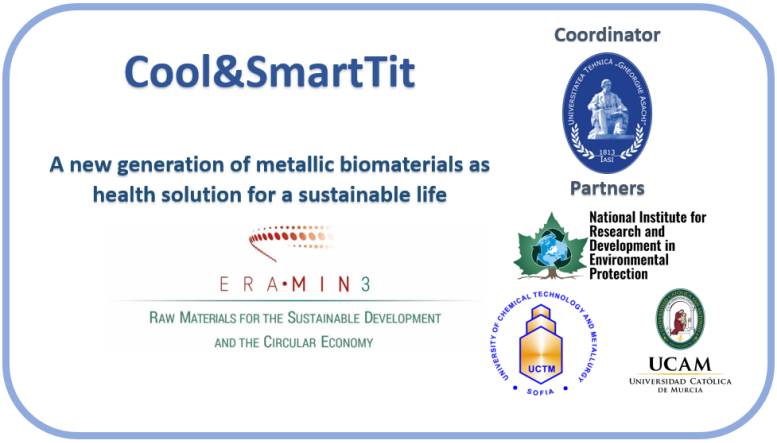
Within the HORIZON EUROPE 2021-2027 Program, CTT POLYTECH contributed to the submission of a number successful projects by providing technical assistance and consultancy services, technological experimentation and testing, technological evaluation, consultancy for the implementation of technological solutions, preparatory technical studies for experimental development activities. CTT POLYTECH also contributed to the submission of project applications for the following funding programs: INTERREG NEXT Romania-Moldova 2021-2027, PNCDI IV Program, North East Regional Program 2021-2027, HORIZON EUROPE 2021-2027, ERA NET Program, PCIDIF and PEO 2021-2027 and other types of financing. In period 2022-2025 CTT POLYTECH has carried out 9 Technology Transfer Contracts (Technical Assistance, Services and Research Expertise).

Cool&SmarTit
"A new generation of metallic biomaterials as health solution for a sustainable life"

Project number: 8/2024; **website:** https://simtit.ro/pf/coolsmartit/
Call: ERA-MIN3 Joint Transnational Call 2023
Funder: European Comision, Horizont 2020
Project period: April 2024 – March 2027
Programme Coordinator: Fundação para a Ciência e a Tecnologia (FCT), Portugal

The proposed project **"A new generation of metallic biomaterials as health solution for a sustainable life"** aims to obtain a new alloys system containing Titanium, Molibdenum, Niobium and Tin (Ti-Mo-Nb-Sn), with characteristics suitable for medical applications. The new generation of biomaterials will overcome the limitations of the titanium, cobalt and stainless-steel alloys as: high elasticity model and low corrosion resistance and biocompatibility. Hence, to achieve long-term stability and rapid osseointegration in orthopedic implants, surface modification of the implant surface is required. In this sense, the new titanium-based alloys will undergo specific heat treatments to obtain alloys with good mechanical properties intended for orthopedic applications.

Originality of the proposed approach consists in the development and characterization of Ti-based alloys containing unique combination of nontoxic alloying elements that are enhancing the Young modulus (in order to have proprieties closer to the attached/replaced tissue). The newly developed alloys will be thermally treated at different temperature levels in order to obtain optimal characteristics.



BIO-SIMTIT

"Experimental model for biofunctionalization of Ti-Mo-Zr-Ta alloys used in orthopedic implantology"

Project number: PN-IV-P7-7.1-PED-2024-0080; **website:** https://simtit.ro/bio-simtit/

Call: Experimental Demonstration Project (PED), Program 5.7 – Partnership for Innovation, Subprogram 5.7.1 – Partnerships for Competitiveness

Funder: Executive Unit for Financing Higher Education, Research, Development and Innovation (UEFISCDI), Romania

Project period: 08/01/2025 – 31/12/2026

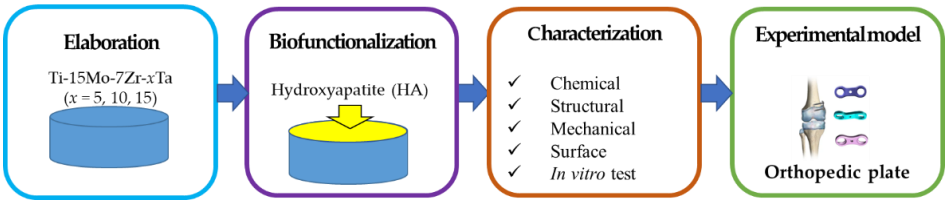
Coordinator: "Gheorghe Asachi" Technical University of Iasi, Faculty of Materials Science and Engineering

Partner: PARCUL TEHNOLOGIC ȘI INDUSTRIAL GIURGIU NORD

The project aims at the development and validation of Ti-Mo-Zr-Ta titanium alloys for orthopedic implants, structuring itself around several well-defined objectives, each closely related to the expected results. The feasibility of the project is based on a robust methodology, advanced technological processes and a clear understanding of the market and medical requirements. The project aims to achieve the following relevant aspects: 1. Creation of a solution that significantly improves current methodologies in orthopedic materials. 2. Addressing and solving a specific need, identified in orthopedic implantology. 3. Ensuring that the solution is sustainable, easy to use and scalable. The project presentation is illustrated in the figure.

The BIO-SIMTIT project approach brings significant progress in orthopedic implant technology by applying an innovative method of biofunctionalization of Ti-Mo-Zr-Ta alloys. This method allows for improved bone integration and biocompatibility, essential elements for the long-term success of implants.

The project is distinguished by the combined use of SLM technology for precise alloy fabrication and the application of a biomimetic hydroxyapatite surface treatment, thus offering a unique and personalized solution for each clinical case. This integrated strategy transforms the way materials are adapted to meet the specific needs of patients in the field of orthopedics.



Black Sea SIERRA

"Harnessing complementary curricular preparedness via sustainable management in response to civil and military pollution on the coastline, tributaries and lagoons in Black Sea's North, West, South zone"

Co-funded by the European Union

Project number: 101124670; **website:** https://simtit.ro/black-sea-sierra/

Call: EMFAF-2023-PIA-FLAGSHIP; **Topic:** EMFAF-2023-PIA-FLAGSHIP-2-BLACK; **Type of action:** EMFAF Project Grants

Granting authority: European Climate, Infrastructure and Environment Executive Agency Grant managed through EU Funding & Tenders Portal: Yes (eGrants)

Project period: 1 October 2023 – 30 September 2026

The **Black Sea SIERRA project** will prepare and adapt decision-makers' response capacity to current/emerging marine pollution, by coordinated cross-border response to armed conflict contamination.

The consortium, by Black Sea (RO, BG, UA, TR) and Mediterranean experience (IT), lists **two priorities**:

- ***Identifying specific types of marine pollution, including war related contaminants***, on an area of cca. 90,000 km^2 along the Black Sea shoreline (territorial, international waters), tributary rivers, and lagoons; Quantifying added marine pollution from armed conflicts, by detecting new contaminants and by hotspot diachronic and synchronic assays of undisturbed core sediments(thru project risk maps); Detection/assay of novel hazardous substances: war-generated/emerging contaminants, microplastics, pesticides, to assess the impact/threats on key marine biodiversity; A map of underwater noise pollution will assess its impact on biodiversity (dolphins).
- The research in demand grants premises to the management plan and ***training curricula and outputs on armed conflict*** contribution to marine pollution; Providing a handbook on marine pollution assessment methodology and sources, including armed conflicts in the Black Sea region; Development of remedial measures to be implemented by competent authorities; Conducting training workshops and meetings with decisional stakeholders and policymakers to increase response capacity, and to optimize cooperation of Black Sea participant countries.

The activities are organized in 6 work packages, related to planned objectives and results: WP1 secures project performance; WP 2 to 3 ensure quality data sampling and generate databases for pollution, bioaccumulation and underwater noise; WP 4 assesses marine pollution impact and identifies Best Available Techniques; WP 5 to 6 develop and optimize regional science-policy dialogue and training regarding marine pollution, monitoring and remedial solutions, by joint actions of EU/non-EU countries.

Pho-Tim

Project title: *"Innovative chemical conversion PHosphate coatings to promote Osseointegration and biocompatibility of Titanium IMplants"*
Project number: PN-IV-P2-2.1-TE-2023-1086
Program: 5.2 Program -Human Resources, 5.2.1. Start of research

Project type: Research projects to stimulate independent young teams
Funder: UEFISCDI, Executive Agency for Higher Education, Research, Development and Innovation Funding
Duration of the project: 08.01.2025 – 31.12.2026

The main objective of the Pho-Tim project is to enhance the characteristics of titanium alloys used for implant manufacturing, by depositing new phosphate layers using a chemical conversion process (phosphating). Therefore, the obtained layers will promote the osseointegration and biocompatibility of the substrate in order to reduce the number of implant failures and decrease patient recovery times.

In recent years, bone tissue engineering has been primarily concerned with finding new biomaterials with superior properties or improving the characteristics of those already on the market. Due to their excellent mechanical properties, high biocompatibility, and satisfactory corrosion resistance, titanium and its alloys are usually recognized as the predominant materials for implants. However, the titanium surface is bioinert, which makes it difficult to actively regulate bone healing processes in the early stages of implantation. In addition, Ti implants are exposed to surface corrosion and wear, which can lead to implant failure. The general objective of the **Pho-Tim project** is to improve the biological response of Ti implants by depositing on their surface phosphate layers based on Zn-Ca-Mg, Zn-Ca-Zr, and Zn-Mg-Zr through chemical conversion. These layers will improve the corrosion and wear resistance of the titanium alloy implants, as well as promote osseointegration and biocompatibility. Thus, the project includes activities to obtain and characterize phosphate layers deposited by phosphating on titanium alloy surfaces, as well as their validation for biomedical applications. The Pho-Tim project aims to eliminate the disadvantages of titanium implants by having a substantial impact on the patient's healing time and decreasing the risk of implant failure

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The **International Civilization Award** is an initiative by Commonance Capital and INSCIF that recognizes exceptional individuals and teams whose work meaningfully advances society. In partnership with EuroInvent, selected recipients are granted a fellowship in the Commonance Accelerator.

Each year, three outstanding participants will receive the award, and their scientific work will be developed into startups with venture backing. The award's mission is to accelerate impactful breakthroughs from science to commercialisation.

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Making their science projects into startups

About Commonance Capital

Commonance Capital is a British venture capital firm advancing early-stage ventures through science. We support bold ideas at their inception and help transform them into companies that are vital for people, the planet, and the future, with a typical investment cheque size of 500K USD. We back founders across industries and geographies, focusing on deep tech and social impact.

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Algeria

DZ.1	
Title	Smart Economic Intelligence Platform for Startups and Investment
Authors	Bibi Fahima (Team Leader) Kadi Hakim,Baouz Samih,Drouaz Karim,Yousfene Ali
Institution	Innovation and Economic Foresight Engineering Company – Algeria (FNIPEC)
Description EN	This project presents an innovative platform for economic innovation and strategic foresight designed to support startups, investors and economic institutions in a rapidly evolving global economy.The system analyzes economic trends, startup ecosystems and investment opportunities using advanced data analysis and forecasting tools.It helps identify emerging opportunities, accelerate startup growth and support smarter investment decisions.The platform contributes to building a dynamic innovation ecosystem that promotes entrepreneurship, strategic investment and sustainable economic development

Belgium

BE.1	
Title	**Removal of Aflatoxins from Fruits and Food Products Using Radio Frequency Waves Technology**
Authors Institution	Technofest Innovations and Institute of Technology Technofest Innovations and Institute of Technology
Description EN	Aflatoxins are highly toxic compounds produced by certain fungi such as Aspergillus flavus and Aspergillus parasiticus. These toxins commonly contaminate fruits, nuts, grains, dried foods, and agricultural products during storage and transportation. Aflatoxin contamination poses serious health risks, including liver damage, immune system suppression, and cancer. This project aims to develop an innovative and non-chemical method for reducing or eliminating aflatoxins from food products using **Radio Frequency (RF) Wave Technology**. **Objective of the Project** The main objectives are: • Reduction or elimination of aflatoxins in food products • Increasing food safety and quality • Extending shelf life of agricultural products • Reducing dependence on chemical detoxification methods • Developing an environmentally friendly sterilization system **Technology Description** Radio Frequency (RF) technology uses electromagnetic waves at specific frequencies to generate controlled heating inside food products. Unlike conventional heating methods, RF waves penetrate deeply and uniformly into the product. The RF treatment can: • Inactivate fungal spores • Reduce microbial contamination

- Destroy or degrade aflatoxin structures
- Preserve nutritional quality better than traditional thermal methods

Proposed Application Areas

The system can be used for:

- Dried fruits
- Nuts and pistachios
- Corn and grains
- Spices
- Animal feed
- Fresh fruits during post-harvest processing

Brazil

BR.1	
Title	**Zentro.AI**
Authors	Adson Adiel de A. Bastos Erick Rafael S. Santana
Institution	**CEEP Pedro Ribeiro Pessoa**
Description EN	Zentro.IA is an artificial intelligence platform created to support microentrepreneurs and small business owners. It transforms business data into strategic insights through automated analysis, interactive dashboards, and intelligent reports. The platform also provides tools such as SWOT analysis, planning assistance, and productivity support, helping users make better decisions and improve business performance. By combining technology and management, Zentro.IA promotes innovation, efficiency, and sustainable business growth.

Bosnia and Herzegovina

BG.1	
Title	**Automated filling station**
Authors	Authors: MAHIR JAKUPOVIC, FARIS RADONCIC; Mentor: ADMIR AKSAMOVIC
Institution	**Srednja elektrotehnicka skola Sarajevo**
Description EN	The purpose of this machine is to revolutionize the way automated machines in food production plants fill packaging in a new, completely innovative way. The main goal is to load as quickly as possible with as much precision as possible for the weight.

Bulgaria

BG.1	
Title	**Corrosion Resistance of Titanium Implants under Redox Conditions in the Human Body**
Authors	Lyudmila ANGELOVA, Andriana SURLEVA, Darya ILIEVA, Dimka FACHIKOVA
Institution	**University of Chemical Technology and Metallurgy**
Description EN	Model studies on the corrosion resistance of metallic biocompatible implants include a series of analyses, part of which are related to the investigation of the implant surface, and another part to the quantitative determination of titanium in media simulating the conditions in the human body. Titanium alloys possess crystalline structures (α-Ti alloys and β-Ti alloys. However, since their surface is readily covered by a thin (a few nanometers) layer of TiO_2, which is predominantly amorphous or contains nanocrystalline inclusions of TiO_2, the implants remain chemically stable and highly corrosion resistant. Because implants are used in a relatively non-aggressive environment with pH around 7.5, and under inflammatory conditions at approximately pH=5–6, the standard reduction potential of the couple $TiO_2+2H^++4e^-\rightleftharpoons Ti^{2+}+2H_2O$ ($E°=-0.502V$) decreases with increasing pH from 5 to 7, leading to an increase in reducing ability. The corrosion of titanium alloys depends not only on pH, but also on the presence of oxidizing agents (H_2O_2, O_2^-, $OH\cdot$, HOCl) and reducing agents (vitamin C, cysteine, histidine, proteins such as albumin, NADH/NADPH), which can alter the redox potential of the surface layer and lead to an increased dissolution rate. In biological fluids of the human body, a dynamic redox balance exists, which determines the stability of the passive layer on the implant, the corrosion rate, and the release of metal ions. Therefore, it is important to investigate the reduction processes of the oxide layer.

BG.2	
Title	**Approaches for Evaluating Methods for the Quantitative Determination of Titanium in Simulated Human Fluids**
Authors	Darya ILIEVA, Andriana SURLEVA, Lyudmila ANGELOVA, Dimka FACHIKOVA
Institution	**University of Chemical Technology and Metallurgy**
Description EN	This work introduces an integrated and validated analytical framework designed to enhance the accuracy and comparability of titanium quantification in simulated human body fluids, addressing a critical challenge in the evaluation of corrosion behavior of biomedical implants. While conventional techniques such as ICP-MS and ICP-OES remain standard, this approach advances the field by systematically optimizing and validating alternative spectrometric methodologies, including UV–Vis, through improved calibration strategies and matrix-adapted protocols. The innovation resides in the development of a robust evaluation protocol that accounts for complex physiological variables—such as pH fluctuations, oxidative species (e.g., H_2O_2), fluoride ions, and protein interactions—that significantly influence titanium ion release. The framework incorporates methodological blank validation, matrix matching, and recovery assessment to ensure high analytical reliability even at ultra-low concentration levels. The proposed methodology supports the development and certification of advanced titanium-based biomaterials by providing a standardized, transferable tool for precise monitoring of ion release, with direct implications for implant safety, regulatory evaluation, and materials optimization.

Acknowledgements: The financial support of the Bulgarian National Science Fund throughout the project KP06 DOO2/07.12.2023 Cool&SmartTit “A new generation of metallic biomaterials as health solution for a sustainable life” in the frame of the ERANET, ERA-Mine3 program of EU is highly acknowledged.

Cambodia

Norton University

KH.1.	
Title	Smart Attendance
Authors	Ms. Heng Sovanmonynuth; Ms. Huot Chansreynich; Mr. Sokun Devid; Ms. Choun Pheakna; Mr. Luy Mithona
Institution	Department of Computer Studies (DCS), Norton University, Cambodia
Patent	Not specified
Description	AI-based facial recognition attendance system designed for fast, secure, and contactless verification with anti-spoofing (liveness detection). Enables real-time attendance recording (~1.5 seconds) and improves accuracy and efficiency.

KH.2.	
Title	Knowly: Smart AI Knowledge Bot
Authors	Ms. Heng Sovanmonynuth; Mr. Chhan Savat; Mr. Luy Mithona
Institution	Department of Computer Studies (DCS), Norton University, Cambodia
Patent	Not specified
Description	AI-powered knowledge system using Retrieval-Augmented Generation (RAG) to provide fast, accurate, and context-aware responses from private data sources with an intuitive chat interface.

KH.3.	
Title	Circular Eco-Bloom Smart
Authors	Dr. So Sokuntheary; Prof. Chuop Sopheak; Mr. Oum Oudamratana; Ms. Meas Sreymi
Institution	Department of Architecture and Urbanism (ARC)
Patent	Not specified
Description	Sustainable smart eco-hub using recycled plastic, solar energy, and wind turbines to provide lighting, communication, charging, and emergency support for urban and displaced communities.

KH.4.	
Title	Smart Bus Stop
Authors	Dr. So Sokuntheary; Prof. Chuop Sopheak; Ms. Thoung Kimheang; Mr. Sun Net
Institution	Department of Architecture and Urbanism (ARC)
Patent	Not specified
Description	Smart transport infrastructure integrating solar power, real-time bus info, LED displays, CCTV, charging stations, and QR navigation to improve mobility and sustainability.

KH.5.	
Title	Urban Carbon and Smog Capture Network
Authors	Dr. So Sokuntheary; Prof. Chuop Sopheak; Mr. Dork Sophanet; Mr. Ly Chandavin
Institution	Department of Architecture and Urbanism (ARC)
Patent	Not specified
Description	Urban air purification system powered by solar energy to capture CO2 and pollutants, improving air quality and public health.

KH.6.	
Title	Under the Wings
Authors	Dr. So Sokuntheary; Prof. Chuop Sopheak; Mr. Cheng Neahav; Ms. Mol Nyta; Mr. Chakk Lyhuor
Institution	Department of Architecture and Urbanism (ARC)
Patent	Not specified
Description	Climate-responsive architectural shelter integrating solar energy, ventilation, dust filtration, and rainwater harvesting for sustainable public spaces.

KH.7.	
Title	The Smart Nomad Class
Authors	Dr. So Sokuntheary; Prof. Chuop Sopheak; Ms. Sok Kimheng; Mr. Cheam Hengsong; Mr. Vong Diyamong
Institution	Department of Architecture and Urbanism (ARC)
Patent	Not specified
Description	Mobile modular classroom with renewable energy and digital tools, providing flexible and accessible education for remote communities.

KH.8.	
Title	Emergency SOS Button for Vulnerable Group
Authors	H.E Chan Mithona; Mr. Hach Phanong; Ms. Poly Pheary; Mr. Dan Chantara
Institution	Department Electrical and Electronic Engineering (EEE)
Patent	Not specified
Description	Emergency system combining manual SOS alerts with automatic detection of break-ins, heat, and fire hazards to improve safety and response time.

KH.9.	
Title	Overcurrent and Fault Monitoring System
Authors	H.E Chan Mithona; Mr. Hach Phanong; Ms. Poly Pheary; Mr. Dan Chantara
Institution	Department Electrical and Electronic Engineering (EEE)
Patent	Not specified
Description	Real-time monitoring system detecting electrical faults and overcurrent conditions, triggering alerts and protective actions to enhance safety.

KH.10.	
Title	Smart Helmet Monitoring for Site Construction
Authors	H.E Chan Mithona; Mr. Hach Phanong; Ms. Poly Pheary; Mr. Dan Chantara
Institution	Department Electrical and Electronic Engineering (EEE)
Patent	Not specified
Description	IoT-based helmet system with camera and sensors to monitor workers, detect unsafe conditions, and send real-time alerts.

KH.11.	
Title	Smart Protection Meter's Box System
Authors	H.E Chan Mithona; Mr. Hach Phanong; Ms. Poly Pheary; Mr. Dan Chantara
Institution	Department Electrical and Electronic Engineering (EEE)
Patent	Not specified
Description	Smart electrical enclosure monitoring temperature and humidity to prevent faults, improve safety, and reduce maintenance costs.

KH.12.	
Title	Petroleum Quality Monitoring System
Authors	H.E Chan Mithona; Mr. Hach Phanong; Ms. Poly Pheary; Mr. Dan Chantara
Institution	Department Electrical and Electronic Engineering (EEE)
Patent	Not specified
Description	Portable sensor-based system for real-time detection of fuel quality and adulteration, improving safety and engine performance.

KH.13.	
Title	Tied-Arc Truss System
Authors	Dr. Yin Hor; Mr. Koem Kin; Mr. Sat Chhorvoeurn; Mr. Laun Panhat; Mrs. Sreng Hiek
Institution	Department Civil Engineering (CE), Norton University, Cambodia
Patent	Not specified
Description	Structural bridge system combining arch and truss mechanisms to reduce deflection and improve load efficiency.

KH.14.	
Title	K-Truss Bridge
Authors	Dr. Yin Hor; Mr. Ol Devith; Mr. Chhoeun Rithy; Mr. Khan Sopheap; Mr. Lem Keo
Institution	Department Civil Engineering (CE), Norton University, Cambodia
Patent	Not specified
Description	Bridge design using K-truss configuration to maximize load capacity and material efficiency, validated through structural analysis.

Canada

CA.1.	
Title	Ai Skin Analysis and Management Application
Authors	Tohid Amadeh, Shadmehr Radmanesh, Mohammad Mahdi Ostadi, Alireza Azarparand
Institution	**Maple Ai Innovation Foundation**
Patent no.	in the process
Description	Our invention is an AI-powered skin analysis and management application that utilizes a combination of advanced machine learning and computer vision models to assess facial skin conditions with high precision. By capturing a simple image of the user's face, the system detects and analyzes a wide range of skin concerns, including wrinkles, acne, pigmentation, texture irregularities, and signs of aging or environmental damage. Based on this analysis, the application generates a fully personalized skincare routine tailored to the user's specific skin needs. It also creates a digital skin profile for each user, enabling continuous monitoring and tracking of skin health over time. Through an interactive dashboard, users can visualize their progress, compare improvements, and receive adaptive recommendations as their skin condition evolves. The application has broad use cases across multiple sectors. For individuals, it provides an accessible and intelligent tool for daily skincare management. For dermatologists and aesthetic clinics, it serves as a decision-support system to enhance diagnosis accuracy and treatment planning. In the cosmetics industry, it can be integrated into product recommendation systems to deliver highly personalized solutions. By combining AI-driven diagnostics, predictive analytics, and longitudinal skin tracking, this invention transforms skincare into a data-driven, measurable, and highly personalized experience.

Chile

CL.1	
Title	**Green Hydrogen and Water Production by Generating Local Electric Energy from Waste Heat Recovery of Pyrometallurgic Processes or from Solar Energy**
Authors	Carlos Hernandez
Institution	**Ambar S.A.**
	N/A
Description EN	Hydrogen and Oxygen production from green electrical generation, making use of waste heat from industrial sources (contaminants and not contaminants) or solar energy, optimizing electrical energy generation by harvesting waste heat from the Stirling generator and electrolyzers. The system possesses four integrated subsystems for the generation of green Hydrogen and Oxygen: (1) Electrical energy generation via Stirling generator, fueled by recovering thermal energy from heat sources of industrial processes or solar energy. (2) Green Hydrogen and Oxygen generation via conventional electrolyzers. (3) Waste energy recovery from the Stirling generator and electrolyzers. (4) The integration of both the electrical energy from the Stirling and that converted from their own residual thermal energy, to feed the electrolyser.

China

CN.1.	
Title	**Natural Sterol Glycoside Essential Oil Deodorant: Plant-Based Dual Deodorization Technology Leading a New Track in Pet Cleaning**
Authors	REN YIBIN, YAN MENGHE, ZHAO KANG, YU KEKE
Institution	MyDooDoctor (Shanghai) Technology Development Co., Ltd.
Description	This product is a plant-based, mild deodorant for pets and indoor use. It uses sterol glycosides from alfalfa to make an essential oil nano-carrier (encapsulation rate >76%). The carrier slowly releases blended essential oils (fir, eucalyptus, tea tree, etc.), avoiding irritation and waste. It also contains a tannic acid-iron metal-polyphenol network that captures bad smells like ammonia, hydrogen sulfide, and methanethiol. Tests show >95% removal within 10 minutes and less than 8% smell remaining after 120 minutes. Key innovations: Natural carrier material (sterol glycosides) instead of synthetic surfactants. Dual action (masking + chemical capture) for long-lasting effect. No strong oxidants, no formaldehyde releasers, no harsh bactericides – safe if licked by pets and gentle on breathing. Economic outlook: The pet cleaning market is over RMB 30 billion, growing >30% per year. This product can replace chemical sprays and oil-based products. Using existing production lines, the gross margin is about 45%. Sales in the first year reached RMB 8 million, and are expected to exceed RMB 16 million this year.

CN.2.	
Title	**Microecological Axis Technology: A Prevention and Protection Program for Female HPV Infection and Cervical Cancer Risk**
Authors	Xuelian Bian, Dandan Mao, Xiao Wang
Institution	AUDOF Biomedical Technology (Shanghai) Co., Ltd.
Description	Cervical cancer is a major threat to women's health in China, primarily caused by persistent high-risk HPV infection. Current challenges include incomplete vaccine coverage and lack of effective interventions during the infection window.

This project pioneers the "Microecological Axis Technology", redefining vaginal microecology as a new primary prevention target for cervical cancer – creating a third track beyond vaccination and screening. The patented strain Lactobacillus rhamnosus LK-08 directly inhibits HPV E6/E7 oncoprotein expression, reducing HPV load by >60% within 48 hours (from 9.9 to <3.78 copies/cell).

Key technologies: (1) Targeted mechanism – first evidence of direct downregulation of HPV oncogene transcription by a Lactobacillus strain; (2) Three-layer microencapsulation – increases colonization rate by 3× for sustained local delivery; (3) Clinical validation and community digital closed-loop – 85% improvement in microecological imbalance, 62% risk reduction (n=500+), serving 5,000+ users in 10+ communities with 92% satisfaction.

Market outlook: Targeting 340 million women of childbearing age in China. HPV-related microecological regulation market exceeds RMB 20 billion, growing 35% annually. Projected sales: RMB 15 million (2026) and RMB 30 million (2027).

CN.3.

Title **Intelligent Eco-Friendly Garage for New Energy Vehicles**

Authors Chen Ziyuan

Institution Dongqiao Primary School, Xiangzhou District, Zhuhai City, Guangdong Province

Description

To realize automatic vehicle identification, automatic gate opening, and automatic gate closing for improved efficiency and safety.

To solve vehicle blocking problems through ultrasonic detection and voice reminder functions.

To integrate solar energy generation and rainwater recycling systems for energy-saving power supply and self-service car washing.

To enhance engineering practice and innovation abilities through sensor integration, controller programming, and structural design.

To develop a demonstrable and promotable smart eco-friendly garage model that supports technological and sustainable development initiatives.

Croatia

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HR.1.

Title	**Machine for discontinuous production of yarn composed of wool fibers and yarns of different materials**
Authors	ZELJKO KNEZIC, DUBRAVKO ROGALE, ZELJKO PENAVA, SNJEZANA FIRST ROGALE, IVAN KNEZIC
Institution	**University of Zagreb Faculty of Textile Technology; Municipality of Majur**
Description	In the process of hand-weaving floor coverings, various thicker materials can be used for the weft. In order to be able to use sheep wool from our region and threads made from recycled materials, a machine was designed that produces complex coarser threads suitable for hand weaving in a discontinuous process. At least two previously prepared threads (or narrow ribbons of recycled material) are laid out in parallel on a 2-meter-long table, and wool fibers or a skein obtained by a carding machine are placed next to them. All threads are fixed to the spindle at one end. After the spindle has been rotated a certain number of revolutions, the desired twists are created on the new thread. The spindle axis is then placed perpendicular to the axis of the created thread, which is wound onto the spindle, and a new amount of material is pulled onto the table to continue the process, which is repeated as desired (or needed). The spindle has an electric motor drive controlled by a counter and a speed regulator.

HR.2.

Title	**Autochthonous microbial tool for in situ degradation of petroleum hydrocarbons**
Authors	MARIJA VUKOVIC DOMANOVAC, MONIKA SABIC RUNJAVEC, BARBARA BERTOVIC
Institution	**University of Zagreb Faculty of Chemical Engineering and Technology**

Description	Autochthonous aerobic heterotrophic microbial cultures PH03 and PH17, isolated from soil contaminated with petroleum hydrocarbons, show the ability to adapt to various environmental conditions, making them valuable tools for in situ bioremediation. Identification of isolates PH03 and PH17 was performed using standardised microbiological techniques, biochemical tests, and protein composition analysis. The isolates are cultivated in conventional microbial media, making them economically viable, and their autochthonous origin further adapts them for use in real environmental conditions. Bioaugmentation with isolates PH03 and PH17 at 0.052 g/kg achieved degradation of 42.6% and 37.1% of total petroleum hydrocarbons (TPH) and 92.9% and 94.2% of the C15–C30 fraction, with high viability of the microbial population up to 9.73 log CFU/g. Isolates PH03 and PH17, due to their exceptional metabolic flexibility, can withstand a wide range of temperatures and pH values and tolerate anaerobic environments, which significantly increases their resistance and ability to survive in extreme conditions.

HR.3.

Title	**Automatic Train Protection System RAS90 (INDUSI PZB90)**
Authors	ZVONIMIR VIDUKA
Institution	**Altpro d.o.o.**
Description	Automatic train protection system RAS90 is an INDUSI PZB90 based ATP system. It is designed in order to increase the safety of railway traffic. RAS90 system consists of central device RAS90, locomotive balise, track balises and signalling and operating elements located in the locomotive cabin. Functionality: The main function of the system is to initiate automatic braking if the driver doesn't comply with safety regulations. RAS90 is continuously monitoring the speed of the train and does not allow overspeeding at any point during the run. RAS90 can be additionally upgraded with various other functions like dead man's system, train driver registration, event recording, speed monitoring, wheel lubrication and similar. Safety: Track and locomotive balises are certified in TUV

Rheinland according to EN norms 50121-3, 50121-4, and 50125-3. RAS90 is developed and certified according to EN 50155, EN 50121-3 and EN61373.
Maintenance: Although RAS90 is a microprocessor based high tech system, maintenance procedures are made to be as user friendly as possible. Diagnostic application was developed for the ease of fault diagnosis and system check. Additionally, peripheral units have their own test devices – speedometer is tested by SB18 testing unit and locomotive balise is tested by LMI18.
Connectivity: Connection to other systems on the vehicle is enables by isolated CAN bus. Connection to the central diagnostic system (CENDIS) is realised through xG router or Wi-Fi.
Analytics: REC90 is a module developed specifically for event recording and it can be used with PC application IRAS viewer. All diagnostic data can be archived in ALTPRO central diagnostic system CENDIS.
System benefits: Track and locomotive balises encased in robust (fire, water, vibration resistant) casings; Equipment compatible with other INDUSI track balise producer; Decentralized architecture; Minimum cable infrastructure - CAN BUS connectivity; Configurable parametring of peripheral units; Low life cycle costs; Low initial investment; High level of customization possibilities; Project management (turn key solution)

HR.4.

Title	**move.AI - Personalized movement analysis and correction using artificial intelligence**
Authors	TOMISLAV BRONZIN, DARKO KATOVIC
Institution	**CITUS d.o.o.**
Description	MOVE = Motion Observation and Validation Engine move.AI is an innovative solution that uses artificial intelligence to analyze the user's movements during exercise or sports activities, recognizes movement patterns and automatically detects irregularities in movements. The system uses computer vision and deep learning algorithms to evaluate biomechanical correctness and provides personalized feedback in real time. Each movement is monitored and analyzed as a series of consecutive individual poses in order to be analyzed in detail and corrected if

necessary. The solution is compliant with personal data protection requirements (GDPR, etc.), and enables the implementation of a non-invasive method of monitoring and comparing movements. The move.AI solution is applicable in various industries and scenarios, e.g. recreation, sports preparation, physiotherapy, home exercise and education. The target groups are individuals and specialized sports, health and rehabilitation institutions.

HR.5.

Title	**Intelligent road sign**
Authors	Author: LORENA RADICEVIC Mentor: SINISA TEVELLY
Institution	**Technical School Zagreb**
Description	This project presents a smart STOP sign designed to improve the visibility of traffic signals in nighttime conditions. The system uses an ultrasonic sensor to detect approaching vehicles and automatically adjusts the LED brightness depending on the distance. The special feature of the project is that it enhances visibility from long distances on unfamiliar roads while reducing driver glare as the vehicle approaches the sign.

HR.6.

Title	**Automatic coin sorting and counting device**
Authors	Author: STJEPAN JOSIPOVIC Mentor: ZELJKO SITUM
Institution	**University of Zagreb Faculty of Mechanical Engineering and Naval Architecture**
Description	An innovative automatic coin sorting and counting device has been designed, combining a mechanical and electronic system for precise money processing without manual intervention. Sorting is done using inclined tracks with openings of different diameters, while counting is provided by optical sensors. When a user requests a payment of a certain number of coins, the device delivers the requested amount if available, or the closest method if not. It is intended primarily for shops and retail premises, where it allows for quick and easy handling of coins. Customers insert coins into the device, the merchant enters the excess

amount, and the system automatically processes the transaction. This innovation reduces the possibility of error, saves time and improves daily cash operations.

HR.7.

Title **GonioGuide AR - U.P.S. Learning System**

Authors ANDREJ VIDAK, IVA MOVRE SAPIC, VESNA OCELIC BULATOVIC

Institution **University of Zagreb Faculty of Chemical Engineering and Technology**

Description

GonioGuide AR is a smart digital system designed to transform how users learn to operate laboratory instruments, moving beyond traditional instruction methods toward an interactive, guided, and user-centered approach. By integrating augmented reality with real-time, step-by-step guidance directly on physical equipment, the system enables intuitive learning within a real working environment. Unlike conventional training based on static manuals or one-time demonstrations, GonioGuide AR provides continuous, on-demand support at the point of use, This reduces hesitation, improves procedural consistency, and minimizes the likelihood of errors during independent work. A key innovation lies in the integration of learning, safety awareness, and practical training into a unified digital framework. Designed for digital-native generations, the system supports engaging, self-paced learning and can be adapted to various laboratory instruments. Its modular concept enables scalability and positions GonioGuide AR as a foundation for future development into a broader learning platform. Beyond academic environments, the solution demonstrates strong potential for application in industrial laboratories supporting standardized training, efficient onboarding, and improved operational reliability. GonioGuide AR is not just an application,it is a scalable system that redefines laboratory learning by bridging education, safety, and real-world practice.

Novelty of the Innovation

GonioGuide AR introduces a shift from passive instructional materials toward an interactive, real-time learning system embedded directly in the working environment. Unlike existing solutions based on static manuals, video tutorials, or

simple OR-based content, this system provides context-based, step-by-step guidance directly on physical laboratory instruments using augmented reality. This enables users to learn procedures while performing them, rather than before or after the task. The novelty lies in the integration oflearning, safety awareness,and practical training into a single, unified digital framework. By delivering guidance at the exact point independent work, improves procedural consistency, and enhances user confidence, use, the system supports Additionally, the concept introduces a scalable approach that can be adapted across different laboratory instruments and environments, positioning it as a foundation for future development into a broader digital learning platform. This approach moves beyond content delivery, establishing a new paradigm of real-time, guided interaction between users and complex equipment.

HR.8.

Title

EXTENDED RELEASE FORMULATION FOR PARENTERAL USE AIMED AT ALLEVIATING PAIN IN ARTHRITIS PATIENTS

Authors

IVANA SOLJIC JERBIC, FABIO FARAGUNA, MARJANA DURRIGL, LEO MANDIC, LEON MIHIC, RAFAEL ANELIC, MONIKA MIHALJEVIC, PETRA PONGRAC, JOSKO BARBARIC, KARLO BLAZEVIC

Institution

University of Zagreb Faculty of Chemical Engineering and Technology; PLIVA d.d. Research institute

Description

The developed formulation consists of a biocompatible and biodegradable polymer system, a biocompatible solvent, and a non-steroidal anti-inflammatory drug (NSAID). The formulation is intended for local application, such as to the knee, where a polymer hydrogel forms and ensures the drug is released according to a given therapeutic profile over a longer period of time. This method of administration ensures the drug is available locally at the source of pain. It avoids the gastrointestinal tract, where chronic conditions can result from long-term oral administration. It reduces the frequency of administration and increases drug usability, allowing for lower drug consumption.

HR.9.

Title	**MatanX**
Authors	IGOR KOLOVRAT
Institution	**E.V.A. BLUE d.o.o.**
Description	A digital-analog business platform with an electric modular vehicle with a hemp body, a device for detecting and analyzing air quality at a micro location with AI software for data and analytics, and 4m2 HD displays with software for advertising, messages, real-time display of air quality conditions with maps of critical locations, etc. are integrated into the vehicle... The vehicle is not intended for sale, but we are building a fleet for selected European cities where, through our business activities in cooperation with the local community, we will help boost the local economy and sustainable way of living. Given that we have three income streams in mind, the main emphasis is on fair and sustainable business. The vehicle is modular and intended for last mile delivery and sale and for tourism in the off road version.

HR.10.

Title	**IoT access control system**
Authors	Author: JAKOV MARKOVIC Mentor: KATARINA STEPIC
Institution	**Faust Vrancic Technical School of Mechanical Engineering**
Description	This project is a fully functional IoT-based access control system built using an Arduino UNO R4 WiFi microcontroller. The system is designed to provide secure entry using two-factor authentication — first by scanning an RFID card and then entering a PIN code on a keypad. Only when both the card and the PIN are correct does the system activate an electric lock. I also designed the physical housing in Autodesk Inventor, so the system is not only electronically functional but also mechanically well-planned. This system is ideal for securing places where controlled access is important. It can be used in: • Banks – to secure vault rooms, employee entrances . • Schools and Universities – for classrooms, laboratories, teacher offices. • Offices and Companies – to control access to sensitive areas, meeting rooms, storage. • Homes and Apartments – for front doors, garages,

private workshops.
I plan to enhance the current system so that the door lock automatically unlocks when the temperature measured by the DHT11 sensor exceeds 30°C. This feature can provide emergency access in case of overheating or fire, improving safety. The system would continue to operate the usual two-factor authentication (RFID + PIN) under normal conditions, while giving priority to automatic unlocking when high temperature is detected.

HR.11.

Title **PYUP-ORDER**

Authors Author: DAVID KOS
Mentor: DANIJEL ESKERICIC

Institution **Technical School for Computer Science and Networking**

Description

This invention presents PyUp-Order, a web-based digital ordering system designed to simplify the process of ordering in restaurants and similar service environments. The application is built with FastAPI on the backend, a lightweight SQLite database, and a static frontend composed of HTML, CSS, and JavaScript pages. The system allows restaurant owners to create stores, manage menu items, customise the appearance of the menu, generate QR-based access for customers, and receive orders in real time. Customers can scan a QR code, browse the menu on their mobile phone, submit an order without installing an application, and optionally use a guest flow. The project also introduces user registration, e-mail verification, token-based authentication, image uploads for store branding and products, and a simple deployment guide for a Raspberry Pi server. The goal of this invention is to document the problem the project solves, explain the technical architecture, analyse the main code modules, evaluate strengths and weaknesses, and present realistic directions for future development.
PyUp-Order is a successful example of a practical school software project that combines a clear business problem, understandable architecture, and realistic implementation choices. It addresses the need for faster, contactless ordering in restaurants while remaining simple enough to deploy and explain in an educational context. The project demonstrates knowledge of Python backend development, SQLAlchemy data modelling, static frontend design, authentication, media handling, and lightweight server deployment.

HR.12.	
Title	**My Happy Coloring Book — Offline AI Coloring Page Generator**
Authors	MARKO MARICEVIC, TIBOR SKALA, LARA MARICEVIC, PAULA SRDANOVIC
Institution	**University of Zagreb Faculty of Graphic Arts**
Description	My Happy Coloring Book is a unique AI application that generates completely original, high quality coloring pages in just a few seconds - entirely offline, without any internet connection. This ensures maximum privacy and safety for children, which is a key advantage over existing online solutions. Powered by local GPU acceleration and advanced line art generation models, the system produces clean, professional illustrations without common AI errors. The application is extremely easy to use: by selecting a category such as animals, robots, or vehicles, the user instantly receives a brand new coloring page ready for A4 printing with a single click. The modular AI architecture enables fast integration of new styles and educational content (letters, numbers, tasks), as well as personalized illustrations. This innovative approach encourages creativity, reduces costs, and supports sustainability by printing only the illustrations users truly want - making it ideal for schools, libraries, kindergartens, and home use.

Cyprus

CY.1	
Title	**CXAI Technology in Olympic Sports and Pro Athletics Biophysical Sequences of Success are Written in the Light**
Authors	Dr. Catherine Demetriades
Institution	**CXAI Technologies**
Description EN	N/A This is a formatted ability developed by early crystalline structures to survey other entities at a distance, by sensing those electric pressures. DNA is forced to execute the information that has been formed by genetic memory which creates the crystalline structure. The electro-plasmic field is the energy surrounding humans and other life energy forms that balances all the levels of radiation. It is a word to distinguish it as an electrical energy of spirit and mind, that unites with plasma, the essential physical substance of all bodies. These decks of energy revolve around, into and through the body as it balances our electric pressures. These decks and layers of energy act much like protective bubbles and balancing mechanisms. Extremes of electric pressure are acted upon by pulling in tighter to protect and preserve or expanding outward to allow the crystal to break through the protective bubble and examine what is inside.

Ecuador

EC.1	
Title	**HYDROMECHANICAL CONCRETE SHRINKAGE MEASUREMENT DEVICE**
Authors	Majid Khorami, William Patricio Acome Teran, Natividad Leonor Garcia Troncoso, Teylon Jardel Peñafiel Goyón
Institution	**UTE University**
Patent	PCT/IB2024/061628 WO/2025/163368
Description EN	The present invention relates to a hydromechanical concrete shrinkage measurement device designed to monitor the shrinkage behavior of fresh concrete during the curing process in real time. Concrete shrinkage is a critical phenomenon that affects durability, structural integrity, and long-term performance of concrete structures. Conventional shrinkage measurement methods typically rely on laboratory equipment, electronic sensors, or complex mechanical systems, which may be costly, sensitive to environmental conditions, and difficult to deploy on construction sites. The proposed device introduces a non-electronic hydromechanical measurement system that operates through fluid displacement within a capillary tube. The device consists of a deformable tubular structure, preferably made of PVC, embedded within the concrete. As the concrete undergoes volumetric contraction during curing, the deformation of the tube causes displacement of an internal liquid, resulting in a measurable rise of the liquid column in a vertical capillary tube. The liquid level variation directly corresponds to the shrinkage magnitude of concrete. This simple, robust, and portable system enables accurate in-situ measurement of concrete shrinkage without electronic sensors, facilitating improved quality control, early crack detection, and enhanced durability management of concrete structures in both laboratory and field conditions.

Estonia

ES.1	
Title	**Self-Unfolding Satellite with Gravity**
Authors	Lembit Maimets
Institution	**N/A**
Description EN	US Patent #5235788 This structure was designed to allow long stays in outer space, avoiding negative health impacts on astronauts. Introducing internal stresses in the metal, without human presence, allows the structure to expand freely and evolve into a toroid in ZERO gravity. Long duration stays in outer space have been shown to have negative health impacts on astronauts, ranging from short term disorientation and proprioceptive system disruptions to long term bone decalcification and muscle atrophy. I have designed and patented a modular satellite that has its own gravity and will therefore allow astronauts and researchers to spend longer durations in outer space, while experiencing fewer negative side effects of zero gravity existence.

Finland

FI.1	
Title	**Seat Guard -Microbreaks**
Authors	Juha Starck, Rose-Marie Backström
Institution	**Office Beat Oy**
	N/A
Description EN	Seat Guard, Designed for your health. Well-being innovation Seat Guard-Microbreaks. The Simplest Solution to Avoid Sitting Too Much. Seat Guard-Microbreaks is a new health innovation to prevent excessive sitting. Seat Guard is a technical intelligent device, that united with the Interstuhl seat cushion makes the perfect combination for healthy sitting on any surface. Place the device into the Seat Guard pocket. The cushion has a non-slip bottom that increases seat comfort. It is machine washable up to 30°C and this quality cushion is produced in an environmentally friendly way.

Germany

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DE.1.	
Title	**SmartFrame Lock – Integrated E-Bike Security System**
Authors	Maximilian Billig
Description EN	The increasing incidence of e-bike theft in urban environments highlights the limitations of conventional locking systems, which are often inconvenient, easily forgotten, and insufficient for securing high-value electric bicycles. Addressing these challenges, the SmartFrame Lock introduces an integrated security solution by embedding a retractable steel cable directly within the bicycle frame. This design eliminates the need for external locks, reducing additional weight and improving user convenience. The system features automatic cable retraction, ensuring seamless operation after unlocking, and is enhanced through smartphone connectivity that enables remote monitoring and control. Advanced functionalities include real-time GPS tracking, movement detection for identifying tampering or suspicious activity, and an integrated alarm system that activates in the event of theft attempts. By combining mechanical robustness with smart digital technologies, the SmartFrame Lock provides a comprehensive, user-friendly protection system tailored for modern urban mobility. The innovation offers a practical balance between security, convenience, and design integration, representing a significant advancement in e-bike anti-theft solutions.

Greece

GR.1	
Title	**Drougas' 3D Real Models for Education of Newton Physics**
Authors	Dr. VASILEIOS Ag. DROUGAS
Institution	**Greek Ministry of Education and Religious Affairs / University of Ioannina**
Description EN	The creation of the real three-dimensional models refers to Newton and concerns the creation of real models of Newton's laws related to speed, momentum, gravity, energy and dynamics. These models are 100 in total and are made with simple materials that can be easily constructed by students at school. The purpose of creating these models was to make it much easier for students to understand the representation of Newton's basic laws of physics and to perceive physical changes in space and in three dimensions. For the purpose of education, students approach the phenomenon and then monitor its evolution through the operation of real three-dimensional educational models, thus more easily recognizing the phenomena of physical kinematics and dynamics in three dimensions. The creation of the models and the education of students in them introduces a new model, way and methodology of education in basic physics. There are three levels of education, for elementary, middle and high school students. And also a training program for teachers and professors. The models that were constructed are on display for the education of students at the Secondary Education Directorate of Arta in Greece in a specially designed and accessible room where seminars for students and teachers are also held. The presentation of the real 3D models in the TV you may find at the following link: https://youtu.be/j6-jwnJpF8U?t=76

Hong Kong

HK.1.

Title	**PureSTEPS Multi-Type Disinfection Shoe Sole Material with Integrated Antimicrobial Function for Seasonal Flu and Pandemic Prevention.**
Authors	Corina Man Ngo CHENG and Siu Tung LUI
Institution	**Simply Mask Ltd**
Patent no.	US patent application ref. no:63/839,451
Description	This invention discloses a patent pending novel shoe sole technology with an integrated, multi-type antimicrobial and antiviral function designed for pandemic prevention and enhanced public hygiene. The core innovation is the incorporation of fast-acting, broad-spectrum disinfecting agents directly into common footwear materials such as EVA, PU, and vulcanized rubber during the manufacturing process. These agents include, but are not limited to, silver-zeolite nanoparticles (AgZNPs), copper oxide (CuO) nanoclusters, quaternary ammonium compound-graphene oxide (QAC-GO), and zinc pyrithione. The resulting shoe sole provides continuous, passive disinfection of ground surfaces upon contact, neutralizing over 98% of viral and bacterial pathogens within seconds. This action effectively reduces pathogen accumulation in high-traffic areas like hospitals, public transport hubs, and schools, mitigating the risk of re-aerosolization and transmission. The technology is presented in multiple formulations tailored for specific applications, ranging from medical and industrial use to toddler-safe and eco-friendly versions. The antimicrobial properties are durable, lasting for a minimum of 18 months of daily use, offering a safe, non-obvious, and industrially applicable solution to pathogen control. This system represents a significant advancement in public health by turning everyday footwear into an active tool for surface disinfection. Backed by Computational Simulation in Hong Kong Admiralty MTR station testing demonstrates 98.32% pathogens dis-infection results in just 120 seconds. Founder Corina's dedication for pandemic solutions has earned her recognition, including an Honorable Fellowship from the Global Academy of Innovative Enterprises, endorsed by a Physics Nobel Laureate. It is now in the patent pending and initial commercialization stage.

India

IN.1.	
Title	**A Hybrid AI Framework for Accurate Fetal Heart Rate Baseline Estimation**
Authors	Raman Teja Venigalla , DR HAB. INŻ. Robert Czabański
Institution	Indian Innovators Association Politechnika Slaska
Description EN	Accurate estimation of the fetal heart rate (FHR) baseline is a critical component of intrapartum cardiotocography (CTG) interpretation and clinical decision-making. This work proposes a hybrid AI framework that integrates statistical, filtering, and deep-learning methods to robustly estimate the FHR baseline under varying physiological and labor conditions. Using the CTU-UHB public dataset, the framework is evaluated with clinically relevant metrics, including RMSD-BL, MADI, and acceleration/deceleration agreement. A novel fusion model incorporating uterine contraction signals is introduced to enhance robustness during contraction-linked events, supporting improved diagnostic reliability and interpretability. Existing automated baseline estimation techniques often rely on a single methodological paradigm—either rule-based statistical approaches, signal filtering, or deep learning. Each approach has limitations: statistical methods struggle with non-stationary signals, filtering techniques may oversmooth clinically relevant patterns, and deep-learning models may lack interpretability and robustness in rare events. There is a need for a unified framework that leverages the strengths of multiple methodologies while maintaining clinical interpretability.

Indonesia

Represented by

Indonesian Invention And Innovation Promotion Association (INNOPA)

ID.1.	
Title	**Danantara Super App: Enabling Public Participation in Financing National Strategic Projects through Rupiah-Backed Tokenization to Strengthen Indonesia's Economic Sovereignty**
Authors	Aziz Qomarul Firdaus, Octaviana Galuh Pratiwi, MD., Afis Baghiz Syafruddin
Institution	**PT. Nexus Global Niaga**
Patent	-
Description EN	Danantara Super App is a digital platform developed by PT. Nexus Global Niaga that enables the public to invest directly in Indonesia's National Strategic Projects through rupiah-backed tokenization. By converting real infrastructure assets into secure, fractional digital tokens, the app makes investment more accessible, transparent, and compliant with financial regulations while integrating taxation and reporting systems. It also includes investor protection, risk management, and educational features to improve financial literacy. In addition to mobilizing domestic capital and reducing reliance on foreign funding, the platform allows foreign investors to participate using rupiah-based instruments, creating potential capital inflows that can help strengthen Indonesia's economic sovereignty and currency stability.

ID.2.	
Title	Scie-Drone: Integrating Pre-Trained Pose Recognition Model and Real-Time Alert System to Enable Smart Drones to Prevent Physical Bullying in Schools
Authors	Audrey Almeera Rizky Putri
Institution	**State Junior High School 1 Surabaya**
Description	EC002025126311 Scie-Drone is a smart drone system designed to prevent physical bullying in schools by using AI-based pose recognition and real-time alert technology.

Iran

Represented by

IR TOP INVENTORS

IR.1.	
Title	**Hybrid Artificial Intelligence-Based Process for Recovering Lost Information**
Authors	**Morteza Faghanifam**
Institution	**EMDAD COMPUTER**

IR.2.	
Title	**Herbal Transdermal Anti-Diabetic Pad from Nettle and Citrullus colocynthis Extracts**
Authors	Haniyeh Alamdari

IR.3.	
Title	**Production of Biodegradable and Transparent Plastic Using Natural, Low-Cost, and Safe Materials**
Authors	Seyyed Mohammadtaha Hosseini, Mohammadmahdi Azadfallah, Narjes Azadfallah, Marziyeh Azadfalah
Institution	Raheno School, Alborz, Iran

IR.4.	
Title	**A Smart Finger Force Monitoring Device for Rehabilitation Applications**
Authors	Seyed Mehrad Mirhosseini, Seyyed Saber Mirhosseini
Institution	EJEI High School –Isfahan, Iran

Japan

JP.1.	
Title	**Thermal Four-Color Printing Machine**
Authors	**Taro Miura, Nissho Miura**
Institution	Toyosu Co., Ltd.
Description	Thermal Four-Color Printing Machine is an innovative system that utilizes thermal-sensitive technology to achieve precise and efficient four-color printing without the need for traditional ink-based processes. By integrating temperature control and advanced material response mechanisms, the machine can accurately generate color variations through heat activation, reducing energy consumption and minimizing environmental impact. The system offers stable performance, simplified operation, and high adaptability across various materials. It is suitable for applications in industrial marking, packaging, and customized printing, providing a sustainable and cost-effective solution for modern manufacturing needs.

Kazakhstan

KZ.1.

Title	**Adaptive Modular 3D Architectures for High-Performance Turbine Blade Tips under Dynamic Loading**
Authors	Savinki Vitaly Vladimirovich, Ratushnaya Tatiana Yurievna, Rakhmatulin Maxim Lenarovich, Tasybek Didar Suleymanovich, Ivanischev Andrey Aleksandrovich, Dyachenko Regina Yuryevna
Institution	M. Kozybayev North Kazakhstan University
Description	This innovation introduces a novel turbine blade tip concept based on a modular and adaptive internal 3D architecture designed to enhance performance under dynamic and vibrational loads. Unlike conventional rigid structures, the proposed design enables controlled stress redistribution, improved damping capacity, and mitigation of fatigue-induced microcrack formation. Additive manufacturing techniques were employed to fabricate cellular structures (D-solid, G-sheet, FCC, BCC, hexagonal), demonstrating that internal geometry plays a decisive role in mechanical behavior and energy absorption. Among these, D-solid and G-sheet configurations showed superior performance in load distribution and vibration damping. A coupled multiphysical and mathematical framework was developed to model the interaction between fatigue, vibration, and damage evolution, introducing predictive relationships between stress, strain, time, and energy. This enables accurate lifetime assessment and optimization of structural performance. The proposed solution marks a transition from monolithic blade designs to adaptive, structurally engineered systems, offering significant improvements in durability, vibration resistance, and operational reliability in advanced turbine applications aligned with Industry 4.0 principles.

Korea

KR.1.	
Title	**Eco-Medical Ventilation System : Integrating Hydroponic Smart Farming for Hospital Air Purification**
Authors	Jeongmin Lee, Seungheon Yum
Institution	**NLCS Jeju & Wilbraham & Monson Academy**
Description EN	This invention presents an eco-friendly "Botanical Ventilation System" designed to tackle indoor air pollution in medical environments. While conventional air purifiers struggle with gaseous pollutants like Formaldehyde and TVOCs, our system utilizes a hydroponic smart farm module featuring **Sansevieria** as a "Living Filter." Through a series of controlled experiments, we proved that the Sansevieria-integrated chamber reduces air quality indicators **1.7 times faster** than non-plant systems. Furthermore, when integrated into a dynamic airflow system, the module successfully restored air quality from toxic levels to original baseline safety within **10 to 20 minutes**. The system operates by continuously circulating polluted ward air through the botanical chamber, where plants chemically neutralize harmful substances and enrich the air with fresh oxygen. This biophilic engineering approach not only ensures superior air purification but also promotes patient recovery through natural humidity control and psychological stability. **[Novelty & Impact]** 1. **High Efficiency:** 1.7x faster reduction of TVOCs and Formaldehyde compared to standard methods. 2. **Rapid Recovery:** Full air restoration within 20 minutes in a system-level integration. 3. **Sustainability:** Low-energy, plant-based filtration suitable for 24/7 hospital operation. 4. **High-Value Supplementary Role & Biophilic Impact:** Designed as a strategic supplementary module, this system fills the "purification gap" of conventional HVAC units by targeting gaseous pollutants. Beyond its technical function, it integrates biophilic design into the medical environment, fostering faster patient recovery and enhancing the hospital's brand image as a sustainable, healing-centered institution.

Korea

by

AI-JAM US

KR.2

Title	Using Artificial Intelligence to Improve Comprehension Through Cognitive Text Simplification for Latino Students in Low-Income Communities
Authors	Charlotte Im
Institution	Harvard Westlake High School
Description	N/A This study investigates whether AI can improve learning outcomes for Latino students from low-income backgrounds by transforming educational materials into cognitively accessible forms. Building on psycholinguistic research showing that comprehension depends on sentence structure, cognitive load, and language processing patterns, the project uses AI-based language models to rewrite academic content into clearer, bilingual-friendly formats tailored to students' needs. Unlike basic translation tools, these systems reorganize syntax, reduce cognitive burden, and emphasize key ideas to enhance understanding. Through a Zoom-based tutoring program, students are exposed to either original instructional materials or AI-adapted versions, with comprehension, retention, and confidence measured through assessments and surveys. The research proposes a scalable, data-driven model integrating AI text simplification into tutoring environments to promote equity, improve digital literacy, and empower underserved students through more accessible and effective learning experiences. Applications include K-12 education, bilingual tutoring platforms, and community learning centers serving low-income populations.

KR.3.

Title	Adaptive Crowd-Density Warning System (ACDWS): A Real-Time Multimodal Alert Framework for Crowd Crush Prevention
Authors	Danwoo Kim
Institution	Saint Johnsbury Academy Jeju
Description	N/A

ACDWS is a scalable, retrofittable safety platform that translates real-time crowd-density measurements into intuitive multimodal alerts for venue occupants, staff, and remote coordinators. The system integrates overhead AI-enabled RGB-D cameras (YOLOv8-Nano), PIR bidirectional sensor arrays, and BLE/Wi-Fi MAC-probe estimation to convert headcount data into quantitative density metrics. A composite Risk Score per zone combines instantaneous density, stagnation coefficient, and density rate-of-change, mapped to a three-tier colour-coded LED illumination protocol: Green (Safe), Amber (Caution), and Red (Critical). Edge processing on Raspberry Pi 5 guarantees response latency below 1.5 seconds. ACDWS addresses gaps exposed by the 2022 Itaewon disaster (159 fatalities) by providing a deployable, cost-effective automated safety layer. Applications include stadiums, transportation hubs, festival grounds, religious pilgrimage sites, and any high-occupancy venue requiring real-time crowd safety management.

KR.4

Title The Future Trends in Digital Journalism and Traditional Journalism

Authors Taehwan Kim, Siyoon Sim, Kwak Dongik, Yoonhyuk Cho

Institution AIJAM - US

Description N/A

This research examines the evolving landscape of digital journalism and its relationship with traditional journalism in the 21st century. As AI, machine learning, VR/AR, and data-driven audience engagement reshape how news is produced and consumed, the study identifies key future trends: AI automation of routine reporting tasks, immersive VR/AR storytelling, stricter data privacy requirements, and growing audience-driven participatory journalism models. The research analyzes critical legal and ethical dimensions of AI in journalism, including copyright liability for AI-generated content, transparency obligations, and algorithmic bias risks. Key findings establish that journalism must embed ethical standards into AI-assisted content creation while ensuring human editorial judgment remains central to newsrooms. The study proposes a journalism education framework that prepares professionals for technology-driven

transformations, developing both digital competencies and critical ethical reasoning. Applications extend to media organizations, journalism schools, and digital content platforms navigating AI-driven disruption.

KR.5

Title Developing Education Access Models in Laos

Authors Kim Minji, Minwoo Jung, Louis Jonghwee Kim, Nam Doyun

Institution AIJAM - US

Description N/A

This project proposes a scalable, zero-cost model enabling Korean high school students to deliver quality English education to Laotian children using AI tools and remote technology without formal organizational support. By dedicating 2-3 hours per week, a single student can provide 1:1 live Zoom tutoring, generate AI-powered custom worksheets using Claude or ChatGPT (designed in Canva, shared as PDF), and produce YouTube video lessons with Lao-language subtitles via DeepL and HeyGen AI avatars. The three-month roadmap begins with AI-generated worksheet distribution, progresses to weekly live tutoring with AI as a real-time teaching assistant, and culminates in launching a YouTube channel with AI-generated English lesson videos. Using 100% free platforms including Zoom, Canva, Duolingo, Khan Academy, and Kahoot, the model creates unlimited compounding educational impact across geographic boundaries. Applications include cross-border volunteer education initiatives, NGO-free grassroots teaching programs, and scalable EdTech models for underserved communities in Southeast Asia.

KR.6

Title Analysis of Success Factors Through Visualization of Start-Up Characteristic Measurements

Authors Hwiwon Park

Institution AIJAM - US

Description N/A

This study presents a comprehensive analysis of success factors in start-up ventures through systematic visualization of characteristic measurement data. Data collected across start-up attributes including team composition, funding levels, industry

sector, and geographic location were examined using scatter plots, heat maps, and histograms, identifying four primary success factors: (1) a multidisciplinary founding team, (2) access to adequate and timely funding, (3) focus on a well-defined market niche, and (4) embeddedness in a supportive entrepreneurial ecosystem. The research demonstrates that data visualization serves as a critical diagnostic and strategic tool, enabling founders to detect patterns, communicate insights to diverse stakeholders, and make evidence-based resource allocation decisions. The Four Pillars Model provides a practical framework for evaluating entrepreneurial decisions in real time, with direct implications for investors and ecosystem builders seeking to identify high-potential ventures. Applications include early-stage venture evaluation, investor due diligence frameworks, startup accelerator program design, and entrepreneurship education curricula.

KR.7.

Title **Fluid Dynamics Experiment to Understand Bernoulli's Principle and Reynolds Equation**

Authors Kang Taewan
Institution Frankfurt International School

Description This experiment aims to delve into the intricate concepts of fluid dynamics, focusing on two fundamental principles — Bernoulli's Principle and the Reynolds Number. Through practical applications and observations, the experiment seeks to provide a hands-on learning experience that aids in understanding these principles and their implications in real-world scenarios. Bernoulli's Principle explores the interplay between pressure, velocity, and elevation in an ideal fluid. The Reynolds Number, a dimensionless quantity, provides insight into the nature of fluid flow — whether laminar or turbulent — based on parameters like fluid velocity, density, and viscosity. Three experiments were conducted: (A) Energy losses in bends, measuring loss factors through various pipe attachments; (B) Bernoulli's theorem demonstration, investigating the validity of Bernoulli's equation in a converging-diverging duct; and (C) Osborne Reynolds' demonstration, confirming laminar, transitional, and turbulent flow regimes and calculating Reynolds Numbers at each section. By the end of this study, the goal is to develop an intuitive grasp of these principles, enriching the overall understanding of fluid dynamics.

Lebanon

Represented by
National Association for Science and Research

LB.1.	
Title	**Zakaa App**
Authors	Ninette Kamel
Institution	National Association for Science and Research (NASR)
Description	ZAKA@ is an innovative educational application designed to support autonomous science learning through the lens of Howard Gardner's Multiple Intelligences theory. By offering personalized and engaging learning experiences, ZAKA@ empowers students to explore scientific concepts in ways that align with their preferred learning styles—linguistic, naturalistic, kinesthetic, and spatial. The app includes interactive content covering six key science chapters for Grade 5 learners: the respiratory system, circulatory system, animals' food chain, light and its colors, electrical circuits, and refraction and lenses. Each chapter features four intelligence-specific activities and a quiz to reinforce learning. Activities range from crafting and nature exploration to song creation, fostering deep understanding through active engagement rather than passive consumption. Developed based on doctoral research conducted in Lebanese classrooms and backed by a patent from the Lebanese Ministry of Economy and Trade (Patent No. 7451), ZAKA@ combines research-driven design with educational technology to promote fun, accessible, and student-centered science education.

Macau

Represented by WIIPA

MC.1.	
Title	**AI and Thermal Imaging-Based Intelligent UAV Pesticide Spraying System**
Authors	TAM CHONG I, JIAN WING YU, CHEN SIYU, SI SAM WA, ZHU POK YIN, LEONG MAN IOI, LUO WAI KUAI
Institution	Hou Kong Middle School
Patent	
Description EN	This project leverages technology to pursue a balanced development between agricultural production and ecological protection. We aim to inject greater intelligence and responsibility into modern agriculture through this innovative solution, transforming pesticide application from an environmental burden into a precise and sustainable asset.

Malaysia

Represented by University Malaysia Perlis

MY.1.

Title	**Agro-Environmental Analytics: Causal Effects on Air Pollution for Food Systems**
Authors	Norazrin Ramli, Norazian M. Noor, Zulkifli A. Rais
Institution	**[1] Faculty of Civil Engineering & Technology, Universiti Malaysia Perlis, Arau 02600, Perlis, Malaysia** **[2] Sustainable Environment Research Group (SERG) Centre of Excellence Geopolymer and Green Technology (CEGeoGTech), Universiti Malaysia Perlis, Arau 02600, Perlis, Malaysia**
Patent no.	Copyright: LY2025P10298
Description EN	The Agro-Environmental Causal Analytics Framework (AECAF) is an innovative analytical framework designed to identify causal relationships between meteorological factors and air pollutants, with direct implications for sustainable food systems. The framework integrates air quality parameters (PM_{10}, NO_2, SO_2, CO, O_3) with meteorological variables (temperature, humidity, and wind speed), applying Granger causality analysis to determine cause–effect interactions influencing environmental conditions. AECAF introduces a shift from conventional correlation-based studies toward causal-driven environmental analytics, enabling a deeper understanding of how climate variability and air pollution interact to affect agricultural environments. It is capable of identifying critical environmental drivers and detecting conditions that may lead to crop stress, reduced yield, and compromised food quality. This provides a scientific basis for predictive agro-environmental assessment and improved decision-making. **Applications:** AECAF can be further developed into an intelligent decision-support system for precision agriculture and environmental management. It supports farmers in optimizing planting schedules, irrigation planning, and crop protection strategies based on environmental conditions. For policymakers and environmental agencies, it offers data-driven insights for air quality management, climate adaptation, and sustainable land-use planning. The framework is adaptable for integration with artificial intelligence (AI), Internet of Things (IoT), and real-time monitoring systems, enabling future smart farming solutions. Ultimately, AECAF contributes to climate-resilient agriculture and global sustainability goals, including food security (SDG 2) and climate action (SDG 13).

MY.2.	
Title	**SDGCraft**
Authors	Nur Liza Rahim, Sara Yasina Yusuf, Nor Faizah Bawadi, Duane Regen anak Broster
Institution	Universiti Malaysia Perlis
Patent no.	Copyright No. CRLY2025P09450
Description EN	In a conventional classroom, students often struggle to engage with sustainability topics that rely heavily on reading, passive listening and abstract concepts. For Gen Z learners, this approach feels disconnected from their digital lifestyle, making it difficult to grasp and internalize Sustainable Development Goals (SDGs) effectively. So how can we transform this challenge into an engaging and meaningful learning experience? SDGCraft provides the solution. SDGCraft is an innovative gamified learning system developed using Minecraft Education, designed to convert complex sustainability concepts into immersive, hands on experiences. Instead of passively learning, students actively participate in solving real world environmental challenges through interactive missions aligned with SDG 2 (Zero Hunger), SDG 6 (Clean Water), SDG 7 (Clean Energy) and SDG 15 (Life on Land). Through features such as agent-based automation, environmental restoration, and renewable energy simulation using redstone circuits, SDGCraft integrates engineering principles, computational thinking and sustainability literacy into a single dynamic platform. Students are not just learning, they are experimenting, problem solving, and making decisions in a simulated environment that mirrors real-world scenarios. This invention redefines sustainability education by making learning engaging, experiential and impactful. SDGCraft empowers a new generation of learners to understand, apply and take action towards global environmental challenges turning passive learners into active problem solvers.

MY.3.	
Title	**TeMo Foliar Fertilizer**
Authors	Irnis Azura Zakarya, Tengku Nuraiti Tengku Izhar, Norlia Mohamad Ibrahim, Roshazita Che Amat,
Institution	**Universiti Malaysia Perlis**
Patent	UI2024006143
Description EN	TeMo Foliar Fertilizer leverages the power of beneficial fungi and natural sugars to promote soil fertility and plant health. The fungi starter provides vital microorganisms that improve nutrient availability, while molasses serves as an energy source to enhance microbial activity. This formulation aligns with sustainable agricultural practices and supports eco-friendly farming. The preparation of TeMo Foliar Fertilizer involves mixing a specific ratio of fungal starter, molasses, and water, followed by a controlled five-day fermentation process. During fermentation, beneficial microbes multiply and produce enzymes and nutrients essential for plant growth. The resulting liquid fertilizer is then diluted and applied directly to plant foliage using a sprayer, ensuring rapid nutrient absorption and minimal waste. The use of TeMo Foliar Fertilizer offers multiple advantages, including improved plant growth, enhanced nutrient absorption, and increased soil microbial activity. It reduces dependency on chemical fertilizers, lowers production costs, and minimizes environmental impact. Additionally, it supports sustainable farming by improving soil structure and fertility over time.

MY.4.	
Title	**HEA-Wave: High Entropy Alloy Thin Films for Wireless Systems**
Authors	Nur Izzati Binti Muhammad Nadzri, Nur Athirah Binti Sidek, Nur Hidayah Binti Ramli, Muhammad Firdaus Bin Mohd Nazeri, Dewi Suriyani Binti Che Halin, Mohd Firdaus Bin Omar, Farah Farhana Binti Zainal
Institution	**University Malaysia Perlis**
Patent	PI2023001901
Description EN	HEA-Wave: High-Entropy Alloy (HEA) thin films are a new class of materials engineered for next-generation

antenna systems. Composed of five or more principal elements in near-equiatomic ratios, their tunable electrical and magnetic properties make them ideal for adaptive antenna technologies. When deposited as thin films on conductive or dielectric substrates, HEAs development of "smart" technology of antenna system—those responsive to thermal, electrical, or mechanical stimuli. These materials could dynamically adjust their electromagnetic properties in response to environmental changes, improving signal reliability and energy efficiency.

MY.5.

Title	**NobleSun: Smarter Dye-Sensitized Solar Cells through ZnO Photoanode Optimization**
Authors	Mohd Natashah Norizan, Ili Salwani Mohamad, Norsuria Mahmed, Kaiswariah Magiswaran, Nor Farhani Zakaria, Suriati Suhaimi, Mohd Fairus Ahmad, Shamsul Amir Abdul Rais, Ahmad Fariz Hasan, Muhamad Hafiz Ab Aziz
Institution	**Universiti Malaysia Perlis**
Patent	PI2023005632
Description EN	The invention, NobleSun, is an advanced Dye-Sensitized Solar Cell (DSSC) technology that significantly enhances solar energy efficiency. It optimizes the zinc oxide (ZnO) photoanode by doping it with 5 mol% of gold (Au) and silver (Ag). This leverages plasmonic resonance to boost charge generation and light absorption while simultaneously reducing electron recombination. Combined with a precision-tuned ZnO film thickness, this method yields a 35% efficiency gain over standard, undoped models. NobleSun features cost-effective fabrication, making it highly scalable for commercial applications like building-integrated photovoltaics, IoT sensors, portable devices, and STEM education kits.

MY.6.

Title	**ITO Interlayer Breakthrough for Perovskite/Silicon Tandem Solar Cells**
Authors	Ili Salwani Mohamad, Mohd Natashah Norizan, Puvaneswaran Chelvanathan, Yoganash Puttisigamany, Nowshad Amin, Tiong Sieh Kiong, Ahmad Wafi Mahmood Zuhdi, Norsuria Mahmed.

Institution	**Universiti Malaysia Perlis**
Patent	PI2025004060
Description EN	This innovation addresses one of the key bottlenecks in perovskite/silicon tandem solar cells by optimizing the Indium Tin Oxide (ITO) interconnecting layer, a critical component that determines how efficiently light and charge move within the device. Using DC magnetron sputtering, the project systematically tunes gas composition, deposition time, and film thickness to identify the most effective ITO design for tandem integration. The study found that an ITO thickness of 50–60 nm gives the best balance between high transparency and low electrical resistance, which is essential for improving tandem solar cell performance. What makes this invention stand out is its strong combination of scientific novelty, practical manufacturability, and commercial relevance. The optimized sample achieved around 85% transparency at 1000 nm, a bandgap of about 3.61 eV, and a low sheet resistance of 1.42 Ω/□, demonstrating that careful ITO engineering can significantly improve tandem interface quality. The work is supported by both simulation and experimental validation on multiple substrates, making it more robust and credible for future scale-up. From an industry perspective, this innovation is highly attractive because it is compatible with existing sputtering infrastructure, requires less than 5% additional panel cost, and offers a projected 20–30% efficiency gain. It is also scalable, thermally stable, and suitable for real applications such as next-generation solar panels and building-integrated photovoltaics. In short, this project offers a realistic pathway toward more efficient, market-ready, and commercially viable tandem solar technology.

Malaysia

by

Toronto International Society of Innovation & Advanced Skills (TISIAS)

MY.9.	
Title	**MALAYSIA**
Authors	**ARIVAAN MediGuard — The Autonomous Doctor's Assistant**
Institution	Narendran Ramasenderan, Harshayn Vythilingam, Darrick Aaron Untarman, Gayatri Reshma Penjarla, Krishna Ravinchandra, Vinesh Thiruchelvam
Patent no.	**Asia Pacific University of Technology & Innovation**
Description EN	MyIPO (IOTECHSOL-ARV-001 through ARV-009)

ARIVAAN MediGuard is an autonomous mobile robotic clinical screening platform integrating a twelve-modality non-contact physiological sensor array, a five-model multilingual conversational patient history acquisition subsystem, and an agentic artificial intelligence clinical reasoning pipeline for hospital, clinical, and institutional care settings. The system combines millimetre-wave radar, thermal imaging, remote photoplethysmography, beamformed acoustic sensing, volatile organic compound detection, carbon dioxide gradient sensing, stereoscopic pose estimation, near-infrared spectroscopy, seismocardiography, and particulate matter monitoring on a self-navigating robotic chassis with edge-fog-cloud compute distribution. An agentic retrieval-augmented generation pipeline fuses sensor-derived biomarkers with patient-reported symptoms across nine Southeast Asian languages to produce ranked differential diagnoses, urgency classification, evidence chain tracing, and practitioner referral with transparent cost and language matching. Designed for Malaysian Medical Device Authority Class B classification and validated through ISO 80601 aligned Bland-Altman limits-of-agreement studies, the platform addresses Malaysia's 10,798 specialist doctor shortage, 1,500:1 public-sector patient-to-doctor ratio, and systemic language and cost barriers affecting 170,000+ international students and underserved rural populations.

Moldova

Technical University of Moldova

MD.1.

Title **DEVICE FOR UNIFORM AIR DISTRIBUTION IN A TUNNEL DRYER**

Authors BALAN Mihail, ŢISLINSCAIA Natalia, STURZA Rodica, POPESCU Victor, BALAN Tatiana, ȘENILĂ Lacrimioara-Ramona, JIAN Mariana, MELENCIUC Mihail, VIŞANU Vitali, GÎDEI Igor, GUȚU Marin

Institution **Technical University of Moldova**

Patent no. Patent no. MD 1885 Z, from 31.01.2026

Description The invention relates to drying technology, in particular to devices for uniform air distribution in a tunnel dryer, and can be used in economic entities in the agricultural field for drying fruits, vegetables, etc. The device for uniform air distribution in a tunnel dryer consists of: two cranks A and B, and two connecting rods C and D. Crank A is equipped with the adjustment channel 1, and connecting rod C is equipped with adjustment holes 2. Crank A and connecting rod C transmit the oscillatory movements of the mobile metal frame 3 mounted in the body 4 for passing the air flow, in which the fluted blades 5 are installed, fixedly mounted with one end on a fixed metal frame 6, and with the other end moving synchronously vertically with the help of the mobile metal frame 3, coupled to it by means of cylindrical couplings 7. The fluted blades 5 are of identical shape and different sizes. The fluted blade 5 in the center of the body 4 for passing the air flow is shorter, and the fluted blades 5 at the ends are longer. On the perimeter of the large section of the body 4, a quadrangular metal plate 8 is mounted, in which flat blades 9 are movably articulated in a vertical position, the opposite end of which is movably articulated with the spacer plate 10, which is set in motion by the crank B and the connecting rod D. The cranks A and B and the connecting rods C and D are set in motion by the gear motor 11 and are mounted on the support 12.

Acknowledgments: The described results were obtained thanks to the research carried out within the project: 25.80012.5107.13.SE "Increasing the efficiency of the dehydration process of stone fruits by applying innovative technologies".

MD.2.

Title	**DEVICE FOR UNIFORM AIR DISTRIBUTION IN A TUNNEL DRYER**
Authors	BALAN Mihail, ŢISLINSCAIA Natalia, POPESCU Victor, BALAN Tatiana, CHIRIŢĂ Alexandru-Polifron, VIŞANU Ion, MELENCIUC Mihail, VIŞANU Vitali, GÎDEI Igor
Institution	**Technical University of Moldova**
Patent no.	Patent no. MD 1868 Z, from 28.02.2026
Description	The invention relates to drying technology, in particular to devices for uniform air distribution in a tunnel dryer, and can be used in small farms for drying fruits, vegetables, etc. The device, according to the invention, contains an air passage body 6, in which are installed corrugated vanes 7, mounted by cylindrical couplings 9 at one end on a fixed metal frame 8, and at the other end - on a mobile metal frame 5, which is connected, with the possibility of performing oscillatory movements, through a connecting rod 3 with adjustment holes 4, with a crank 1, in which an adjustment channel 2 is made. The crank 1 with the connecting rod 3 are driven by a gear motor 10.
	Acknowledgments: The described results were obtained thanks to the research carried out within the project: 25.80012.5107.13.SE "Increasing the efficiency of the dehydration process of stone fruits by applying innovative technologies".

MD.3.

Title	**PEACH DEHYDRATION PROCESS USING MICROWAVES**
Authors	VIŞANU Vitali, ŢISLINSCAIA Natalia, ŢĂRNĂ Ruslan, POPESCU Victor, BALAN Mihail, MELENCIUC Mihail, GÎDEI Igor
Institution	**Technical University of Moldova**
Patent no.	Patent no. MD 1923 Y, from 28.02.2026
Description	The invention relates to a process for dehydrating peaches using microwaves, which can be used in food industry enterprises, laboratories and research centers related to dehydration processes. The process, according to the invention, consists in initially selecting peaches suitable for drying, ripe, undamaged, with a humidity of 87-91%, washing and

removing the pits from them, then slicing them with a slicer into 3 mm thick slices and arranging a predetermined amount of slices horizontally in a single layer on a flat, perforated support in the drying chamber. After that, the slices are dehydrated by applying microwaves from a magnetron with a total power of 600 W at a regime of 185-245 W, or 800 W at a regime of 210-260 W, or 900 W at a regime of 225-285 W, for 180-225 min until a product humidity of no more than 20% is reached. At the same time, as a thermal agent, intended for removing humidity from the drying chamber, room air with a temperature of 26-30 °C, its relative humidity of 50-65%, normal atmospheric pressure and air flow speed of 1.0-1.8 m/s is used.

Acknowledgments: The described results were obtained thanks to the research carried out within the project: 25.80012.5107.13.SE "Increasing the efficiency of the dehydration process of stone fruits by applying innovative technologies".

MD.4.

Title **Dry Control Monitor**

Authors BALAN Mihail, VIŞANU Vitali, CALMÎCOV Igor, ŢURCANU Dinu, POPESCU Victor, MELENCIUC Mihail

Institution **Technical University of Moldova**

Patent no. Patent application no. 3300, from 13.03.2026

Description

DryControl Monitor – Software system for monitoring the drying process is an application developed in the C++ language, using the VCL (Visual Component Library) library, designed to monitor the progress of drying technological processes through an intuitive graphical interface. The program offers a specialized dialog window that displays the drying process status in real time through a progress bar and a numerical progress indicator. The application also includes a process interruption mechanism, through a cancel button, which allows the operator to stop the operation in case of unforeseen situations. When the application is initialized, the progress indicators are set to the initial values, allowing for correct monitoring of the drying cycle from its beginning. The system manages the events associated with the graphical interface and provides simple and efficient control over the monitored process. The DryControl Monitor application contributes to improving

the supervision of drying technological processes, providing operators with a software tool for visualizing progress, controlling process execution and increasing operational safety within drying installations or equipment.

Acknowledgments: The described results were obtained thanks to the research carried out within the project: 020405 "Optimization of food processing technologies in the context of circular bioeconomy and climate change"

MD.5.

Title

Method for culturing the Rhodotorula gracilis CNMN-YS-03 strain

Authors

Ludmila Balan, Nina Bogdan-Golubi, Evelina Tibirnac, Ana Rozlovan

Institution

Technical University of Moldova, Institute of Microbiology and Biotechnology

Patent no.

Patent application No. s 2026 0023, s 2026 0024 from 24.02.2026

Description

The invention relates to microbiology and biotechnology, specifically to a method for culturing pigmented yeast strain Rhodotorula gracilis CNMN-YS-03 to achieve increased biomass productivity, enhanced carotenoid and carbohydrate content. This method can be applied in biotechnology for the cultivation of pigmented yeast strains, particularly after prolonged lyophilized storage for the targeted synthesis of bioactive compounds of interest. The essence of the present invention provides a method for culturing the strain Rhodotorula gracilis CNMN-YS-03, specifically after reactivation from a lyophilized state using a standard rehydration medium (distilled H_2O) or with the addition of a mannoprotein extract obtained from yeast biomass remaining after Lager beer production (MPB) or Merlot red wine production (MPV) at a concentration of 1–10% vol. The Rhodotorula gracilis CNMN-YS-03 strain is cultured in beer wort medium with a sugar content of 6.0° Blg at a temperature of 27–28°C on a shaker at 200 rpm under continuous illumination for 120 hours.

The invention results in an increase in productivity by 2.83-2.99 times, carotenoid content by 2.25-2.47 times and carbohydrate content by 4.27-4.54 times compared to YPD medium or medium supplemented with agri-food waste containing carrot peel extract, celery peel extract, or a

mixture of carrot peel and celery peel extracts in a 1:1 ratio.

Acknowledgement: This study was supported by the research project 25.80012.7007.16TC „Viability and productive potential of pigmented yeasts of the genus Rhodotorula – carotenoid producers, after long-term preservation”, funded by NARD.

Applications: Biotechnology

MD.6.

Title **Technological model for preventing soil biodegradation. Practical recommendations**

Authors Frunze Nina, Bolocan Nistor

Institution Institute of Microbiology and Biotechlology
Technical University, Republic of Moldova

Patent no. Series WS / Patent application No. 7987/2024

Description

The process of soil degradation, which encompassed the entire Globe, did not bypass the RM either. Thus, if in 1877 about 5.7% humus was recorded here, then in 2025 the humus content in the soils of the Republic of Moldova was on average only 3.1%. We are eyewitnesses that the preservation and increase of soil fertility is becoming an increasingly difficult task for humanity in order to ensure and preserve life on Earth.

Our invention represents a multidisciplinary work carried out within the framework of multi-annual field experiments (about 30 years).

The study was conducted in three forage crop rotations, . Based on 20 biochemical, microbiological, agronomic, and soil science indicators, the influence of anthropogenic factors on soil fertility was studied: crop rotation, crop, mineral fertilizers, organic fertilizers, combined fertilizers, etc..

The results of the investigations are presented in the form of scientifically substantiated practical recommendations for the procedures for directing the production process of agricultural crops. They are intended for the republic's farmers and allow not only to stop degradation processes, but also to initiate the process of synthesis of organic matter in the soil.

MD.7.

Title	**FEEDING METHOD FOR BROILER CHICKEN**
Authors	**CAISÎN Larisa, MALENCHI Dumitru, BIVOL Ludmila, RAILEANU Ana, AL KHATIB JEHAD abd Aljabar Hassan**
Institution	**Technical University of Moldova**
Patent no.	Patent application No. 2790
Description	The invention relates to poultry farming, in particular to a method of feeding broiler chickens, and can be used in the production of compound feed. A method for feeding broiler chickens, characterized by the inclusion of meal obtained from Hermetia illucens larvae at 3.5% in nutritionally balanced compound feed formulated according to the growth phases, as follows: – Starter phase: corn 36.49%; wheat 20.0%; soybean meal 34.41%; soybean oil 1.40%; limestone 1.70%; vitamin–mineral premix 2.5%; Hermetia illucens larval meal 3.5%; – Grower phase: corn 40.08%; wheat 20.0%; soybean meal 30.66%; soybean oil 2.16%; limestone 1.10%; vitamin–mineral premix 2.5%; Hermetia illucens larval meal 3.5%; – Finisher (Phase I): corn 36.44%; wheat 25.0%; soybean meal 25.0%; sunflower meal 3.68%; soybean oil 3.08%; limestone 0.80%; vitamin–mineral premix 2.5%; Hermetia illucens larval meal 3.5%.

MD.8.

Title	**FEEDING PROCESS FOR BROILER CHICKEN**
Authors	**CAISÎN Larisa, DABIJA Adriana, AGAPII Vitalii, BIVOL Ludmila, MALENCHI Dumitru, CHETRARIU Ancuţa**
Institution	**Technical University of Moldova**
Patent no.	Patent application No. 2791
Description	The invention relates to poultry farming, in particular to methods of feeding broiler chickens, and can be used in poultry farms to optimize nutrition and valorize alternative feed resources. The essence of the method consists in using an optimized level of 4.0% dried wine yeast as a feed additive in compound feeds intended for broiler chickens during growth phases (Starter phase: corn – 34.84%; wheat – 20.0%;

soybean meal – 34.05%; soybean oil – 2.64%; limestone – 1.97%; vitamin-mineral premix – 2.5%; wine yeast – 4.0%; Grower phase: corn – 38.37%; wheat – 20.0%; soybean meal – 30.31%; soybean oil – 3.42%; limestone – 1.40%; vitamin-mineral premix – 2.5%; wine yeast – 4.0%; Finisher phase (Period I): corn – 34.99%; wheat – 25.0%; soybean meal – 24.74%; sunflower meal – 3.50%; soybean oil – 4.26%; limestone – 1.00%; vitamin-mineral premix – 2.5%; wine yeast – 4.0%), aimed at improving productive performance and economic efficiency, reflected in increased body weight, reduced feed consumption, and improved carcass yield.

The additive contributes to more efficient feed utilization, increased body weight and carcass yield, while maintaining the normal physiological state of the birds and stable hematological and biochemical parameters.

MD.9.

Title	**METHOD FOR NUTRITION OF BROILER CHICKENS**
Authors	**CAISÎN Larisa, DABIJA Adriana, AGAPII Vitalii, BIVOL Ludmila, MALENCHI Dumitru, AVRAMIA Ionuţ**
Institution	**Technical University of Moldova**
Patent no.	Patent application No. 2792
Description	The invention relates to the field of poultry farming, in particular to the composition of compound feeds intended for broiler chickens, with the inclusion of brewer's yeast. A method of feeding broiler chickens, characterized in that brewer's yeast is introduced as a biologically active feed additive into compound feed formulations differentiated according to the growth phases of the birds, namely the starter phase, grower phase, and finisher phase. The brewer's yeast is included at a proportion of 2.0% with the aim of improving nutrient utilization, optimizing growth performance indicators, reducing specific feed consumption, and increasing carcass yield.

MD.10.

Title **HORIZONTAL AXIS WIND TURBINE WITH TWO COUNTER-ROTATING ROTORS**

Authors Valeriu DULGHERU; Ion BOSTAN; Marin GUȚU; Radu CIOBANU; Oleg CIOBANU; Sergiu ZAPOROJAN; Ion BODNARIUC

Institution **Technical University of Moldova**

Patent no. Patent application nr. 2785 of 2026.04.10, AGEPI.

Description

The invention relates to energy, namely, to horizontal axis wind turbines, and can be used for converting wind energy into electrical energy with increased conversion efficiency. A horizontal axis wind turbine with two counter-rotating rotors includes a support tower (1), on which a nacelle (2) is installed with the possibility of rotation around the axis of the support tower (1). In the nacelle (2) is installed a radial generator with permanent magnets (3), the rotor (4) of the generator is fixedly connected to the wind rotor shaft (5) with aerodynamic blades (6), installed at an angle of attack $-\alpha_{optim}\pm\Delta\alpha$. The stator (7) of the generator is fixedly connected to the wind rotor shaft (8) with aerodynamic blades (9), installed at an angle of attack optimal in terms of wind energy conversion $+\alpha_{optim}$. The stator (7) is connected to the nacelle (2) by means of a one-way coupling (10), and the rotor (4) of the generator is connected to the nacelle (2) by means of a one-way coupling (11). The horizontal axis wind turbine with two counter-rotating rotors operates in the following way. At the wind direction indicated in the figure, the air currents act on the aerodynamic blades (6), installed under the angle of attack $-\alpha_{optim}\pm\Delta\alpha$, driving the wind rotor (5) and the rotor (4) of the generator (3) into rotational motion, which will rotate with the angular velocity ω_1, producing the amount of power P1. The air currents, which pass through the wind rotor (5), will act on the aerodynamic blades (9), installed under the angle of attack $-\alpha_{optim}$, driving the wind rotor (8), which is rigidly connected to the stator (7) of the generator (3) into rotational motion. as a result, the stator (7) will rotate in the opposite direction to the rotor (4) of the generator (3) with the angular velocity ω_2, producing the amount of power P_2. Thus, the magnetic field of the stator (7) accumulated from the counter-rotating rotations of the wind rotors (5) and (8) will rotate with the total angular velocity $\omega_\Sigma=\omega_1+\omega_2$. The value of the angle of attack deviation $\pm\Delta\alpha$ will be chosen provided that $P_1= P_2$.

MD.11.

Title **PRECESSIONAL PLANETARY TRANSMISSION WITH AXIAL FLOATATION OF THE SATELLITE WHEEL AND PORTSATELLITE**

Authors Viorel BOSTAN; Ion BOSTAN; Sergiu MAZURU; Maxim VACULENCO; Ion BODNARIUC; Radu CIOBANU; Oleg CIOBANU; Dumitru VENGHER.

Institution **Technical University of Moldova**

Patent no. Patent nr. 4911 of 2025.07.31, AGEPI.

Description

The invention relates to machine construction, namely to precessional planetary transmissions.

Precessional planetary transmission, which contains a housing (1) with a flange (2), in which are placed a satellite wheel (4) with two conical crown gears (6, 7), a driving shaft with a crank (12), installed on bearings (13), a driven shaft (14), installed on bearings (15), and two central conical gears, fixed (3) and movable (5), which interact with the satellite wheel (4) by means of the crown gears (6, 7); the satellite wheel (4) is rigidly mounted on a satellite carrier (8), placed on a spherical support (9), located on the driven shaft (14) with the possibility of axial movement, in the center of precession O thereof, coaxial with the movable wheel (5); the satellite wheel (4) is equipped with a half-shaft (10), at the end of which bearings (11) are mounted, kinematically connected to the driving shaft with a crank (12); in the driving shaft with a crank (12), on the side, an inner cylindrical surface is made inclined at a nutation angle θ to the axis of the central wheels (3, 5), in which the half-shaft (10) of the satellite wheel (4) is installed with the possibility of axial movement, so that the satellite wheel (4) together with the satellite carrier (8) floats axially with a positioning with clearances between the central wheels (3, 5) with the center of mass merged with the center of precession O.

The technical project is developed and the industrial prototype is experimentally researched.

MD.12.

Title	**PRECESSIONAL PLANETARY TRANSMISSION WITH BALANCING OF UNBALANCED DRIVE SHAFT MASSES**
Authors	Viorel BOSTAN; Ion BOSTAN; Sergiu MAZURU; Maxim VACULENCO; Stanislav LEALIN; Ion BODNARIUC; Alina BREGNOVA; Radu CIOBANU; Oleg CIOBANU.
Institution	**Technical University of Moldova**
Patent no.	Patent nr. 4910 of 2025.07.31, AGEPI.
Description	The invention relates to machine construction, namely to precessional planetary transmissions. The precessional planetary transmission comprises a housing (1) with a flange (2), in which are located a satellite wheel (4) with two bevel gear crowns (6, 7), a driving shaft (9) with a crank (12), installed on bearings (13), a driven shaft (14), installed on bearings (15), and two central bevel gears, fixed (3) and movable (5), which interact with the satellite wheel (4) by means of the gear crowns (6, 7); the satellite wheel (4) is mounted on a spherical support (8), located on the driven shaft (14), in its precession center O, coaxial with the movable wheel (5); the satellite wheel (4) is equipped with a half-shaft (10), at the end of which bearings (11) are mounted, kinematically connected to the driving shaft (9) with a crank (12); in the crank (12), on the side, an inner cylindrical surface is made inclined at a nutation angle θ to the axis of the central wheels (3, 5), in which the half-shaft (10) of the satellite wheel (4) is installed, the axis of which passes through the precession center O, at the same time in the crank (12) axial conical holes are made for balancing the unbalanced masses of the driving shaft (9) with a crank (12). The technical project is developed and the industrial prototype is experimentally researched.

Moldova State University

MD.13.

Title	**1-(2-TERT-BUTYL-2-HYDROXY-7-PHENYL-2H-CHROMEN-3-YL)-4-(2-OXO-2-PTOLYLETHYL)-1H-1,2,4-TRIAZOL-4-YL BROMIDE THAT MANIFESTS ANTIFUNGAL PROPERTIES AGAINST *Fusarium culmorum***
Authors	**Fliur MACAEV, Galina LUPASCU, Eugenia STANGACI, Marina ZVEAGHINTEVA, Natalia SUCMAN, Lucian LUPASCU, Svetlana GAVZER, Nicolae CRISTEA**
Institution	**State University of Moldova, Institute of Chemistry; Institute of Genetics, Physiology and Plant Protection**
Patent no.	**MD 4929/2026.02.28**
Description	The invention relates to chemistry and agriculture, in particular to a 1,2,4-triazole derivative which exhibits antifungal properties against *Fusarium culmorum*. The essence of the invention is that a new compound from the class of 1,2,4 triazoles is claimed: 1 -(2-tert-butyl-2-hydroxy-7-phenyl-2H-chromen-3-yl)-4-(2-oxo-2-p-tolylethyl)-1 H-1,2,4-triazol-4-yl bromide (3) which exhibits antifungal activity against the fungus *Fusarium culmorum*. Active concentrations vary in the range of 0.0025…0.02%. The advantage of the invention consist in the accessibility of the claimed compound and the pronounced fungitoxic activity. The technical result consists in the increasing of the fungitoxic activity of the compound from the invention in relation to the closest prior art by 23.1…1.3% for the strain 5 and by 56.2…26.2% for the strain 19 of the fungus *Fusarium culmorum* in the last days of the fungus cultivation, in the concentration range of 0.0025…0.02%, respectively.

MD.14.

Title	**METHOD FOR INCREASING THE ION EXCHANGE CAPACITY OF PECTINS THROUGH OXIDATION**
Authors	**Oleg PETUHOV, Nina BOLDURESCU, Nina ȚÎMBALIUC, Raisa NASTAS, Irina CEBAN, Tudor LUPAŞCU**
Institution	**Institute of Chemistry of Moldova State University**
Patent no.	**MD a 2025 0022/2025.05.05**
Description	The invention relates to a process for increasing the ion exchange capacity of pectins, which can be used in medicine as enterosorbents for the removal of radioactive metal ions and heavy metals.

The essence of the invention consists in that the pectines are oxidized with ammonium persulphate. The technical result of the invention consists in a significant increase in the cation exchange capacity (CEC) of pectins oxidized with $(NH_4)_2S_2O_8$, which is approximately six times higher than that of pectins oxidized with the O_3+H_2O_2 system and about seventeen times higher than that of the initial (non-oxidized) pectins.
The oxidation of pectins is accompanied by partial degradation of their macromolecular structure, resulting in the formation of lower-molecular-weight polymeric products enriched with additional acidic functional groups. Consequently, oxidation with ammonium persulfate enhances the ion-exchange capacity of pectins.

MD.15.

Title **NEW COPPER(II) COMPOUNDS AS INHIBITORS OF CANCER CELLS PROLIFERATION**

Authors **Aurelian GULEA, Victor ȚAPCOV, Olga GARBUZ, Roman RUSNAC, Aliona PÎNTEA**

Institution **Moldova State University**

Patent no. **MD 4948/2026.01.31**

Description

The present invention consists in obtaining new coordination compounds that possess properties of inhibiting the proliferation of cancer cells.

Synthesis and structural characterization of {N-[(2-methoxyphenyl)-2-(pyridin-2-yl-methylidene)hydrazine-1-carbothioamido)]}copper(II) nitrates (compound I) and {N-[(4-methoxyphenyl)-2-(pyridin-2-yl-methylidene)hydrazine-1-carbothioamido)]}copper(II) (compound II) as proliferation inhibitors of a cell lines: BxPC-3 -pancreatic cancer, RD - human muscle rhabdomyosarcoma, HeLa - cervical cancer, HL-60 - human myeloid leukemia, LNCaP - human prostate carcinoma cancer, MCF-7 - breast carcinoma cancer, HepG-2 - human liver hepatocellular carcinoma cancer, K-562 - human bone marrow chronic myeloid leukemia cell line.
The invention consists of the establishment of anticancer activity of compounds I and II, which exceeds the cisplatin activity by 17 - 2.7 times and exceeds the analogous characteristics of the structural analogue by 30 - 1.1 times. State of development: design, prototype.

MD.16.

Title **NOVEL AUTOCHTHONOUS METAL-BASED INHIBITORS OF CANCER CELL PROLIFERATION:**

SYNTHESIS, BIOLOGICAL EVALUATION AND MECHANISMS OF ACTION

Authors **Excellence Enhancement in Research Program (2024–2025)**
Institution **Aurelian GULEA, Victor ȚAPCOV, Olga GARBUZ**
MOLDOVA STATE UNIVERSITY
Institute of Chemistry, Institute of Zoology

Patent no. **24.80012.8007.01SE**

Description

This project focuses on the design, synthesis, and biological evaluation of novel metal-based molecular inhibitors of cancer cell proliferation, based on coordination compounds of 3d transition metals (Cu, Ni, Co) with thiosemicarbazone ligands derived from autochthonous resources. The main objective is to develop new anticancer agents with high antiproliferative activity, increased selectivity toward tumor cells, and reduced toxicity compared to conventional chemotherapeutic drugs such as doxorubicin and cisplatin.

The synthesized compounds are characterized using advanced physicochemical methods and evaluated on multiple cancer cell lines, while selectivity is assessed using normal cells. The most active compounds demonstrate significant biological activity at micro- and nanomolar concentrations, with high selectivity indices. The proposed mechanisms of action involve oxidative stress induction, interaction with cellular targets, and activation of apoptosis pathways.

The results of this project have strong potential applications in oncology and pharmaceutical research, particularly for the development of safer and more effective anticancer drugs. The compounds may serve as promising candidates for preclinical and clinical studies, as well as for personalized medicine and combination therapies.

Additionally, the project contributes to drug discovery and the advancement of medicinal and bioinorganic chemistry, providing new insights into structure–activity relationships. The use of local (autochthonous) resources supports sustainable and cost-effective pharmaceutical development, enhancing the innovation capacity and competitiveness of regional research.

The authors acknowledge the participation in subprograms 010602 and 010701 of Moldova State University.

MD.17.

Title **NEW MOLECULAR INHIBITORS OF HUMAN HEPATOCELLULAR CARCINOMA HepG2 CELLS**

Authors **Aurelian GULEA, Victor ȚAPCOV, Olga GARBUZ, Dorin**

ISTRATI, Elena-Mihaela PAHONȚU, Donald POIRIER
Institution **MOLDOVA STATE UNIVERSITY**
Patent no. **MD 4899/2025.03.31; MD 4949/2026.01.31**

Description The invention relates to chemistry and medicine, namely to the biologically active thiocarbamides and copper(II) coordination compound with thiocarbamide ligand. They may find application in medicine for the prophylaxis and treatment of human liver cancer. The claimed compounds inhibit the proliferation of liver cancer HepG2 cells 4 - 14 times more effectively than the prototype. The discovered properties of these substances are of interest for medical practice for enhancement of the arsenal of inhibitors of liver cancer cells.

MD.18.

Title **NEW SYNTHETIC ANTIFUNGAL AGENT**

Authors **Aurelian GULEA, Ianina GRAUR, Vasilii GRAUR, Victor ȚAPCOV, Greta BĂLAN, Carolina LOZAN-TÎRŞU**
Institution **MOLDOVA STATE UNIVERSITY**
Patent no. **MD 4936/2025.09.30**

Description The invention relates to chemistry and medicine, namely to the biologically active synthetic compound of the thiocarbamide derivative. The described compound possesses fungiostatic and fungicidal activity within the limits of concentrations 0.008-0.031 μg/mL against fungi of the species Candida albicans, which exceeds 23-87 times the activity of the prototype. The present invention expands the arsenal of fungal inhibitors of the Candida albicans species with high antifungal activity.

MD.19.

Title **POLYMORPHIC 1D COORDINATION POLYMERS OF Cd(II) WITH PHOTOLUMINESCENT PROPERTIES**

Authors **Olga DANILESCU, Ion BULHAC, Pavlina BOUROSH, Olga KULIKOVA, Yurii CHUMAKOV**
Institution **Moldova State University, Institute of Chemistry, Institute of Applied Physics, Chisinau, Republic of Moldova**
Patent no. **MD a 2025 0028/30.05.2025**

Description The invention relates to coordination chemistry, in particular to the synthesis of two new one-dimensional coordination polymers of cadmium(II) *N,N′* - bis(picolinoyl)hydrazine-cadmium(II) hemihydrate with the formula $\{[Cd(L)]\cdot 0.5H_2O\}_n$ (**1**) and *N,N′* - bis(picolinoyl)hydrazine-cadmium(II) monohydrate with the formula $\{[Cd(L)]\cdot H_2O\}_n$ (**2**), H_2L = *N,N′*-bis(picolinoyl)hydrazine, with have the photoluminescence properties. The claimed complexes exhibit photoluminescent

activity with a significantly higher emission intensity, than the free ligand (H_2L). It was established by evaluating the effect of the flourescent emission in the range 450-550 nm which can be observed even with the naked eye. The results of the photoluminescence study demonstrated that the claimed polymorphs emit yellow-green fluorescence, with a maximum at 2.5 eV (500 nm) for **1** and 2.4 eV (520 nm) for **2**, respectively. PL is suitable for the production of applicable materials, such as screens and display devices, as the yellow-green region is the most comfortable and optimal for the human eye and allows for better visual perception.

MD.20.

Title **THE COMPOUND (N',N''E)-N',N''-[1,4-PHENYLENE-BIS(METANYLIDENE PICOLINHYDRAZIDE)] WITH ANTIFUNGAL AND ANTIBACTERIAL PROPERTIES**

Authors **Olga DANILESCU, Ion BULHAC, Pavlina BOUROSH, Maria COCU, Alexandru CIOCARLAN, Nicoleta VORNICU**

Institution **Moldova State University, Institute of Chemistry, Institute of Applied Physics, Chisinau, Republic of Moldova; Metropolitan Center of Research T.A.B.O.R, Iasi, Romania**

Patent no. **MD a 2025 0046/06.10.2025**

Description The invention relates to the fields of chemistry and medicine, specifically to the synthesis of a new azomethine compound obtained by the condensation of 1,4-dicarboxaldehydebenzene and 2-pyridincarbohydrazide, which exhibits antifungal and antibacterial properties. Biological testing results have demonstrated that (*N',N''E*)-*N',N''*-[1,4-phenylene-bis (metanylidenepicolinhydrazide)] exhibits remarkable antifungal and antibacterial properties with minimum inhibitory concentration (MIC, µg/mL) values of 0.032 and 0.028 µg/mL, respectively. These values indicate significantly higher activity compared to the reference compounds Caspofungin and Kanamycin. The obtained results demonstrate the high antimicrobial efficacy for the claimed compound.

MD.21.

Title Ti AND TiO_2 EPITAXIAL LAYERS FOR PHOTOVOLTAIC DEVICES

Authors Leonid GORCEAC, Vasile BOTNARIUC, Simion RAEVSCHI, Petru CHETRUS, Elena BERCU, Sergiu VATAVU

Institution Moldova State University, Republic of Moldova

Patent no.	MD 4772/2022.05.31; MD 1740Z/2024.08.31; MD 4924 C1/2025.12.31; MER subprogram 011207
Description	**The application of CVD (chemical vapor deposition) and HVPE (hydride vapor phase epitaxy) methods in separate flows of Ar and O2 and respectively H2 and HCl (gas) allowed the preparation of epitaxial layers of Ti for GaN ohmic contacts, epitaxial layers of TiO2 and ITO-TiO2-InP heterojunction for photovoltaic cells and photodetectors.**

MD.22.

Title	**SYNTHESIS OF PHOTOPOLYMER MATERIAL**
Authors	**Ștefan ROBU, Tamara POTLOG, Ion LUNGU, Ana POPUȘOI, Iacob GUȚU, Ion BULIMESTRU**
Institution	**Moldova State University**
Patent no.	**MD 4912/2025.08.31**
Description	This innovation presents a novel photoactive polymeric material obtained through the grafting of dextran with mono-(O-carboxybenzamidomethylene) zinc phthalocyanine (ZnPc), in a controlled composition ranging from 10 to 50 wt%. The developed system combines the excellent photophysical properties of ZnPc with the biocompatibility and water solubility of dextran, resulting in a highly dispersible and stable material in aqueous media. Compared to conventional photosensitizing systems, the proposed material is synthesized using accessible and cost-efficient reagents, offering a simplified preparation route without compromising performance. A key advantage of this material is its prolonged excited-state lifetime (exceeding 10^{-7} s), which significantly enhances its ability to generate reactive oxygen species under light irradiation. These characteristics make the material particularly suitable for applications in photodynamic therapy (PDT), where efficient singlet oxygen generation and biocompatibility are essential. Additionally, its improved solubility reduces aggregation effects typically observed in phthalocyanine-based systems, thereby maintaining high photodynamic efficiency. The proposed invention provides a promising alternative to existing photoactive materials by combining affordability, ease of synthesis, and enhanced functional performance. It opens new perspectives for biomedical applications, especially in targeted cancer therapy, as well as in other light-activated processes requiring efficient and stable photosensitizers.

MD.23.

Title	**UV-C DEVICE FOR STERILIZATION AND PURIFICATION OF AIR IN ENCLOSED SPACES**
Authors	**Ion MUNTEANU[1], Corneliu BIRTOK BANEASA[2,3]**
Institution	**[1] Moldova State University, Institute of Applied Physics, Quantum Optics and Kinetic Processes Laboratory;** **[2] CORNELIUGROUP Research-Innovation;** **[3] Politehnica University of Timisoara**
Patent no.	**MD s 2026 0029**
Description	This invention describes a compact air sterilization and purification device designed for enclosed spaces. It combines multi-stage treatment, including high-efficiency HEPA filtration, controlled multidirectional UV-C irradiation at 253.7 nm, and activated carbon post-filtration. The system ensures effective removal of particulate matter and inactivation of airborne pathogens such as viruses, bacteria, and fungi. Its innovative wavy reflective walls enhance uniform UV-C distribution, increasing disinfection efficiency while reducing exposure time. Engineered for safe, continuous operation in occupied environments, the device prevents UV leakage. It significantly improves indoor air quality, making it ideal for medical, educational, commercial, and residential applications.

MD.24.

Title	**DEVICE FOR CONTINUOUS AIR DISINFECTION WITH THE USE OF UV-C AND IR RADIATION**
Authors	**Ion MUNTEANU, Marina ȚURCAN, Nicolae ENACHI, Viorica TONU, Elena STARODUB, Serghei BÎZGAN and Tatiana PÎSLARI**
Institution	**Moldova State University, Institute of Applied Physics, Quantum Optics and Kinetic Processes Laboratory**
Patent no.	**MD s 2026 0022**
Description	The invention is a compact air disinfection device designed for continuous, safe operation in occupied indoor spaces such as hospitals, schools, and public buildings. It recirculates ambient air through a sealed housing where it undergoes mechanical filtration combined with high-efficiency UV-C ultraviolet irradiation and controlled pulsed infrared (IR) radiation. By optimizing radiation dispersion for broader and more uniform coverage, the device significantly reduces the required UV-C and IR exposure time while effectively neutralizing airborne fungi, bacteria, viruses, and suspended particles. The

system uses only physical methods, ensuring no harmful substances or radiation are emitted into the room, making it ideal for permanent use in populated environments.

MD.25.	
Title	**SUSTAINABLE ENVIRONMENT THROUGH DRONE EDUCATION**
Authors	**Marianna SAVVA, Alisa MOŞNEAGA, Anton DANICI, Sergiu PASCARI**
Institution	**Moldova State University, Institute of Applied Physics, Scientific Research Laboratory, Environmental Physics and Modeling Complex Systems**
Patent no.	**Young Researchers Project 2025–2026 (code 25.80012.0807.25TC)**
Description	The Sustainable Environment through Drone Education project integrates advanced UAV technologies with hands-on learning experiences, enabling both environmental monitoring and practical education in geospatial analysis and sustainability. The proposed solution is based on integrating Unmanned Aerial Vehicles (UAVs) equipped with advanced sensing technologies, such as LiDAR and high-resolution photogrammetric cameras, into environmental monitoring workflows. Within the Sustainable Environment through Drone Education project, UAV platforms are deployed to collect precise geospatial data over areas affected by mineral resource exploitation or environmental degradation. The acquired data are processed using specialized software (e.g., photogrammetry and point cloud analysis tools) to generate accurate digital terrain models (DTM), digital surface models (DSM), and orthomosaics. These products enable detailed analysis of terrain morphology, vegetation cover, and structural changes, supporting both environmental impact assessment and decision-making processes for land rehabilitation. Additionally, the solution incorporates an educational component, where students and trainees are actively involved in mission planning, data acquisition, and analysis. This approach enhances practical skills in drone technologies, geospatial analysis, and sustainability-oriented engineering. By combining technological innovation with education, the solution contributes to improving environmental monitoring efficiency, reducing operational costs, and fostering a new generation of specialists capable of addressing complex ecological challenges through UAV-based methodologies.

MD.26.	
Title	**SCALABLE COMPUTATIONAL FRAMEWORK FOR URBAN AIR POLLUTION MONITORING AND FORECASTING USING 4DEnVar DATA ASSIMILATION**
Authors	**Adrian PALADI and Veaceslav SPRINCEAN**
Institution	**Moldova State University, Institute of Applied Physics, Scientific Research Laboratory "Environmental Physics and Modeling Complex Systems"**
Patent no.	**Adeverința AGEPI Seria PC nr. 8398 din 20.01.2026**
Description	Integrated computational framework for air quality modeling, statistical analysis, and short-term forecasting based on four-dimensional ensemble-variational (4DEnVar) data assimilation and quasi-dynamic simulations of particulate matter concentrations. The system is implemented in a cost-effective, Python-based environment and integrates multiple components, including real-time data assimilation, quasi-dynamic modeling, ensemble-based data assimilation, statistical diagnostics, and forecast evaluation. Pearson correlation analysis is employed to quantify the coherence among PM fractions and their relationships with meteorological variables. Results reveal strong interdependence between PM1, PM2.5, and PM10, suggesting common emission sources. Model validation demonstrates improved forecasting performance, with reduced root mean square error (RMSE) and positive skill scores across all monitored indicators.

MD.27.	
Title	**INTEGRATION OF DJI MATRICE 350 RTK WITH GEOSPATIAL SOFTWARE FOR 3D MAPPING: A CASE STUDY OF THE NATIONAL BOTANICAL GARDEN (INSTITUTE) "Alexandru CIUBOTARU"**
Authors	**Veaceslav SPRINCEAN, Serghei PASCARI, Liviu DONTU, Ion ROȘCA, Florentin PALADI**
Institution	**Moldova State University, Institute of Applied Physics, Scientific Research Laboratory "Environmental Physics and Modeling Complex Systems"**
Patent no.	**011210 and NATO SPS G6140**
Description	Integration of UAV-based LiDAR and photogrammetry technologies provides an advanced framework for high-precision environmental monitoring and 3D mapping of the National Botanical Garden (Institute) "Alexandru Ciubotaru".

The solution employs the DJI Matrice 350 RTK platform equipped with LiDAR sensors and RGB imaging systems to acquire high-resolution spatial data under diverse environmental conditions. Data acquisition is supported by GNSS RTK positioning and inertial measurement systems, ensuring centimeter-level accuracy. The collected datasets are processed using specialized software, including DJI Terra for initial reconstruction, Agisoft Metashape for photogrammetric processing, and CloudCompare for point cloud filtering, classification, and analysis. This integrated workflow enables the generation of digital terrain models (DTM), digital surface models (DSM), canopy height models (CHM), orthomosaics, and detailed 3D representations of vegetation structure. The solution facilitates accurate assessment of vegetation distribution, structural parameters, and terrain morphology, enabling the detection of environmental changes and potential degradation processes. Repeated UAV surveys ensure temporal monitoring and comparative analysis. Additionally, the approach supports educational and research activities by providing practical experience in UAV operation, geospatial data processing, and environmental analysis. This integrated technological and educational framework contributes to sustainable environmental management, informed decision-making, and the development of innovative methodologies for ecosystem monitoring.

MD.28.

Title **CHRYSANTHEMUM INDICIUM L. "DOMNIȚA" - IS A NEW LOCAL VARIETY**

Authors **Ina VOINEAC, Ion ROȘCA, Vasile SLIVCA, Alexandru MÎRZA**

Institution **"Al. CIUBOTARU" National Botanical Garden (Institute) of Moldova State University/ Republic of Moldova**

Patent no. **MD 2024 0018/2024 08.19**

Description Variety Domnița was obtained in 2001, from the seeds (collection of 2000) of the variety Fuchsia Fairy from the group of small-flowered chrysanthemums with an average flowering period. The bush is 60-70 cm tall; the foliage is medium; the shoots are resistant to lodging. The leaves are rounded, large, shiny. Inflorescences are terry dark pink with a lilac tint, 4.5-6 cm in diameter. In full dissolution, the center (tubular flowers) is clearly visible, small, bright yellow with a slightly greenish tint. The variety belongs to the group of early flowering, it begins to bloom from the end of September and retains its

decorative effect from 36 to 52 days. It can be propagated vegetatively and annually by stem cuttings and by dividing the bush. Usually, the division of the bushes is carried out in the spring (May). The cuttings are taken from the stems in February-March, being planted on special parapets, in a substrate of perlite mixed with sand.

Drought - and frost-resistant, can be used for cutting, in mixborders and group plantings.

MD.29.

Title **EVALUATION OF THE STRUCTURAL DIVERSITY OF PLANT SPECIES IN THE ”PLAIUL FAGULUI” SCIENTIFIC RESERVE AND THEIR IMPACT ON FOREST CONSERVATION**

Authors **Tatiana SÎRBU, Pavel PÎNZARU, Petru CUZA, Gheorghe FLORENȚĂ**

Institution **“AL. CIUBOTARU” NATIONAL BOTANICAL GARDEN (INSTITUTE) OF MOLDOVA STATE UNIVERSITY/ REPUBLIC OF MOLDOVA**

Patent no. **25.80012.7007.23SE**

Description

Environmental changes and anthropogenic pressures affect the herbaceous layer, trees, and natural regeneration processes of forest ecosystems, making protected areas essential for the conservation of biological diversity. In this context, floristic and phytosociological surveys were conducted in the experimental plots of the ”Plaiul Fagului” Scientific Reserve, resulting in the identification of 148 vascular plant species, distributed across four life forms: trees (16), shrubs (16), lianas (2), and herbs (114). Among the recorded taxa, 17 are rare species with varying degrees of threat, and 10 are listed in the Red Book of the Republic of Moldova. Within the project, the presence of Lunaria annua L. was documented for the first time in the reserve, and Lunaria rediviva subsp. bassarabica Pînzaru was confirmed, clarifying its status in relation to previous floristic literature. Furthermore, 17 previously conducted relevés (2001–2007) were digitized and analyzed, allowing the detection of floristic changes over the last two decades. Simultaneously, α- and β-diversity were assessed using an integrated set of indices for diversity, evenness, dominance, and structural convergence. Species diversity was characterized using the Shannon-Wiener (H′) and Simpson (D) indices, while evenness and dominance were estimated with the Pielou (J′) and Berger-Parker (d) indices. Differences among communities were quantified using the Bray-Curtis index and its components

(turnover and nestedness), while structural convergence was evaluated using the ICF index. The results indicate that α-diversity ranges from low to moderate levels, suggesting a relatively balanced species abundance, whereas some microhabitats exhibit tendencies toward diversification and oligodominance. β-diversity reveals pronounced dissimilarity between communities, mainly driven by species turnover, with a smaller contribution of nestedness. The ICF index indicates moderate structural convergence, characteristic of mature stands in a relatively stable ecological equilibrium.

MD.30.

Title **BIOLOGICALLY ACTIVE DIETARY SUPPLEMENT WITH ADAPTOGENIC ACTIVITY**

Authors **Ion MEREUȚĂ, Vladimir CARAUȘ, Ion BALAN**

Institution **Moldova State University, Institute of Physiology and Sanocreatology**

Patent no. **1873 (13) Y/2025.08.31**

Description

The invention relates to a bioactive dietary supplement with adaptogenic activity, intended to support homeostasis and prevent physiological imbalances caused by stress, chronic fatigue, and metabolic disorders. The composition includes standardized dry extracts of medicinal plants recognized for their adaptogenic properties: ashwagandha (25%), Siberian ginseng (25%), Rhodiola rosea (25%), Ginkgo biloba (12.5%), and Schisandra chinensis (12.5%). This synergistic combination contributes to the regulation of nervous, cardiovascular, and metabolic functions.

Compared to known solutions, the product offers a much more pronounced adaptogenic effect due to the balanced selection of components and their optimal ratio. The biological activity of the supplement has been validated through clinical experimental studies that demonstrated significant improvements in physiological parameters, such as blood glucose, blood pH, blood pressure, oxygen level, and serum electrolytes.

The product is easy to prepare, being formulated as a powder encapsulated in 400 mg gelatin capsules. The recommended administration is 2 capsules per day for 3 months. Following testing on human subjects, a clear improvement in general condition, physiological performance, and the ability to adapt to stress was noted. The invention thus contributes to broadening the range of adaptogenic supplements, with wide applicability in functional nutrition and preventive medicine.

State of development: patented and currently being

implemented.

MD.31.	
Title	**MECHANISMS FOR REGULATING THE ORGANISM'S HOMEOSTASIS AND HEALTH AND THE ELABORATION OF PROCEDURES AND MEASURES TO MAINTAIN IT**
Authors	**Teodor FURDUI, Valentina CIOCHINA, Ion BALAN, Sergiu BALACCI, Lilia POLEACOVA, Galina OSIPCIUC, Roman CRETU, Vasile HAREA, Vladimir BUZAN**
Institution	**Moldova State University, Institute of Physiology and Sanocreatology**
Patent no.	**011001**
Description	The expected scientific results will not only assimilate the information from the contemporary scientific literature – the strong and weak parts – of the existing research in order to highlight the factors according to the components (genetics, way of life, environmental and social environment and medical care), which constitute the health phenomenon, but also, in particular, to identify those that deteriorate somato-vegetative health. The scientific researches carried out within the sub-program will be counted on: the elaboration of the scientific concept on the regulation of the body's homeostasis and somato-vegetative health; highlighting and describing the functional systems of regulation of homeostasis and the vital activity of the body in physical and mental inactivity, a vital activity of various modalities and in extreme conditions; highlighting and describing the biological processes that determine sanogenicity and dissanogenicity gametes; developed the concept and principles of regulating the body's homeostasis and determined the mechanisms for maintaining and strengthening somato-vegetative health. The components will be selected, their compatibility tested, the properties of biologically active compounds identified, the formula of the compositions will be developed and the serial production of three phytotherapeutic preparations with antihypertensive, antidiabetic and antidyslipidemic effects. As a result of scientific research, two methods, two procedures and an algorithm for maintaining and strengthening the somato-vegetative health of the body will be developed. The treatise "The scientific and practical bases of sanocreatology. Volume IV. Mechanisms of regulation of body and health homeostasis". State of development: Scientific product.

MD.32.

Title	**DIETARY SUPPLEMENT FOR THE PROPHYLAXIS OF HYPOGLYCEMIA AND FOR MAINTAINING IMMUNE STATUS IN DISORDERS OF CARBOHYDRATE METABOLISM IN RODENTS (*Rattus Norvegicus*)**
Authors	**Iurie BACALOV, Adriana DRUȚA, Elena CHIRIȚA, Aurelia CRIVOI**
Institution	**Moldova State University, Institute of Physiology and Sanocreatology Scientific Research Laboratory Human and Animal Ecophysiology**
Patent no.	**MD a 2025 0058/2025.12.17**
Description	The present invention is a dietary supplement with homeostatic action, which ensures greater efficiency in the prevention of hypothyroidism caused by carbohydrate metabolism disorders, both by maintaining blood glucose levels and by regulating the functional state of the thyroid, which is often affected in endocrine pathologies. Thus, it maintains interglandular balance; being purer, it does not contain toxic substances and helps prevent the onset and progression of complications characteristic of both pathologies, as well as disorders of other endocrine glands. The developed dietary supplement, as a bioactive substance, contains an infusion of Cucurbita maxima leaves, Hippophae rhamnoides, Cydonia oblonga, and the aerial parts of Equisetum arvense, Lavandula angustifolia, Anethum graveolens. Compared to other remedies, the proposed dietary supplement has a dual effect (hypoglycemic and thyreotropic), which prevents the onset and progression of complications in carbohydrate metabolism disorders, maintains blood sugar levels, and improves the functional state of the thyroid gland, which is often dysregulated in this endocrine pathology.

MD.33.

Title	**THE PROCESS FOR GROWING CYPRINIDS FISH AT THE EARLY ONTOGENESIS STAGE**
Authors	**Elena ZUBCOV, Natalia ZUBCOV, Laurentia UNGUREANU, Ion TODERAS**
Institution	**Moldova State University**
Patent no.	**MD 1877/2024.12.25**
Description	The invention relates to fish farming, namely to a process for growing cyprinids at the early ontogenesis stage. The process includes adding ammonium molybdate – (NH4)6Mo7O24·4H2O to water, in an amount that ensures a molybdenum concentration in water of 20 µg/L, while ammonium molybdate is added in spring-summer, during the

period of 7-21 days after hatching the larvae, for 15 days.
The problem solved by the present invention consists in developing a process that ensures the growth and obtaining viable and resistant cyprinid larvae and fry, thus increasing the efficiency of fish production. The technical result is achieved due to the stimulation of the development of larvae and fry in water treated with molybdenum additive, which ensures a 23-32% better viability and health compared to larvae grown in water without molybdenum addition, in the first 7-21 days after hatching. The development of fry in experimental larvae turned out to be more synchronized, and the biomass of one-year-old fry was 39-45% higher than in the control group. It is a simple, affordable and minimally expensive procedure useful for both small private households and complex enterprises, including those practicing fish reproduction on an industrial scale.

MD.34.

Title **METHOD FOR THE PROPHYLAXIS AND TREATMENT OF ENDOPARASITOSES IN DOMESTIC WATERFOWL**

Authors **Ştefan RUSU, Dumitru ERHAN, Maria ZAMORNEA, Ion TODERAŞ, Viorelia RUSU, Natalia MASCENCO, Victor MELNIC, Ion GOLOGAN**

Institution **MOLDOVA STATE UNIVERSITY**
INSTITUTE OF ZOOLOGY, Laboratory of Parasitology and Helminthology

Patent no. **MD 1827 (13) Y/2025.08.22**

Description The invention can be used for the prophylaxis and treatment of endoparasitoses in domestic waterfowl (such as ducks and geese), both in small-scale households and in specialized poultry farms, providing an ecological solution that is safe for humans, animals, and the environment. The invention relates to veterinary medicine, in particular to parasitology, and specifically to a method for the prophylaxis and treatment of endoparasitoses in domestic waterfowl (ducks and geese). According to the invention, the method involves the oral administration, as drinking water, of the preparation Endopalmivet — an aqueous solution containing a 30% extract from the aerial parts of Tansy (Tanacetum vulgare). For prophylaxis, the administration is carried out in a single dose, while for treatment — in two doses at an interval of 14 days. The effectiveness of the procedure lies in achieving a maximum therapeutic effect, as evidenced by a 90% recovery rate in the

treated birds. Due to the use of a natural extract, there are no restrictions on the consumption of products and by-products derived from the treated birds, making the procedure safe for animals, the environment, and humans.

MD.35.

Title	**"INDIGO" - INTERSPECIFIC RHIZOGENIC SEEDLESS GRAPEVINE GENOTYPE (V. vinifera L. x M. rotundifolia Michx.)**
Authors	**Eugeniu ALEXANDROV**
Institution	**Institute of Genetics, Physiology and Plant Protection of the Moldova State University**
Patent no.	**v 2025 0019/2025.11.11**
Description	Interspecific rhizogenic seedless grapevine genotype. Shoots exhibit relatively strong growth vigor, with a dominant reddish-brown coloration at maturity. Bunches are small to medium-sized, uniaxial, single-winged, and loose. Ripening period – medium. Berries are small, slightly flattened, covered with a waxy bloom, uniformly blue-violet in color, and seedless. Bunch weight – 200 - 250 g. Total sugar content – 24%. Fertility coefficient: - absolute – 1.3–1.4; - relative – 0.9–1.0. Productivity index: - absolute – 0.28–0.35; - relative – 0.25–0.32. Plant productivity, depending on cultivation technology, ranges from 5 to 7 kg per vine, with a potential yield of 7–10 t/ha.

MD.36.

Title	**A MULTIMODAL APPROACH FOR SEMANTIC AUGMENTATION OF CULTURAL IDIOMS USING AI AND AR**
Authors	**Inga TITCHIEV, Olesea CAFTANATOV, Dan DANCUȚA, Daniela CAGANOVSCHI, Arcadie FRON**
Institution	**Vladimir Andrunachievici Institute of Mathematics and Computer Science, Moldova State University**
Patent no.	**25.80012.5007.79SE**
Description	This innovation proposes a multimodal framework designed for the semantic augmentation and digital preservation of cultural heritage, specifically focusing on native idiomatic expressions. Recognizing that idioms are non-compositional linguistic units whose meanings cannot be deduced literally, this approach addresses the challenge they pose for natural language understanding and cross-cultural communication. The methodology employs a cross-modal pipeline that bridges

linguistic analysis with visual representation. Initially, Large Language Models (LLMs) like ChatGPT and DeepSeek are used to extract and decode figurative meanings from digitized Bessarabian idioms. Research findings indicate that ChatGPT achieves an 81% accuracy rate in articulating these complex figurative nuances. These semantic explanations are then transformed into prompts for multimodal generative AI systems, which create visual metaphors intended to illustrate the abstract essence of the idioms. The final implementation is a marker-based Augmented Reality (AR) mobile application. By scanning physical "idiom cards," users trigger an immersive environment where AI-generated visual and textual layers are overlaid in real-time. This system facilitates deep language learning and digital literacy by providing interactive, multilingual support (including English, Russian, and Spanish equivalents), thus ensuring that the deep cultural values and folk wisdom of a community are accessible to a global audience. The proposed approach connects textual semantic recognition with creative visual generation to capture non-literal meanings, leverages high-performing LLMs for accurate figurative breakdown of cultural metaphors, and uses AR to transform passive learning into an engaging, multisensory experience, promoting inclusivity and cultural empathy.

This research has been supported by the project 25.80012.5007.79SE ”Expressing cultural identity through the digital transformation of native idiomatic expressions using AR and AI technologies with implementation in education.”

MD.36.a

Title **THE NEW VARIETY *‘MIHAI’* OF JERUSALEM ARTICHOKE, *HELIANTHUS TUBEROSUS* L.**

Authors Victor ŢÎŢEI

Institution Moldova State University, “Alexandru Ciubotaru” National Botanical Garden (Institute)

Patent no. MD 0024/2024.

Description The new variety ‘*MIHAI*’of Jerusalem artichoke, *Helianthus tuberosus* L., family *Asteraceae* has been created by individual breeding of local forms and introduced taxa. The phytomass (aerial parts) productivity 68-70 t/ha fresh mass or 18-24 t/ha dry matter. The phytomass can be used as forage for farm animals (chopped fresh mass, silage, vitaminized flour) and as

substrates in biogas reactors and feedstock for biorafenary. The biochemical composition and nutritive value of harvested phyto mass: 184-240 g/kg dry mattter with 9.9-12.1 % ash, 10.8-13.5 % crude protein, 5.0-5.5 % acid detergent lignin, 28.2-32.0% cellulose, 12.2-14.5% hemicellulose, 595-629g/kg digestible dry matter, 9.67-10.18 MJ/kg metabolizable energy, 5.69-6.21 MJ/kg net energy for lactation, relative feed value RFV=106-122. The prepared silage had agreeable specific smell and quality indices, pH= 4.07, 12.36 % CP, 31.83 % CF, 2.24% EE, 39.22% NFE, 0.21% sugars, 1.47% starch, 14.34% ash, 1.24 % Ca, 0.29% P. may be use as alternative ensiled forage. The fresh and ensiled mass substrates in biogas reactor for anaerobic digestion, have optimal C/N ratio, amount of acid detergent lignin and hemicellulose, biomethane potential achieved 300 l/kg ODM. The tubers contain 237g/kg dry matter with 5.5 % ash 9.9 % CP, 54.00% inulin and other carbohydrates, eligible for feed, forage and feedstock for the pharmaceutical and food industry. The dry stalks mass had 2.1% ash content and 18.5 MJ/kg gross energy value. The ethanol potential of substrates from dry stalks -565 l/t. Financially supported- subprogram no. 01.01.02

MD.36.b

Title **THE INNOVATIVE TECHNOLOGY FOR CREATION INDUSTRIAL BIOMASS ENERGY PLANTATIONS**

Authors Victor ȚÎȚEI

Institution Moldova State University , “Alexandru Ciubotaru” National Botanical Garden (Institute)

Patent no. MD 348; MD 402; MD 478.

Description The local varieties of new crops created in the National Botanical Garden (Institute) of Moldova State University and registered in the Catalogue of Plant Varieties and patented by the State Agency on Intellectual Property (AGEPI) of the Republic of Moldova: *‘MARIA’ of* Jerusalem artichoke*, Helianthus tuberosus (* patent MD 402 and variety no. 0734840*); ‘TITAN’* of giant miscanthus*, Miscanthus × giganteus (*MD 348 and no. 0394505) and *‘MIHAELA’* of plume poppy *Macleaya cordata* (MD 478 and no.0745066), are intended for the foundation of biomass energy plantations and the restoration of degraded, eroded and polluted lands that cannot be profitably cultivated with traditional crops. The local varieties *‘MARIA’* and *‘TITAN’* achieved annual productivity 60-100 t/ha of green mass with biomethane potential 260-355 l/kg organic dry matter or estimated biomethane production varied from 4100 to 7000 m^3/ha/ year. The yield of stem biomass harvested in winter period of varieties *‘MARIA’,*

'MIHAELA' and *'TITAN'* varied from 13.0 to 28.0 t/ha dry matter with gross calorific value 18.8-19.9 MJ/kg and 1.5-2.5% ash content, can be processed into solid biofuels (bales, biomass chips, pellets and briquettes), as well as utilized as a substrate to obtain cellulosic ethanol with a potential of 533-610 l/t organic matter. The implementation of these innovative technology will ensure the production of energy biomass for obtaining different types of biofuels, reducing illegal logging and preserving forests, creating new job opportunities in the rural area and ensuring the country's energy security

Financially supported- subprogram no. 01.01.02

Institute of Mathematics and Computer Science „Vladimir Andrunachievici", State University of Moldova

MD.37.	
Title	**Guguță AI – AI-Powered Educational Platform for Primary and Secondary Education**
Authors	Tudor BUMBU, Olesea CAFTANATOV, Alexandr PARAHONCO, Marius CERESCU, Nichita DEGTEARIOV, Dan BUMBU, Ion BOSTAN, Iurie CIALA
Institution	**Institute of Mathematics and Computer Science „Vladimir Andrunachievici", State University of Moldova, Chisinau, Republic of Moldova**
Patent no.	State Register code 25.80012.0807.21TC
Description	Guguță AI is an AI-powered educational platform that combines Large Language Models with Retrieval-Augmented Generation (LLM-RAG), speech technologies and multimodal resources for primary and lower-secondary education. The platform adopts a notebook-centered structure where each notebook aggregates curricular resources such as school textbooks, teachers' notes, pupils' homework, audio/video lessons and complementary materials organized for a specific grade or subject. An intelligent agent operates over these curated resources to support pupils through conversational interaction, answering questions, explaining concepts, and generating adaptive learning materials such as quizzes and flashcards. A defining innovation is the voice-first interface for children in the Republic of Moldova. To enable robust speech-to-speech dialogue, a dedicated corpus of over 330 hours of Romanian speech data has been constructed, including 130 hours of professionally recorded studio audio and over 200 hours of transcribed material from educational media. The platform runs on GPU-based on-premise infrastructure powered by NVIDIA Tesla T4, with over 300 verified educational resources prepared for integration. A comprehensive security and GDPR module ensures the agent remains strictly focused on approved educational content. **Applications:** Adaptive AI-assisted learning for primary and lower-secondary schools; voice-enabled educational assistants in Romanian/Moldovan; speech corpus development for under-resourced languages; GDPR-compliant AI platforms for minors.

Nicolae Testemitanu State University of Medicine and Pharmacy of the Republic of Moldova

MD.38.	
Title	**Intelligent Predictive Analysis for Optimizing Orthodontic Correction Expansion Using Orthodontic Archwires**
Authors	Mihaela Jarovlea-Bejenari, Oleg Solomon, Oleg Arnaut, Earar Kamel
Institution	**Nicolae Testemițanu State University of Medicine and Pharmacy, Faculty of Dentistry**
Patent no.	-
Description	A statistically significant association was identified between maxillary space deficiency (ISMS) and treatment duration ($p = 0.004$), indicating that case severity directly influences treatment dynamics. Cephalometric parameters showed relevant structural interdependencies, particularly between IMPAI and AoBo and between FMAI and POI. The predictive regression model demonstrated moderate explanatory power, accounting for 62.3% of treatment duration variability ($R^2 = 0.623$). Comparative analysis revealed that the alternative orthodontic method significantly reduced treatment duration, with a median of 19 months versus 30 months for the conventional approach ($p < 0.001$), corresponding to an adjusted reduction of approximately 8.7 months. The integration of anthropometric and cephalometric parameters into an intelligent predictive analytical framework improves the estimation of orthodontic treatment duration and enhances treatment planning. The proposed approach demonstrates significant clinical value by increasing treatment predictability and reducing therapy duration. These findings support the application of predictive analytics as an innovative tool for optimizing orthodontic correction strategies.

MD.39.	
Title	In vivo recellularization of lymph node extracellular matrix for the treatment of secondary lymphedema: an experimental study
Authors	STOIAN Alina, JIAN Mariana, COBZAC Vitalie, NACU Ana-Maria, HÎNCOTA Dumitru, GLOBA Tatiana, BABUCI Angela, VEREGA Grigore, NACU Viorel
Institution	Nicolae Testemitanu State University of Medicine and Pharmacy
Patent no.	Project no. 25.80012.8007.03TC
Description	This study focuses on regenerative medicine, targeting lymphatic tissue engineering to revolutionize the treatment of secondary lymphedema—a chronic and progressive disease affecting millions of people worldwide. The main objective of the research is the development of vascularized lymph node allografts, with potential application in the effective treatment of secondary lymphedema. The working hypothesis is based on stimulating lymphangiogenesis by providing structural and molecular support for lymphatic cells, as well as through the release of specific growth factors such as VEGF-C.The research included the development of methods for the decellularization and recellularization of lymph nodes, both vascularized and non-vascularized, using small and large animal models. Within the project, protocols for decellularization and preconditioning were established, and the lymph nodes were prepared as extracellular matrix (ECM) scaffolds for in vivo recellularization. The recellularization stage involves initial transplantation in a small animal model, followed by testing in a large animal model. This research is carried out within the framework of the project with code 25.80012.8007.03TC, supported by NARD.

MD.40.	
Title	Method for obtaining collagen-based hydrogels from placenta
Authors	COBZAC Vitalie, JIAN Mariana, STOIAN Alina, COJOCARI Ștefan, NACU Ana-Maria, SAMSON Stella, NACU Viorel
Institution	Nicolae Testemitanu State University of Medicine and Pharmacy

Patent no.	Innovation No. 6424/24.11.2025
Description	The method for obtaining the hydrogels consists of combining an acidic suspension of human placenta-derived collagen with physiological media suitable for cell culture, followed by the incorporation of zinc oxide (ZnO) nanoparticles with dimensions < 50 nm. The formulation parameters were adjusted to allow control of the collagen polymerization process under conditions compatible with cell viability. The protocol was designed to minimize osmotic stress during gelation and to ensure homogeneous dispersion of ZnO nanoparticles within the collagen matrix. In addition, the system allows the incorporation of cells with chondrogenic potential, ensuring their uniform distribution within the three-dimensional scaffold. The results demonstrated the formation of bioactive allogeneic collagen-based hydrogels with improved mechanical stability. The formed three-dimensional network maintained a microenvironment favorable for cell viability, particularly at ZnO concentrations of 1–10 µg/ml. At these concentrations, the nanoparticles also contributed to the enhancement of the mechanical properties of the hydrogel.

MD.41.

Title	**Combined minimally invasive treatment method for esophagogastric varices in patients with decompensated liver cirrhosis**
Authors	ANGHELICI Gheorghe, MD; SAVIN Oleg, MD; PISARENCO Serghei, MD; CRUDU Oleg, MD; CEBAN Marina, MD; ZUGRAV Tatiana, MD
Institution	**STATE UNIVERSITY OF MEDICINE AND PHARMACY "NICOLAE TESTEMIȚANU" OF THE REPUBLIC OF MOLDOVA, MD**
Patent no.	Patent application No. **MD 1882 Z 2026.01.31**
Description	The invention relates to a combined minimally invasive procedure for the treatment of esophageal-gastric varices in patients with decompensated liver cirrhosis, a pathology associated with a high risk of severe digestive bleeding and high mortality. The proposed method integrates laparoscopic and endoscopic techniques, aiming to achieve effective hemostasis and prevent hemorrhagic relapses. The intervention is performed under general anesthesia and

initially involves a laparoscopic approach with evacuation of ascitic fluid, inspection of the abdominal cavity and removal of fibrin adhesions. Subsequently, azygo-portal disconnection is performed by vascular sealing of the veins from the greater curvature of the stomach and the gastric fundus to the esophagus, using high-frequency alternating current (470 kHz), with controlled parameters of voltage, intensity and power.

The endoscopic stage consists of injecting a bicomponent fibrin adhesive into the esophageal and gastric fundus varices, both in the retrograde and anterograde directions. The adhesive consists of fibrinogen and a mixture of thrombin, 10% albumin, aprotinin and calcium chloride, administered separately and mixed in situ, which determines the rapid formation of a stable fibrin clot, adherent to the vascular wall.

The results of the method highlight the achievement of effective hemostasis, the reduction of intraoperative blood loss, the decrease in the duration of the intervention and the sedation time. The procedure contributes to the prevention of recurrent variceal hemorrhages and hepatic encephalopathy, being well tolerated by patients with severely compromised liver function. It also favors the formation of extraluminal collaterals, with a long-term protective role.

MD.42.

Title

MOSAIC-MM: RELIABLE INTELLIGENT PREDICTIVE AND DECISION-MAKING ANALYSIS MODEL IN THE ORTHOPAEDIC TREATMENT OF BONE COMPLICATIONS IN MULTIPLE MYELOMA

Authors **OLARU Andrei, BURUIANĂ Gheorghe**

Institution **THE INSTITUTE OF ONCOLOGY, IP State University of Medicine & Pharmacy"NICOLAE TESTEMIȚANU" oF the Republic of Moldova**

Patent no. AGEPI MD Certificat SAIP seria OȘ Nr. 8396 din 20.01.2026

Description The, MOSAIC-MM model, provides a structured approach that can be integrated into clinical practice and evaluated in future studies. For clinical research, prospective studies could be initiated in which patients with myeloma and bone disease are stratified according to MOSAIC-MM (score or

categories) and then the results are compared: for example, surgical decision rate, functional outcomes, quality of life and survival at different scores. This would validate the usefulness of the model in predicting who truly benefits from surgery. A nomogram (similar to the one recently developed for post-surgical prognosis) could be developed that, based on the values of each domain, would provide the probability of a favorable outcome. Such a nomogram would quantify the indications more precisely: for example, if a patient has a high score in Mechanical and Anatomical, but a poor score in Systemic and Oncological, the model could indicate limited benefit – the nomogram would give a low probability of 1-year survival with surgery, so something else would be chosen.

In everyday clinical practice, the MOSAIC-MM algorithm encourages clinicians to systematically document each of the 6 domains for patients with MM and bone lesions. Thus, the final decision becomes a multidimensionally reasoned one (e.g.: "We indicated prophylactic femoral fixation because: Mechanical - Mirels 9, Anatomical - lesion in the femoral diaphysis, Oncological & Systemic favorable, Imaging - focal lesion, CRP normal, and support is optimal.").

MD.43.

Title **The concept "MOSAIC-MM" integrated with the XGBoost algorithm for predicting postoperative outcomes in patients with multiple myeloma and associated bone disease**

Authors **OLARU Andrei, BURUIANĂ Gheorghe**

Institution **THE INSTITUTE OF ONCOLOGY, IP State University of Medicine & Pharmacy"NICOLAE TESTEMIȚANU" oF the Republic of Moldova**

Patent no. AGEPI MD Certificat SAIP seria OȘ Nr. 8397 din 20.01.2026

Description Multiple myeloma (MM) is a systemic plasma cell neoplasm that frequently causes extensive osteolytic bone lesions and severe osteopenia. The skeletal complications of MM (pathological fractures, intense pain, neurological compressions) affect ~80% of patients and significantly decrease quality of life..").

The MOSAIC-MM (Mechanical–Oncological–Systemic–Anatomical–Imaging & Inflammation–Comprehensive

Support) conceptual framework proposes a holistic approach to the evaluation of patients with MM and associated bone disease. Its components include mechanical factors (M), such as bone microarchitecture and fragility; oncological factors (O), such as disease extent and prognostic markers; systemic factors (S), such as general performance and renal function; anatomical factors (A), such as fracture location; imaging and inflammation (I), including advanced imaging (CT, MRI, PET) and inflammatory markers (e.g. CRP, IL-6); and comprehensive support (C), such as supportive therapy (bisphosphonates, radiotherapy, rehabilitation).
XGBoost model configuration: We will use XGBoost in classification mode (XGBClassifier) to predict a binary outcome (e.g. survival over a given period vs. deaths). The main hyperparameters include: learning rate (learning_rate), number of trees (n_estimators), maximum depth of trees (max_depth), data truncation fraction (subsample), feature fraction (colsample_bytree), L1/L2 regularization, etc. An initial set of parameters can be adjusted by systematic search (GridSearchCV) or Bayesian optimization. For example, a commonly used starting point is learning_rate=0.1, n_estimators=100, max_depth=3-6, and subsample=0.8.

MD.44.

Title	**Combined minimally invasive treatment method for esophagogastric varices in patients with decompensated liver cirrhosis**
Authors	**ANGHELICI Gheorghe, SAVIN Oleg, PISARENCO Serghei, CRUDU Oleg, CEBAN Marina, ZUGRAV Tatiana**
Institution	**Nicolae Testemiţanu State University of Medicine and Pharmacy of the Republic of Moldova**
Patent no.	MD 1882 Z, BOPI 01/2026
Description	The invention relates to a combined minimally invasive procedure for the treatment of esophageal-gastric varices in patients with decompensated liver cirrhosis, a pathology associated with a high risk of severe digestive bleeding and high mortality. The proposed method integrates laparoscopic and endoscopic techniques, aiming to achieve effective hemostasis and prevent hemorrhagic relapses. The intervention is performed under general anesthesia and

initially involves a laparoscopic approach with evacuation of ascitic fluid, inspection of the abdominal cavity and removal of fibrin adhesions. Subsequently, azygo-portal disconnection is performed by vascular sealing of the veins from the greater curvature of the stomach and the gastric fundus to the esophagus, using high-frequency alternating current (470 kHz), with controlled parameters of voltage, intensity and power.

The endoscopic stage consists of injecting a bicomponent fibrin adhesive into the esophageal and gastric fundus varices, both in the retrograde and anterograde directions. The adhesive consists of fibrinogen and a mixture of thrombin, 10% albumin, aprotinin and calcium chloride, administered separately and mixed in situ, which determines the rapid formation of a stable fibrin clot, adherent to the vascular wall.

The results of the method highlight the achievement of effective hemostasis, the reduction of intraoperative blood loss, the decrease in the duration of the intervention and the sedation time. The procedure contributes to the prevention of recurrent variceal hemorrhages and hepatic encephalopathy, being well tolerated by patients with severely compromised liver function. It also favors the formation of extraluminal collaterals, with a long-term protective role.

MD.45.	
Title	**Innovative methods for the treatment of conductive hearing loss through the implantation of auditory systems with advanced protection and anatomical adaptation techniques.**
Authors	**NOROC Iurie, VETRICEAN Sergiu, SENCU Eusebiu, DIDENCU Alexandru, ENACHI Victor**
Institution	**Nicolae Testemițanu State University of Medicine and Pharmacy of the Republic of Moldova**
Patent no.	**Cycles of inventions: s 2025 0128 from 2025.12.17; s 2025 0127 from 2025.12.17; s 2025 0126 from 2025.12.17**
Description	The cycle of inventions relates to the fild of medicine, particularly to otologic surgery and neurosurgery, and

concerns methods for the treatment of conductive, mixed, or unilateral hearing loss by implantation of transcutaneous auditory systems.

The methods comprises preoperative imaging by computed tomography with three-dimensional reconstruction for evaluation of temporal bone thickness, sigmoid sinus position, and dura mater location, followed by determination of optimal implantation coordinates. During formation of the implant bed in the middle cranial fossa, a circular inner cortical bone ring with a thickness of 1–2 mm is preserved, ensuring protection of the dura mater. The methods further comprises obliteration of mastoid cells affected during drilling using autologous bone material triturated into a paste-like consistency, thereby preventing subcutaneous emphysema and providing additional mechanical support. The auditory implant is fixed with monocortical screws, and the implant cable is positioned without tension in prepared bony grooves or subperiosteally, followed by layered closure with periosteal refixation and application of a temporal muscle flap. The methods ensure increased safety of implantation, reduction of intraoperative and postoperative complications, improved implant stability, and preservation of intracranial anatomical structures.

MD.46.

Title	**Method for treating non-infectious ocular inflammatory process**
Authors	**CUSNIR Valeriu, BALTA Florian, DUMBRAVEANU Lilia, GROPPA Liliana, BOBESCU Doina, COBET Valeriu, CUSNIR Vitalie, BOBESCU Nicolae, BALTA George, CUSNIR Valeriu Valeriu**
Institution	**Nicolae Testemițanu State University of Medicine and Pharmacy of the Republic of Moldova**
Patent no.	MD 1907 Y, BOPI 12/2025
Description	The invention relates to medicine, particularly to ophthalmology, and can be used for the treatment of non-infectious ocular inflammatory processes. Ocular inflammatory diseases include uveitis, scleritis, and inflammation of adjacent eye structures. Chorioretinitis represents a form of uveitis affecting the posterior segment of the eye, involving inflammation of the choroid and retina.

The causes of ocular inflammation may include eye injuries such as trauma, as well as autoimmune and inflammatory diseases, including rheumatoid arthritis, sarcoidosis, Behçet's syndrome, and certain genetic disorders. The inflammatory process may involve multiple ocular structures, such as the anterior uvea and the lens, or may manifest as posterior uveitis with involvement of the vitreous body, lens, and retina, conditions often associated with direct trauma to the eyeball.
The problem addressed by the invention lies in the development of an effective method for treating non-infectious ocular inflammation that overcomes the limitations of existing approaches. Specifically, it aims to interrupt the pathogenic chain of the inflammatory process during its stabilization phase.
The technical result of the invention consists in halting the progression of inflammation and associated degenerative processes, thereby preventing vision loss. Additionally, it reduces the overall number of recurrences and prolongs the remission period, ensuring improved long-term outcomes for patients.

MD.47.

Title **Integrated therapeutic approach for inflammatory gastrointestinal disorders**

Authors **BOTEZATU Adriana, BODRUG Nicolae, RE Lamberto, LUNGU Nicolae, PRADA Gabriel-Ioan, CIUREA Marius-Eugen, BĂJENARU Ovidiu-Lucian, NUȚA Cătălina-Raluca**

Institution **Nicolae Testemitanu State University of Medicine and Pharmacy of the Republic of Moldova**

Patent no. MD 1862 Z, BOPI 02/2026

Description

The invention relates to medicine, particularly to gastroenterology, and may be used for the complex treatment of inflammatory diseases of the gastrointestinal tract.

The essence of the invention consists in the following therapeutic regimen: on treatment days 1, 4, and 7, patients are administered intravenously 200 mL of a 0.9% NaCl solution ozonated with an oxygen-ozone mixture, with an ozone concentration of 6 µg/mL. On days 2, 5, and 8–10, 200 mL of venous blood is collected from the patient,

ozonated with an oxygen-ozone mixture at a concentration of 15 µg/mL, and reinfused. On days 3, 6, and 9, intestinal insufflations with medical ozone are performed using 200 mL of an oxygen-ozone gas mixture per session, with an ozone concentration of 30 µg/mL.

Additionally, throughout the treatment, the patient orally consumes 0.5 L of ozonated drinking water daily (ozone concentration 8 µg/mL) for a duration of 2–4 weeks. Concomitantly, 15 minutes before meals, three times daily, the patient takes one capsule containing a biologically active phytotherapeutic mixture. The composition (by mass %) includes: aerial parts of common agrimony (20–25%), St. John's wort (12–16%), yarrow (14–18%), safflower-like leuzea (16–20%), licorice root (15–17%), with mint leaves constituting the remainder.

MD.48.

Title

The influence of thiosemicarbazone derivates on total nitric oxide levels and endothelial nitric oxide synthase activity: a sex dependent comparative study

Authors

PANTEA Valeriana, PAVLOVSCHI Ecaterina, TAGADIUC Olga

Institution

Nicolae Testemitanu State University of Medicine and Pharmacy of the Republic of Moldova

Patent no.

Copyright Registration AGEPI Certificate (SAIP), Series No. OȘ 8348 from 24.11.2025

Description

Thiosemicarbazones are organic compounds with high pharmacological potential, recognized for their ability to form stable complexes with metal ions. Among them, copper–thiosemicarbazone complexes (CuCCTs) have attracted particular interest due to their diverse biological activities, including antimicrobial, antioxidant, and especially antitumor effects. Their high chemical stability and strong interactions with biomolecules make them promising candidates for the development of novel therapeutic agents with improved efficacy and reduced toxicity.

The development of new CuCCTs represents a key direction in medicinal chemistry, as copper-based compounds are increasingly explored as cost-effective and potent anticancer agents in preclinical research. These complexes are known to interact with multiple molecular

targets, influencing oxidative stress, cell proliferation, and apoptosis pathways. Despite the well-established role of endothelial nitric oxide synthase (eNOS) in producing nitric oxide (NO) in peripheral tissues and the central nervous system, its involvement in oncological processes remains insufficiently understood.

This study aimed to evaluate the effects of CuCCTs on NO concentration and eNOS activity in erythrocytes using an in vivo experimental model. The results confirmed that thiosemicarbazone derivatives significantly influence NO metabolism and eNOS activity. Moreover, a clear sex-dependent difference was observed, with higher NO levels and eNOS activity in females compared to males. These findings suggest that sex hormones, particularly estrogens, play an important modulatory role in regulating NO synthesis pathways and may contribute to differential biological responses. Additionally, these results highlight the potential of CuCCTs as candidates for personalized therapeutic strategies, taking into account sex-specific differences in drug response in clinical applications overall.

MD.49.

Title

Angiotensin II and angiotensin converting enzyme: key players in the pathogenesis of hypertensive retinopathy

Authors

PAVLOVSCHI Ecaterina, PANTEA Valeriana, BOROVIC Djina, TAGADIUC Olga

Institution

Nicolae Testemitanu State University of Medicine and Pharmacy of the Republic of Moldova

Patent no.

Copyright Registration AGEPI Certificate (SAIP), Series OȘ Nr. 8346 from 24.11.2025

Description

This study proposes a novel diagnostic and prognostic approach for hypertensive retinopathy (HR) based on the evaluation of key components of the renin–angiotensin system (RAS), namely angiotensin II (Ang II) and angiotensin-converting enzyme (ACE), in paired serum and tear samples.

The innovation lies in demonstrating that systemic and ocular biomarkers exhibit distinct yet complementary patterns during disease progression. Serum Ang II levels increase proportionally with the severity of HR, reflecting systemic vascular dysfunction, endothelial impairment, and enhanced vasoconstrictive activity. In contrast, tear Ang II

levels show a significant decrease, suggesting localized dysregulation of the ocular RAS and altered microenvironmental homeostasis at the ocular surface. Furthermore, serum ACE levels rise notably in moderate stages of HR, while tear ACE levels remain relatively stable, indicating compartment-specific regulation mechanisms.

This dual biofluid analysis provides a minimally invasive, objective, and reproducible method for early detection, staging, and monitoring of hypertensive retinal damage, addressing the limitations associated with subjective fundoscopic assessment. The use of tear fluid as a diagnostic medium represents a patient-friendly and innovative alternative to conventional blood-based investigations. The proposed approach has broad applicability, including early diagnosis and risk stratification of hypertensive retinopathy, monitoring of disease progression and therapeutic response, and the development of non-invasive screening tools.

Moreover, it supports the advancement of personalized medicine strategies targeting the RAS and may be extended to other ocular and systemic vascular disorders characterized by RAS dysregulation.

MD.50.

Title **MOSAIC-MM: A Modular Clinical Decision Support Framework for Multiple Myeloma**

Authors **OLARU Andrei, BURUIANĂ Gheorghe**

Institution **Nicolae Testemițanu State University of Medicine and Pharmacy of the Republic of Moldova; THE INSTITUTE OF ONCOLOGY**

Patent no. Cycle of copyrighted works: Copyright Registration AGEPI Certificates (SAIP), Series OȘ Nr.Nr. 8396 and 8397 from 20.01.2026

Description The, MOSAIC-MM model, provides a structured approach that can be integrated into clinical practice and evaluated in future studies. For clinical research, prospective studies could be initiated in which patients with myeloma and bone disease are stratified according to MOSAIC-MM (score or categories) and then the results are compared: for example, surgical decision rate, functional outcomes, quality of life and survival at different scores. This would validate the usefulness of the model in predicting who truly benefits from surgery. A nomogram (similar to the one recently

developed for post-surgical prognosis) could be developed that, based on the values of each domain, would provide the probability of a favorable outcome. Such a nomogram would quantify the indications more precisely: for example, if a patient has a high score in Mechanical and Anatomical, but a poor score in Systemic and Oncological, the model could indicate limited benefit – the nomogram would give a low probability of 1-year survival with surgery, so something else would be chosen.

In everyday clinical practice, the MOSAIC-MM algorithm encourages clinicians to systematically document each of the 6 domains for patients with MM and bone lesions. Thus, the final decision becomes a multidimensionally reasoned one (e.g.: "We indicated prophylactic femoral fixation because: Mechanical - Mirels 9, Anatomical - lesion in the femoral diaphysis, Oncological & Systemic favorable, Imaging - focal lesion, CRP normal, and support is optimal.").

The innovative value of the model lies in the structured integration of multiple clinical dimensions into a decision- and prediction-oriented system, with potential for standardization and application in personalized medicine.

MD.51.

Title	**Theoretical research through an integrated medical, psychological and ethical approach in the management of steatotic liver disease associated with metabolic dysfunction: Development of a monograph and application materials for physicians**
Authors	**LUPAȘCO Iulianna, VENGHER Inna, BANARI Ion, BEREZOVSCAIA Elena**
Institution	**Nicolae Testemitanu State University of Medicine and Pharmacy of the Republic of Moldova**
Patent no.	Research project within the competition „Stimulating excellence in scientific research" for the years 2025-2026 (Project number 25.80012.8007.07SE)
Description	The project aims to conduct theoretical research with multidisciplinary and complex application indications on Steatotic Liver Disease Associated with Metabolic Dysfunction (SLDAMD), with publication of a monograph, focusing on three fundamental aspects: the medical, psychological and ethical analysis of this condition, as well as the integration of these areas, in order to provide holistic

and effective patient care.

The research will explore the causes, evolution and risk factors of SLDAMD, diagnostic methods, pharmacological and non-pharmacological treatment options, moral decision-making, as well as possible complications of the disease. It will also investigate the impact of psychological and moral factors on the disease, adherence to treatment and recommendations related to lifestyle changes. The ethical implications of the doctor-patient relationship will be analyzed, with the aim of formulating recommendations for an integrated and empathetic/assertive approach to treatment.

The research will address current gaps in the literature, advancing an innovative approach that integrates medical, psychological and ethical dimensions in the context of SLDAMD. The project aims to analyze the fundamental aspects of the doctor-patient relationship, to develop formative and educational applicative resources that will help doctors better understand the importance of the communicative component, to apply ethical principles in relationships with patients and to promote sustainable changes in patients' behaviors, related to lifestyle changes. The result of the project will contribute to improving treatment adherence and promoting a healthy lifestyle.

The main activities of the project will include reviewing relevant sources from the scientific literature related to the research topic. It will research and analyze the structure and function of morality regarding clinical activity in the context of SLDAMD and the socialization mechanisms of patients. The processed information will serve to write a monograph, which will detail all aspects of the study and propose integrated solutions for the SLDAMD management, taking into account the medical, psychological and ethical aspects.

The research will contribute to the development of integrated, effective and personalized approaches for patients with SLDAMD, will improve the interaction between doctors and patients.

An integrated approach will be proposed that takes into account the medical, psychological and ethical dimensions of treatment, with an emphasis on creating a more open and collaborative relationship, in which the patient is better informed and involved in decisions related to health.

MD.52.	
Title	**Integrated Pathogenetic Framework for Prediction, Diagnosis and Personalized Management of Perinatal Psychoses Based on Clinical and Biological Aspects**
Authors	**BORONIN Larisa, CHIHAI Jana**
Institution	**Nicolae Testemitanu State University of Medicine and Pharmacy of the Republic of Moldova**
Patent no.	Postdoctoral research project
Description	This project introduces a novel integrative pathogenetic framework for the prediction, early diagnosis, and evidence-informed management of perinatal psychoses**,** addressing a critical gap in contemporary perinatal mental health research. The framework is based on a systematic synthesis of original scientific publications and high-quality evidence, integrating multidimensional data across clinical, neurobiological, immunological, genetic, epigenetic, and microbiome-related domains. **It establishes a unified model of disease pathogenesis and enables advanced risk stratification and biomarker-oriented approaches.** This work provides a scientific platform **for the development of next-generation screening tools, predictive algorithms, and personalized intervention strategies, promoting a shift from symptom-based to mechanism-based understanding and management**. The project is applicable in scientific research, medical education, and the development of clinical guidelines and health policies. It is particularly relevant for healthcare systems lacking standardized protocols and has strong potential to improve early detection, support future clinical implementation, and enhance maternal and child health outcomes.

MD.53.	
Title	**Method for assessing the risk of developing severe community-acquired pneumonia in obese patients**
Authors	**FETCO-MEREUȚĂ Diana, DUMITRAȘ Tatiana, GRIB Livi, MATCOVSCHI Sergiu, CAȘCAVAL Virginia**
Institution	**Nicolae Testemitanu State University of Medicine and Pharmacy of the Republic of Moldova**
Patent no.	**PhD project**

The results of this research project refer to the application in the clinical practice of internal medicine physicians, intensive care physicians, pulmonologists, endocrinologists, emergency physicians, and family physicians, a formula which includes clinical examination parameters and will directly contribute to the stratification of obese patients at high risk of developing severe community-acquired pneumonia.

Community-acquired pneumonia (CAP) is a major public health problem, due to its high incidence, severe clinical course and significant impact on population morbidity and mortality. The incidence of CAP worldwide is 1.5–12 cases per 1000 people per year. The mortality rate from CAP in hospitalized patients ranges from 5% (in non-intensive care units) to 25% (for patients hospitalized in ICU), reaching a rate of 40–50% in cases requiring vasopressors and in intubated patients.

Currently, several scores for predicting the severity of community-acquired pneumonia are known and applied in clinical practice. However, there is no prognostic score for assessing community-acquired pneumonia severity in patients with obesity.

Description

The formula we recommend for predicting severity of community-acquired pneumonia in patients with obesity. In the first stage, clinical and paraclinical data, as well as oxidative stress markers (advanced oxidation protein products and SH total thiol groups) were included for logistic regression. The second stage of logistic regression highlighted the following parameters with statistical significance, which included the following variables: peripheral oxygen saturation, abdominal circumference, as well as the value of the constant adjusted for this formula (7.491).

The advantages of the proposed method consist in early detection (with a probability of 97.7%) of patients with an increased risk for severe CAP, which dictates an early therapeutic management, with the aim of correcting possible complications and avoiding unfavorable clinical course.

The innovation is a part of the development process carried out within the doctoral research and the Innovator's certificate No. 6271 from 29.07.2024, Public Institution Nicolae Testemitanu State University of Medicine and Pharmacy of the Republic of Moldova.

MD.54.	
Title	**Longitudinal assessment of oxidative stress markers and endocrine profile in surgical menopause: an innovative monitoring approach**
Authors	**VATAMAN Elena, CERNEȚCHI Olga, SAGAIDAC Irina, SÂRBU Zinaida**
Institution	**Nicolae Testemitanu State University of Medicine and Pharmacy, Chisinau, Republic of Moldova**
Patent no.	PhD project
Description	Surgical menopause induces an abrupt estrogen deficiency, leading to oxidative stress – a key pathophysiological mechanism involved in cardiovascular, metabolic, and bone disorders. In this context, the evaluation of the hormonal profile alone provides an incomplete characterization of postoperative status, necessitating the integration of oxidative stress markers into the longitudinal assessment of patients. The present research proposes an innovative integrated monitoring model for the longitudinal and personalized evaluation of patients. A longitudinal design with four time points was employed (T1–T4: preoperative, 10–12 days, 6 months, and 12 months postoperatively). Oxidative stress markers - malondialdehyde (MDA), advanced oxidation protein products (AOPP), superoxide dismutase (SOD), and total antioxidant capacity (TAC) - were analyzed in correlation with endocrine parameters estradiol (E2), follicle-stimulating hormone (FSH), and luteinizing hormone (LH). The study included three groups: hysterectomy with bilateral oophorectomy (L_{1A}), hysterectomy without oophorectomy (L_{1B}), and a control group (L_0) consisting of age-matched healthy women assessed once, providing reference values. The results demonstrate a persistent oxidative imbalance in the oophorectomy group, characterized by a marked decrease in estradiol, elevated MDA and AOPP levels, and a progressive decline in TAC. At the 12-month follow-up, parameter values in this group remained altered, without reaching those of the control group (L0). In contrast, the L_{1B} group exhibited more moderate changes, suggesting partial maintenance of compensatory antioxidant mechanisms and more efficient metabolic adaptation over time. The proposed model integrates endocrine and oxidative profiles, enabling

early stratification of long-term risk and the individualization of clinical management through targeted interventions tailored to each patient's biological profile. The model was developed within a doctoral research project and has been registered with a copyright certificate.

MD.55.	
Title	**Assessment of the health status of surgeons in relation to occupational risk factors**
Authors	**VÎLCOVA Ana, FERDOHLEB Alexandru, SPINEI Larisa, PARASCHIV Angela, DELEU Raisa, CIOBANU Elena**
Institution	**Nicolae Testemițanu State University of Medicine and Pharmacy, Republic of Moldova**
Patent no.	PhD research
Description	The activity of surgeons is characterized by a high level of physical, psychological, and emotional demands, being associated with multiple occupational risk factors that can negatively affect health status and work capacity. In this context, the PhD research aims to identify and rank occupational risk factors that contribute to shaping the health status of surgeons, in order to develop effective preventive measures. The study includes a comprehensive assessment of surgeons' health status, a hygienic evaluation of the work process and occupational environment, as well as the investigation of psychosocial factors that influence professional performance and psycho-emotional balance. Particular emphasis is placed on identifying modifiable risk factors to support the development of targeted preventive interventions. Within the research, an original questionnaire was developed to assess workplace risk factors among surgeons; this method was recognized by the Innovator Certificate No. 6403 (03.09.2025), implemented in practice (Act No. 98, 09.09.2025), and protected by copyright issued by AGEPI (State Agency on Intellectual Property) (Series OS No. 8369, 18.12.2025). The integrated approach of the study allows for a realistic assessment of the interaction between occupational factors and surgeons' health, contributing to the development of primary prevention strategies and the optimization of working conditions in healthcare institutions.

Institute of Mother and Child

MD.56.	
Title	**Integrated National Workflow for Early Detection and Diagnosis of Spinal Muscular Atrophy in Newborns**
Authors	Coliban Iulia, Sacară Victoria, Ușurelu Natalia, Opalco Igor, Palii Ina, Gladun Sergiu
Institution	**Institute of Mother and Child, Human Molecular Genetics Laboratory**
Patent no.	Copyright Certificate, Series OS No. 8347 (24.11.2025)
Description	The integration of screening and diagnostic workflows for rare genetic diseases is essential for enabling early detection and timely clinical intervention. This invention presents an integrated national workflow for neonatal genetic screening and early diagnosis of Spinal Muscular Atrophy (SMA), moving beyond isolated laboratory testing toward a complete and scalable healthcare solution. The workflow combines dried blood spot (DBS) collection, DNA extraction, Real-Time PCR, confirmatory MLPA testing, and clinical reporting into a standardized pathway. It is fully compatible with existing neonatal screening infrastructure, allowing rapid implementation at national level. The system demonstrates high diagnostic accuracy and significantly reduced cost per test compared to commercial solutions. It enables early identification of SMA in the pre-symptomatic stage, which is critical for effective treatment and improved patient outcomes. By integrating laboratory processes with clinical pathways, this model provides a practical, sustainable, and scalable solution that can be extended to other genetic disorders.

The Institute of Emergency Medicine

MD.57.

Title ***PSYCHOLOGICAL PROFILE OF PERSONS POST STROKE. Synthesis of experimental studies in the Institute of Emergency Medicine***

Authors **GLAVAN Aurelia, GROPPA Stanislav, MANEA Diana**

Institution **The Institute of Emergency Medicine**

Patent no. AGEPI MD Certificat SAIP seria OȘ Nr. 8345 din 24.11.2025

Description

That investigation presents the results of the first psychodiagnostics study in the Republic of Moldova, which provides a post-stroke psychological profile,

In the elaboration of the psychological profile of a person post-stroke concurs all the psychic processes and mechanisms: cognitive, Affective, motivational, intellectual, affective, volitional, etc., the substantial-qualitative nature of the organization of a psychological profile, imposing on the psychological level specific types of relationships: cognitive, relational-practical, affective, ethical, aesthetic, etc.

For the first time in the Republic of Moldova, a holistic view on post-stroke psychological disorders was substantiated, inferred from the approach of psycho-social determinants of rehabilitation. By creating and applicatind that epistemic-empirical conception regarding the management of psychological and social rehabilitation of post-stroke people, we come with an interdisciplinary vision on the principles, conditions and methods of complex post-stroke rehabilitation. Deriving from an original system of ideas of reference authors in the field and having as reference the multivalent concept of psychological and social rehabilitation, this research offers the elements of originality and novelty, and the principally new scientific results have led to the establishment of a new research direction - psychology of post stroke rehabilitation.

The present research represents a brief synthesis of the experimental application of the psychodiagnostics approach for establishing the post-stroke psychological particularities and elaborating the psychological profile of people with post - stroke status-a voluminous and lasting study.

MD.58.

Title

PATIENT MONITORING POST-STROKE BY STANDARDIZED TELEPHONE QUESTIONNAIRES IN THE POPULATION OF THE REPUBLIC OF MOLDOVA

Authors **EFREMOVA Daniela, Diana GAVRILUȚA, ZOTA Eremei, CRIVORUCICA Igor, MANEA Diana, GROPPA Stanislav**

Institution **The Institute of Emergency Medicine**

Patent no. AGEPI MD Certificat SAIP seria OȘ Nr. 8395 din 20.01.2026

Description

Stroke is a major public health issue in the Republic of Moldova, with a severe impact on both survival and quality of life. Although significant progress has been made in acute treatment, the absence of a structured post-discharge follow-up system leaves patients vulnerable to recurrences, long-term disability, and psychological complications.

For this purpose, a telephone assessment questionnaire at 3 months post-stroke was developed at the Institute of Emergency Medicine in Chisinau. This tool assesses functionality, emotional state, sleep, cognition, treatment adherence and risk factors, enabling rapid, personalized interventions and detection of existing problems in stroke patients. The telephone format ensures easy access, efficiency and continuous monitoring, especially for patients with limited mobility. The questionnaire provides valuable information about the patient's progress, highlights

areas that require additional interventions and helps predict long-term outcomes.

MD.59.

Title

RELIABLE PREDICTIVE ANALYSIS OF PATIENTS TREATED BY NON-INVASIVE VENTILATION TO ESTIMATE THE RISK OF DEATH. PREDICTIVE MODEL - VNI

Authors

CÎVÎRJIC Ivan, ȘANDRU Serghei, ARNAUT Oleg, NERPII Alina, *COBÎLEȚCHII Serghei, MAXIM Igor*

Institution

The Institute of Emergency Medicine. IP State University of Medicine & Pharmacy"NICOLAE TESTEMIȚANU" oF the Republic of Moldova

Patent no.

AGEPI MD Certificat SAIP seria OȘ Nr. 8365 din 18.12.2025

Description

The logistic model constructed to estimate the probability of death among patients treated with non-invasive ventilation (NIV) was evaluated on a dedicated test set using standard performance indicators. The logistic model for estimating the risk of death under non-invasive ventilation demonstrated robust overall performance on the test set, achieving an overall accuracy of 84.3% and a balanced accuracy of 84.1%, suggesting a balanced ability to classify between unbalanced classes. The sensitivity of the model, i.e. the ability to correctly identify cases of death, was 83.3%, indicating a high detection rate of critical events. The accuracy was 75.8%, reflecting an acceptable proportion of cases correctly labeled as deaths among the total positive predictions. The F1 score, which harmonizes sensitivity and precision, recorded a value of 79.4%, suggesting a good balance between correct identification and limiting false alarms. The performance of the model was evaluated on an independent test set using the following indicators overall accuracy balanced accuracy (for unbalanced data) F1-score recall (sensitivity) and precision In addition the ROC curve was generated to

assess the discriminative ability and the precision–recall (PR) curve to estimate the performance in the context of unbalanced classification

MD.60.

Title

RELIABLE ANALYSIS WITH MAXIMIZING SENSITIVITIES OF PATIENTS TREATED BY NON-INVASIVE VENTILATION FOR EARLY IDENTIFICATION OF PATIENTS AT INCREASED RISK OF FAILURE.PREDICTIVE MODEL – VNI-1

Authors

CÎVÎRJIC Ivan, ȘANDRU Serghei, ARNAUT Oleg, NERPII Alina, *COBÎLEȚCHII Serghei, MAXIM Igor*

Institution

The Institute of Emergency Medicine. IP State University of Medicine & Pharmacy"NICOLAE TESTEMIȚANU" oF the Republic of Moldova

Patent no.

AGEPI MD Certificat SAIP seria OȘ Nr. 8364 din 18.12.2025

Description

The VNI 1 model was built to predict failure of non-invasive ventilation based on data available at treatment initiation. 60 primary predictors were used, identical to those in the previous model. Unlike the model for death, the final selection of the model sought to maximize sensitivity (recall), to identify patients at high risk of failure as early as possible.

The VNI 1 logistic model was designed to predict failure of non-invasive ventilation based on clinical and biological parameters available at baseline. The main objective of this model was the early identification of patients at high risk of therapeutic failure, to allow effective risk stratification and possible early adjustment of therapeutic behavior. The model has been evaluated on an independent test set, and its performance is summarized in the table below.

The model achieved an overall accuracy of 81.9%, indicating a satisfactory overall patient classification ability. The balanced accuracy, which takes into account the uneven distribution of classes, was 83.7%,

suggesting a similar efficiency in identifying both failure cases and those with favorable evolution under NIV. A remarkable aspect is the very high sensitivity (90%), which reflects an excellent ability of the model to detect cases of therapeutic failure. In contrast, the model's accuracy was 69.2%, indicating a reasonable trade-off between correctly identifying failure cases and the number of false alarms. The F1 score, which integrates sensitivity and precision, recorded 78.3%, suggesting an appropriate balance between the two essential components of predictive performance.

MD.61.

Title

RELIABLE ANALYSIS OF PATIENTS TREATED BY NON-INVASIVE VENTILATION TO SUPPORT THERAPEUTIC DECISIONS IN THE MANAGEMENT OF THE CRITICAL PATIENT, USING EVOLVING CLINICO-BIOLOGICAL VARIABLES. VNI. PREDICTIVE MODEL – VNI-2

Authors

CÎVÎRJIC Ivan, ȘANDRU Serghei, ARNAUT Oleg, NERPII Alina, *COBÎLEȚCHII Serghei, MAXIM Igor*

Institution

The Institute of Emergency Medicine. IP State University of Medicine & Pharmacy"NICOLAE TESTEMIȚANU" oF the Republic of Moldova

Patent no.

AGEPI MD Certificat SAIP seria OȘ Nr. 8363 din 18.12.2025

Description

The VNI 2 model was designed to estimate the risk of NIV failure taking into account the patient's clinical and biological evolution after initiation of therapy. 63 predictors were included, representing both baseline clinico-biological variables and parameters of therapeutic response or changes occurring over time. The optimization of the model also aimed at maximizing the recall, in order to use it as a tool for monitoring and continuously reassessing the risk in dynamics.

The VNI 2 logistic model was designed to estimate

the risk of failure of non-invasive ventilation using evolutionary clinico-biological variables obtained after treatment initiation. By integrating dynamic data that reflect changes occurring during hospitalization, this model aims for a continuous reassessment of risk, with the aim of supporting therapeutic decisions in the later stages of the management of the critical patient. The performances of the model were evaluated on the test set, and the results are summarized in the following table.

The model demonstrated an overall accuracy of 84.3%, indicating a solid ability to classify cases according to the evolution under NIV. The balanced accuracy of 84.8% suggests comparable performance in identifying both patients with therapeutic success and those with failure. The sensitivity of the model, of 86.7%, confirms an excellent ability to detect real cases of ventilation failure, while the accuracy, of 74.3%, reflects good specificity in positive predictions. The F1 score, with a value of 80.0%, reveals an effective balance between sensitivity and precision, confirming the robustness of the model in the context of unbalanced binary classification.

MD.62.

Title **RELIABLE PREDICTIVE ANALYSIS SOFTWARE SOLUTION FOR THE MANAGEMENT OF PATIENTS TREATED BY NON-INVASIVE VENTILATION**

Authors **CÎVÎRJIC Ivan, ȘANDRU Serghei, ARNAUT Oleg, NERPII Alina, *COBÎLEȚCHII Serghei, MAXIM Igor***

Institution **The Institute of Emergency Medicine. IP State University of Medicine & Pharmacy"NICOLAE TESTEMIȚANU" oF the Republic of Moldova**

Patent no. AGEPI MD Certificat SAIP seria PC Nr. 8366 din 18.12.2025

Description The COVID-19 pandemic has posed a major global threat to public health and has placed enormous

pressure on the healthcare delivery system in the global NHI.

In order to build reliable predictive tools in the context of non-invasive ventilation (NIV), three L2 penalized logistic regression models were developed, using supervised machine learning methodology. The data were divided into two sets: a training set (n = 330) and a test set (n = 83). Hyperparameter selection was performed by GridSearchCV within a 5-fold cross-validation. The input variables were standardized, and the optimization of each model sought to maximize the performance score considered relevant for the analyzed objective (accuracy or recall). All models had a binary classification (survivor/deceased or NIV success/failure) as the dependent variable. The statistical and predictive modeling methodology was based on automated data analysis using established open-source tools RStudio (version 2024.09.1+394, https://www.rstudio.com) and Python (version 3.12.3, https://www.python.org) These platforms, widely recognized in academic and scientific circles, enabled a transparent and fully reproducible rigorous analysis The source codes used in the processing and analysis process can be put available to facilitate verification of the results and integration of the methodology in similar future research.

MD.63.

Title

TRAHEOSTOMIA PERCUTANĂ.
Standardized algorithm

Authors

BOLEAC Diana, PLĂMĂDEALĂ Svetlana, GURGHIȘ Radu, MAXIM Igor

Institution

The Institute of Emergency Medicine, IP State University of Medicine & Pharmacy"NICOLAE TESTEMIȚANU" oF the Republic of Moldova

Patent no.

AGEPI MD patent pending mart 2026

Description

A tracheostomy is a surgically created airway that is kept open with a breathing tube or tracheostomy tube.

The tube is inserted directly into the trachea, through an incision in the trachea. This tube allows the person to breathe without using their nose or mouth. Both surgical and percutaneous techniques are widely used in current surgical practice. The word "tracheostomy" (Greek "stoma" = mouth, opening) refers to the creation of a permanent or temporary opening and to this opening itself. It is performed in patients who are expected to require prolonged mechanical ventilation, with installation times being defined individually and determined by certain clinical conditions.

TP is a safe procedure performed at the patient's bedside, performed in a relatively short time, with low costs and does not require an appointment in the operating room. The most common intra- and postoperative complication is bleeding. The use of an ultrasound probe is encouraged as a complementary tool to locate an abnormally high-placed innominate artery and may prevent uncontrolled bleeding and periprocedural hemorrhagic losses. TP can be performed by thoracic or intensive care surgeons, otolaryngologists, general surgeons, and interventional pulmonologists.

MD.64.

Title **TREATMENT OF UNSTABLE PELVIC RING INJURIES WITH DORSAL DISPLACEMENT**

Authors **KUSTUROVA Anna, KUSTUROV Vladimir, CIOCANU Mihail**

Institution **The Institute of Emergency Medicine**

Patent no. AGEPI MD patent pending mart 2026

Description The metod refers to medicine, especially medical technique, and can be used in orthopedics and traumatology for the early surgical treatment of unstable ring injuries .pelvic. The essence of this scientific work lies in the fact that the device for the treatment of injuries of the pelvic ring with dorsal

displacement contains two pelvic supports in the form of arcuate plates, fasteners, connecting and repositioning nodes, movable frames, supports and a distractor with an indicator, the front ends of the pelvic supports are equipped with a longitudinal repositioning node made by two interconnected blocks joined by a slider, with the possibility, along the axis of each block, a rod with a metric thread is installed, equipped with a nut and a countersunk, the connecting part of the threaded rod is made in the form of a “dovetail”, equipped with two cylindrical channels with an internal thread, a hex head for the key is made at the second end of the threaded rod. The technical result consists in the possibility of repositioning the hemipelvis (or bone fragment) displaced dorsally, in a strictly dosed rhythm, which allows to perform effective reduction, to eliminate twisting and deformation of the pelvic ring, restore the shape and integrity of the pelvis by means of adequate reduction with low impact, stable fixation of the pelvic ring until bone consolidation.

"Ion Creangă" State Pedagogical University of Chisinau

MD.65.

Title

MDIR-MATE-5a: Interactive digital mathematics textbook for 5th grade

Authors Nicolae Balmuș, Tatiana Chiriac, Andrei Braicov, Natalia Zloi

Institution "Ion CREANGĂ" State Pedagogical University of Chișinău

Patent no. AGEPI MD Certificate Series PC No. 8407 of 23.02.2026

Description

MDIR-MATE-5a: Interactive Digital Mathematics Textbook for Grade 5 is an educational software designed for computer-assisted mathematics learning, developed using **MDIR Constructor 4.0** and compiled/updated in the Delphi 12 programming environment. The content of the textbook, with the consent of Prut International Publishing House, is adapted from the printed version of *"Mathematics. Textbook for Grade 5"*.

The interactive digital content was developed based on the learning and assessment activities described in the printed textbook and aligns with the National Curriculum for Mathematics, Grades 5–9, 2020 edition, Republic of Moldova. Using Delphi programming, digital-interactive activities were designed and implemented to reinforce knowledge in: identifying, reading, and writing natural numbers; performing column-based calculations; studying set theory and divisibility of natural numbers; identifying and representing fractions and decimal numbers; as well as applying geometric terminology and units of measurement.

For the digital learning and self-assessment activities with instant feedback, specific to mathematics textbooks, applications were developed for tests such as: true/false, multiple-choice, exclude the intruder, ascending/descending ordering, fill-in-the-blank, table completion, and solving cloned problems.

The MDIR-MATE-5a software was developed within the research project "**Innovation in the Design and Implementation of Interactive Digital Math Textbooks for Lower Secondary Education**", Strategic Direction: "Innovative Educational Technologies and Products", registered in the State Register of Projects in the Field of Science and Innovation of the Republic of Moldova, project code 25.80012.0807.42SE.

MD.66.

Title

MDIR-MATE-6a: Interactive digital mathematics textbook for 6th grade

Authors Nicolae Balmuș, Tatiana Chiriac, Andrei Braicov, Silvia Turuta

Institution "Ion CREANGĂ" State Pedagogical University of Chișinău

Patent no. AGEPI MD Certificate Series PC No. 8419 of 23.02.2026

Description

MDIR-MATE-6a: Interactive Digital Mathematics Textbook for Grade 6 is an educational software designed for computer-assisted mathematics learning, developed using **MDIR Constructor 4.0** and compiled/updated in the Delphi 12 programming environment. The content of the textbook, with the consent of Prut International Publishing House, is adapted from the printed version of *"Mathematics. Textbook for Grade 6"*.

Using Delphi programming, digital-interactive activities were developed and implemented to strengthen competencies in working with the sets of numbers $\mathbb{N}$, $\mathbb{Z}$, $\mathbb{Q}$, $\mathbb{R}$, including addition, subtraction, multiplication, division, exponentiation, comparison, ordering, and representation of integers and rational numbers on a number line; solving problems and equations within the sets of integers and rational numbers; interactive exercises and problems on ratios, proportions, and percentages; as well as digital-interactive activities for mastering basic geometric concepts such as points, lines, rays, angles, geometric figures, and solid bodies.

The MDIR-MATE-6a software was developed within the research project "**Innovation in the Design and Implementation of Interactive Digital Math Textbooks for Lower Secondary Education**", Strategic Direction: "Innovative Educational Technologies and Products", registered in the State Register of Projects in the Field of Science and Innovation of the Republic of Moldova, project code 25.80012.0807.42SE.

MD.67.

Title	**ERASMUS-JMO-2023-HEI-TCH-RSCH "Ensuring Quality Teaching and Learning in a Digital Age: Development and Implementation of E-Textbooks (EUDIGBOOK)". Reference number: 101126852 – DLV-101126852 (2023-2026)**
Authors	Tatiana Chiriac, Nicolae Balmuș, Ana Bulat-Guzun, Olesea Sîrghi, Victoria Efros
Institution	"Ion CREANGĂ" State Pedagogical University of Chișinău
Patent no.	Reference number: 101126852 – DLV-101126852
Description	The EUDIGBOOK project aims to integrate a short teaching program focused on the **development and implementation of e-textbooks** and the adoption of innovative teaching methodologies based on open digital tools and resources. It seeks to enhance digital competencies among educators, enabling the effective integration of technology into teaching and learning through authentic digital textbooks. The project is coordinated by **ICSPUC**, leveraging its specialized Informatics and Information Technology (IIT) department, which offers accredited bachelor's and master's programs in education, software development, and digital educational resources. The teaching team includes highly qualified university staff with extensive experience in integrating information technology into educational practices and national projects. **EUDIGBOOK delivers a tailor-made course on key EU themes: digitalization, blending pedagogy with technology, developing and applying e-textbooks in education**. The course prepares teachers, educators, and administrators to develop and implement e-textbooks in classroom settings, emphasizing research-based and practical applications, as well as the professional training necessary for successful digital integration. Project activities include teaching sessions, practical exercises, and the creation of outputs such as: an electronic course with didactic materials, project website, methodological guide, scholarly articles, and annual reports. The project impacts educational practice by improving the planning, development, and use of e-textbooks, ensuring quality teaching in the digital age. It also addresses the shortage of interdisciplinary courses in Moldovan universities related to EU digital education practices, promoting modern, research-informed approaches to technology-enhanced learning.

National Agency for Public Health, Republic of Moldova

MD.68.	
Title	**Health Effects of Lead and Prevention Measures for the Population**
Authors	Vladimir Bernic, Iurie Pînzaru, Inga Miron, Roman Corețchi, Mariana Zavtoni
Institution	**National Agency for Public Health**
Patent no.	OȘ nr. 8441 din 26.03.2026
Description	This paper represents a comprehensive tool for public information and education aimed at increasing awareness of the risks associated with lead exposure and encouraging the adoption of preventive behaviors among the population. The guide provides accessible, well-documented, and easy-to-understand information about lead, with a particular focus on recognizing, preventing, and reducing the risk of exposure to this toxic metal. The document presents essential information about lead, including its definition, the historical evolution of its use, and the physical, chemical, and toxicological properties that have contributed to its wide application in various industrial and commercial fields. Particular attention is given to the effects of lead on human health. The guide explains the mechanisms through which lead enters and affects the human body, the different types of intoxication, its impact on the endocrine system, and the population groups that are most vulnerable to exposure, such as children and pregnant women. In addition, the guide highlights the main sources of lead exposure, both natural and anthropogenic, which contribute to environmental contamination and increase the risk of daily exposure for the general population. These include sources related to environmental pollution, occupational exposure, and certain consumer products. paper also proposes practical solutions and preventive measures that can be applied in everyday life, at the workplace, within communities, and at the level of public health policies. By translating complex scientific information into clear and practical recommendations, the guide aims to support informed decision-making and encourage behaviors that reduce the harmful effects of lead exposure, ultimately contributing to the protection of individual and public health.

MD.69.	
Title	**Method for clarifying equivocal results in the determination of anti-HEV IgM in blood serum**
Authors	Sajin Octavian; Iziumov Nina; Țurcanu Adela; Holban Tiberiu; Blaj Valentina
Institution	**National Agency for Public Health**
Patent no.	Patent application No. s 2025 0124 dated 2025.12.15
Description	The invention provides a standardized ELISA-based method to clarify equivocal ("grey zone") anti-HEV IgM results and improve the serological diagnosis of acute hepatitis E, a frequent challenge in routine laboratory practice. Borderline IgM values often arise from non-specific serum interferences such as heterophile antibodies, immune complexes, and rheumatoid factor, which may lead to delayed diagnosis, repeated testing, or unnecessary referral to molecular assays that are not universally accessible. Following initial ELISA testing (optical density measured at 450–620 nm), results are interpreted using a defined cut-off value calculated as the mean optical density of negative controls plus 0.250, and classified quantitatively by ratio as negative (<0.9), positive (>1.1), or equivocal (0.9–1.1). The core novelty of the invention lies in introducing a targeted clarification step applied exclusively to equivocal samples, using controlled pre-treatment with a 10% kaolin suspension ($Al_2O_3 \cdot 2SiO_2 \cdot 2H_2O$). This approach adsorbs non-specific interfering components while preserving HEV-specific antibodies, allowing accurate retesting with the same ELISA protocol. By combining a clear interpretative algorithm with a simple pre-analytical purification step, the method transforms uncertain serological results into clinically actionable outcomes. In experimental validation on 256 serum samples, equivocal results decreased from 5.8% to 0.39% after kaolin treatment, with 93.3% of borderline samples clarified into definitive positive or negative categories. The method is low-cost, reproducible, easy to implement in standard ELISA laboratories, and compatible with commercial diagnostic kits without requiring assay redesign. It is particularly valuable in clinical and public health settings with limited access to HEV PCR.

MD.70.	
Title	**Standardized kaolin suspension for the control of interferences in immunoenzymatic assays for hepatitis E**
Authors	Octavian Sajin, Nina Iziumov, Adela Țurcanu, Veaceslav Guțu, Valentina Blaj
Institution	**National Agency for Public Health**
Patent no.	Patent application No. s 2025 0125 dated 2025.12.16
Description	The invention addresses the need for a standardized reagent capable of reducing non-specific interferences that compromise the reliability of immunoenzymatic assays used in hepatitis E virus (HEV) diagnostics. It consists of a standardized aqueous kaolin suspension dispersed in a phosphate buffer with neutral pH ranging from 6.8 to 7.6 (preferably 7.0–7.4), formulated for pre-treatment of serum or plasma samples prior to ELISA testing. The suspension contains a controlled adsorbent concentration of 2–15% (preferably 5–12%), ensuring efficient adsorption of interfering components without significant loss of HEV-specific markers. The phosphate buffer provides physicochemical stability and preserves the immunological properties of treated samples, enabling consistent analytical performance. In a preferred formulation, the reagent includes an antimicrobial preservative at concentrations of 0.01–0.1% (optimally 0.02–0.05%) to prevent microbial contamination during storage and routine laboratory use. Optionally, a non-ionic dispersing agent at 0.005–0.1% may be incorporated to improve suspension homogeneity and limit sedimentation of kaolin particles over time. For application, the reagent is mixed with biological samples at defined volumetric ratios of 1:10 to 1:40 (preferably ~1:20) and incubated for several minutes to allow adsorption of interfering substances, followed by centrifugation or equivalent separation. The clarified supernatant is then used in standard immunoenzymatic assays for detection of HEV markers. ugh standardization of formulation and operating conditions, the invention ensures reproducible pre-treatment, reduces inter-laboratory variability, and remains compatible with existing commercial ELISA kits, allowing use as a standalone reagent or as part of hepatitis E diagnostic systems.

MD.71.

Title

MONITORING OF EXPOSURE TO IONIZING RADIATION OF PROFESSIONALLY EXPOSED PERSONNEL AND THE PUBLIC WITH THE DEVELOPMENT OF RADIOPROTECTION MEASURES

Authors

Corețchi Liuba, Bogdan Marina, Overcenco Ala, Apostol Ion, Capațîna Angela, Ababii Aurelia, Șargu Valentin, Romanciuc Parascovia

Institution

National Agency for Public Health of the Ministry of health of the Republic of Moldova

Patent no.

Institutional subprogram nr.1301.02

Description

The purpose of the study in the framework of the subprogram in the framework of the National Agency for Public Health (NAPH) research program is to assess the health status of those professionally exposed and the public to ionizing radiation, with the development of measures to control/reduce radiation risk to health at workplaces in the Republic of Moldova.

Project objectives:

- Assessment of the health status of those professionally exposed to ionizing radiation, involved in radiological diagnostic practices/TRI/radiological interventions, including through oncological diseases;
- Assessment of individual doses of those professionally exposed to ionizing radiation;
- Detection of medical-biological effects (immunological/genetic-molecular) in those professionally exposed to ionizing radiation;
- Characteristics of the distribution of radon concentrations in the air of homes and educational institutions in the main geographical areas of the country: North, Center and South;
- Risk assessment and descriptive analysis of the results of exposure to natural radiation, caused by radon in the air of homes and public buildings, with the establishment of exposure doses of the population and children, in relation to physical factors indoors and outdoors under the conditions of regional climate change;
- Elaboration of radiation protection measures and risk control to which medical personnel in the radiological field (and the population) are exposed with proposals for the development of a Register of personnel professionally exposed to ionizing radiation jointly with specialists from National Agency for Regulation of Nuclear and Radiological Activities and Institute of Oncology.

MD.72.

Title	**QUESTIONNAIRE ON MEASURING RADON CONCENTRATION IN THE AIR IN HOMES**
Authors	**Coreţchi Liuba, Ababii Aurelia, Capaţăna Angela**
Institution	**National Agency for Public Health of the Ministry of health of the Republic of Moldova**
Patent no.	Registration number of the application for a certificate of copyright and related rights at the State Agency on Intellectual Property of the Republic of Moldova (AGEPI) nr. 3299 of 13.03.2026
Description	This questionnaire represents a standardized methodological tool designed to support radon monitoring in residential environments in the Republic of Moldova. It is developed to systematically collect essential data on housing characteristics, environmental conditions, and resident behavior that influence indoor radon concentrations. The tool is completed by residents during the radon measurement period and is integrated with instrumental measurements conducted using radon detectors. It includes detailed sections on building typology, construction materials, floor and wall composition, ventilation practices, presence of basements, and structural integrity factors such as cracks. Additionally, it captures contextual parameters such as occupancy, number of floors, and microclimatic conditions. The primary purpose of this instrument is to enable comprehensive interpretation of radon measurement results by linking physical measurements with environmental and structural determinants. This approach improves the accuracy of exposure assessment and facilitates identification of key factors contributing to elevated radon levels. The collected data are used within the national radon monitoring framework to support evidence-based decision-making, risk assessment, and the development of targeted mitigation strategies. Furthermore, the tool contributes to the creation of a national database on indoor radon, enabling spatial analysis, risk mapping, and long-term trend evaluation. This methodological approach enhances the effectiveness of public health interventions aimed at reducing radon exposure and supports the implementation of national and international recommendations for radiation protection in residential buildings.

MD.73.	
Title	**INNOVATIVE ASSESSMENT TOOL FOR OCCUPATIONAL RADIATION RISK MANAGEMENT IN MEDICAL PERSONNEL. Part of PhD Thesis**
Authors	Bogdan Marina, Corețchi Liuba
Institution	**National Agency for Public Health**
Patent no.	Registration number of the application for the issuance of a copyright and related rights certificate with the State Agency on Intellectual Property of the Republic of Moldova (AGEPI) – No. 3298 of March 13, 2026.
Description	This invention consists of a structured, multidisciplinary questionnaire designed to assess knowledge, attitudes, practices, and health risks related to occupational exposure to ionizing radiation among medical personnel. The novelty of this tool lies in its integrated approach, which combines five key dimensions: demographic and professional profile, exposure assessment, compliance with radiation protection measures, monitoring of health effects, and risk perception analysis. Unlike traditional assessment methods, this tool enables rapid, anonymous, and scalable data collection (5–10 minutes), identifying gaps in radiation safety culture in real time. The questionnaire is adaptable to multiple medical settings (radiology, CT, interventional procedures, nuclear medicine) and can be implemented digitally, facilitating large-scale epidemiological studies and institutional audits. Its practical applications include: improving occupational safety policies, optimizing training programs, supporting individualized dosimetric monitoring, and contributing to early detection of potential radiation-induced health effects. The innovation supports evidence-based decision-making in healthcare institutions and aligns with international radiological protection standards, enhancing both worker safety and quality of medical services.

Public Institution National Institute for Applied Research in Agriculture and Veterinary Medicine

MD.74.	
Title	Process of producing white sparkling wine with enhanced foaming properties
Authors	Taran Nicolae, Ponomariova Irina, Nemțeanu Silvia, Grosu Olga, Adajuc Victoria, Morari Boris, Soldatenco Olga
Institution	Public Institution National Institute for Applied Research in Agriculture and Veterinary Medicine, Republic of Moldova
Patent no.	*Patent application No. 2701/16.10.2025*
Description	The invention relates to the wine industry and describes a method for producing white sparkling wine with enhanced foaming properties, using local grape varieties Luminița and Telti Curuc. The method involves producing base wines from these varieties and creating a blend in optimal proportions: 50-80% Luminița and 50–20% Telti Curuc. Research has shown that the Telti Curuc variety is the most suitable blending component to complement wine obtained from the Luminița variety, due to its moderate alcohol content (10–12% vol.) and balanced acidity (6–8 g/dm³). The Luminița variety provides the sparkling wine with typical varietal aromas and freshness, while Telti Curuc contributes to taste harmony through floral notes and complexity. At the same time, blending reduces the risk of oxidation specific to the Luminița variety and stabilizes the aromatic profile. The dosage liqueur used to adjust the sugar content is prepared based on Telti Curuc wine, which improves the physico-chemical characteristics and foaming properties of the final product. The technological process includes the classic stages: grape crushing, pressing, sulfiting and clarification of the must, fermentation at 16°C, followed by treatment, stabilization, and blending of the wines. The result consists in obtaining high-quality sparkling wines with improved organoleptic properties and diversifying the range of products made from local grape varieties.

MD.75.	
Title	Process of producing white sparkling wine with enhanced foaming properties
Authors	Taran Nicolae, Ponomariova Irina, Nemțeanu Silvia, Grosu Olga, Adajuc Victoria, Morari Boris, Soldatenco Olga
Institution	Public Institution National Institute for Applied Research in Agriculture and Veterinary Medicine, Republic of Moldova
Patent no.	*Patent application No. 2702/16.10.2025*
Description	The invention relates to the wine industry and describes a method for producing sparkling wines with enhanced foaming properties, which involves obtaining a blend from treated wines derived from the Meleag and Telti Curuc grape varieties, in proportions of 50–80% and 50–20%, respectively. The problem addressed by the present invention consists in improving the foaming characteristics of sparkling wines, ensuring a more efficient use of wines obtained from newly selected varieties, and diversifying the product range by creating a high-quality sparkling wine characterized by specific aromas and flavors, as well as superior foaming and perlage properties. The Meleag variety is characterized by the need to use high doses of SO_2 during the technological process, which complicates its use in the production of sparkling wines. Studies have shown that the most suitable blending component for wine from the Meleag variety—an early-ripening variety with a tendency to accumulate high sugar content—is the Telti Curuc wine, characterized by a moderate alcohol content (10–12% vol.) and balanced acidity (6–8 g/dm³). A proportion of 50–80% Meleag allows the preservation of varietal character and body, while the addition of 50–20% Telti Curuc contributes to taste balance, freshness, and complexity. The resulting blend exhibits improved aromatic stability and is less prone to oxidation. The process includes secondary fermentation of the blend in hermetically sealed vessels under pressure, followed by isobaric filtration and bottling under pressure. For consistent stability, a dosage liqueur based on Telti Curuc wine is used.

MD.76.	
Title	Process for obtaining structured fruit snacks with benefits for digestion
Authors	ŞLEAGUN Galina, IUŞAN Larisa, CUPCEA Tatiana, CARELINA Marina, COJUCARI Ludmila, GOLUBI Roman, GORDEEVA Valentina, TOFAN Svetlana
Institution	Public Institution National Institute for Applied Research in Agriculture and Veterinary Medicine, Republic of Moldova
Patent no.	*Patent application* No. s 2026 0017 of 2026.02.10
Description	The invention discloses a process of preparing structured fruit snacks with benefits for digestion. The process is characterized by the following steps: (1) plum puree preparation; (2) red beet roots processing and beet powder preparation; (3) snack ingredients dosage, which include (% in dry matter): 55-65 prepared plum puree, 5-15 - beetroot powder, the rest - other fruits; and (4) snack's preparation. The basis of this snack is plum puree and red beetroot powder. Plum puree, which includes the fruit's skin, preserves the soluble and insoluble dietary fiber and other components that have a laxative or prebiotic effect, while fully utilizing the gastrointestinal health benefits of whole plums. The proposed red beetroot processing allows the maximum preservation of the remarkable content of betalains and phenols with antioxidant, anti-inflammatory and anticancer properties, associated with the positive effects of beetroot on gastrointestinal health. The proposed fruit snack composition uses the beneficial health properties of each component, which allows you to get an exceptionally natural healthy food with benefits for digestion and rich in nutrients. Thanks to the perfect coordination and interaction of raw materials such as plums and red beets, as well as apples and grapes, the prepared snacks are well structured, acquire a pleasant bright color, harmonious taste and aroma, and are easy to chew. The method described in the invention is scientific, simple, feasible, practical, effective and obvious in terms of comprehensive economic and social benefits from promotion and application.

MD.77.

Title	**Method for treating ear scabies in rabbits**
Authors	MOSCALIC Roman, CARAMAN Mariana, MAȘNER Oleg, PETCU Igor, LUPAȘCU Tudor, EFTENIUC Iulia, COJUȘNEANU Oleg
Institution	Public Institution National Institute for Applied Research in Agriculture and Veterinary Medicine, Republic of Moldova
Patent no.	MD 1628 Z from 2023.01.31
Description	The invention relates to veterinary medicine, namely to a method for treating ear scabies in rabbits. The method, according to the invention, provides for spraying onto the affected surface of the ear or into the affected ear canal a preparation, obtained by mixing 5 g of water-soluble enotannins, obtained by oxidizing enotannins with hydrogen peroxide, 40 mL of glycerol and 60 mL of water. The result of the invention consists in providing an acaricidal, bactericidal regenerating action of the used drug and reducing the duration of treatment. Field of application: Veterinary medicine The work was financially supported by the project 220101 "Scientific support for the exploitation of resources in the zooveterinary sector, selection and adaptation of new breeds and hybrids, technologies, and harmless curative methods, under conditions of climate resilience".

MD.78.

Title	**Process for breeding rabbits**
Authors	MOSCALIC Roman, CARAMAN Mariana, CREMENEAC Larisa, MAȘNER Oleg, COJUȘNEANU Oleg
Institution	Public Institution National Institute for Applied Research in Agriculture and Veterinary Medicine, Republic of Moldova
Patent no.	MD 1631 Z from 2023.02.28
Description	The invention relates to animal husbandry, namely to rabbit breeding. The process for breeding rabbits, according to the invention, provides for the administration of a preparation based on a mixture of effective microorganisms, comprising photosynthetic bacteria, lactic acid bacteria and yeast, in an amount of 1.5 mL/L of water, daily for watering females during the gestation-lactation period and rabbits from birth

to slaughter, at the same time it is used a preparation obtained by fermentation of 1 L of mixture of effective microorganisms, 44 L of water and 5 L of molasses, at a temperature of 33°C for 7 days. The result of the invention consists in increasing the prolificacy of females, diminishing the emergency kindlings and mortality of kindles, increasing pre-slaughter body weight and slaughter yield.
Field of application: animal husbandry.
The work was financially supported by the project 220101 "Scientific support for the exploitation of resources in the zooveterinary sector, selection and adaptation of new breeds and hybrids, technologies, and harmless curative methods, under conditions of climate resilience".

MD.79.

Title **Process for breeding young chickens**

Authors PETCU Igor, MAŞNER Oleg, SÎRBU Tamara, STARCIUC Nicolaie, CARAMAN Mariana, DEMCENCO Boris

Institution Public Institution National Institute for Applied Research in Agriculture and Veterinary Medicine, Republic of Moldova

Patent no. MD 1656 Z from 2023.07.31

Description The invention relates to animal husbandry, namely to the breeding of young chickens. The process for breeding young chickens, according to the invention, provides for the introduction of the culture liquid of the *Penicillium piceum* CNMN-FD-21 fungal strain, in the amount of 1 mL/L of water, daily, by watering in the age period of 1-49 days. The result of the invention consists in increasing the weight, daily gain, viability of young chickens and reducing the specific feed consumption
Field of application: animal husbandry.
The work was financially supported by the project 220101 "Scientific support for the exploitation of resources in the zooveterinary sector, selection and adaptation of new breeds and hybrids, technologies, and harmless curative methods, under conditions of climate resilience".

MD.80.

Title	**Process for growing corn for silage**
Authors	CARAMAN Mariana, CREMENEAC Larisa, MOSCALIC Roman, COJUŞNEANU Oleg, MAŞNER Oleg, PETCU Igor
Institution	Public Institution National Institute for Applied Research in Agriculture and Veterinary Medicine, Republic of Moldova
Patent no.	MD 1668 Z from 2023.09.30
Description	The invention relates to organic agriculture, crop production branch, in particular to a process for growing corn for silage. The process, according to the invention, comprises the uniform introduction into the soil before sowing of a biocompost in the amount of 10 t/ha, the biocompost being obtained by traditional fermentation, for at least 3 months, of rabbit droppings, which were daily given a preparation based on a mixture of effective microorganisms, including photosynthetic bacteria *Rhodopseudomonas ssp., acidolactobacteria Lactobacillus ssp*., and yeast *Saccharomyces ssp.*, in the amount of 1.5 mL per 1 L of drinking water. Field of application: organic agriculture The work was financially supported by the project 220101 "Scientific support for the exploitation of resources in the zooveterinary sector, selection and adaptation of new breeds and hybrids, technologies, and harmless curative methods, under conditions of climate resilience".

MD.81.

Title	Procedure for determining the varietal authenticity of dry red wine from Negru de Căuşeni grapes
Authors	DEGTEARI Natalia, TARAN Nicolae, EFREMOV Egor, SCORBANOV Elena, RINDA Parascovia
Institution	Public Institution National Institute for Applied Research in Agriculture and Veterinary Medicine, Republic of Moldova
Patent no.	Patent application No. 2706/16.10.2025
Description	The invention relates to the wine industry, in particular to the varietal identification process of dry red wine obtained from grapes of the Negru de Căuşeni variety. The authenticity of wine, including the determination of the grape variety used in its manufacture, is a fundamental element in ensuring quality, traceability and protection of geographical

indications. The determination of the variety of wine and its origin was made either by organoleptic or by instrumental means, both of them having certain limitations in terms of identifying.
The key point of our approach lies in the fact that, simultaneously with the organoleptic evaluation of the color, aroma and taste of the Negru de Căuşeni dry red wine, several characteristic chemical parameters of the wine are determined. These parameters are the quantities of monomeric anthocyanins, non-volatile organic acids and the ratio between tartaric acid and malic acid (T/M). In this way, the quantitative values of these indicators, characteristic of the Negru de Căuşeni dry red wine, have been found.
1. Anthocyanin content (% of the total anthocyanin content):
- delphinidin-3-glucoside 2.2…4.0
- cyanidin-3-glucoside 0.2…0.5
- petunidin-3-glucoside 4.0…6.0
- peonidin-3-glucoside 6.5…8.0
- malvidin-3-glucoside 45.0…70.0
- peonidin-3-acetyl-glucoside 2.5…3.5
- malvidin-3-acetyl-glucoside 7.0…8.5
- peonidin-3-coumaryl-glucoside 6.5…7.5
- malvidin-3-coumaryl-glucoside 1.2…2.0
2. The mass concentration of malvidin diglucoside (mg/dm³) is ≤ 15.0
3. The mass concentration of organic acids non-volatile (g/dm³):
- tartaric acid 3.6…5.0
- malic acid 1.8…2.3
4. Ratio between the concentration of tartaric acid and malic acid (T/M) 2.0…2.2

MD.82.

Title Procedure for determining the varietal authenticity of dry red wine from Codrinschii grapes

Authors DEGTEARI Natalia, TARAN Nicolae, EFREMOV Egor, SCORBANOV Elena, RINDA Parascovia,

Institution Public Institution National Institute for Applied Research in Agriculture and Veterinary Medicine, Republic of Moldova

Patent no. Patent application No. 2704/16.10.2025

Description
The invention relates to the wine industry, in particular to the varietal identification process of dry red wine obtained from grapes of the Codrinschii variety.
The authenticity of wine, including the determination of the grape variety used in its manufacture, is a fundamental element in ensuring quality, traceability and protection of geographical indications. The determination of the variety of wine and its origin was made either by organoleptic or by instrumental means, both of them having certain limitations in terms of identifying.

The key point of our approach lies in the fact that, simultaneously with the organoleptic evaluation of the color, aroma and taste of the Codrinschii dry red wine, several characteristic chemical parameters of the wine are determined. These parameters are the quantities of monomeric anthocyanins, non-volatile organic acids and the ratio between tartaric acid and malic acid (T/M). In this way, the quantitative values of these indicators, characteristic of the Codrinschii dry red wine, have been found.

1. Anthocyanin content (% of the total anthocyanin content):
- delphinidin-3-glucoside: 8.0…10.0
- cyanidin-3-glucoside: 0.3… 0.5
- petunidin-3-glucoside: 9.5…11.5
- peonidin-3-glucoside: 3.0…4.0
- malvidin-3-glucoside: 43.0…48.0
- peonidin-3-acetyl-glucoside: 1.8…2.4
- malvidin-3-acetyl-glucoside: 10.2…14.5
- peonidin-3-coumaryl-glucoside: 1.2… 2.0
- malvidin-3-coumaryl-glucoside: 4.5…5.0

2. The mass concentration of malvidin diglucoside (mg/dm³) is ≤ 15.0

3. The mass concentration of organic acids non-volatile (g/dm³):
- tartaric acid 3.6…4.2
- malic acid 1.8…2.1

4. Ratio between the concentration of tartaric acid and malic acid (T/M) 2.0…2.1

MD.83.

Title CASEICHIT: Casein–Chitosan Protein Ingredient from Skim Milk (research project)

Authors Anatoli Cartasev, Maria-Marcela Barbaros, Liudmila Necrilova, Irina Fedotchina

Institution Public Institution National Institute for Applied Research in Agriculture and Veterinary Medicine, Republic of Moldova

Patent no. Research project

Description

This invention generates a unique food-grade “bio-complex” ingredient: a protein–polysaccharide structure formed by casein micelles and chitosan. The resulting casein–chitosan complex is not simply separated protein—it is a functional composite in which dairy protein is organized within a biopolymer network. This architecture provides a practical combination of high protein density and adjustable techno-functional properties, including water binding, viscosity enhancement, and structure stabilization in wet food systems.

The complex can be recovered as a concentrated fraction and, after

neutralization, can be re-dispersed and incorporated into diverse food matrices. Its main value is as an ingredient platform for designing texture and protein enrichment simultaneously, with the potential to reduce syneresis and improve mouthfeel in protein-fortified formulations. Because chitosan is a cationic polysaccharide, the complex can be tuned by simple process variables (dose and pH) to achieve targeted functionality without relying on membrane filtration infrastructure.

Applications include high-protein fermented dairy (yogurt-type products), protein-enriched beverages and desserts, sauces and emulsified systems requiring improved stability, and other structured foods where controlling water release and consistency is critical. The approach is particularly relevant for pilot-scale development and SMEs seeking flexible, low-capex routes to functional protein ingredients.

Academy of Economic Studies of Moldova

MD.84.	
Title	**Fair value measurement: the methodological framework for entities in the Republic of Moldova through the prism of international best practices**
Authors	FRUNZE RODICA, GRIGOROI LILIA
Institution	Academy of Economic Studies of Moldova
Patent no.	doctoral research project
Description	The development of a coherent methodological framework for fair value measurement is essential for entities in the Republic of Moldova, where adopting fair value raises significant methodological and practical challenges. These stem from the absence of active markets, limited access to observable data, and uneven professional proficiency. Fair value has become a central reference point of modern financial reporting, increasingly used for measuring a wide range of assets and liabilities. **Applications:** The proposed framework integrates IFRS 13 with National Accounting Standards and international best practices, providing entities and professionals with a structured tool for credible and comparable fair value measurement. It serves as an indispensable instrument for: • **Standardization of measurement practices** – Applying the three-level fair value hierarchy consistently across entities ensures uniform and reliable estimates throughout Moldova. • **Enhanced credibility and comparability** – Aligning national practice with IFRS 13 and European models strengthens comparability of financial statements and builds confidence among investors, creditors and stakeholders. • **Reduction of misstatement risk** – A clear methodology supports preparers in selecting valuation techniques (market, cost or income approach) and documenting inputs, hypotheses and hierarchy levels applied. • **Support for audit and decision-making** – The framework provides clear references for evaluators, accountants and auditors, reducing inconsistent application of standards and aligning national

practices with international benchmarks. Implementing this framework transforms fair value measurement into a structured, documented and reproducible process. Adapting international best practices to Moldova's realities improves financial reporting quality, consolidates trust in accounting information and supports the long-term integration of national entities into the European reporting space.

MD.85.

Title	**Decision matrix for determining the accounting treatment of digital databases in public higher education institutions in the Republic of Moldova**
Authors	Grigoroi Lilia, Țurcanu Liliana
Institution	Academy of Economic Studies of Moldova
Patent no.	Doctoral research project
Description	The development of a decision matrix for determining the accounting treatment of digital databases is essential for modernising financial management in public higher education institutions (HEIs) in the Republic of Moldova (RM). As the transition to online resources redefines the financial value of university libraries, while national accounting regulations remain insufficiently adapted to the specific nature of digital assets, this innovation becomes a critical priority. The matrix enables a transparent, consistent and well-founded selection of the accounting treatment applicable to access to digital databases — as intangible assets, prepaid expenses or current expenses. **Applications:** the decision matrix is an important tool for the strategic modernisation of accounting practice in public HEIs of the RM, going beyond a simple classification exercise. It supports: → **standardisation of accounting practice** – a uniform approach reduces heterogeneous practices and ensures comparability of financial information; → **clear differentiation of accounting treatments** – the matrix supports professional judgment in analysing contractual clauses and distinguishing between intangible assets, prepaid expenses and current expenses; → **faithful representation of institutional patrimony** – consistent application increases the

reliability of financial statements and reduces the risk of misstatements concerning digital assets and investment capacity;

→ **strengthening professional judgment** – the matrix provides a conceptual framework for accounting professionals when assessing access rights to digital resources.

The integration of this decision matrix into accounting practice is essential for modernising university financial management in the RM, increasing transparency, comparability and alignment with international good practices.

MD.86.

Title	**Analysis of the double materiality algorithm: from accounting compliance to sustainable value creation for entities in the Republic of Moldova**
Authors	Iavorschi Irina, Lazari Liliana
Institution	Academy of Economic Studies of Moldova
Patent no.	Doctoral research project
Description	The transition of financial reporting for entities in the Republic of Moldova, from accounting compliance toward a model centered on sustainable value creation, represents a challenge both for aligning the national regulatory framework with European and international standards, and for entities in developing new business models. **Applications:** The research findings, based on a sample of entities that maintain their accounting and financial reporting under National Accounting Standards (SNC) versus those applying IFRS, reveal a significant discrepancy in their perspectives on the implementation of sustainability reporting. The research maintains that: ✓ In an economy undergoing full alignment with the European regulatory framework, the transition from simple accounting compliance to the strategic communication of value becomes an imperative for the resilience of local entities. ✓ The materiality algorithm represents an essential methodological tool for entities in the Republic of Moldova, providing a transition path from rigorous SNC/IFRS compliance to sustainability reporting. This

algorithm not only facilitates the prioritization of reporting requirements but also serves as a mechanism to filter information that truly matters to investors and other stakeholders.

- ✓ The hypothesis regarding the materiality of non-financial information in the context of the Republic of Moldova finds that stakeholders react to ESG data and demonstrates that these are not merely image-building exercises (greenwashing), but are becoming predictive elements of value that influence users' decision-making processes.
- ✓ Implications for regulatory harmonization: the findings support the need to accelerate the alignment of the national regulatory framework with European Directives (the CSRD), arguing that the standardization and auditing of ESG information are essential to maximize transparency benefits domestically and to facilitate the access of Moldovan entities to international sustainable financing.

The implementation of the double materiality principle within entities in the Republic of Moldova represents a fundamental pillar in the transposition of the European Corporate Sustainability Reporting Directive (CSRD); the application of this concept compels entities to move beyond the traditional perspective of financial materiality (outside-in) by integrating the social and environmental impact dimension (inside-out).

MD.87.	
Title	**An accounting model based on algorithmic trust via blockchain**
Authors	Violeta CODREAN, Svetlana MIHAILA
Institution	**Academy of Economic Studies of Moldova, „Ștefan cel Mare" University of Suceava**
Patent no.	-
Description	In an economic context where trust in financial information is essential but difficult to guarantee, traditional accounting systems remain dependent on human verification, redundant processes, and post-hoc audits, resulting in high costs and vulnerabilities to errors or fraud. The project proposes an accounting model based on algorithmic trust, integrating

blockchain technology to fundamentally transform the way accounting information is generated and validated.
The research introduces the concept of „trustless accounting", in which trust is ensured not by human intervention, but by accounting rules encoded and executed automatically via smart contracts. The proposed model, Algorithmic Trust-Based Accounting Model, enables the recording, validation, and monitoring of economic transactions in real time within a distributed, immutable, and transparent ledger.
Within this model, every economic event is automatically processed according to predefined rules: an economic transaction simultaneously generates accounting entries, updates inventory, and calculates tax liabilities, all of which can be instantly verified by the parties involved. This eliminates the need for subsequent reconciliations and lays the groundwork for continuous auditing.
The innovative value of the project lies in redefining the accounting function, transforming it from a retrospective process dependent on external control into a proactive, autonomous system based on algorithmic validation. The model has the potential to enhance transparency, reduce fraud, and optimize administrative processes, as it is scalable and applicable to all types of entities.

Through the proposed approach, this research contributes to the development of a new paradigm in accounting, aligned with trends in digital transformation and the decentralized trust-based economy.

MD.88.

Title	**AIMCOMM - the comprehensive model of integrated marketing communication processes from an anthropic perspective.**
Authors	Emil Bolocan, Oxana Savciuc
Institution	**Academy of Economic Studies of Moldova**
Patent no.	Doctoral research
Description	The Anthropic Integrated Marketing Communication Model – AIMCOMM, is a comprehensive integrated marketing communication (IMC) model which details all processes, subprocesses, medium, roles, actions implementing agency, media, channels, carriers, vehicles of

communication messages and other IMC elements with applications in tactical and strategic marketing decision making and academic marketing theory. The usual conceptualization of communication models based on Claude Shannon's Mathematical Theory of Communication does not provide the necessary framework for an IMC model. The message alone is not sufficient. It is sufficient for a mathematical system (as it is present in Claude Shannon's diagram) but in IMC there is the need for human communication elements – an anthropic factor. The anthropic factor implies the transmission of ideas; we recognize that an idea must travel from the Source to the Destination. This flow is sequenced in seven stages: Formulation, Illustration, Production, Transmission, Display, View/Hear and Interpretation. Each stage for the exception of the Transmission consists of two actions. The actions are mirrored from the Source to the Destination since they follow a process of construction and deconstruction. The construction is Message –> Story –> Content –> Format –> Vehicle, then Transmission (either as signal or in a physical shape) and then deconstruction in reverse order.

MD.89.

Title	**The methodology for business combinations accounting in the Republic of Moldova**
Authors	Lupașcu Margareta, Grigoroi Lilia
Institution	**Academy of Economic Studies of Moldova**
Patent no.	Research Doctoral Project
Description	The methodology for business combinations accounting in the Republic of Moldova comprises a comprehensive framework of rules and regulations designed to standardize economic and financial transactions related to the transfer of assets, liabilities, and equity from the acquiree to the acquirer or a newly registered company, encompassing mergers by absorption and consolidation. Due to insufficient regulation in the Republic of Moldova, this framework emphasizes the harmonization and synergy between the National Accounting Standards and International Financial Reporting Standard (IFRS) 3 "Business combination", recommending the establishment of interim debt and receivable accounts for the acquirees,

categorizing the transfer process as a derecognition of assets, liabilities, and equity. Similarly, the acquirer executes the asset, liability, and equity mergers, except for share capital, using the 850 “Merger Operations Transfer” account. The final differences determine whether to recognize the goodwill or the merger premiums.

The research findings highlight a comprehensive sample of 375 companies and state-owned institutions involved in merger-by-absorption or consolidation transactions undertaken between 2020 and 2024. Additionally, the research was expanded to include a multiple regression analysis focused on identifying the influencing factors of the Return on Assets (ROA) Ratio in the merger year for three categories of parties: public institution acquirers, corporate-sector acquirers, and acquirees.

MD.90.

Title **MASSUREMENT OF CEO INDIVIDUAL FACTORS INFLUENCING ON THE ITSM IMPLEMENTATION IN MOLDOVAN SMEs**

Authors Colesnicova Vlada
Institution Academy of Economic Studies of Moldova
Patent no. Doctoral Research Project

Description

This research empirically analyzes the extent to which a CEO personal characteristics and enterprise attributes influence on the implementation of ITSM in Moldovan SMEs. The main objective is to evaluate both driving forces and barriers to innovation.

- Theoretical Basis: Based on scientific theory and existing empirical studies.
- Sample: Questionnaire distributed to 126 respondents from diverse national SMEs (North, South, Center, Chisinau Municipality) between December 2025 and March 2026.
- Data Sources: Data from the free smart platform https://www.data2b.md/ro/ was also integrated.

The econometric analysis reveals that ITSM implementation in Moldovan SMEs is driven by a combination of CEO human capital and organizational maturity. The study revealed that CEOs aged 30-50 with high education levels are the most proactive in adopting

ITSM and new technologies, regardless of their gender or tenure. The digital transformation of Moldovan SME sector is the most successful when led by highly educated, mid-career professionals operating within established organizational structures.

MD.91.

Title **"Decoding Gender Differences in Consumer Reactions to Shock Advertising through Eye-Tracking Analysis"**

Authors Gaugas Tatiana
Institution Academy of Economic Studies of Moldova
Patent no. doctoral research project

Description

The project introduces an innovative gender-based behavioral model for decoding consumer reactions to shock advertising using neuromarketing techniques. In a highly competitive advertising environment, where capturing attention is increasingly challenging, this research provides a data-driven framework for understanding how men and women perceive and process controversial content.

The study integrates eye-tracking technology to measure visual attention, emotional engagement, and cognitive processing in real time. A total of 40 participants were exposed to different categories of shock advertising stimuli, including cruelty, disgusting imagery, moral violations, religious taboos, indecency, and sexual content. The collected data were analyzed using SPSS and Python, with a focus on heatmaps, gaze paths, fixation duration, and viewing time.

The findings reveal significant gender differences: women show stronger emotional responses and deeper engagement, especially toward ethically sensitive content and images involving vulnerable subjects, while men demonstrate a more rational, cognitive processing style with faster visual scanning. The highest impact is generated by cruelty and disgusting imagery, followed by religious taboos and moral violations, while sexual content produces lower perceived shock intensity.

Applications:

- This model supports the development of gender-sensitive advertising strategies, helping marketers design more effective and ethically aligned campaigns based on objective consumer behavior

data.

- Integration of eye-tracking technology for objective measurement of consumer attention and emotional response
- Women showed more negative emotional reactions to shock tactics in advertising compared to men.
- Identification of high-impact shock categories and their differentiated perception across genders
- Support for ethical and targeted advertising design, minimizing negative reactions and maximizing engagement for male and female segments.
- Contribution to the advancement of neuromarketing and consumer behavior research.

This behavioral model allows marketers to tailor shock advertising strategies based on the specific emotional and cognitive processing preferences of each gender segment.

MD.92.	
Title	**Economic Development Scenarios for Romania and Moldova through 2040: Based on Demography and Government Expenditure on Tertiary Education**
Authors	Samohvalov Artiom, doctoral student of Doctoral School of AESM
Institution	Academy of Economic Studies of Moldova
Patent no.	Doctoral research project
Description	The effectiveness of government expenditure on education is particularly relevant in countries facing demographic decline and labor market imbalances, such as Moldova and Romania. Against this background, Cobb–Douglas–type models were estimated for Romania and the Republic of Moldova using linear regressions of the natural logarithm of GDP (PPP) on the logarithm of capital stock, labor input, and the share of government expenditure on tertiary education averaged over the preceding 10 years. For Moldova, the estimated model showed that all coefficients are statistically significant at least at the 10% level. Weak instruments and Wu–Hausman tests indicate that increase in the share of government expenditure on tertiary education leads to a decrease in GDP (PPP). For Romania, no comparable models were obtained; instead, the best-

performing specification, based on the highest coefficient of determination, corresponds to an exogenous growth model including capital stock and the number of people working in the economy. Using endogenous model for Moldova alongside three demographic scenarios from CDR of NIER for Moldova, projections suggest that, under current efficiency of government investment in tertiary education, the average economic growth rate will range from 0.83% to 1.16% annually through 2040. GDP (PPP) per capita in constant 2021 USD is not expected to exceed 23085 by 2040, even under the most favorable scenario. For Romania, based on three UN demographic scenarios, projected growth ranges from 0.53% to 2.47% annually through 2040. GDP (PPP) per capita is expected to be 62793 USD (2021 prices) in 2040 under the most optimistic scenario.

MD.93.

Title **AI-DRIVEN DECISION SUPPORT MODEL FOR REVENUE RECOGNITION UNDER IFRS 15 (RRDI)**

Authors ȘOIMU Corneliu, MIHAILA Anastasia, BĂDICU Galina

Institution Academy of Economic Studies of Moldova,
Ștefan cel Mare University of Suceava,
Bucharest University of Economic Studies

Patent no. -

Description

This innovation introduces the Revenue Recognition Decision Index (RRDI), a quantitative decision-support model designed to enhance consistency and transparency in revenue recognition under IFRS 15. The model addresses the high dependence on professional judgment and subjectivity, particularly in complex contractual environments such as IT and SaaS.

RRDI integrates four key determinants: Contract Complexity (C), Performance Obligations (P), Transfer Type (T), and Estimated Risk (R), combined into a weighted composite index. Based on the resulting score, contracts are classified into three categories: point-in-time, over-time, or mixed revenue recognition, ensuring methodological consistency and comparability.

The model reduces interpretative variability and provides a transparent justification for accounting decisions, supporting audit processes and improving financial reporting quality.

Empirical validation on IT contracts confirms its applicability and robustness.

RRDI represents an original contribution by transforming professional judgment into a structured, quantifiable, and reproducible framework, applicable in financial reporting, auditing, and digital decision-support systems.

MD.94.

Title

Conceptualization of an Inclusive Employer Maturity Index (IEMI) to assess the readiness of Romanian companies regarding the inclusion of people with disabilities

Authors

Ancuta-Anisia CHELBA, Veronica GROSU, Cristina Gabriela COSMULESE, Ludmila FRUMUSACHI

Institution

Ștefan cel Mare University of Suceava, Academy of Economic Studies of Moldova

Patent no.

-

Description

Globally, neurodiversity is increasingly recognized not only as a medical concept but also as a broader social and economic dimension, with growing efforts to integrate persons with disabilities (PwD) into meaningful employment and leadership structures. Despite progressive EU legislation, PwD continue to face disproportionate unemployment, structural barriers, and persistent stigmatizing attitudes that undermine their full participation in the labor market. This study explores the interaction of six dimensions of workplace inclusion – stigma perception, cost-related reluctance, company size, loyalty and diversity value, organizational factors, and CSR practices – from the perspective of employers.

The main objective is to examine the integration process of PwD in Romanian companies by analyzing employment policies, organizational practices, and the associated social and economic impact. Our findings reveal three main perspectives. First, stigma and persistent misconceptions remain critical barriers, shaping employers' reluctance despite recognizing the competencies of PwD. Second, concerns regarding workplace adaptation costs continue to discourage many employers, even though long-term benefits such as reduced turnover and improved corporate reputation outweigh initial investments. Third, larger organizations and

those with diversity-oriented practices demonstrate higher maturity levels in terms of PwD inclusion. The results highlight that stigma and prejudice remain deeply embedded in organizational cultures, acting as major barriers to inclusion. However, companies facing labor shortages tend to perceive PwD as valuable and loyal employees, which can reduce discriminatory attitudes. Furthermore, the findings indicate the presence of "subtle stigma", where PwD are formally included but assigned to marginal roles with limited career advancement opportunities. This suggests that inclusion policies must go beyond compliance and focus on transforming organizational culture. The study also shows that SMEs often face greater challenges due to limited resources, while larger firms benefit from better infrastructure, CSR integration, and regulatory compliance capabilities. The study confirms that inclusive employment is shaped by both behavioral and organizational factors. While CSR strategies, diversity values, and organizational size positively influence inclusion, stigma and cost-related concerns remain significant barriers. The proposed Inclusive Employer Maturity Index (IEMI) provides an innovative framework for assessing organizational readiness and supports the development of more inclusive labor markets. Future research should focus on expanding this model and integrating policy and managerial interventions to reduce stigma and enhance inclusion practices.

MD.95.

Title	**The budget cost of envelope wages among minimum wage workers**
Authors	Iulian DASCALU, Veronica GROSU, Svetlana MAHAILA
Institution	Academy of Economic Studies of Moldova/Stefan cel Mare University of Suceava
Patent no.	-
Description	Our poster addresses an issue with important economic and social implications, the practice of paying part of an employee's wages "under the table,". A practice that affects both employees' incomes and the state's budgetary resources. In Romania, this situation is particularly relevant in labor-intensive sectors, where payment at the minimum wage level may conceal additional undeclared income.

The objective of the research was to construct a easily replicable model to estimate the budgetary cost associated with these practices. We focused on employees declared at the minimum wage, as in this category the difference between official income and actual remuneration can be identified more easily compared to other occupational segments.

The methodology used was based on a pilot questionnaire administered to a sample of 120 respondents in the HoReCa sector. An area considered high-risk regarding informal payments. We investigated the existence of additional cash payments, their value, and the frequency with which they are made.

The results indicate that 60% of respondents report the existence of informal additional payments. The estimated average value of hidden remuneration is approximately 512 lei per month per respondent, and for affected employees, it exceeds 850 lei per month. From a fiscal perspective, this generates an estimated loss of over 224 lei per month for each employee analyzed.

Extending the model to the national level, the scenarios presented show that the potential annual recovery for the public budget could range between approximately 1.79 and 2.24 billion lei, depending on the adjustment assumptions used.

MD.96.	
Title	**The dynamics of value determinants for economic entities in the age of innovation and digitalization**
Authors	Ioana ANDRIOAIA, Veronica GROSU, Svetlana MIHAILA, Cristina-Gabriela COSMULESE, Anamaria-Geanina MACOVEI
Institution	**Ștefan cel Mare University of Suceava / Academy of Economic Studies of Moldova**
Patent no.	Doctoral Research Project
Description	Understanding the changing determinants of value is becoming essential as intangible assets, adaptability, and digital business models reshape stakeholders perceptions of how to assess the value of an economic entity. The purpose of this study is to capture the transition of the determinants of economic entities value from traditional

financial and governance factors to modern value creation mechanisms. The analysis includes 2,995 documents indexed in the Web of Science database between 1991 and March 2026, processed as a bibliometric analysis using VOSviewer and the Bibliometrix package in RStudio.
The results comprise three distinct yet complementary thematic groups that explain the traditional value of economic entities from the perspective of governance quality, financial structure, and financial performance and efficiency; underscore the need to link the value of these entities to sustainability, transparency, accountability, and responsiveness to stakeholders; and at the same time highlights the dynamism with which the value creation of economic entities is oriented toward innovation, knowledge, skills, and digital transformation. This thematic evolution demonstrates the shift from a classical vision (1991–2016), marked by financial value, toward a phase of convergence (2017–2022) involving multiple determinants, moving as close as possible to the present (2023–2026) with complex value models centered on digital transformation.

The conclusions highlight the need to develop hybrid models that combine structural and dynamic determinants to provide a realistic perspective on the value of contemporary economic entities.

MD.97.	
Title	**Beyond Lean: The Dynamic Buffer Intelligence Model (DBIM) and Index (DBII) for Adaptive Management of Global Supply Chains**
Authors	**Macovei Anamaria-Geanina, Burciu Aurel, Pârţachi Ion, Kicsi Rozalia-Iuliana**
Institution	**"Ştefan cel Mare" University of Suceava, Academy of Economic Studies of Moldova**
Patent no.	**doctoral research project**
Description	The invention consists of the development of an innovative conceptual model, called the Dynamic Buffer Intelligence Model (DBIM), based on the Dynamic Buffer Intelligence Index (DBII), which enables adaptive buffer management within supply chains. The DBIM model proposes a paradigm shift from the traditional Lean approach, which

aims to eliminate buffers to increase efficiency. Instead of this perspective, the model advocates the use of buffers as strategic resources, intelligently managed and dynamically adjusted according to the actual conditions of the system, such as demand variability, the level of disruptions, and the quality of available information. This approach allows for maintaining a balance between efficiency and resilience, reducing the vulnerability of systems to uncertainty.

In this context, the DBII indicator serves to measure the system's ability to adapt buffers in real time. It integrates essential dimensions such as operational adaptability, information quality, environmental variability, and the impact of disruptions, providing a comprehensive assessment of the supply chain's adaptive performance. By correlating the DBIM model with the DBII indicator, the invention provides a practical tool for designing and optimizing supply chains capable of simultaneously maintaining operational efficiency and resilience under conditions of uncertainty

MD.98.	
Title	Greenwashing awareness and food security in R. Moldova: empirical evidence and educational implications
Authors	Perciun Rodica, Timofei Olga, Iordachi Victoria
Institution	National Institute of Economic Research of the Academy of Economic Studies of Moldova
Patent no.	n/a
Description	This research was carried out within the framework of the project 25.80012.5107.10SE "The phenomenon of greenwashing in the context of food security in the Republic of Moldova: best practices and alignment with the EU", funded by the National Agency for Research and Development, R. Moldova. Greenwashing in Moldova's agri-food sector poses a growing threat to consumer trust, food security and sustainable development, particularly as the country advances its EU integration agenda ahead of the Green Claims Directive. The research combines a comprehensive literature review and theoretical analysis with a quantitative empirical study administered to N=235 economics students. **Results: 1.** The published **practical guide** establishes the first national taxonomic framework of

agrifood greenwashing in Moldova across six typologies, clarifying the critical distinction between food security and food safety that producers actively exploit through misleading environmental claims. 2. **Structural analysis of Moldova's agri-food sector** identifies specific vulnerabilities favoring greenwashing proliferation: soil degradation, limited organic adoption, and a legitimacy arbitrage trap between regulations and market pressures, with comparative evidence confirming that transition economies face significantly higher institutional exposure than developed EU members. 3. **The empirical study** reveals a striking consumer paradox: although economics students self-assess as moderately aware of greenwashing (GWA = 3.82/5), only 10.6% correctly identify all deceptive labels while 61.7% erroneously reject legitimate certifications such as EU Organic and Fairtrade. Greenwashing awareness positively drives purchase intention ($\beta=+0.424$; $p<0.001$) and perceived product benefits emerge as the strongest behavioral predictor ($\beta=+0.577$; $p<0.001$), together explaining 45.2% of variance, with the original F1 net score instrument confirming that superficial awareness may be more damaging than complete ignorance.

MD.99.

Title **" Contribution of the internal audit function to enhancing organizational resilience in small and medium-sized enterprises in Romania"**

Authors Cristina-Raluca Cernovschi, Marius-Sorin Ciubotariu, Svetlana Mihăilă, Corina Petrescu

Institution Academy of Economic Studies of Moldova
Stefan cel Mare University of Romania

Patent no. doctoral research project

Description In an economic environment marked by unpredictability, digitalization, and successive crises, organizational resilience has become condition for the grouth and survival of small and medium-sized enterprises (SMEs). The vulnerability of SMEs is not solely due to a lack of financial resources, but rather to the absence of structured mechanisms for identifying and managing risks, to governance that is often informal, and to an organizational culture in which uncertainty is managed reactively rather

than proactively. In this institutional gap, the internal audit function, when voluntarily adopted, can serve as the very tool that transforms a fragile organization into one capable of anticipating, absorbing, and recovering from adversity. Building on these considerations, this research aims to analyze the extent to which Romanian SMEs that choose to voluntarily implement the internal audit function, internally, or through outsourcing, or via co-sourcing, gain a real competitive advantage by increasing their organizational resilience. The study employs a questionnaire-based approach, administered to managers and owners of SMEs across all regions of Romania, operating in various sectors. The research instrument is structured around three dimensions: the existence and form of voluntary implementation of the internal audit function at the organizational level, the degree of formalization of governance and risk management, and organizational resilience measured by the firm's ability to anticipate, absorb, and recover from major disruptions. Data collection is carried out by sending the questionnaire via email to representatives of the SMEs included in the sample. The findings confirm that voluntary internal audit significantly enhances organizational resilience in SMEs, with the manager's profile proving a stronger predictor of adoption than firm size. The co-sourcing model emerges as the most feasible implementation solution, while perceived cost remains the primary barrier. The study offers professional bodies and economic policymakers an empirical basis for developing incentive and support programs to encourage the adoption of this function. Last but not least, the research helps fill a gap in the Romanian specialized literature, as empirical studies on internal audit in SMEs remain limited, and even more so those that explicitly address the link between audit and organizational resilience.

MD.100.

Title	**"The illusion of integration: Measuring information connectivity and detecting connectivity-washing in integrated reporting using AI and NLP"**
Authors	Ciubotariu Marius-Sorin, Sandulachi Ana-Maria
Institution	Ștefan cel Mare University of Suceava

Patent no. doctoral research project

The study proposes a model based on NLP techniques and artificial intelligence, which enables the objective measurement of real information connectivity, as well as the identification of the phenomenon of connectivity-washing by detecting discrepancies between declarative and effective connectivity.

The research paper is based on an interdisciplinary approach, positioned at the intersection of accounting, sustainability, corporate governance, and information technology. It draws on both principles from the field of corporate reporting and natural language processing (NLP) techniques, as well as semantic network analysis tools.

The main objectives of the study are as follows:

- clarifying the concept of connectivity washing;
- developing an automated semantic analysis model;
- proposing a quantitative connectivity indicator;
- defining a discrepancy index (CW);
- extending the concept of greenwashing toward the dimension of informational integrity.

Description

The findings of the study contribute to enriching the literature by extending the concept of greenwashing toward a broader framework of informational integrity in corporate reporting, while also offering practical implications for investors, regulators, and standard-setters by providing a scalable tool for assessing the authenticity of integrated reporting practices.

Applications:

- The model may be used to evaluate whether an integrated report provides genuinely connected information or merely broad descriptive narratives. Through the calculation of the CI, CD, and CW indicators, the report can be classified as authentic, weak, imbalanced, or exposed to the risk of connectivity washing.
- Investors may use the model to distinguish between credible reports and reports that are predominantly rhetorical in nature. A high CW level may indicate informational risk, limited transparency, or a lack of strategic coherence.
- By applying the model to successive reports of the same

company, it is possible to observe whether reporting becomes more integrated and coherent or, conversely, more declarative.

- Regulators and standard-setting bodies may use the model to identify reports exposed to a high risk of symbolic reporting and to enhance the evaluation criteria applied to integrated reporting practices.
- The model may support auditors and non-financial assurance providers by identifying areas characterized by contradictions, limited coherence, or discrepancies between financial and ESG reporting.

The proposed model transforms integrated reporting analysis from a qualitative judgment into a data-driven assessment of semantic connectivity and reporting authenticity.

MD.101.

Title **Measuring Active Ageing Beyond the EU: The Republic of Moldova's 2024 Index as a Policy Innovation**

Authors Mariana BUCIUCEANU-VRABIE

Institution **National Institute for Economic Research, AESM**

Patent no. N/A – **research-based methodological and policy innovation**

Description

This project presents the 2024 Active Ageing Index (AAI) for the Republic of Moldova as a methodological and policy innovation developed in a non-EU context. Its originality lies in the systematic adaptation of the UNECE/European Commission AAI framework to national statistical realities while preserving the principle of best possible comparability. The model integrates multiple data sources, including the 2024 Population and Housing Census, the Generations and Gender Survey (Wave II), the Labour Force Survey, the Household Budget Survey, mortality tables, and complementary targeted studies on older persons.

The Moldovan AAI has been developed in three comparable national rounds—2016, 2020, and 2024—allowing consistent monitoring of progress over time. **The 2024 edition** introduces, for the first time, **urban-rural estimation**, which substantially strengthens the analytical and policy relevance of the instrument. The index captures **four core dimensions of active ageing:** employment,

participation in society, independent, healthy and secure living, and capacity and enabling environment.
Its applications include evidence-based policy design, identification of gender and territorial inequalities, monitoring of demographic resilience, and support for national and international reporting on ageing. The Moldovan model also offers a transferable framework for other non-EU countries seeking robust, transparent, and policy-relevant tools for measuring and governing active ageing.

The 2024 AAI for the Republic of Moldova was developed within the Generations and Gender Programme (GGP) to support authorities in designing evidence-based policies that strengthen demographic resilience. It also forms part of the research subprogramme "030102 Demographic Transition in the Republic of Moldova: Specific Features, Socio-Economic Implications, and the Consolidation of Demographic Resilience" (2024–2027).

MD.102.

Title

HOW WIDE IS THE GAP BETWEEN RICH AND POOR? MEASURING QUINTILE-BASED INEQUALITY IN TIME UNITS FOR THE REPUBLIC OF MOLDOVA

Authors

Tatiana COLESNICOVA, Anatolii ROJCO, Ecaterina HEGHEA, Mihail CIOBANU

Institution

National Institute of Economic Research, Academy of Economic Studies of Moldova

Patent no.

Scientific Research Project

Description

This research introduces two original indices for measuring income and expenditure inequality through an intuitive time-based metric. Conventional inequality measures - including the Gini coefficient and quintile income ratios - express disparity in abstract numerical terms that are difficult to communicate to policymakers and the general public.
The Index of Time-Based Income Inequality (ITBII) and the Index of Time-Based Expenditure Inequality (ITBEI) translate the quintile gap into days: how many working days (ITBII) or calendar days (ITBEI) the poorest quintile must work or spend to match what the richest quintile earns or spends in one month. Applied to Moldova (2019–2025)

using NBS Household Budget Survey data disaggregated by urban/rural strata, the indices reveal: persistent and widening polarization; urban-driven expenditure inequality (ITBEI reaching 141 calendar days in 2025); a temporary compression of the income gap during 2020–2022 due to social transfers and minimum wage increases, subsequently reversed by inflation (overall ITBII reaching 84 working days by 2025); and rural subsistence activities partially cushioning rural income shocks. The indices offer a replicable, communication-friendly tool for policymakers, EU-convergence benchmarking, and poverty-targeting strategies.

Research was done within the Project selected in competition "Stimulating excellence in scientific research 2025-2026" 25.80012.0807.37SE "The perfection of instruments for reducing income inequality and reducing poverty of the population.

MD.103.

Title Developing an innovative ecosystem to optimize human capital in the Republic of Moldova through mechanisms of social inclusion and sustainable development

Authors Gribincea Corina, Popa Marina, Ungur Cristina, Sîrbu Elena

Institution National Institute for Economic Research, Academy of Economic Studies of Moldova

Patent no. -

Description This innovation addresses one of the most pressing challenges facing transition economies: the erosion of human capital through mass labour migration, skills mismatch, and inadequate social inclusion mechanisms. The proposed innovation is an innovative human capital optimisation ecosystem for the Republic of Moldova, beeing a replicable, evidence-based model that integrates digital tools, cross-sector collaboration, and targeted social inclusion mechanisms to retain and develop the national workforce. Unlike conventional approaches, this ecosystem simultaneously addresses educational access, vocational reskilling, and labour market integration through a unified, data-driven framework. The ecosystem is built on three interconnected pillars: (1) a platform that maps skills gaps and matches individuals with tailored educational and

training pathways; (2) a public-private partnership framework that aligns vocational curricula with real labour market demand; and (3) a social inclusion module specifically designed to support vulnerable groups, including youth, rural populations, and displaced workers. The innovation moves beyond diagnosis to implementation, offering a pilot-tested intervention. A rigorous analytical phase identified systemic barriers in the current education-to-employment pipeline, informing the design of scalable policy tools and operational mechanisms. The model generates actionable data for policymakers and offers a scientifically grounded, transferable framework that measurably improves employability, reduces skills mismatch, and retains workforce across transition economies in Central and Eastern Europe.

MD.104.

Title

" The proliferation of digital economic and financial crime and its implications for the financial and accounting sector through the development of a Machine Learning-based risk assessment and anomaly detection model"

Authors

Racolciuc Adina-Cosmina, Sandu (Stan) Bianca-Mihaela, Ciubotariu Marius-Sorin, Mihaila Svetlana

Institution

"Ștefan cel Mare" University of Suceava, Academy of Economic Studies of Moldova

Patent no.

doctoral research project

Description

The rapid growth of digital economic crime has produced annual global losses of tens of billions of dollars, amplified by transnational criminal networks, digital technologies, and weak ex-ante fraud detection. In this context, the study proposes a financial risk assessment model designed to identify systemic vulnerabilities, detect anomalies, and support decision-making through data-driven early warning indicators.The methodology uses machine learning algorithms, including Random Forest, decision trees, classification, clustering, and unsupervised anomaly detection, to analyze financial data, distinguish legitimate from suspicious transactions, and identify statistically significant deviations. The results are integrated into a dynamic, real-time risk scoring mechanism that aggregates

multiple indicators into an interpretable index. The research addresses the convergence between financial risk and cybercrime in increasingly complex digital financial ecosystems. Its main contributions include an integrated framework for assessing financial and cybercrime-related risks, an interpretable mechanism suitable for audit, supervision, and compliance, a system for detecting abnormal financial and digital behavior, and an early warning model based on continuous monitoring of emerging risk signals. Overall, the study shifts financial risk management from post-event reaction toward prevention and anticipation. It demonstrates that financial risk assessment can no longer be separated from cybercrime dynamics, as both form an interconnected system with rapid propagation and systemic impact. Future research will extend the framework to decentralized financial ecosystems and heterogeneous data sources, including unstructured digital streams.

MD.105.

Title

The Smart Hospital as an Emerging Outcome of Intellectual Capital: A Reconceptualization of Organizational Intelligence in the Healthcare Sector

Authors

Siretean Sorinel Toderaş, Grosu Veronica, Mihaila Svetlana, Macovei Anamaria-Geanina

Institution

"Ştefan cel Mare" University of Suceava,
Academy of Economic Studies of Moldova

Patent no.

doctoral research project

Description

The invention consists of redefining the concept of the “smart hospital” by shifting the dominant perspective in the specialized literature, which primarily associates organizational intelligence with the level of digitization and the use of advanced technologies. This approach argues that technology is not the fundamental source of intelligence, but rather a supporting factor, whose value depends on how it is integrated and utilized.

The novelty lies in defining the smart hospital as an emergent result of intellectual capital, specifically the interaction between human, structural, and relational capital. In this view, organizational intelligence is not a static attribute or a direct effect of digital infrastructure, but a

dynamic process generated by the organization's ability to leverage intangible resources within medical and managerial activities.

Through this contribution, the research proposes an innovative conceptual model in which the hospital's performance and adaptability are explained by the synergies between knowledge, processes, and institutional relationships, and not exclusively by the degree of technological advancement. Thus, the paper offers an alternative perspective on the development of healthcare systems, highlighting the decisive role of intellectual capital in generating organizational intelligence.

Mariana Malcoci

MD.106.	
Title	**Ethnic accessories: belts with embroidered geometric motifs**
Authors	**Malcoci Marina, Malcoci Maria-Eudochia, Doina-Bezuțchi Angela, Corolevschi Marcela**
Institution	Public Institution Center of Excellence in Light Industry from Chisinau
Patent no.	-
Description	The work features four leather straps, designed as a modern reinterpretation of the traditional chimera. Each piece is made using manufacturing techniques that combine the rigor of material processing with the finesse of manual cross-stitch embroidery. The vivid color scheme, based on contrasts of yellow, blue and red, highlights archaic geometric motifs, while the closure systems with satin laces and metal clasps give the accessories a contemporary aesthetic and functionality adaptable to the modern silhouette. From a social point of view, the project contributes to the preservation of cultural identity and the transmission of intangible heritage to new generations. By stylizing a traditional wearable object, the work educates the young audience in the spirit of appreciating authentic values, transforming ancestral symbols into a current visual language. From an economic perspective, the work promotes the concept of sustainable design and creative entrepreneurship in light industry. The efficient use of resources (recovery of leather waste) and the integration of handcraft techniques demonstrate the potential to create products with high added value. This approach supports the circular economy and provides a model of best practices for small local producers, demonstrating that tradition can become a viable resource for competitive products in the modern fashion accessories market.

Junior Achievement Moldova

MD.107.	
Title	METIK -ALEXA code 2026-1
Authors	Moga Alexandra, Scorțescu Silvia
Institution	Junior Achievement Moldova
Description	METIK ALEXA is a face cream, with a regenerative effect, it is made from coconut, natural coffee with bee honey. The cream treats wounds and heals scars. It is suitable for adolescents and adults, contraindicated for childrens.

MD.108.	
Title	EMY- BLAM code 2026-2
Authors	Nistor Emilia, Scorțescu Silvia
Institution	Junior Achievement Moldova
Description	EMY-BLAM is a natural balm that has a transparent color, is made with essential oils, is applied on face and hands. It has a regenerative purpose and treats from the inside. The skin becomes velvety. After administration, wash the hands and face with warm water. It is recommended for 14+ inclusive adults. It is administered in the evening when the skin is tired.

MD.109.	
Title	VIK -CAND code 2026-3
Authors	Carabet Victoria Scorțescu Silvia
Institution	Junior Achievement Moldova
Description	VIK- CAND are candles made from natural soy wax with an aphrodisiac and curative effect. The candles have a therapeutic effect and not emit smoke, it is innovative through long-term use.

MD.110.	
Title	MI -GLOMS 2026-4
Authors	Pulucciu Ema Scorțescu Silvia
Institution	Junior Achievement Moldova

Description	MI-GLOMS is a pink lip gloss with dried strawberry powder , made from DIY natural oil, VS translucent lip gloss, has a shiny, metallic finish. The lip gloss provides a fresh condition, leaving lips soft and fresh.

MD.111.	
Title	NIKOL-TY 2026-5
Authors	Drumea Nicoleta Scorțescu Silvia
Institution	Junior Achievement Moldova
Description	NIKOL-TY is a white lip cream with a vanilla scent, has a consistent, creamy appearance. It can be used from the age of 10+ and is special in its consistency and appearance.

MD.112.	
Title	PROJECT KOSMETIC LAB. JA-MD code 2026-6
Authors	Scorțescu Marius-Silviu Scorțescu Silvia
Institution	Junior Achievement Moldova
Description	PROJECT KOSMETIC LAB JA-MD Childrens products, the main function of which is not decorative, but caring. The skin in this area is very thin, therefore it is she who suffers first of all from cold wind, dry air and high or low temperatures. The task of this technology is to create a special protective layer or to accelerate the regeneration of chapped lips. The nourishing effects of the balm, prevents moisture loss, helps to combat peeling and small cracks, heals wounds and cuts. Often there are also SPF filters in the composition, which guarantee sun protection for delicate skin. The first innovative formulas for protection appeared at the end of the 19th century. Today, these products are developed by both pharmaceutical brands and popular brands that produce various cosmetics, being very widespread and available to absolutely everyone. The colorless version of the formulas is the most popular, however, remedies that both care for the lips and give them a tint are gaining great popularity among young ladies.Basic component. The compositions of balms can vary greatly depending on the manufacturer, but some active caring and moisturizing ingredients are initial for such remedies, among which are the following: Beeswax or vegetable wax - softens and smoothes the skin, makes it more elastic and supple.

Natural oils such as coconut, apricot, almond, argan, shea and jojoba - are responsible for moisturizing and nourishing.Vitamins of groups A, E, C, F - strengthen and protect the skin.
Extracts of aloe vera, chamomile, sage and calendula - relieve irritation and soothe.
Panthenol and honey - have excellent healing abilities.
How to choose a suitable balm?
When selecting a care product, you should take into account three initial factors:
In summer, products labeled with SPF and moisturizing ingredients are recommended, and for winter, richer textures with as many nourishing components as possible are needed.
Purpose. In cases where the skin of the lips is cracked and wounds form, therapeutic formulas are recommended - such items, on the tube, the word "repair" is present. Colored cosmetics in this category are a perfect remedy for those who want care and tinting at the same time. And to maintain healthy epidermis, pay attention to moisturizing compositions with a light texture. Personal preferences. In cases where you are allergic to something, first of all, make sure that this ingredient is not present in the selected product. When choosing, consider the texture, the most convenient are in the form of a stick or those that can be applied with a finger. Students are educated individually to product natural cosmetics in the laboratory, to avoid problems and use materials correctly.

MD.113.

Title	AME-KRIM code 2026-7
Authors	Amelia Pînzaru Scorțescu Silvia
Institution	Junior Achievement Moldova
Description	AME-KRIM its regenerating hand cream with peony and jojoba oil, the cream threats and heals wounds and scratches and prevents hands from aging. Apply to clean, washed hands, it can be used by adolescents and adults. Its forbidden to use for childrens and pregnant mothers.

MD.114.

Title	PINK-MADA 2026-8
Authors	Mădalina Golban Scorțescu Silvia
Institution	Junior Achievement Moldova
Description	PINK-MADA healing lipstick cream with raspberry extract , which prevents chapped lips. Can be used by all categories of people. Keep in a cold and dark place to prevent melting.

MD.115.	
Title	MIRA-ROZ 2026-9
Authors	Jomiru Mirela Scorțescu Silvia
Institution	Junior Achievement Moldova
Description	MIRA-ROZ it is rose candle oil. Prepared entirely from roses oil extract. It is natural , ecological, curative. It is used for elaxation areas and massage rooms. Candle rose aromatherapy can only be used by the people who have headaches pain.

MD.116.	
Title	ALLIX 2026-10
Authors	Pulbere Alexandra Scorțescu Silvia
Institution	Junior Achievement Moldova
Description	ALLIX this face mask from seaweed with shell powder, treats acnee and regenerates skin. The seaweed removes the black pigment of scars and the sheel powder dies out wounds. It is recommended for teenagers. It is used on a washed clean , warm water in a lying position 35 min with the face up.

MD.117.	
Title	NAL-FIT code 2026-11
Authors	Goncear Artiom Scorțescu Silvia
Institution	Junior Achievement Moldova
Description	NAL-FIT it is a gel applied between the leg toes where the fungus appear, being a sportsman i got this huge problem. It is made from nettle and garlic extract, washed toes with hot water and apply at night. Procedure takes 10 days, it is used only for people with such a fungus.

MD.118.	
Title	TUL-SKAB 2026-12
Authors	Sîrbu Andreea Scorțescu Silvia
Institution	Junior Achievement Moldova
Description	TUL-SKAB it’s a tulip petal scrub with green tea oil, has

	fabulous effects on traumatized skin. Cleans all dead skin and provides freshness. Apply to slightly damp skin, massage in the opposite direction. Them wash with warm water and do not apply after cream because the scrub contains tea oil .
MD.119.	
Title	ARTS- KAM 2026-13
Authors	Stratulat Camelia Scorțescu Silvia
Institution	Junior Achievement Moldova
Description	ARTS-KAM it's a body talk made from starch powder with added chamomile, is an effective method to absorb moisture and reduce unpleasant odor caused by sweat. Chamomile is a natural antibiotic, that does not allow to cause infection. Can be used throughout the day to avoid unpleasant sweating, especially for teenagers and performance athletes.
MD.120.	
Title	BLAM-STORM code 2026-14
Authors	Cîrlan Maria Scorțescu Silvia
Institution	Junior Achievement Moldova
Description	BLAM-STORM the lip mask is made from mint and blueberries, applied to dry lips, lip mask has a cleansing, refreshing and anti-aging effect, mint has a cooling effect and the lips become fluffy pink. The vitamins from blueberries help with rejuvenation.
MD.121.	
Title	LEG-HALF code 2026-15
Authors	Lungu Sabrina Scorțescu Silvia
Institution	Junior Achievement Moldova
Description	LEG-HALF the heel mask helps cracks and painful wound. Made from lactic acid and shea butter. Has an intense softening and smoothing effect. Suitable for calluses and very thickened skins.

Mongolia

MN.1.	
Title	**Mongolian Ger Lantern**
Authors	Myagmarsuren Tsanjid
Institution	**Urangar Urlal LCC**
Patent	MN/3/2026/5319
Description	This artwork is inspired by the iconic form and structure of the traditional Mongolian ger, a remarkable symbol of the nomadic Mongolian people's intellectual heritage and craftsmanship. The design beautifully combines traditional knotting techniques with contemporary interior aesthetics, creating a unique harmony between cultural tradition and modern design. The composition of the ger's roof poles and the circular crown (toono) is delicately recreated through intricate hand-tied string patterns. By using ancestral knotting methods in an innovative way, the piece reinterprets a centuries-old craft from a fresh artistic perspective. The lantern's distinctive woven textures and ornamental knots interact elegantly with light, producing a warm, peaceful, and comforting atmosphere within any living space. Beyond its practical function as a lighting object, it serves as an artistic statement that brings the spirit of Mongolian heritage into modern interiors. More than a decorative lamp, this piece embodies the beauty of traditional Mongolian culture while celebrating the creativity of contemporary craftsmanship. Its fusion of cultural symbolism, fine handwork, and ambient illumination makes it a one-of-a-kind artwork that both preserves and reimagines the essence of nomadic life.

Morocco

MA.1.	
Title	**Self-supporting keystones, formwork, and bending for the construction of vaults and domes with interlocking from the extrados**
Authors	Mehdi CHAOUI
Institution	**Independent inventor**
Patent	Moroccan patent application No. 70339, PCT application No. PCT/MA2026/000002
Description	The new voussoirs are inserted at the extrados into the spaces left by the last placed voussoirs, forming an arch with a width corresponding to half the voussoirs. These cantilevered voussoirs become locked/embedded and can no longer rotate and fall, which is why centering is no longer needed. These spaces match perfectly the shape of half of a voussoir. Once a portion of the vault is completed (closure of the arch, with a width corresponding to half a voussoir, using the keystone), it becomes stable and load-bearing and can then support the next voussoirs. It is important to note that vaults using this new form of voussoirs are extremely stable, even in the event of earthquakes or displacement of the vault's supports and It is possible to create multiple shapes using the six interlocking systems/groups of the CHAOUI-BLOCK. It is also now possible to use steel tie rods between the springers and/or to use the passive thrust of the surrounding soil and/or the counter-thrust of another vault to balance the lateral forces, instead of relying on massive and costly structures such as buttresses and their variants, flying buttresses.

Netherlands

NL.1.

Title

Plasma Technology System for Extending the Shelf Life of Fruits, Meat, and Food Products

Authors Behzad Jaybashı, Abolfazl Azizmi

Institution Wave Tech Company

Description

Food spoilage is one of the major global challenges in the agricultural and food industries. Every year, a significant amount of fruits, vegetables, meat, and food products are lost due to microbial contamination, fungal growth, oxidation, and improper storage conditions. These losses create serious economic damage and increase food waste worldwide.

Traditional preservation methods often rely on:

- Chemical preservatives
- Refrigeration systems
- Synthetic additives

However, consumers and international markets are increasingly demanding safer, chemical-free, and environmentally friendly food preservation technologies.

This project introduces an advanced **Plasma Technology System** designed to increase the shelf life of fruits, meat, and food products without the use of harmful chemicals.

Technology Description

The system uses **Cold Plasma Technology**, which produces reactive particles capable of:

- Destroying bacteria
- Inactivating fungi and molds
- Reducing microbial contamination
- Slowing down spoilage processes
- Improving food safety

Cold plasma treatment is a non-thermal process, meaning it can disinfect and preserve food products without significantly affecting:

- Taste
- Color
- Texture
- Nutritional value

Peru

PE.1.	
Title	**PERSONAL PROTECTIVE GARMENT WITH FASTENING ELEMENTS**
Authors	SOFIA CALVO NIÑO
Institution	**N/A**
Patent	1585
Description	The present invention consists of a personal protective garment designed for beauty centers, intended to protect users against infections caused by viruses and bacteria. The garment covers the body from the head to the ankles and is characterized by a hood connected to a cape through detachable fastening elements. The hood leaves the back portion of the hair uncovered, while the front section partially covers the face, ears, and neck. It incorporates a skin adhesive positioned along the temples, forehead, and hairline, as well as an adjustable cord that secures the hood from the eyebrows to the chin, providing greater safety and anatomical fit. At the back of the hood, an elastic band and an adjustable adhesive element are included for improved support. Additionally, the garment comprises a detachable mask connected to the hood through fastening elements, allowing the insertion and replacement of internal filters to enhance respiratory protection. The cape may be worn as a gown or transformed into a jumpsuit-style garment through a plurality of fastening elements, providing greater mobility and protection against contaminated surfaces or individuals. The system allows the front and rear openings to be separated and joined, creating independent leg sections with internal fastening connections. Additionally, the lower section incorporates adjustable ankle straps to prevent the garment from touching the ground. The fastening elements allow the hood and cape to be removed, replaced, or exchanged in a practical and hygienic manner.

Philippines

PH.1.	
Title	**SPOTLIGHT – Smart Platform for Optimized Tracking and Lighting Innovation**
Authors	Matteo Raphael A. Goco, Miguel Jared V. Cheng, Rojan Jacob A. Dela Cruz
Institution	**HOLY INFANT ACADEMY OF CALAPAM**
Description	N/A Automation is a key driver in the advancement of modern living, offering enhanced efficiency, convenience, and security. Despite the growing adoption of smart home technologies, many residential and commercial spaces still rely on manual lighting and security systems. To address this gap, this project creates an IoT-based control system utilizing the Blynk platform and ESP32 microcontroller, aimed at modernizing home lighting and surveillance functionalities. Results demonstrated that the lighting and surveillance systems could be effectively and reliably controlled via the mobile application from any location with internet access. It enhances home security and optimizes energy consumption by enabling intelligent controls.

PH.1.	
Title	**iCAM**
Authors	Iman Hadi Vincheh , Ma Chat Donna V. Ofilas
Institution	**FARIN Technologies OPC**
Description	N/A iCam is a multi-mode AI vision module designed to bring advanced, real-time artificial intelligence capabilities to low-cost robotics. Built to operate within the constraints of Arduino-class systems, it enables high-performance vision processing without requiring powerful external hardware. The device acts as the central controller of a robot, communicating via UART to manage motors, sensors, and other modules. It supports multiple AI modes, including gesture recognition (with multi-hand support and custom training), adaptive color detection (with adjustable hue, brightness, and detection zones), barcode and QR code scanning, and robust line tracking capable of operating in noisy and complex environments.

Poland

Represented by
IBS Global

PL.1.	
Title	**Method of diagnosing an electric parking brake module**
Authors	Bartłomiej Ambrożkiewicz, Łukasz Wójcik
Institution	**Lublin University of Technology/Borg Automotive Sp. z o.o.**
Patent	PL 247140B1
Description	A non-invasive diagnostic method for electric parking brake (EPB) modules using external piezoelectric sensors. By comparing vibration signals from four key module locations with reference data, it allows precise localization of mechanical faults, enabling targeted component replacement. The invention introduces a diagnostic method for electric parking brake (EPB) modules using piezoelectric vibration sensors mounted externally on the housing near the electric motor, pinion, motor-pinion coupling, and gearbox. The module is actuated under constant 12 V, and current and vibration signals are recorded via a data acquisition system. Deviations in amplitude or irregular time patterns compared to a healthy reference module allow identification of the specific degraded component causing abnormal resistance. This non-invasive approach avoids disassembly, enables selective repair instead of full module replacement, reduces maintenance costs, and improves diagnostic reliability for automotive safety systems.

PL.2.	
Title	**Anti-theft device and method, especially for motorcycles**
Authors	Grzegorz Barański, Mateusz Paszko
Institution	**Lublin University of Technology**
Patent	B1 241348
Description	The anti-theft system addresses the significant problem of the low effectiveness of currently used security measures for two-wheeled vehicles, especially when perpetrators use GSM and GPS signal jammers. The solution integrates advanced electronic security features with a proprietary electro-mechanical brake lock, enabling active response to theft attempts even in the absence of connectivity. The system is equipped with, among other things, a GPS locator,

an accelerometer, an alarm module, and its own power source, and works with dedicated server infrastructure and mobile applications.

PL.3.

Title	**Modular wind turbine with a vertical axis of rotation**
Authors	**Michal Jan Geca, Konrad Pietrykowski**
Institution	**Lublin University of Technology**
Patent	PL 248261
Description	The turbine has a shaft with an upper frame and a lower frame rotatably attached to it, between which the blades are rotatably attached. The rotor of the vertical axis wind turbine (VAWT) is equipped with a wind vane that normally extends in the vertical direction, so that the rotor rotates about an axis perpendicular to the ground. The operation of the VAWT is not affected by the wind direction, and it can operate as before in turbulent and unstable wind conditions. The main advantage of the proposed solution is that it allows the turbine power to be adjusted over a wide range of speed values, depending on the wind speed. This will be possible due to the ability to adjust the pitch angle of the rotor blades, and thus adjust the rotor's working area. The developed design will also be protected against damage to the turbine's components, as well as the stress on the materials from which it is made, in the event of the impact of the wind, with at least a limiting value of its flow speed, and there will be no need to modify the alignment of the rotor with respect to the wind direction. Attached to the turbine is a directional rudder that is aligned parallel to the wind direction.

PL.4.

Title	**Attachment for bike rack**
Authors	Paweł Magryta, Konrad Pietrykowski
Institution	**Lublin University of Technology**
Patent	B1 245354
Description	Device for the bicycles that allows to increase the volume of the carried load and to protect it from falling out, to enable the attachment of various loads in a stable way, such as backpacks and bags. The device is foldable, universal and can be mounted on any bicycle rack.

PL.5.	
Title	**Quick refill bottle**
Authors	Konrad Pietrykowski
Institution	**Lublin University of Technology**
Patent	B1 242843
Description	The design of the bottle allows very fast and efficient filling with water during the competition. This minimizes the loss of filling time

PL.6.	
Title	**Modular Upper Limb Rehabilitation Orthosis – Elbow Module**
Authors	Project Menager:Mgr inż. Zdzisław Wałęga, Students:Jakub Zimny, Amadeusz Korona, Paweł Rodenko, Jędrzej Marcinkiewicz, Anielka Dylewicz, Zuzanna Łopatka
Institution	**University of Zielona Góra**
Patent	The patent number will be provided at the beginning of May.
Description	The project aims to design and develop an elbow module for a Modular Upper Limb Rehabilitation Orthosis, extending a previously developed wrist orthosis that serves as the main component of the system. The goal is to create a more comprehensive device supporting the rehabilitation of the upper limb after injuries and neurological conditions. Rehabilitation following fractures, traumatic injuries, or ischemic brain injuries such as stroke requires a multi-stage therapeutic process involving several joints, including the wrist, elbow, and shoulder. Expanding the existing orthosis with an elbow module will enable better stabilization and controlled movement of the upper limb during therapy. The elbow module will incorporate a hinge mechanism allowing controlled flexion and extension while providing joint stabilization. This solution may support the treatment of elbow injuries such as sprains, fractures, and overuse conditions including tennis elbow and golfer's elbow. It may also assist in postoperative rehabilitation and in managing chronic conditions such as arthritis. Compression elements may additionally help reduce pain and swelling.

PL.7.	
Title	**Transcripta**
Authors	**Michał Żbikowski, Tomasz Tomeckim Krzystof Smyczek, Artur Hausman, Marcin Lasak**
Institution	**School Complex No. 6 named after King John III Sobieski in Jastrzębie-Zdrój**
Description	The project involves creating an application that uses artificial intelligence to record phone calls, automatically generate text transcripts, and produce summaries of the most important information. As a result, the user does not need to take notes or become distracted during a conversation, which significantly improves safety while driving. In addition, the project includes a steering wheel band that enables control of the application, phone calls, and multimedia in cars that do not support smartphone integration systems such as Apple CarPlay or Android Auto. Buttons mounted on the steering wheel make it possible to use all functions without looking at the phone, eliminating the need to take your hands or eyes off the road. The solution is especially useful for people who frequently make phone calls while travelling. It is particularly valuable for professional drivers, couriers, sales representatives, and entrepreneurs who arrange orders, addresses, deadlines, or cooperation terms while driving. Thanks to automatic recording and summarizing of conversations, they can quickly return to the most important information after the journey without having to listen to entire recordings. The application supports work organization, reduces the risk of mistakes caused by forgetting important details, and allows for more efficient communication management. At the same time, it significantly increases user safety by eliminating the need to use a phone while driving and reducing driver distraction.

PL.8.

Title

Help! Save the Dog

Authors

Authors: **Emilia Szweda, Maja Szweda, Juliusz Szweda**
Research Supervisor: **Anna Szweda**

Institution

High School No. 4 at School Complex No. 6 in honor of King John III Sobieski in Jastrzebie-Zdroj
/ **Silesian University of Technology** /
Public Primary School of the Salesian Sisters in Jastrzebie-Zdroj

Description

The project is an innovative, integrated emergency response support system combining three complementary pillars: a mobile application, an assistive AED communication device, and a structured training program.
The solution stands out through its **comprehensive approach** to improving the effectiveness, accessibility, and inclusivity of first aid, particularly in veterinary emergencies.
The mobile application provides **real-time, step-by-step guidance** based on decision-making algorithms, supporting users in delivering pre-veterinary first aid. A key innovation is its **full accessibility for deaf and hard-of-hearing users**, including visual communication and Polish Sign Language (PJM) materials, significantly expanding access to life-saving knowledge.
The second pillar is a **unique device that converts AED voice prompts into text in real time**. This solution removes critical communication barriers in the use of defibrillators and addresses an important gap in current emergency response systems. Its **compatibility with multiple AED models** and ability to operate in field conditions demonstrate strong implementation potential.
The third component consists of **practical training workshops in pre-veterinary first aid**, through which over **15,000 participants have already been trained**. The program is based on realistic scenarios and complements the technological aspects of the project with hands-on skill development.
The innovation of the project lies in the **synergy of technology, education, and accessibility**, resulting in increased effectiveness of emergency response and equal access to life-saving procedures.

Poland

Represented by
Association of Polish Inventors and Rationalizers

PL.9.

Title	**Preparation inhibiting acetylcholinesterase from large cranberry fruit- NeuroCran MT**
Authors	Natalia Matłok, Maciej Balawejder, Tomasz Piechowiak
Institution	**University of Rzeszow**
Patent	Pat.249157
Description	The developed product (Pat.249157) is a standardized ethanolic extract from large-fruited cranberry, characterized by a high content of bioactive compounds, including polyphenols, anthocyanins, and vitamin C. In vitro studies have shown that the extract exhibits significant antioxidant potential by neutralizing reactive oxygen species and protecting cells from oxidative stress, which is a key factor in aging processes and chronic diseases. Tests conducted on the cellular model Saccharomyces cerevisiae confirmed that the extract reduces the level of reactive oxygen species in cells and supports the activity of antioxidant enzymes (SOD, CAT), thereby demonstrating strong cytoprotective effects. Moreover, the extract inhibits the activity of enzymes associated with inflammatory and neurodegenerative processes, including cyclooxygenases (COX-1, COX-2) and acetylcholinesterase (AChE). These mechanisms indicate its potential in the prevention and support of treatment of neurodegenerative diseases such as Alzheimer's and Parkinson's disease, by protecting neurons against oxidative stress, reducing inflammation, and supporting cognitive functions. The innovation of the extract lies in its high biological activity, standardization, and broad potential for application in nutraceuticals, dietary supplements, and health-promoting products, particularly in the field of nervous system protection and prevention of neurodegenerative diseases.

PL.10.

Title	**Development of guidelines for an integrated system for the collection and processing of emergency response knowledge for the preparation, prevention, response and recovery phases, for the purposes of fire safety and civil protection**
Authors	Bożena Kukfisz, Przemysław Wysoczyński, Paweł Gromek, Robert Piec, Michał Szota, Mateusz Banaś, Wiktor Gawroński, Rafał Wróbel
Institution	**Fire University**
Patent	Pat.250158
Description	Description of the solution: For the purposes of fire safety, civil protection and civil defence, a solution has been developed comprising a unified decimal classification system for rescue operations and planning procedures, implemented in accordance with the BPMN standard, which supports the activities of civil protection and civil defence authorities and organisations. A legal analysis of the current situation was carried out, followed by an assessment of the scope of legislative changes that will need to be implemented to adopt the solutions developed in the project. A pilot scheme is currently underway to develop procedures to replace rescue plans in selected government and local government units. In addition, a set of certification and audit procedures has been developed for notification, warning and alert systems used for civil protection purposes. This project is funded by the National Centre for Research and Development under the GOSPOSTRATEG programme. This project is funded from the state budget. Contract No. GOSPOSTRATEG9/001G/2022, dated 23 June 2023.

PL.11.

Title	**Multi-sensor measurement system with wireless communication functions with Android mobile application offering AI/ML analysis of biomedical signals used for medical analysis and training effort.**
Authors	Mariusz Chmielewski, Tadeusz Sondej, Michal Sobolewski, Jakub Sierżęga, Jakub Nowakowski Jakub Rzepinski, Karolina Marciniak, Łukasz Pytlarczyk, Łukasz Skwarszczow
Institution	**Military University of Technology**

Patent	-
Description	The integrator, the mobile application are the centerpiece of the innovative smart wear. The system offers the first such a broad spectrum of biomedical analysis, not only of physiologybut also of health giving a complete picture of the physiological responses of the human body. Such a wide spectrum and accuracy of biomedical signal acquisition, has been combined with ergonomics and convenience of long-term use of specialized breathable sportswear supervised by modern electronics and analytical mobile application. The comprehensive monitoring system combines multi-channel electrocardiography and electromyography, analysis of movement, body temperature and sweating, so as to precisely analyze the biochemical processes of users' physical activity. The use of specialized measurement techniques and long-term studies of human physiological patterns made it possible to develop the system's knowledge base, contained in a mobile application capable of detailed analysis of exercise physiology processes and identification of positive as well as negative health events. By combining the analysis of physiology, the system introduces new functions for evaluating the training carried out as well as the body's recovery processes, so as to provide a more complete and precise analysis of the user.

PL.12.

Title	Tactical reconnaissance and situational awareness system using Al models and unmanned weapon systems
Authors	Mariusz Chmielewski, Patryk Podbielski, Wojciech Krawczyk, Dorian Michalski, Dawid Bugajewski, Marcin Kukiełka
Institution	**Military University of Technology**
Patent	
Description	The Al-supported tactical support system, integrated with the TAK (Tactical Assault Kill piator, 3 ar innovation in automatic situational awareness building. The key element is proprietary sensary data fucion algorithms which, supported by artificial intelligence (Al), transtorm rav image data, video streams, and command systems into a unified, deconflicted acoregated, and consistent TARV mane that extends the image on a mobile davice with an assessment of military and crisis threats. The software was Aalivered as nronrietar extensions (plug-ins) to the military-civilian

Tactical Assault Kit platform, used by NATO as a basic tool for digitizing tactical-level operations. This system significantly improves decision-making and the use of unmanned vehicles for reconnaissance and monitoring, providing operators with protection and "suspended intelligent eyes." its innovative nature IS alen hishlinhtod hits notential for integrating and controlling autonomous vehicles, which extends the anerational ranna and minimizes risk to personnel. Data fusion algorithms, in addition to deconflicting the location of reported events and oblects, are also used to precisely determine the location of the device.

PL.13.

Title Mobile Application Implementing Artificial Intelligence Algorithms For Analyzing Biomedical Data From Wearable Devices Supporting Epilepsy Patients

Authors Mariusz Chmielewski, Jakub Szota, Szymon Niedziólka

Institution **Military University of Technology**

Patent

Description The presented application provides comprehensive analysis of biomedical data acquired from the MYO ARMBAND sensor, which captures 8 EMG channels and IMU signals from the user's forearm. The system serves two primary functions: real-time prediction of epileptic seizures and retrospective analysis of historical seizure data to evaluate pharmaceutical treatment effectiveness. Leveraging advanced artificial intelligence algorithms, the application processes physiological signals to identify patterns indicative of impending tonic and clonic seizures. The retrospective analysis module enables clinicians and patients to assess the efficacy of drug therapy over time by examining seizure frequency, intensity, and response to medication adjustments. To enhance user experience and facilitate seizure tracking, the application integrates with Google Calendar, allowing patients to maintain a comprehensive seizure diary with automatic logging of predicted and confirmed seizures, medication schedules, and symptom notes.

Poland

Represented by
Association for the Promotion of Polish Science, Technology and Innovation

PL.14.

Title1	**From Waste to Water Protection: Circular-Economy-Oriented Zeolite Synthesis from Energy Industry Residues**
Authors	Kinga Korniejenko, Maciej Gąbka, Beata Figiela, Kacper Oliwa, Elwira Rusinek, Beata Messyasz, Agnieszka Grela, Michał Łach
Institution	**Cracow University of Technology, Kraków, Poland; Adam Mickiewicz University, Poznań, Poland**
Patent	Not applicable
Description	The invention relates to a low-temperature method for synthesizing zeolites from industrial by-products for use in water purification systems. The process operates at 20–25°C using low-concentration alkaline solutions (≤3 M), significantly reducing energy demand compared to conventional high-temperature synthesis. Industrial wastes such as fly ash and mineral residues are directly converted into zeolitic sorbents via simple alkaline activation. The key innovation is the efficient transformation of waste into high-performance materials with strong ion-exchange capacity for selective removal of nitrogen and phosphorus compounds. The resulting zeolites exhibit high adsorption efficiency, tailored porosity, and are suitable for water treatment and ecological applications. The method supports circular economy principles by enabling waste valorization and nutrient recovery through recycling of spent sorbents into fertilizers.

PL.15.

Title	**One-dimensional photocatalyst of biological origin and its production method**
Authors	Tomasz Tański, Paweł Jarka, Weronika Smok, Yao Mawuena Tsekpo
Institution	**DEPARTMENT OF ENGINEERING MATERIALS AND BIOMATERIALS, FACULTY OF MECHANICAL ENGINEERING**
Patent	

Description	This patent presents an innovative approach to valorizing clamshell waste through its conversion into a one-dimensional photocatalyst. Waste shells derived from the clam species Galatea paradoxa are utilized as a sustainable calcium source and processed with phosphoric acid and selected additives. The resulting material is fabricated using electrospinning followed by calcination, yielding well-defined one-dimensional nanostructures with enhanced photocatalytic activity. This solution not only addresses environmental challenges associated with shell waste disposal but also contributes to the development of sustainable, high-performance materials for photocatalytic applications.

PL.16.

Title	**Numerical Analysis of Surface Contact in the Conical Pick–Pick Holder System**
Authors	Wojciech Mikołejko, Agata Śliwa, Jarosław Mikuła, Piotr Cheluszka
Institution	**Department of Engineering Materials and Biomaterials**
Patent	
Description	The extraordinary value of this work encompasses both the methodology of numerical contact analysis and its contribution to the understanding of tool–holder interaction using computer simulation. The undertaken simulation using the finite element method concerned the calculation of stress distribution and rotational behaviour of conical picks under time-varying operational loading conditions. The proposed model was based on frictional contact formulation with a parametrised friction coefficient ranging from 0.05 to 0.99. The load input to the system was derived from experimental force measurements recorded by a Kistler 9077C three-axis piezoelectric sensor mounted in the pick holder of an R-130 roadheader. The focus was on the physical phenomena occurring during the contact interaction of conical picks with their holders, with particular attention to the influence of friction on pick rotation and shear stress concentration in the contact zone.

PL.17.

Title	**INNOVATIVE METHODOLOGY FOR DETERMINING SERVICE LIFE OF AUSTENITIC STAINLESS STEELS**
Authors	Marek Sroka, Adam Zieliński, Hanna Purzyńska, Magdalena Sroka, Jarosław Mikuła
Institution	Silesian University of Technology
Patent	Not Applied yet
Description	The study of the microstructure of steel after long-term exposure to elevated and high temperatures, close to and higher than the temperature of long-term operation, enabled the analysis of the dynamics of microstructure changes. Scanning and transmission electron microscopy and X-ray analysis of the phase composition of the precipitates were used to thoroughly describe the changes in the microstructure during long-term exposure to elevated and high temperatures. Creep tests are the most objective method of predicting the service life of steels and alloys intended for operation in temperature and stress conditions. They make it possible to determine the creep time resistance under the required operating conditions. Creep tests make it possible to determine the creep rate in a steady state, i.e. in the second creep period. It is an important parameter showing the resistance to creep of the tested material. The innovative methodology for determining operational durability involves combining the results of creep tests, mechanical properties and analysis of microstructural changes in materials in their initial state with the results of tests of materials after ageing at least two temperature levels, i.e. at the temperature of expected long-term operation and at a higher temperature, the level of which accelerates microstructural changes without significantly changing the nature of the phenomenon.

PL.18.

Title	**Programming duplex stainless steel microstructures by additive manufacturing**
Authors	Zbigniew Brytan, Beatrice Naa Ayeley Ardayfio, Przemysław Snopiński
Institution	**Department of Engineering Materials and Biomaterials, Faculty of Mechanical Engineering, Silesian University of**

	Technology
Patent	-
Description	This research develops a new approach to producing duplex stainless steels by Laser Powder Bed Fusion. The main aim is to control the ferrite–austenite phase balance directly during 3D printing, rather than relying only on post-process heat treatment. The research combines nickel alloying, laser parameter optimisation, heat-treatment design, and grain boundary engineering. Special attention is given to controlling phase boundaries, low-angle grain boundaries, dislocation structures, and local stored energy. These microstructural features can promote austenite nucleation and influence the final phase distribution. By linking processing parameters with microstructure evolution, the research aims to create programmable duplex stainless steels with improved corrosion resistance, mechanical performance, and durability.

PL.19.	
Title	**Physical Phenomena Occurring During Laser Remelting of the Surface Layer of Tool Steel**
Authors	Amadeusz Dziwis, Mirosław Bonek, Wojciech Pakieła, Agata Śliwa
Institution	**Department of Engineering Materials and Biomaterials**
Patent	-
Description	The extraordinary value of this invention encompasses both the production technology and the contribution to laser machining using computer simulation. The undertaken simulation using finite element method concerned the calculation of heat propagation during laser processing in various process variants, considering the power of the laser beam and the technique of delivering powder to the melting zone. The proposed model was based on the nonlinear thermal conductivity change, specific heat and density depending on temperature. The heat supply to the processing site was assumed to be a heat beam corresponding to a laser power of 1.4, 1.7, and 2.1 kW. The latent heat effects are considered in the solidification analysis. The melting point consists of the same material as the substrate and no chemical reaction occurs there. The properties of the simulated materials and their surface condition depend on the absorbency. The focus was on the physical phenomena

occurring during laser remelting of the surface layer of tool steel.

PL.20.

Title	**Water-based drilling fluid for high-temperature geothermal reservoirs**
Authors	Sławomir Błaż, Grzegorz Zima, Grzegorz Szubra, Anna Szajna
Institution	**OIL AND GAS INSTITUTE - NATIONAL RESEARCH INSTITUTE**
Patent	P.455450
Description	The invention concerns a water-based drilling fluid designed for geothermal operations under high-temperature and high-pressure (HTHP) conditions exceeding 200°C, where conventional fluids fail. It is based on a sepiolite-derived mineral framework forming a stable, thermally resistant three-dimensional structure. A key innovation is the shift from polymer-dominated systems to a hybrid structure in which sepiolite acts as the primary structure-forming component. Conventional biopolymers are largely replaced by thermally resistant copolymers. The formulation includes multifunctional amine compounds and antioxidants to enhance stability and limit thermal degradation. Sodium gluconate is used to complex Ca^{2+} and Mg^{2+} ions, improving resistance to chemical contamination and salinity. The fluid maintains rheological stability in the range of 180–220°C, as confirmed by laboratory studies. It effectively transports cuttings, suspends weighting materials, and controls filtration under extreme conditions. The system reduces operational risks such as barite sag and wellbore instability. It performs reliably in fractured and highly permeable formations. The solution is applicable in deep geothermal wells (including EGS) and high-temperature oil and gas drilling. It provides a cost-effective alternative to complex nanomaterial-based drilling fluid systems.

PL.21.

Title	**A METHOD FOR THE PURIFICATION OF BIOGAS**
Authors	Wojciech Krasodomski, Stefan Ptak, Artur Antosz, Jadwiga Holewa-Rataj
Institution	**OIL AND GAS INSTITUTE - NATIONAL RESEARCH INSTITUTE**
Patent	P.454689
Description	The invention relates to a method for purifying biogas

produced via anaerobic digestion to a quality enabling its direct use as a gaseous biofuel. The process is based on a combination of absorption and adsorption carried out under relatively mild operating conditions compared to conventional biomethane upgrading technologies. Raw biogas is continuously passed in series through one or two absorption columns at temperatures from −15 to 40°C and slight overpressure. The columns are filled with a liquid sorbent composed of an aqueous solution containing triethanolamine, glycerol, and butyldiglycol to enhance purification efficiency. The liquid sorbent is continuously regenerated in an external column at elevated temperature and reduced pressure. After dehydration, the gas stream is directed to adsorption columns for final purification. Depending on the configuration, activated carbon is used with cyclic regeneration, or inorganic sorbents (ZnO/FexOy) are applied with periodic replacement. The purified gas contains 80–99.8% methane, 0.2–20% carbon dioxide, and less than 0.1% of other components. The key innovation lies in achieving fuel-grade biogas using significantly milder and less complex conditions than those required for biomethane production. An additional innovative aspect is the use of a tailored liquid sorbent composition enhancing overall process efficiency. The method enables simplified and cost-effective production of purified biogas. The resulting gas can be used directly as a fuel or blended with biomethane or natural gas.

PL.22.

Title **COLD HARDENING FLUID**

Authors Stefan Ptak, Agnieszka Skibińska, Wojciech Krasodomski, Artur Antosz, Zygmunt Burnus, Magdalena Żółty, Grażyna Żak, Jarosław Markowski, Sylwia Jędrychowska, Agnieszka Wieczorek

Institution **OIL AND GAS INSTITUTE - NATIONAL RESEARCH INSTITUTE**

Patent Pat. P.447431

Description The inventive solution of the present patent application is the innovative composition of a quenching fluid for cold heat treatment of steel, containing as the main ingredient a vegetable base oil, modified jojoba oil, and with additives with various refining functions, including modified lanolin. The fluid maintains stable performance during heat treatment and ensures that the desired martensitic or bainitic structure of the hardened workpieces is achieved.

PL.23.

Title	**Method for the purification of wax waste materials**
Authors	Artur Antosz, Stefan Ptak, Wojciech Wilk
Institution	**OIL AND GAS INSTITUTE - NATIONAL RESEARCH INSTITUTE**
Patent	PL 246901
Description	The invention relates to a method for the purification of candle wax waste generated during candle production processes involving dyes and fragrance additives. Increasing regulatory and safety requirements demand high-purity raw materials free from toxic, allergenic, and undesirable contaminants. The proposed solution enables effective recycling of waste candle materials to meet stringent quality standards comparable to refined paraffins. The process is based on multi-stage adsorption refining using a tailored mixture of bleaching earths and activated carbon. This approach allows efficient removal of dyes and fragrance compounds from contaminated wax streams. The refining is conducted under controlled thermal conditions, ensuring preservation of key physicochemical properties. Experimental results confirm progressive improvement in color, odor, and purity across successive refining stages. The purified material exhibits properties suitable for reuse in paraffin-based product manufacturing. The key innovation lies in the optimized composition of adsorbents and process parameters enabling high-efficiency purification. The method transforms waste into a high-quality reusable component, supporting circular economy principles. The technology reduces environmental impact and raw material consumption in candle production. It can be implemented directly in industrial candle manufacturing plants or in specialized waste processing facilities.

PL.24.

Title	**Quasi One-Dimensional Phononic Crystal with Phase-Conjugated Dynamical Defect**
Authors	Sebastian Garus
Institution	Czestochowa University of Technology
Patent	Not Applied yet
Description	A quasi one-dimensional phononic crystal with a phase-conjugated dynamic defect is an advanced periodic structure designed to precisely control acoustic wave propagation by

introducing a controlled, time-varying disturbance into its ordered lattice. Unlike classical phononic crystals, where defects are static, the use of a phase-conjugated dynamic defect enables active bandgap modulation and real-time localization and channeling of wave energy. This allows for frequency-selective filtering, amplification of specific vibration modes, and adaptive adjustment of propagation properties to changing conditions. This type of solution has potential applications in modern vibration isolation systems, acoustoelectronic transducers, wave control systems, and metamaterials technology, where dynamic and precise wave energy management is crucial.

PL.25.

Title	**Phage preparation for rectal use**
Authors	Sławomir Letkiewicz[2, 4], Ryszard Międzybrodzki[1, 2, 3], Andrzej Górski[1,2]
Institution	**1 Bacteriophage Laboratory, Department of Phage Therapy, Ludwik Hirszfeld Institute of Immunology and Experimental Therapy of the Polish Academy of Sciences, Wroclaw, Poland** **2 Phage Therapy Unit, Medical Center, Ludwik Hirszfeld Institute of Immunology and Experimental Therapy of the Polish Academy of Sciences, Wroclaw, Poland** **3 Department of Clinical Immunology, Medical University of Warsaw, Poland** **4 Medical Faculty, Katowice Business University, POLAND**
Patent	Pat.214743B16
Description	**- Application possibilities:** **As a rectal composition (enemas, reticoles microenemas, rectocapsules, suppositories, gels, creams and ointments) containing bacteriophages and Tween 20 (or Tween 80) for rectal use in the treatment of bacterial infections in humans and animals, in particular for the treatment of infections of female and male organs genitals, especially chronic bacterial**

PL.26.

Title	**Personal protection capsule**
Authors	Przemysław Palacz, Izabela Major, Maciej Major
Institution	**Czestochowa University of Technology**
Patent	Patent application No. PL 248234 B1
Description	Individual Protection Capsule is an innovative safety shelter designed to protect people during sudden disasters and extreme emergency situations when evacuation is impossible or time is critically limited. The invention is intended for use during events such as earthquakes, floods, hurricanes, building collapses, explosions, industrial accidents, or other life-threatening hazards. The capsule is based on a highly durable spatial structure with an optimized egg-shaped geometry inspired by the "Columbus egg" concept. This form provides an excellent balance between structural strength, efficient use of internal space, and resistance to external loads. The construction may consist of an internal and external supporting framework connected into one integrated system capable of absorbing impact forces and reducing deformation under extreme conditions. Depending on the application, the capsule can be manufactured from steel, aluminum, composite materials, or advanced polymers. It may include a sealed protective shell, entrance hatch, safety seats with harnesses, communication systems, emergency ventilation, lighting, and life-support equipment. The solution can be installed inside residential buildings, public facilities, industrial plants, warehouses, schools, hotels, or outdoor locations exposed to natural hazards. It can function as a personal shelter for households, a protective unit for workplaces, or part of critical emergency infrastructure. The invention responds to the growing global need for resilient safety technologies caused by climate change, urbanization, and increasing risks related to natural and human-made disasters. It offers a practical, scalable, and commercially viable way to significantly improve personal survival and emergency preparedness.

PL.27.

Title	**Ultra-Durable Multilayer Steel Plate for Extreme Application Conditions**
Authors	Bartłomiej Walnik, Dariusz Woźniak, Bogdan Garbarz, Jarosław Marcisz, Mariusz Adamczyk, Aleksandra Bagińska, Artur Żak, Marek Jelec
Institution	**Łukasiewicz Research Network - Upper Silesian Institute of Technology, Poland**
Patent	Project S0B 114: Forming the structure and properties of layered products intended for special applications, especially in the defense industry
Description	The presented invention focuses on the development of a novel Multilayer Steel System (MSS) combining ultrahighstrength nanobainitic steel (NANOS-BA®) with conventional structural steel S355J2. The main objective was to overcome the fundamental limitation of nanobainitic steels, namely their limited weldability, while preserving their exceptional mechanical and functional properties. The developed technology and product is based on a thermomechanical processing route involving hot rolling bonding, intermediate annealing, and controlled isothermal heat treatment. Early experimental trials showed that improper selection of rolling parameters led to severe defects, including delamination, cracking, and loss of interlayer bonding. After process optimization, a stable and defect-free multilayer structure was successfully achieved. The resulting MSS exhibits a unique combination of properties derived from both constituent materials. The nanobainitic layer provides extremely high strength and wear resistance, while the S355J2 substrate ensures ductility and good weldability. Synergistic interactions between layers lead to improved overall performance compared to monolithic steel plates. Tribological tests demonstrated approximately 20% lower wear compared to conventional wear-resistant steels. Ballistic testing confirmed full resistance to 7.62×39 API BZ projectiles for 11.5 mm plates, meeting STANAG 4569 Level 2 requirements under multi impact conditions. The proposed solution offers a cost-effective and scalableapproach for the industrial use of nanobainitic steels by integrating them into weldable multilayer systems. This significantly expands their potential applications in defense, heavy industry, and wear-critical engineering components.

PL.28.

Title	**Cooling system of a rotating machine**
Authors	Bartłomiej Będkowski, Piotr Dukalski
Institution	**Łukasiewicz Research Network - Upper Silesian Institute of Technology, Poland**
Patent	Pat.245603
Description	The invention relates to a cooling system for the stator of a rotating electrical machine (particularly high-power-density machines with permanent magnets, e.g. for electric vehicles). The space between the winding end-turns, the magnetic core, and the core support element is filled with thermally conductive resin. The key innovation is the use of two angular radiators that form an integral part of the stator support structures. One of the support elements contains internal liquid cooling channels. Both angular radiators are in direct contact with the thermally conductive resin surrounding the winding end-turns, ensuring excellent heat transfer. Main advantage: The solution eliminates the increase in thermal contact resistance caused by differential thermal expansion between the radiator and the support structure, which is a common problem in conventional designs. By integrating the radiators directly into the liquid-cooled support elements, the system provides significantly more efficient heat dissipation from the hottest parts of the stator (the winding end-turns). This allows higher power output and current density while maintaining safe operating temperatures for the permanent magnets.

PL.29.

Title	**Hydroelectric generating set**
Authors	Stanisław Gawron, Tadeusz Glinka
Institution	**Łukasiewicz Research Network - Upper Silesian Institute of Technology, Poland**
Patent	Pat.228937
Description	The subject of the invention is a compact hydroelectric generating set designed for installation on water pipelines in small hydropower plants. The solution integrates a water turbine and a permanent magnet synchronous generator into a single compact unit.

The turbine is located inside a tubular duct, while the generator rotor with permanent magnets is mounted directly on the outer surface of this duct, above the turbine blades.
Key innovation:
The external cylindrical and annular surfaces of the generator rotor, as well as the internal cylindrical surface of the stator, are coated with a self-lubricating bearing polymer. Additional bearing rings made of the same material are mounted on the inner surfaces of the end shields. This creates a simple, integrated slide bearing system within the generator air gap.
Main advantages:
The design is significantly shorter and more compact than conventional solutions. It eliminates the need for a mechanical coupling and complex bearings, reduces manufacturing costs, and enables reliable operation fully submerged in water. The set is particularly suitable for small hydropower installations with limited space, such as wastewater treatment plants.

PL.30.

Title	**Traction motor winding front cooling system**
Authors	Emil Król, Marcin Maciążek, Andrzej Weber
Institution	**Łukasiewicz Research Network - Upper Silesian Institute of Technology, Poland**
Patent	Pat.246737
Description	The invention relates to an improved cooling system for the end windings of a traction motor. The space between the end windings and the liquid-cooled housing is filled with a thermally conductive resin, which enhances heat transfer from the windings to the cooling structure. A key feature of the solution is the incorporation of arcuate elements made of materials with high thermal conductivity, such as aluminium or corundum. These elements, shaped as ring segments, are embedded within the resin and significantly improve heat dissipation by creating additional thermal conduction paths between the end windings and the cooled housing. The elements are arranged in such a way that they do not come into direct contact with the winding insulation or the housing surface, thereby preventing the transmission of

vibrations and the formation of structural gaps. Preferably, they remain in contact with the stator lamination stack, ensuring effective heat transfer while maintaining mechanical integrity. The number of elements is selected in relation to the motor design, typically equal to or greater than the number of poles, and their axial length corresponds approximately to the overhang length of the end windings.
The proposed solution substantially reduces thermal resistance, enabling higher power density and improved reliability of the traction motor, particularly under high-load operating conditions.

PL.31.

Title	**A new, innovative generation of steels intended for use in the mining industry, characterized by high strength and increased corrosion resistance to aggressive corrosive environments**
Authors	dr inż. Łukasz Poloczek, prof. dr hab. Roman Kuziak, dr inż. Artur Mazur
Institution	**Łukasiewicz Research Network - Upper Silesian Institute of Technology, Poland**
Patent	Pat.246737
Description	The new generation of steels developed for the mining industry represents an advanced material solution addressing key operational challenges related to corrosion and the durability of roadway support elements. These materials are characterized by high mechanical strength and significantly enhanced resistance to aggressive corrosive environments typical of hard coal mines. The core innovation lies in the development of new chemical compositions of microalloyed steels using advanced thermodynamic calculations (including ThermoCalc and JMatPro), which enabled optimization of the material's structure. A key modification involves replacing manganese with alloying elements such as chromium, nickel, copper, and molybdenum. This results in a ferritic-pearlitic structure with substantially improved corrosion resistance while maintaining mechanical properties comparable to currently used steel grades. As a result, this solution enables extended service life of structural components used in mining excavations, reduces costs associated with their replacement, and improves operational safety by minimizing the risk of corrosionrelated failures.

PL.32.

Title **New Amorphous iron alloy**

Authors Bartłomiej Jeż, Marcin Nabiałek, Kinga Jeż

Institution **Czestochowa University of Technology**

Patent Pat.245646

Description

Classic amorphous alloys produced in the form of thin ribbons are commonly used as core materials for low-loss transformers. These alloys are produced by unidirectional cooling on a copper drum. A cooling rate in the range of 10^5-10^6 K/s allows the alloy to solidify without crystallization. Amorphous Fe alloys are characterized by so-called soft magnetic properties: high saturation magnetization, high magnetic susceptibility, and low coercive field. Due to the lack of a crystalline structure, amorphous alloys are easily remagnetized. The high content of ferromagnetic elements such as Fe, Co, Ni ensures high saturation magnetization and low coercive field. Furthermore, the lack of ordered structures allows cores made from amorphous alloys to operate at high frequencies, unlike their crystalline counterparts in the form of Fe-Si sheets. The advantage of the proposed alloy according to the invention in relation to the produced amorphous ribbons is that the magnetically soft amorphous alloy with the chemical composition $Fe_{65}Co_{9.5}Hf_2Zr_2Si_{1.5}B_{20}$ is characterized by good magnetic properties with the content of ferromagnetic elements below 75%. The alloy can be used to build cores of low-loss transformers.

PL.33.

Title **New Nanocrystalline Iron Alloy**

Authors Katarzyna Błoch, Marcin Nabiałek, Łukasz Pytlarz

Institution **Czestochowa University of Technology**

Patent P.432728

Description

The subject of the invention is a massive nanocrystalline iron alloy classified as magnetically soft, which can be used in electronics, electrical engineering and energy and in particular as: high power transformers for switched mode power supply systems, high accuracy current transformers for energy meters or impulse transformers for communication.

The massive fast-cooled nanocrystalline alloy according to the invention, the main component of which is iron, is characterized in that Si (Si: 0.25 or 0.5 or 0.75 or 1%) was introduced as a structure stabilizer. Increasing the Si content blocks the growth of Fe phase and borides by limiting the diffusion of atoms over further distances.

The massive nanocrystalline alloy was produced in one production step, which means that it was not subjected to additional processing enabling its nanocrystallization. In the casting process it was cooled

at a speed of about 10^2 K / s, which at this speed causes a significant relaxation of structure and gives the alloy the expected properties. The $Fe_{65}Co_{11-x}B_{20}Si_xZr_2Hf_2$ alloy material according to the invention contains (atomically) respectively: Fe - 65%; B - 20%; Zr - 2%; Si - from 0.25% - to 1%; Co - from 10% to 10.75%, Hf - 2% when meeting the Co11-xSix relationship (where x = 0.25 or 0.5 or 0.75 or 1) with permissible contamination not more than 0.09%.

Poland – Ukraine - China (collaboration)

PL.34.	
Title	Integrating Heritage Conservation and Contemporary Architecture: Renovation and Modernization of the Terrace at Uniejów Castle
Authors	Karol Wysznacki
Institution	Institute of Architecture and Urban Planning, Faculty of Civil Engineering, Architecture and Environmental Engineering, Lodz University of Technology, Poland
Patent	Not specified
Description	Integrated restoration methodology combining structural reinforcement and modern architectural elements (steel–glass systems) to enable adaptive reuse of heritage monuments while preserving authenticity.

PL.35.	
Title	Functioning Features of the Poltava Local Memorial Museums
Authors	Yulia Ivashko; Andrii Dmytrenko; Pavol Tišliar; Aneta Pawłowska; Andriy Pavliv; Gelena Kovalska; Marek Pabich
Institution	Kyiv National University of Construction and Architecture, Ukraine; National University "Yuri Kondratyuk Poltava Polytechnic", Ukraine; Masaryk University, Czech Republic; University of Lodz, Poland; Lviv Polytechnic National University, Ukraine; Lodz University of Technology, Poland
Patent	Not specified
Description	Innovative museum model integrating heritage preservation with therapeutic and rehabilitation functions, transforming cultural spaces into active environments for social recovery and mental health support.

PL.36.	
Title	Challenges in the Preservation of Historical Heritage in Mountain Resorts: The Case of Krynica
Authors	Yulia Ivashko; Krystyna Paprzyca; Andrii Dmytrenko; Oleksandr Ivashko
Institution	Kyiv National University of Construction and Architecture, Ukraine; Academy of Silesia, Poland; National University "Yuri Kondratyuk Poltava Polytechnic", Ukraine
Patent	Not specified

Description	Advanced conservation strategies for mountain resort heritage addressing humidity and fire risks, introducing resilient restoration and adaptive reuse solutions for long-term preservation.

PL.37.	
Title	Assessment of Crack Injection Methods in the Restoration of Historic Brick Buildings
Authors	Oleksandr Molodid; Sergii Benderskyi; Ruslana Plokhuta; Sergey Bogdan; Volodymyr Skochko; Yevheniia Novak; Katarzyna Słuchocka
Institution	Kyiv National University of Construction and Architecture, Ukraine; Prydniprovska State Academy of Civil Engineering and Architecture, Ukraine; Yuriy Fedkovych Chernivtsi National University, Ukraine; Poznan University of Technology, Poland
Patent	Not specified
Description	High-performance polymer-based crack injection technology enabling significant structural strength recovery, offering a minimally invasive solution for heritage masonry restoration.

PL.38.	
Title	Post-Industrial Heritage and Contemporary Spatial Transformation: The Case of Łódź
Authors	Anna Aneta Tomczak; Sylwia Krzysztofik
Institution	Lodz University of Technology, Institute of Architecture and Urban Planning, Poland
Patent	Not specified
Description	Urban regeneration model transforming post-industrial zones into multifunctional spaces, enhancing urban resilience through adaptive reuse and cultural integration.

PL.39.	
Title	Reprofiling Sacred Heritage for Museum Use: Ukraine, Norway and China as Case Studies
Authors	Oleksandr Ivashko; Michał Krupa; Mykola Orlenko
Institution	Kyiv National University of Construction and Architecture, Ukraine; Cracow University of Technology, Poland; Ukrrestavratsiia Corporation, Ukraine
Patent	Not specified

Description	Framework for adaptive reuse of sacred heritage into museum spaces, balancing conservation, functionality, and environmental control of sensitive historical elements.

PL.40.	
Title	Preservation and Conservation Issues of the Salesian Monastery Façade in Oświęcim
Authors	Mykola Orlenko; Krystyna Paprzyca; Yulia Ivashko; Andrii Dmytrenko; Łukasz Krysmalski; Bianka Boros
Institution	Ukrrestavratsiia Corporation, Ukraine; Academy of Silesia, Poland; Kyiv National University of Construction and Architecture, Ukraine; National University "Yuri Kondratyuk Poltava Polytechnic", Ukraine; John Bosko Salesian Monastery, Poland; "George Enescu" National University of Arts, Iași, Romania
Patent	Not specified
Description	Multi-stage façade conservation methodology combining diagnostics, monitoring, and restoration strategies for long-term preservation of complex heritage structures.

PL.41.	
Title	Reconstruction and Restoration of the Former Jewish Hospital in Kropyvnytskyi
Authors	Maryna Omelianenko; Marek Pabich; Paulina Sztabińska-Kalowska
Institution	Kyiv National University of Construction and Architecture, Ukraine; Lodz University of Technology, Poland; University of Lodz, Poland
Patent	Not specified
Description	Restoration framework integrating structural rehabilitation and functional modernization, enabling continued medical use while preserving historical architecture.

PL.42.	
Title	Key Aspects on Desalination in Historic Brick Masonry
Authors	Yulia Ivashko; Dominika Kuśnierz-Krupa; Mykola Orlenko; Andrii Dmytrenko; Łukasz Bednarz; Valerii Tovbych; Oleksandr Kravchuk
Institution	Kyiv National University of Construction and Architecture, Ukraine; Cracow University of Technology, Poland; Ukrrestavratsiia Corporation, Ukraine; National University "Yuri Kondratyuk Poltava Polytechnic", Ukraine; Wroclaw

	University of Science and Technology, Poland
Patent	Not specified
Description	Advanced desalination technology targeting deep salt removal in masonry, improving durability and preventing long-term structural degradation.

PL.43.	
Title	Approaches to Organizing Recreational Spaces in Forefields of Historic Fortifications
Authors	Yulia Ivashko; Andrii Dmytrenko; Michał Krupa; Gabriel Tudora; Łukasz Bednarz
Institution	Kyiv National University of Construction and Architecture, Ukraine; National University "Yuri Kondratyuk Poltava Polytechnic", Ukraine; Cracow University of Technology, Poland; Gheorghe Asachi Technical University of Iași, Romania; Wroclaw University of Science and Technology, Poland
Patent	Not specified
Description	Innovative landscape design strategies integrating recreational functions into historic fortification zones while preserving structural integrity and cultural value.

PL.44.	
Title	Classification of the Four Largest Rock-Cut Cave Monasteries in China by Cave Shape
Authors	Shiru Wang; Zhijun Wang; Katarzyna Janicka-Świerguła
Institution	Lanzhou City University, China; Lanzhou University of Technology, China; Lodz University of Technology, Poland
Patent	Not specified
Description	Three-dimensional classification model (function–form–era) enabling systematic analysis and conservation planning of rock-cut heritage.

PL.45.	
Title	Influence of Geological Conditions and External Factors on the Structure and Decor of the Rock-Cut Monasteries of China
Authors	Yulia Ivashko; Shiru Wang; Andrii Dmytrenko; Przemysław Bigaj
Institution	Kyiv National University of Construction and Architecture, Ukraine; Lanzhou City University, China; Poltava

	Polytechnic, Ukraine; Cracow University of Technology, Poland
Patent	Not specified
Description	Integrated model linking geology with architectural design and decoration, enabling predictive conservation strategies.

PL.46.	
Title	Preservation of Architectural Heritage: Stratigraphic Analysis of a 19th Century Tenement House in Rzeszów
Authors	Krystian Sikorski; Rafał Lichołai; Anna Maria Martyka; Tomasz Dziurawiec
Institution	Rzeszow University of Technology, Poland; Independent Conservator
Patent	Not specified
Description	Advanced stratigraphic diagnostic method revealing historical layers for precise conservation planning.

PL.47.	
Title	Transformations of Market Square Façades in Small Towns
Authors	Anna Maria Martyka; Agata Mikrut-Kusy
Institution	Rzeszow University of Technology, Poland
Patent	Not specified
Description	Framework for façade conservation using controlled color and design strategies to preserve urban identity.

PL.48.	
Title	Wartime Restoration of Early 20th-Century Heritage Buildings in Lviv
Authors	Ihor Bokalo; Mariana Kaplinska; Iryna Pohranychna; Bohdan Cherkes; Karol Wysznacki
Institution	Lviv Polytechnic National University, Ukraine; University of Agriculture in Krakow, Poland; Lodz University of Technology, Poland
Patent	Not specified
Description	Adaptive restoration methodologies for war-damaged heritage integrating modern and historical systems.

PL.49.	
Title	Industrial Memory of a Heritage Corridor
Authors	Zhijun Wang; Shuo Wang; Xinyu Luo
Institution	Lanzhou University of Technology, China

Patent	Not specified
Description	Framework for transforming industrial heritage into dynamic cultural corridors through spatial narrative integration.

PL.50.

Title	Issues Related to the Protection of Cultural Heritage in a Small Historic Town
Authors	Joanna Bartkiewicz; Anna Krukowiecka-Brzęczek; Patrycja Białas; Agata Mikrut-Kusy
Institution	Rzeszow University of Technology, Poland; Cracow University of Technology, Poland; Monument Protection Office, Poland
Patent	Not specified
Description	Integrated urban conservation strategy combining monitoring and planning for heritage protection.

PL.51.

Title	Comprehensive Post-War Reconstruction of Settlements (Borodianka Case)
Authors	Oleksandr Molodid; Volodymyr Rashkivskiy; Ruslana Plokhuta; Volodymyr Skochko; Volodymyr Pipa; Ivan Musiiaka; Yevheniia Novak
Institution	Kyiv National University of Construction and Architecture, Ukraine; Chernivtsi National University, Ukraine
Patent	Not specified
Description	Scalable reconstruction model integrating energy efficiency, inclusiveness, and digital infrastructure.

PL.52.

Title	Analysis of the Destruction and Strategy for Brickwork and Stone Decor Consolidation
Authors	Iryna Korotun; Ruslan Yuriichuk; Oksana Halunka; Grzegorz Twardowski
Institution	Chernivtsi National University, Ukraine; Cracow University of Technology, Poland
Patent	Not specified
Description	Integrated conservation strategy combining traditional and modern materials for UNESCO heritage.

PL.53.

Title	Museification of Ruins Integrated into Modern Building
Authors	Svitlana Linda; Andrii Pavliv; Anna Fedak; Renata

	Przewłocka-Sionek
Institution	Opole University of Technology, Poland; Lviv Polytechnic National University, Ukraine; Lodz University of Technology, Poland
Patent	Not specified
Description	Techniques for integrating archaeological remains into modern architecture for preservation and reuse.

PL.54.

Title	Documentation and Reproduction of Frescoes
Authors	Iryna Korotun; Tamara Marusyk; Yevhen Popovych; Marek Początko; Tetiana Antoschuk; Svitlana Herehova
Institution	Chernivtsi National University, Ukraine; Cracow University of Technology, Poland
Patent	Not specified
Description	Differentiated restoration methodology based on material diagnostics for fresco conservation.

PL.55.

Title	Revitalization of the Skierniewice Railway Station
Authors	Katarzyna Janicka-Świerguła
Institution	Lodz University of Technology, Poland
Patent	Not specified
Description	Adaptive reuse model balancing heritage preservation with modern functionality.

PL.56.

Title	Repurposing of Architectural Monuments for Cultural and Artistic Functions
Authors	Oleksandr Ivashko; Andrii Dmytrenko; Aneta Pawłowska; Monika Wiśniewska-Kin; Aleksander Serafin
Institution	Kyiv National University of Construction and Architecture, Ukraine; Poltava Polytechnic, Ukraine; University of Lodz, Poland; Lodz University of Technology, Poland
Patent	Not specified
Description	Strategies for transforming historic buildings into cultural and artistic spaces.

PL.57.

Title	Preservation and Adaptive Reuse of the Former Auschwitz I Slaughterhouse

Authors	Magdalena Kozień-Woźniak
Institution	Cracow University of Technology, Poland
Patent	Not specified
Description	Adaptive reuse strategy preserving historical value while enabling visitor functionality.

PL.58.	
Title	Green Public Spaces in Kraków's Historical Urban Fabric
Authors	Justyna Kobylarczyk; Patrycja Seruga
Institution	Cracow University of Technology, Poland
Patent	Not specified
Description	Framework for integrating green infrastructure into historic urban environments.

PL.59.	
Title	Conservation Challenges in Nowy Wiśnicz
Authors	Justyna Kobylarczyk; Mateusz Budziakowski
Institution	Cracow University of Technology, Poland
Patent	Not specified
Description	Integrated conservation planning tools preserving historic urban identity.

Saudi Arabia

by Highly Innovative Unique Foundation,

SA.1.	
Title	**Digital Evidence Analysis System for Health Data Protection**
Authors	**Albenhendi Meshari Yaser S, Almasaad Ziyad Anwar H, Manjur Kolhan**
Institution	**King Faisal University**
Patent no.	SA-1020251812
Description	Digital Evidence Analysis System for the protection of health data through an advanced mechanism that combines cybersecurity analysis, deep learning, and integration with healthcare systems to ensure a secure environment for medical information. Healthcare institutions rely heavily on electronic medical records and connected databases that store sensitive patient information, diagnoses, and treatments, making them a primary target for cyberattacks and electronic breaches.

SA.2.	
Title	**A Graph-Based Approach to Modeling Decisions Enabling Case-Based Reasoning and Context-Aware Recommendations via Vector Space Encoding**
Authors	**Moria Abdulaziz Hazim A, Ahmad Ghassan Yousef Rabaiah, Albenhendi Meshari Yaser S, Yazan Ghassan Yousef Rabaiah**
Institution	**King Faisal University**
Patent no.	**-**
Description	The Decision Memory Graph is an AI infrastructure that transforms every organizational decision into a persistent, query-able node in a dynamic knowledge graph. It captures the full context of each decision — action, objective, actor, timestamp, KPIs, and outcomes — then encodes decision-context pairs into a vector space enabling instant similarity search, case-based reasoning, and context-aware recommendations grounded strictly in historical evidence — not isolated data points.

SA.3.	
Title	**Oculomo**
Authors	First Author(Jawaher Turki Bin Khunaysir), **Second Author (Fatima Ahmed Alwouhaimed),third author(Madhawi Abdulrahman Alismail)**
Institution	**King Faisal university**
Patent no.	-
Description	Oculomo is an innovative solution designed to improve treatment adherence in children with amblyopia through real-time monitoring and digital integration. It consists of a smart eye patch embedded with a capacitive sensor and connected to an IoT control unit, which continuously detects whether the patch is worn correctly. When the patch is properly applied, the system records the duration of use and transmits data wirelessly to a mobile application. The application provides a user-friendly interface tailored for children and caregivers, beginning with an engaging onboarding experience and offering personalization features to enhance motivation and user engagement. A key advantage of Oculomo is its ability to ensure accurate adherence tracking. If the eye patch is removed or worn incorrectly, the system immediately responds in three ways: an audible alarm is triggered from the device, a real-time alert is sent to the caregiver's mobile application, and the therapy timer automatically stops counting. This guarantees that only effective treatment time is recorded and prevents false adherence data. In addition, the system generates detailed reports that allow healthcare providers to make data-driven clinical decisions. A built-in motivation system further encourages consistent use through positive reinforcement and rewards. Beyond clinical benefits, Oculomo also contributes to environmental sustainability by reducing the unnecessary use and disposal of ineffective traditional patches, thereby minimizing medical waste. Overall, Oculomo transforms amblyopia treatment into a precise, reliable, and digitally enhanced therapeutic process, improving outcomes while supporting both patients and caregivers.

SA.4.	
Title	**Novel Drug Screening susceptibilities in Trichomonas vaginalis by using the novel fluorescence assays**
Authors	**Dr. Amani Alhejely**
Institution	Jazan University – University College of Al-Darb, Department of Biology, Jazan, Saudi Arabia
Patent no.	Saudi Patent Application No. SA 1020245971
Description	This invention presents a novel fluorescence-based drug screening method for assessing drug susceptibility in Trichomonas vaginalis. The assay utilizes resorufin as a metabolic indicator to quantitatively evaluate parasite viability and determine IC_{50} values with high sensitivity and reproducibility. Compared to conventional microscopy-based methods, this fluorescence-based system significantly improves accuracy, reduces analysis time, and enables scalable, high-throughput drug screening. The method was validated using standard antiparasitic compounds, demonstrating consistent and reliable results across multiple tested compounds. In addition to the resorufin-based assay, a propidium iodide-based method was developed and validated for comparative drug susceptibility assessment, further confirming the system's reproducibility and scalability. Overall, this platform provides a reliable and standardized approach for in vitro drug sensitivity testing and represents a scalable fluorescence-based screening system suitable for future kit development and pharmaceutical R&D implementation.

SA.5.	
Title	**A Non-Invasive Breast Health Monitoring Device for Rapid Pre-Screening and Early Detection of Breast Cancer Using breath sample analysis**
Authors	**Alhassan Rizq Y Alqarih , Hanan Mahfouz Alghamdi**
Institution	Ministry of Health
Patent no.	SA1020262287
Description	This invention is a non-invasive **breast health monitoring** device designed as a rapid **pre-screening** tool for the early detection of breast cancer. The device operates by analyzing volatile organic compounds (VOCs) in exhaled breath to identify biochemical signatures associated with

breast tissue health, including the detection of the **unhealthy breast tissue product component that our device can detect**. By integrating electronic nose technology with artificial intelligence, the system delivers accurate results within 6 minutes, enabling early risk classification and supporting timely medical decision-making.
The device is portable, cost-effective, and easy to use, making it suitable for deployment across a wide range of healthcare environments. It can be used in primary healthcare centers, hospitals, mobile clinics, and remote or underserved areas where access to conventional screening methods is limited. In addition, it serves as an effective **pre-screening** tool to reduce unnecessary diagnostic procedures and optimize healthcare resources.
Beyond clinical applications, the device plays a significant role in **promoting awareness about breast cancer** by enabling accessible, routine screening and encouraging early detection practices. It also supports large-scale national screening programs and public health initiatives aimed at improving early diagnosis rates and reducing breast cancer mortality.

SA.6.	
Title	From Green to Nano: Targeting Biofilm-forming Bacteria In Urinary Catheters
Authors	**Omar Abdulaziz Alghamdi**
Institution	Ministry of Education , Al Baha Education Deperatment
Patent no.	SA1020252944
Description	Antibiotic resistance poses serious global health challenges, necessitating the development of sustainable and effective alternatives to conventional antibiotics. Therefore, biofilm formation represents one of the most important mechanisms that cause tolerance and failure of antibiotic therapy in chronic infections and related to medical devices such as catheters. In this study, zero-valent silver nanoparticles (AgNPs) were biosynthesized using Rosmarinus officinalis (rosemary) methanolic leaf extract as a natural reducing and stabilizing agent through a green synthesis approach. The phytochemical composition of the rosemary extract was identified using LC–ESI–QTOF–MS. AgNPs were extensively characterized using UV–Vis spectroscopy,

Scanning Electron Microscopy-Energy Dispersive X-ray Spectroscopy (SEM–EDX), confirming the formation of stable, phytochemical-capped Ag^0 nanoparticles. The antibacterial activity of the biosynthesized AgNPs and rosemary methanolic plant extract (PE) was evaluated against methicillin-resistant Staphylococcus aureus (MRSA) ATCC 33591, Escherichia coli ATCC 25922, and Pseudomonas aeruginosa ATCC 27853 using agar-well diffusion and minimum inhibitory concentration (MIC) assays. AgNPs exhibited significantly enhanced antibacterial activity compared to PE, with low MIC values (≤0.07–0.15 mg/mL). Antibiofilm activity was assessed using microtiter plate assays and urinary catheter models, where AgNP-treated surfaces demonstrated a substantial reduction in biofilm formation relative to untreated controls. Cytotoxicity evaluation using a normal fibroblast cell line indicated acceptable biocompatibility of the AgNPs. Overall, this work demonstrates that rosemary-mediated AgNPs possess strong antibacterial and antibiofilm activities with a favorable safety profile, highlighting their potential as promising antibacterial agents against pathogens associated with biofilm formation on urinary catheters.

SA.7.

Title	Smart Enzymatic Reader for Agricultural Grains (SERAG)
Authors	**Ashwaq Alnazawi, Ahmed Hashem**
Institution	Jazan University
Patent no.	Patent application No. SA1020253562/2025
Description	SERAG is an innovative, rapid enzymatic diagnostic strip designed for the early detection of hidden insect infestations in stored agricultural grains, including wheat, rice, and maize. The system operates on enzyme-based colorimetric reactions that generate visible results within minutes, based on the metabolic activity of common storage pests. **Innovation Objectives:** • Enable early and reliable detection of stored-product insect infestations. • Support farmers, storage operators, and food processors in protecting grain quality. • Deliver a low-cost, user-friendly, and field-deployable solution without the need for laboratory infrastructure.

Technical Features:

- Utilizes enzymatic reactions involving amylase, protease, and chitinase.
- Detects biochemical markers associated with insect metabolism inside grains.
- Produces rapid colorimetric responses, interpretable without specialized equipment.
- Applicable across diverse environments, including silos, warehouses, food processing units, and logistics centers.

Societal and Economic Impact:

- Minimizes post-harvest losses and contributes to improved food security.
- Enhances quality control and safety across agricultural supply chains.
- Promotes sustainable pest management practices through early intervention and reduced chemical usage.

SA.8.	
Title	**M.B.S**
Authors	**TURKI ABDULLAH ALANAZI**
Institution	
Patent no.	NO. SA 10120254758
Description	The MBS System represents a transformative proactive healthcare ecosystem specifically engineered to bridge the critical detection gap in modern patient monitoring by shifting medical care from a reactive model to a life-saving preventive framework. Unlike traditional monitoring systems that only trigger alerts after a crisis has occurred, MBS utilizes sophisticated LSTM algorithms to analyze real-time physiological data, including heart rate, blood pressure, and oxygen levels, which enables the prediction of severe cardiac events such as myocardial infarction up to fifteen minutes before symptoms manifest. This innovation integrates a versatile IoT wristband and a secure AI core powered by Python and Flask, ensuring high-accuracy physiological trend modeling and real-time analytics while maintaining full compliance with international HIPAA and GDPR data standards. In clinical settings, the system

automates monitoring within hospitals and ICUs to significantly reduce alarm fatigue and ensures absolute medication accuracy for nursing staff through instant task notifications. Beyond the hospital walls, it serves as a predictive guardian for high-risk chronic patients in remote home-care settings, providing a vital safety net for independent living and supporting elderly care through the early detection of stress patterns. Ultimately, MBS provides medical teams with essential clinical decision support during the critical fifteen-minute golden window, delivering best-action recommendations that align with global sustainable development goals for health and innovation.

SA.9.

Title **Smart Hybrid Diabetic Patch**

Authors **Reema Ali Alhalafi**

Institution ZHOOR ALTAJ

Patent no. -

Description

This project introduces a "Smart Hybrid Bio-Patch" specifically engineered for chronic Diabetic Foot Ulcers (DFU). It features a unique Multi-layered Architectural Design that integrates four critical functions:

• Antimicrobial Action: Green-synthesized Silver Nanoparticles (AgNPs) to eliminate drug-resistant bacteria.
• Wound Drying: Natural Tannins acting as an astringent to dry moist ulcers and accelerate skin pore closure.
• Tissue Regeneration: Aloe Vera extract to soothe inflammation and stimulate cell regrowth.
• Real-time Diagnosis: An isolated pH sensor chamber connected via microfluidic channels. This design allows for continuous monitoring of the wound’s infection status through colorimetric changes while preventing chemical interference between the healing agents and the pH indicator.

Spain

SP.1.

Title	**Architecture Controlled PAN–Collagen–Dexamethasone Electrospun Scaffolds for Mesenchymal Stem Cell Culture**
Authors	Camilo Zamora-Ledezma, Nayeli Y Gómez-Castillo
Institution	Universidad Alfonso X el Sabio (UAX).
Description	This innovation introduces a tunable electrospun composite scaffold system based on PAN–collagen–dexamethasone, designed to precisely control fiber architecture for enhanced mesenchymal stem cell (MSC) response. By optimizing solution composition and electrospinning parameters, the platform enables tailored modulation of fiber diameter, porosity, and surface morphology, directly influencing mechanical, thermal, and chemical performance. A key advancement lies in correlating scaffold microstructure with biological functionality, demonstrating improved MSC adhesion, viability, and proliferation as a function of fiber organization and controlled drug incorporation. The integration of dexamethasone within an ECM-mimetic fibrous network provides simultaneous structural support and localized therapeutic delivery. The proposed system represents a versatile and scalable platform for regenerative medicine, enabling the design of biomimetic, drug-releasing scaffolds with predictable structure–property–cell interaction relationships. This approach offers significant potential for next-generation tissue engineering applications, supporting both research and clinical translation.

Switzerland

CH.1.	
Title	**Two-Track Validation Methodology for Audit-Proof Cash Register Management — A Pan-European Standar**
Authors	Luca Gobbo
Institution	**FISCALIANCE**
Patent	-
Description	A forensic methodology that closes the structural gap between European bookkeeping law and its daily practical implementation in cash-intensive businesses. The EU Accounting Directive 2013/34/EU, the VAT Directive 2006/112/EC (Art. 242–244), and the national anti-manipulation regimes adopted across all EU Member States — TSE in Germany, RT and Lotteria degli Scontrini in Italy, SAF-T in Poland, Portugal, Romania and Lithuania, NF525 in France, myDATA in Greece, eKasa in Slovakia, VeriFactu and TicketBAI in Spain, KSeF in Poland — define what is required, but no Member State prescribes how to produce evidence that withstands a tax audit. Cash books are routinely kept without any physical cash count: closing balances are computed, not counted, leaving them legally vulnerable regardless of arithmetic correctness. The Two-Track Methodology establishes a closed evidentiary chain by running two fully independent determination paths in parallel: (1) the counting track — physical cash count with denomination list, from which daily revenue is derived retrogradely (counted closing balance + expenses/withdrawals − deposits − opening balance = daily revenue); (2) the system track — the fiscal record from the certified electronic register. Both tracks meet in an **actual-vs-expected reconciliation**; daily revenue is additionally bank-validated through neutralisation, fixed-cash-stock procedure, and external proof. Statistical anomaly detection (Benford / chi-square digit analysis, round-amount detection, bunching, cost-of-goods plausibility) acts as an internal pre-audit. A comparative review against the audit standards of all 27 EU Member States confirms that the methodology meets or exceeds every national requirement, producing a single uniform evidentiary standard valid throughout the Union.

CH.2.	
Title	**PRO Gramm — Forensic Calculation Software for Production-Based Businesses (every gram of product reconciled to every cent of revenue)**
Authors	Luca Gobbo
Institution	**FISCALIANCE**
Patent	-
Description	PRO Gramm is a forensic calculation engine purpose-built to reconstruct revenue and consumption in production-based businesses with a degree of evidentiary precision unattainable by conventional accounting, ERP, or merchandise-management systems. Where standard tools record what was sold, PRO Gramm proves what could have been sold given the documented inputs — and reconciles the two with mathematical closure. The decisive distinction is the engine's capacity to handle highly complex operational structures. Real production environments are governed by n:n relations — one ingredient feeds many recipes, one recipe contains many ingredients, one sales unit aggregates many production stages. PRO Gramm captures this combinatorial complexity in full and resolves it deterministically: every gram of input is set in relation to every cent of output, and every value within the structured dataset is proven and counter-proven by adjacent values. The result is a self-validating data structure in which manipulation, omission, or reconstruction error becomes mathematically detectable. This evidentiary quality is the engine's central purpose. In tax-audit and tax-tribunal proceedings across the EU — where indirect estimation procedures (DE Schätzung §162 AO; IT accertamento induttivo; FR taxation d'office; ES estimación indirecta; PT avaliação indireta) routinely produce excess assessments through linear extrapolation from isolated parameters — PRO Gramm delivers a closed evidentiary chain with documented traceability from each closing figure back to the originating supplier invoice. The output meets the standards of expert evidence under the procedural codes of all EU Member States and shifts the burden of proof from the taxpayer to the tax administration.

CH.3.	
Title	**Fiscal Forensic Index (FFI) — A Deterministic Multi-Neural System for Mass Detection of Shadow Economy, Money Laundering and Social Security Fraud**
Authors	Luca Gobbo
Institution	**FISCALIANCE**
Patent	-
Description	The Fiscal Forensic Index (FFI) is a deterministic, multi-neural analytical engine that reconstructs the economic reality of a business from structured operational and accounting data and compares it — formula by formula — with declared values. Its architecture is six-layered: ingestion, mapping, validation, analysis, scoring, and governance. Each layer operates read-only, processes data in batch, and emits a hash-sealed, versioned audit trail. The validation layer enforces completeness, cardinality, periodic coverage, duplication checks and double-entry coherence. The analysis core then derives target values (Soll) for revenue, gross profit, cost-of-goods ratio, labour ratio and overhead ratio from physical operating parameters (floor area, headcount, energy consumption, hours worked, supplier purchases, recipe-based throughput) and reconciles them against declared actual values (Ist). More than 100 mathematical plausibility formulas operate on more than 200 economic parameters across over 800 industry categories. The anomaly layer combines rule-based detection (negative inventories, broken time-axes, impossible cardinalities) with statistical forensics (Benford digit analysis, Z-scores, IQR outliers, ratio drift, time-series desynchronisation, NACE peer-band positioning). Each flag is traceable to a documented rule, formula, or benchmark — explainable by design. The scoring layer aggregates weighted partial scores into a 0–100 risk index with red-flag classification. Identical inputs produce identical results: every run is reproducible, cryptographically signed, and admissible as expert evidence under the procedural codes of EU Member States. The system operates without intervention in operating systems, processes mass datasets in deterministic batch cycles, and replaces supervisory discretion with rule-bound, court-admissible computation.

Taiwan

Represented by **WIIPA**

TW.1.	
Title	**FlexWear Stand**
Authors	HSU CHUN-YEN Hsinchu International Academy
Patent no.	M682247
Description	FlexWear Stand is a wearable mobile holder designed for hands-free convenience in daily life. With adjustable shoulder straps and an extendable pole, it securely supports your phone at eye level, allowing users to watch videos, video call, or navigate without holding the device. The lightweight pocket design makes it easy to carry and perfect for commuting, traveling, or multitasking. FlexWear Stand solves the problem of limited hand use—bringing freedom, comfort, and safety to your mobile experience.

TW.2.	
Title	**Innovation Induction Cooker**
Authors	LIN PIN-CHUN
Institution	Hsing Lung Primary School
Patent no.	M682268
Description	This product is designed to improve cooking efficiency and reduce energy consumption when used with induction cookers. By helping speed up the cooking process, it can shorten heating time and lower power usage, supporting energy saving and environmental protection. The sides of the pot are made of non-conductive materials, making it safer and easier to handle during cooking. Its practical design enhances convenience while providing a more energy-efficient cooking experience.

TW.3.	
Title	**Umbrella storage rack**
Authors	YUAN CHING-CHIEN
Institution	National Chutung Senior High School
Patent no.	-
Description	The name of this project is called umbrella storage rack. This product is an improvement on the square and round

plug-in type umbrella stand/holder (or receptacle). Traditional plug-in umbrella stands are bulky, have limited capacity, can only store long umbrellas, and often make storing short umbrellas difficult, leading to clutter, slow drying, and inconvenient retrieval. They also lack a drip tray at the bottom or the tray is too shallow, resulting in water accumulation or leakage. The upright tree-style umbrella rack/stand saves floor space, offers flexible storage capacity, is easily expandable, provides versatile storage options, quick drying, and offers convenient retrieval. It features a bottom drip tray to collect rainwater for reuse.

TW.4.

Title	**Anti-tip bottle holder**
Authors	HUANG YI-HSUN
Institution	Hsinchu International Academy
Patent no.	M679774
Description	The Anti-tip Bottle Holder is designed based on the principle of center balance, ensuring that cups and bottles remain stable even during movement or driving. By effectively reducing the risk of tipping and spills, it helps protect both the user and surrounding items from mess or damage. This makes it especially suitable for use in vehicles, as well as in offices, homes, and travel scenarios. Its lightweight and compact design allows for easy storage and portability, while the user-friendly structure ensures simple and convenient operation. Overall, it provides a practical solution for maintaining stability and safety in daily life.

TW.5.

Title	**AI-driven Plant Cultivator**
Authors	WU CHEN-NI, WU PEI-HSUN
Institution	De Anza College Pacific American School
Patent no.	M673632_
Description	Our product is a multifunctional device that provides water, regulates temperature, and connects to AI for plant identification, offering plants a blend of efficiency and innovative technology.

TW.6.

Title	**Anti-barking and anti-biting device**
Authors	LI SHU-KAI
Institution	Korrnell Academy
Patent no.	M681653
Description	Our anti-barking and biting device features an improved muzzle design with a built-in pendulum mechanism. When the dog barks or attempts to bite, it triggers mild discomfort by touching sensitive areas. The dog can still eat when lowering its head, effectively preventing excessive barking or attacks while maintaining freedom of movement.

TW.7.

Title	**Portable Towel Auxiliary Washer**
Authors	LIU JASON
Institution	Xin-Rong Elementary School
Patent no.	M673686
Description	This portable washing assistant uses a hollow cylindrical structure with rotating caps to securely hold cloths in place. Users can easily add water, rotate the caps to wash the cloths, and then wring them dry with minimal effort. Its compact, lightweight, and convenient design makes it suitable for cleaning cloths anytime and anywhere, helping maintain cleanliness and hygiene in daily life.

TW.8.

Title	**One-Hand Hair Drying Helper**
Authors	CHUNG YI-FEI, CHUNG YI-KAI
Institution	Dong Sing Junior High School Chung Yuan Elementary School
Patent no.	M672445
Description	This product connects a Silicone Hand-shaped Diffuser to the front of a hair dryer, held firmly in place with a non-slip pad. There are small holes between the fingers and on the palm, so the air can easily blow through and reach deep into the hair. The best part is that you can dry and comb your hair with just one hand, while the other hand is free to do something else. This design makes it easier and safer for people with hand injuries or disabilities to dry their hair by themselves.

	It also helps the air reach the hair roots better and gives a soft scalp massage. Plus, it keeps your hair at a safe distance from the dryer, so you don't get burned or have your hair sucked into the machine. It's a super handy and safe tool for drying your hair

TW.9.	
Title	**Towel Auxiliary Cleaning Device**
Authors	LIAO JIA-JIN, LIN TZU-QI
Institution	Fudan High School Kuai Ji Junior High School
Patent no.	M674673
Description	This device is designed for convenient towel cleaning and hygiene maintenance. It features internal clamps to securely hold towels in place during washing. After adding water, users simply rotate the lid to clean the towels effectively. The wastewater can then be drained easily, helping remove dirt and moisture. Its simple structure and user-friendly operation make it practical for daily use, especially for maintaining clean towels and better hand hygiene.

TW.10.	
Title	**Automatic Window Cleaning Machine**
Authors	TSAI TSUNG-YU
Institution	Chien-Kuo Junior High School
Patent no.	M674278
Description	This compact and portable sprayer is designed for convenient and versatile use in daily life. By simply filling the container with water and pressurizing it, users can easily operate it anywhere without complicated steps. It is suitable for a wide range of tasks, including cleaning windows, washing vehicles, watering plants, and general outdoor maintenance. Its lightweight structure, easy-carry design, and user-friendly operation make it practical for both household and outdoor applications.

TW.11.	
Title	**Mobile Cleaner**
Authors	LI PEI-HSUAN, LI PEI-CHU
Institution	Kuai Ji Junior High School Qing Xi Elementary School
Patent no.	M680780

Description	Due to religious considerations this year, the Thailand delegation has requested a more simple and low-profile booth arrangement. They prefer to use a standard booth setup without raised structures or overhead decorations. However, the lounge area may still require special construction to accommodate officials and staff. We appreciate the organizer's understanding and apologize for any inconvenience caused.

TW.12.

Title	**Multifunctional Mobile Alarm**
Authors	LI, PEI-HSUAN LI, PEI-CHU
Institution	Kuai Ji Junior High School Qing Xi Elementary School
Patent no.	M681985
Description	This device is designed to improve road safety when a vehicle breaks down or stops unexpectedly. It combines a mechanical onboard triangular warning sign with a buzzer alarm to provide both visual and audio alerts. By warning approaching drivers more effectively, it helps reduce the risk of rear-end collisions and secondary accidents. The device enhances protection for drivers and passengers, especially in emergency roadside situations, and offers a practical safety solution for daily vehicle use.

TW.13.

Title	**Magnetic-Driven Pinball**
Authors	LIU JUN-LIN, LIU YI-SHUO, LIU YI-ZHEN
Institution	Lilin Elementary School, New Taipei City.
Patent no.	M672859
Description	This educational toy uses magnetic force and the conversion between potential and kinetic energy to launch steel balls, allowing them to roll down from the rear platform. Through this interactive process, users can observe basic physics principles in a fun and engaging way. The innovative design combines play with hands-on learning, helping students better understand energy transformation, motion, and magnetism while inspiring curiosity, learning motivation, and interest in scientific exploration.

TW.14.

Title	**Electromagnetic claw machine**
Authors	FU KUAN-CHUNG, WANG ZE-CHENG
Institution	Korrnell Academy
Patent no.	
Description	The Hanging Toy Machine is an energy-saving recreational device inspired by traditional claw machines. Instead of relying on continuous electricity consumption, it uses hand-cranked power to generate electromagnetism for lifting metal objects. This design reduces energy use while adding physical activity and interaction to the game. By combining entertainment, exercise, and environmental awareness, the invention offers a fun and sustainable alternative for stress relief and leisure activities.

TW.15.

Title	**A method for dynamic fusion and mapping of cyberspace assets based on knowledge graph enhancement.**
Authors	Huan Wang, Junjie Yan, Zhe Wang, Yong Peng, Jianhua Huang
Institution	Guangxi University of Science and Technology
Patent no.	M673849
Description	This invention establishes a mechanism for resolving co-references in asset attributes based on the quality of asset intelligence, defines metrics for assessing the quality of asset intelligence data, and designs an ontology structure for a cyberspace asset knowledge graph based on a six-tuple schema. Through the representation of asset attributes and the analysis of asset protocols, it extracts cyber asset entities and their relationships. By utilising a false-positive domain name asset entity alignment algorithm to identify the scope of wildcard-resolved domain name asset entities within asset intelligence data, the accuracy of cyber asset knowledge representation is enhanced.

TW.16.

Title	**Breakthrough in Diabetes Prevention: The Novel Pediococcus pentosaceus GKP4 and Its Potent Glycemic Regulation Technology**
Authors	Chen Chin-Chu, Chen Yen-Lien, Lin Shin-Wei, Chen Yen-

	Po
Institution	GRAPE KING BIO
Patent no.	I879630
Description	With diabetes cases projected to reach 366 million globally by 2030, finding accessible and natural ways to manage blood sugar has never been more urgent. Our award-winning innovation introduces Pediococcus pentosaceus GKP4, a specific probiotic strain designed to transform glycemic control through natural intervention. Innovation & Proven Efficacy: • Exclusive Patent Strain: GKP4 is a Gram-positive lactic acid bacterium traditionally found in fermented foods like kimchi and cheese, now scientifically optimized and deposited under accession number BCRC-910879. • Validated Results: Through rigorous 14-day oral trials, GKP4 has demonstrated a powerful ability to suppress post-meal blood glucose spikes. • Superior Performance: In Oral Glucose Tolerance Tests (OGTT), GKP4 significantly reduced both peak glucose levels and the 120-minute integrated glycemic response (iAUC), outperforming control groups. Future Impact: Designed for modern lifestyles, the GKP4 composition can be seamlessly integrated into health supplements, functional foods, and beverages. It offers a safe, effective, and non-invasive alternative for individuals seeking to maintain healthy blood sugar balance and prevent metabolic diseases.

TW.17.

Title	**Charging Device Structure**
Authors	Bing-Wei Chen
Institution	National Taipei University of Technology
Patent no.	
Description	This project presents an innovative charger structure design that addresses common shortcomings in traditional charging devices, such as bulkiness, poor heat dissipation, limited safety features, and lack of modularity. The proposed structure integrates a high-efficiency power conversion module, smart current control chips, and multiple protection mechanisms to deliver stable, safe, and fast charging performance.

The internal layout adopts a layered architecture that separates the input processing section, voltage regulation module, and thermal dissipation zone. This design significantly enhances heat management and electromagnetic interference (EMI) isolation. The casing is made of flame-retardant materials and features a detachable modular interface, which facilitates maintenance, upgrades, and broad compatibility with various devices.
Furthermore, the structure supports multiple fast-charging protocols (such as QC and PD), allowing it to automatically detect connected devices and adjust the output current accordingly—ensuring both safety and efficiency. Its compact and portable form factor makes it ideal for use in travel, office, and daily scenarios.

TW.18.

Title	**Charging Station for Flashlight**
Authors	Yang-Sheng Wang
Institution	Tamkang University
Patent no.	
Description	This project designs a dedicated charging dock for flashlights, aiming to provide a convenient and safe charging solution. The dock features a stable base to ensure that the flashlight remains securely in place during charging, preventing tipping. It is equipped with an intelligent charging control circuit that effectively prevents overcharging, overheating, and short circuits, ensuring user safety. The charging dock supports multiple flashlight sizes and connector types, offering excellent versatility and compatibility. The built-in charging module can automatically detect the battery status of the flashlight and adjust the charging rate accordingly, enhancing battery lifespan and optimizing charging efficiency. Furthermore, the product is made from eco-friendly materials, featuring a simple and aesthetically pleasing structure that facilitates daily use and storage. This charging dock not only improves the convenience of using flashlights but also meets high standards of safety and durability, making it suitable for home, outdoor, and emergency backup scenarios.

TW.19.

Title	**Fermentation Complex with Anti-aging Effect Similar to NMN**
Authors	Cheng Huang, Yi Chung Lai, Bo Ru Lai
Institution	Biozyme Biotechnology Corp.
Patent no.	I804133, M621785
Description	A fermentation complex with anti-aging effect similar to NMN, the fermentation complex containing a vegetable ingredient and use a special polysaccharide fermentation preparation method to get a fermentation complex, within the vegetable ingredient include truffle, mushroom, avocado, tomato or edamame. The fermentation complex has anti-aging effect.

TW.20.

Title	**Hand function rehabilitation water bottle**
Authors	Kuo Tsu-Hsiang LI HUI-WEN, CHUNG MIAO-CHEN, YANG HSIANG-HAN
Institution	Jenteh Junior College of Medicine, Nursing and Management
Patent no.	M670883
Description	This creation is a hand-function rehabilitation water bottle designed for patients, this aid contains a stainless steel thermos bottle, the Hexagon surface of which is designed with a tenon track and buckle device; As well as removable strength training course, auxiliary drinking device, fine motor training mortise. We have designed the tenon track can adjust the position of muscle strength training according to the size of the hand, and use the bottle as a fulcrum for hand muscle strength training; The buckle device is combined with the fine motor training mortise, a set of different sizes, soft, hard and weight. A male buckle is set at another end of these mortises, so that patients can achieve muscle strength training course in rehabilitation of hand and hand-eye coordination and fine motor training through different grasping situation.

TW.21.

Title	**High-Efficiency Intelligent Automatic Cleaning System for Photovoltaic Panels**
Authors	Chien Wei, Hsiao Chun-Yu, Sun Zong-Kun, Lu Ssu-Hsuan, Yang Fang-Yuan,
Institution	Tatung university, Ningde Qianwei Industrial Technology Co., Ltd. Tatung university. Lunghwa University of Science and Technology
Patent no.	M673849
Description	This invention provides a High-Efficiency Intelligent Automatic Cleaning System for Photovoltaic Panels, which achieves the advantage of automatically cleaning the solar panels, so that workers can automatically rinse the solar panels when cleaning them, avoiding the time-consuming and labor-intensive problem of long-term manual cleaning for workers, reducing the labor intensity of workers, and meeting actual usage needs.

TW.22.

Title	**Improved Structural Design for Wireless Security Camera**
Authors	Chun-Jie SHIH, YANG LUNG SHIH, YANG FU SHIH
Institution	Fengzhou Trading Co., Ltd.
Patent no.	M671877
Description	This project focuses on improving the structural design of a wireless surveillance camera to enhance its durability, heat dissipation efficiency, and ease of installation. The improved structure employs a modular design that separates the camera body, antenna, and battery components, reducing interference and improving signal stability. Regarding the cooling system, additional heat sinks and ventilation slots are incorporated to effectively dissipate heat, preventing overheating during prolonged operation and extending the device's lifespan. The casing is made of high-strength lightweight alloy with waterproof and dustproof features, making it suitable for various harsh environmental conditions. Furthermore, the structural design optimizes the installation method by supporting multi-angle adjustment and quick

disassembly, allowing flexible deployment in different scenarios. The internal battery module is rationally arranged to enhance battery life and simplify the replacement process. This improved structure effectively enhances the performance and user convenience of wireless surveillance cameras, making it suitable for applications in home security, commercial monitoring, and public spaces, with strong market potential and application value.

TW.23.

Title	**Intelligent e-sports training fatigue monitoring system**
Authors	HSIEH CHE JEN, LEE CHUN-TE, HU YU-CHIANG, LUI MING-CHUN, LIN HUANG-FU
Institution	Cheng Shiu University
Patent no.	I879603
Description	The esports training fatigue monitoring system consists of monitoring unit, processing control unit, and verification unit. The monitoring unit tracks changes in the user's physiological data. Based on these changes, the processing control unit assesses whether the user has entered a state of suspected fatigue and issues a verification command accordingly. If the user fails to respond to this message, the processing control unit confirms the user is fatigued and immediately halts the operation of the console.

TW.24.

Title	**Intelligent monitoring platform for machine operation status**
Authors	HSIEH CHE JEN, LEE CHUN-TE, HU YU-CHIANG, LUI MING-CHUN, LIN HUANG-FU
Institution	Cheng Shiu University
Patent no.	M676066
Description	The intelligent machine operation monitoring platform is used to monitor machines on a production line. It includes a monitoring unit that triggers an anomaly signal to the central control unit upon detecting a fault. This allows the system to identify the machine's abnormal state and judge the severity of the issue. The system then scans the QR Code barcode on the faulty machine to retrieve its data, allowing maintenance personnel to carry out repairs based on this information.

TW.25.	
Title	**Multi-functional Lighting Figurine Supporting Mobile Charging and Power Generation**
Authors	TSAO YU MING
Institution	Shih Chien University
Patent no.	M671880
Description	This creation combines lighting with multifunctional power applications by designing an illuminated figurine capable of mobile phone charging and power generation. The figurine is equipped with a high-efficiency power generation module that can produce electricity through hand-cranking or other renewable energy sources, providing an eco-friendly and stable power supply. The product features an intelligent power management system that supports simultaneous mobile phone charging, allowing users to conveniently recharge their phones without external power sources. This enhances usability during outdoor activities or emergencies. The lighting component uses energy-efficient LED lights to provide soft and long-lasting illumination, suitable for nighttime lighting or decorative purposes. The figurine's design is visually appealing and structurally stable, making it suitable for placement in both home and outdoor environments. This multifunctional lighting figurine is not only practical but also embodies eco-friendly principles, making it ideal for users who value green energy and lifestyle convenience. It holds strong market potential and broad application prospects.

TW.26.

Title	**Patented Novel Strain GKA4: A New Biotherapeutic Frontier for Renal Health**
Authors	Chen Chin-Chu, Chen Yen-Lien, Lin Shin-Wei, Chen Yen-Po
Institution	GRAPE KING BIO
Patent no.	I849717
Description	Breakthrough in Renal Protection: Patented GKA4 Probiotics for Mitigating Chemo-Induced Kidney Injury [Background] Cisplatin is an indispensable chemotherapy drug, yet its severe nephotoxicity leads to Acute Kidney Injury (AKI) in over 30% of patients. The accumulation of Cisplatin in the kidneys results in decreased filtration rates, elevated serum toxins, and extensive renal tubular necrosis. [Core Technology: Patented GKA4 Strain] This technology utilizes a novel strain, Pediococcus acidilactici GKA4 (Deposit No. BCRC 910876). Research confirms that GKA4 and its active substances can effectively prevent or treat renal function impairment specifically caused by Cisplatin. [Scientific Evidence: Proven Renal Benefits] Animal studies demonstrate that GKA4 supplementation provides the following protective effects: • Reduction of Toxin Markers: Significant lowering of Blood Urea Nitrogen (BUN) and Creatinine (Cr) levels, restoring essential waste excretion. • Preservation of Tissue Integrity: Marked reduction in proximal tubular necrosis and the abnormal appearance of hyaline casts. • Control of Organ Inflammation: Effectively lowers the "Kidney Index" (kidney-to-body weight ratio), mitigating drug-induced renal swelling. [Market Applications] GKA4 holds immense commercial potential for development into pharmaceuticals, nutritional supplements, functional beverages, or health foods. For cancer patients undergoing chemotherapy, GKA4 offers a natural, scientifically-validated biotech solution to alleviate side effects and enhance quality of life during treatment.

TW.27.

Title	**Polysaccharide fermentation composition capable of**

	anti-cancer, anti-virus, anti-inflammatory, promoting osteoblast proliferation, promoting intestinal stem cell proliferation effects and preparation method thereof.
Authors	Cheng Huang, Yi Chung Lai, Bo Ru Lai
Institution	Biozyme Biotechnology Corp.
Patent no.	I724352
Description	The present invention provides a composition containing polysaccharide vegetables, mushrooms and algae as fermentation materials by using special polysaccharide fermentation preparation method to transform and divide the polysaccharide molecules(β-glucan, α-glucan) into small molecular form sugars, which are a polysaccharide fermentation composition having a molecular weight of about 300 Daltons. Its structure is different from the general polysaccharide molecule, and it is an organic form. After the fermentation, the excess glucose structure on the branch is metabolized by the bacteria to remove excess glucose molecules, which can make sugar molecule to have affinity and become a coating material of polysaccharide fermentation composition. The composition has efficacies of anti-cancer, anti-viral, anti-inflammatory, promote osteoblast proliferation, promote intestinal stem cell proliferation.

TW.28.

Title	**ReAge Motion - Interactive Balance Marble Training Device for Seniors**
Authors	HSU DING-YANG, LIN HENG-YI, YANG YUNG-CHI, HSIEH YI-HSUAN
Institution	Department of Industrial Design, Ming Chi University of Technology
Patent no.	I917301
Description	This project is an interactive balance marble training device designed for older adults. It integrates upper-limb movement, attention training, reaction practice, and social engagement. Through interchangeable maze discs, push controls, and a rotary mechanism, users can move the marble with their arms, legs, or through two-person cooperative play to complete path-based challenges. The design combines rehabilitation value with playful interaction and is suitable for daycare centers, community programs, and healthy aging activities. It helps improve hand-eye

coordination, concentration, and motor control while encouraging participation and communication among seniors. The invention has been granted Taiwan Patent No. I917301.

TW.29.

Title	**Self-Powered Figurine with Built-in Flashlight Illumination**
Authors	CHEN CHUNG YI
Institution	Sunflower Imperial Palace Ltd.
Patent no.	M678983U
Description	This invention is an innovative figurine that integrates both flashlight illumination and self-power generation, combining functionality with entertainment. The product is equipped with a micro power-generation module that produces electricity through manual actions such as rotating or shaking, eliminating the need for external power sources or battery replacement, thereby achieving energy-saving and environmentally friendly benefits. At the same time, the figurine features a built-in LED lighting system, allowing it to function as a portable flashlight for emergency or everyday use, enhancing its overall value. With a distinctive design and collectible appeal, it is suitable for users of all ages. Furthermore, it holds strong potential for applications in educational promotion, outdoor activities, and cultural and creative markets, showcasing the integration of innovative technology and sustainability.

TW.30.

Title	**Smart Photovoltaic Mounting System with Automatic Solar Tracking**
Authors	Chien Wei, Wu Hung-Yu, Lin Xin-Li, Lu Ssu-Hsuan, Lin Wei-Hsin
Institution	Tatung University, Ningde Qianwei Industrial Technology Co., Ltd. Tatung university Lunghwa University of Science and Technology\
Patent no.	M676404
Description	This invention provides a Smart Photovoltaic Mounting System with Automatic Solar Tracking. Through the motor, the driving wheel rotates; the driving wheel, in turn, drives

the belt; the belt, in turn, drives the driven wheel; the driven wheel, in turn, drives the threaded rod via a bearing; the threaded rod, in turn, allows for height adjustment of the threaded sleeve via a slider and groove; the threaded sleeve, in turn, allows for height adjustment of the support platform; and the support platform, in turn, allows for height adjustment of the support rod.

TW.31.

Title	**Toothbrush with built-in LED lighting**
Authors	YANG CHEN SHIH
Institution	Tamkang University
Patent no.	M671878
Description	This invention presents an innovative toothbrush integrated with a lighting function, designed to enhance visibility and improve oral hygiene efficiency, especially in low-light environments. Conventional toothbrushes often make it difficult for users to clearly observe the interior of the mouth during nighttime or in poorly lit conditions, which may result in incomplete cleaning and missed areas. The proposed design incorporates a low-power LED module within the toothbrush structure, providing direct illumination to the oral cavity while maintaining normal brushing performance. A waterproof sealing structure ensures the safety and durability of the internal electronic components in humid bathroom environments. The lighting function assists users in identifying blind spots and maintaining proper brushing techniques. This product is particularly beneficial for children who are developing independent brushing habits, as well as for elderly users who may require additional visual assistance. By combining daily oral care tools with optoelectronic technology, this invention demonstrates practical functionality, user-centered design, and strong commercial potential in the oral hygiene market.

TW.32.

Title	**Hold the Future, Brush for Health**
Authors	I-CHEN YU, LI-YUN WANG, TUNG CHU, YU-TING LIU, YUN-JIE LI
Institution	Chang Gung University of Science and Technology
Patent no.	

Description	This innovative smart toothbrush transforms daily oral hygiene into an early warning system for dementia. Research indicates that the regression of fine motor skills is a critical physiological marker of cognitive impairment; therefore, this product utilizes built-in pressure sensors to precisely monitor hand tremors and coordination during brushing without altering the user's existing habits. Data is synchronized to the cloud via Bluetooth, where AI algorithms perform long-term longitudinal trend comparisons to accurately capture early signs of hippocampal functional impairment. This invisible health management model breaks through the time constraints of current screening scales, protecting the "Golden Window" for treating Mild Cognitive Impairment (MCI) in high-risk groups aged 50 to 70 and realizing the ultimate value of home-based preventive medicine.

TW.33.

Title	Modular Ground–Aerial Integrated System for Industrial Site Inspection
Authors	FA-SHIAN CHANG, JYH-HAW CHEN, SHANG-CHI SU, JUN-XIANG WU, JUN-HAO LEONG
Institution	Cheng Shiu University National Kaohsiung University of Science and Technology
Patent no.	I895036
Description	To enhance inspection efficiency and safety management in industrial facilities while enabling real-time awareness of on-site conditions, this system integrates an aerial unmanned aerial vehicle (UAV) with a ground unmanned vehicle (UGV) to establish a coordinated ground–aerial patrol system. By combining real-time aerial imaging with close-range ground inspection capabilities, the system can rapidly perform anomaly detection, equipment inspection, and environmental monitoring, thereby significantly improving inspection accuracy and operational efficiency. This invention proposes a modular integrated system with ground–aerial collaborative operation capabilities. The overall architecture consists of four major subsystems: the mechanical system, control system, communication and

transmission system, and power system. To address complex industrial terrains such as uneven surfaces, slopes, and obstacles, the ground vehicle adopts a tracked locomotion mechanism to enhance mobility and stability. Additionally, a modular track retraction mechanism is designed to reduce ground friction during turning or precision maneuvers, thereby improving maneuverability and control accuracy.

The system features a highly modular design, allowing various functional modules to be configured based on different inspection requirements. These modules include a robotic arm module, environmental sensing module, and marking device, enabling tasks such as equipment inspection, anomaly identification, and data acquisition. In terms of control and communication, the system primarily utilizes wireless communication for remote operation and real-time image transmission, with an effective range of approximately 300 to 500 meters. To further enhance system stability and resistance to interference, a fiber-optic wired communication mechanism is also integrated, providing a backup transmission distance of up to 200 meters and enabling a hybrid wired–wireless communication architecture.

Overall, the proposed system can be widely applied to routine inspection, safety monitoring, and rapid response to abnormal events in industrial facilities. It effectively reduces the need for personnel to enter hazardous environments while enhancing operational safety and advancing intelligent management capabilities.

TW.34.

Title	Natural Gas Pipeline Internal Cleaning Robot
Authors	FA-SHIAN CHANG, CHEUNG-HWA HSU, SHANG-CHI SU, YI-CHENG TSAI, JUN-XIANG WU
Institution	Cheng Shiu University & CTCI Corporation National Kaohsiung University of Science and Technology
Patent no.	
Description	This invention presents a modular in-pipe inspection and cleaning robot designed for pipelines with diameters ranging from 10 to 14 inches. The robot adopts a wheeled driving structure, and conical-shaped tires are introduced to conform closely to the inner curved surface of the pipe, thereby enhancing contact stability and traction performance. This

design enables stable locomotion in horizontal, vertical, and curved pipeline environments, allowing the robot to perform inspection, cleaning, and maintenance tasks.

The overall system architecture consists of four main components: the robotic body, control system, transmission system, and backend data management system. The robotic body features an innovative power module that adaptively adjusts tire–pipe contact through multiple driving units, accommodating variations in pipe diameter and curvature to ensure stable operation. The functional module integrates adjustable brushes and suction devices to remove welding slag and debris, along with a three-axis robotic arm for handling larger obstacles. A vision system provides real-time evaluation of cleaning performance and positioning.

The transmission system employs a 50–200 m fiber-optic hybrid cable for power and communication, while the control system supports real-time monitoring, recording, positioning, and operational control with digital data management.

TW.35.

Title	**Portable electrotherapy device**
Authors	CHUN-TE LEE, HSIEH CHE JEN, TZAI-DER WANG, JUI-LING HSIEH, YI-HSIANG KUO,
Institution	Cheng Shiu University
Patent no.	M647890
Description	The present invention relates to an electrotherapy device, primarily comprising a main body having an assembly slot formed on a bottom surface thereof. A first electrode pad is fixedly disposed on one side of the bottom surface of the main body. A retractable housing of an auxiliary body is movably assembled within the assembly slot of the main body, and a second electrode pad is fixedly disposed on a bottom surface of the retractable housing. Through a conductive wire connection between the auxiliary body and the main body, the spacing between the two electrode pads can be adjustably varied according to the therapeutic requirements of the user. This configuration enables simultaneous electrotherapy treatment of multiple target areas, thereby improving operational convenience and treatment efficiency.

TW.36.

Title **PsyComm- AI: AI-Based Communication Footprint Analysis**

Authors CHIEN NAI-HUI, KUAN-LING CHANG, KONG YAO-XIAN, TSAI MENG-HSIU, SHIH KAI-LUN

Institution Chang Gung University of Science and Technology

Patent no.

Description

This work, "PsyComm-AI," is a simulation-based training system for psychiatric therapeutic communication that integrates large language models (LLMs). It is designed to enhance the clinical communication competencies of nursing students and novice psychiatric nurses. Therapeutic communication is a core competency in psychiatric nursing; however, due to the heterogeneity of psychiatric symptoms and the inherent uncertainty in communication, learners often experience anxiety stemming from limited clinical experience, which can negatively affect their communication performance and quality of care. Although traditional role-playing approaches provide training opportunities, they are constrained by high manpower demands, repetitive scenarios, and a lack of immediate, systematic feedback, limiting their effectiveness for sustained practice.

The proposed system establishes a highly realistic simulation environment. Through scenario-oriented prompt design, it generates virtual patients with clinically grounded backgrounds and dynamically produces responses based on dialogue history and patient states. This enables continuous, context-aware interactions that enhance immersion and clinical authenticity. In addition, the system incorporates a structured evaluation model to perform multidimensional analysis of therapeutic communication, including empathy expression, response strategies, and conversational appropriateness. It further provides specific and actionable feedback to help learners identify strengths and areas for improvement, thereby facilitating skill refinement.

Furthermore, the system adopts a feedback-loop learning mechanism, allowing learners to iteratively refine their communication strategies through repeated practice and real-time feedback. It records longitudinal learning data to

support the development of clinical reasoning and decision-making skills. Built on a web-based and cloud-deployed architecture, the system ensures high accessibility and scalability, enabling learners to practice without temporal or spatial constraints, thereby increasing training frequency and clinical preparedness.

Compared with conventional training approaches, this system leverages generative AI to enable non-scripted, dynamic interactions, significantly improving realism and flexibility while reducing dependence on human and physical resources. It demonstrates strong educational value and practical applicability.

This work aligns with the United Nations Sustainable Development Goals (SDGs). For SDG 3 (Good Health and Well-being), it enhances therapeutic communication skills to improve mental healthcare quality. For SDG 4 (Quality Education), it provides a high-quality, sustainable digital learning environment. For SDG 9 (Industry, Innovation and Infrastructure), it showcases the innovative application of generative AI in healthcare education and supports integration with learning management systems (LMS), promoting the advancement of smart healthcare education.

TW.37.

Title	**Segment-based intelligent street lighting control system**
Authors	HUAN-MEI CHU, BONNIE HM CHEN, HSI AN CHEN, YI TING CHEN, YI-HSIANG KUO
Institution	Cheng Shiu University
Patent no.	M651782
Description	This section-based smart street lighting control system divides streetlights into multiple small zones, in which all streetlights operate synchronously. When no pedestrians or vehicles are present, the streetlights within the same zone remain in a low-power dim mode. Once any streetlight in the zone detects a passing pedestrian or vehicle, it transmits a trigger signal to other streetlights in the same zone via a 2.4 GHz Wi-Fi wireless communication module, prompting all streetlights in that zone to simultaneously switch to bright mode.

A non-profit global organization. In 2010, it was founded by Mr. Hsieh Hsin-Ming. For a decade, WIIPA has been using Taiwan as the its headquarter.
At the moment, 50 member countries and partners have joined the "WIIPA Family" with the goal of promoting invention, innovation and intellectual property rights around the globe.

Promoting cooperation between associations, inventors and enterprises of various countries. Inspiring creativity and innovation of potential inventors both local and international. Meanwhile, strengthening the global application development in the field of intellectual property rights.

Thailand

By ATIP

TH.1.

Title	**Rice Coated with Turmeric and Black Pepper Extracts : A Low-Glycemic Functional Rice for Diabetes Risk Reduction**
Authors	Chonlawit Yuvajita, Rewadi Muaddarak, Narong Khandisriphaibun, Naporn Aeknarajindawat, Nattachai Aekinachindawut
Institution	**Udon Thani Rajabhat University, Thailand**
Patent no.	2503002034
Description	This invention presents a functional food product derived from *Khao Mao*, a traditional Thai roasted young glutinous rice, enhanced with bioactive herbal extracts. The product is coated with extracts from *Curcuma longa* (turmeric) and *Piper nigrum* (black pepper) to improve its nutritional profile and health-promoting properties. Turmeric is rich in curcumin, a well-documented compound exhibiting antioxidant, anti-inflammatory, and immunomodulatory activities. Black pepper contains piperine, which significantly enhances the bioavailability of curcumin, thereby amplifying its physiological efficacy. The production process involves steaming and roasting young glutinous rice to achieve the characteristic crisp texture of Khao Mao. Turmeric and black pepper are individually dried, milled, and subjected to Soxhlet extraction using 95% ethanol. The obtained extracts are subsequently formulated into a coating solution with distilled water and sugar. This solution is uniformly applied to the roasted rice and dried under controlled conditions to preserve sensory quality. The final product is vacuum-sealed to maintain freshness and extend shelf life. This innovation adds value to a traditional food by incorporating functional ingredients, offering a nutritionally enhanced snack with strong potential for commercialization while promoting the utilization of local agricultural and herbal resources.

TH.2.	
Title	**Phatthara Biochar-AMF Pellets: A Pelletized Biochar Soil Amendment Enriched with AMF for Reducing Chemical Fertilizer Use and Enhancing Maize Productivity**
Authors	Chonlawit Yuvajita, Narong Khandisriphaibun, Rewadi Muaddarak, Natnaporn Aeknarajindawat, Nattachai Aekinachindawut
Institution	**Udon Thani Rajabhat University, Thailand**
Patent no.	2503001685
Description	This study presents the development of a pelletized soil conditioner formulated from organic materials and beneficial microorganisms to enhance soil fertility, water retention, nutrient availability, and plant growth. The composition includes cow and pig manure, fermented weed biomass, biochar, arbuscular mycorrhizal fungi, photosynthetic bacteria, termite mound-derived microorganisms, and natural minerals such as dolomite, phosphate rock, limestone, zeolite, and volcanic rock. This integrated formulation is designed to rehabilitate degraded soils, improve soil structure, stimulate microbial activity, and support sustainable agricultural production. The production process involves composting organic substrates, culturing beneficial microorganisms, and blending these components with finely ground biochar and mineral additives. The mixture is subsequently pelletized into stable granules, facilitating ease of handling, transportation, storage, and field application. The developed product is particularly suitable for organic farming systems, soil restoration programs, and low-input agriculture. It contributes to reduced reliance on synthetic fertilizers while enhancing long-term soil health and ecosystem sustainability. Moreover, its formulation supports community-based production and is applicable to a wide range of crops, including field crops, vegetables, and fruit trees, thereby offering practical and scalable benefits for environmentally responsible agriculture.

TH.3.

Title

Phytosterol-Rich Red Shallot Extract as a Nutraceutical for Obesity, Diabetes, and Dyslipidemia: Winural

Authors

Ubon Rerk-am, Praphakorn Kaemchantuek, Sarunya Laovitthayanggoon, Tanapak Inyod, Kwankaow Wongsawang, Oradee Vorahirun, Thitisak Wongsawang

Institution

Thailand Institute of Scientific and Technological Research, and Odee Style Co.,Ltd. Thailand

Patent no.

Patent application No. 2603001247

Description

The ethanolic extract derived from the outer skins of red shallots, a byproduct of the food processing industry, contains phytosterols, predominantly stigmasterol and β-sitosterol, as its principal bioactive constituents. The extract was found to inhibit pancreatic lipase, α-glucosidase, and α-amylase activities, suggesting potential roles in the regulation of glucose and lipid metabolism.

In vitro studies demonstrated that the extract enhanced insulin secretion and protected pancreatic β-cells (RIN-5F) against streptozotocin-induced, ROS-mediated apoptosis. Furthermore, treatment with the extract resulted in reduced intracellular triglyceride levels and lipid accumulation in 3T3-L1 adipocytes, indicating potential anti-adipogenic effects.

In silico molecular docking analysis suggested favorable binding interactions of stigmasterol and β-sitosterol with key metabolic enzymes, including α-amylase, α-glucosidase, and lipase. Additionally, the extract exhibited angiotensin-converting enzyme (ACE) inhibitory activity, implying possible vasoprotective properties.

Safety evaluations revealed no genotoxic effects in V79 cells, both in the presence and absence of metabolic activation, and no observable adverse effects were reported in Wistar rats at doses up to 2,000 mg/kg. Collectively, these findings suggest that the extract may serve as a promising multifunctional agent for the management of metabolic disorders.

Thailand

By TISIAS

TH.4.

Title

Research and Design of Toxic Fumes Treatment Device from Metal Welding Processes by Using High-Power Plasma Electric Energy Technology for Sustainable Community Environmental Management

Authors **Siseerot Ketkaew**

Institution Faculty of Engineering, Ramkhamhaeng University

Description

This research project presents the research and design of a plasma vapor treatment device for welding fumes, utilizing high-power plasma energy technology for sustainable community environmental management. It employs the principle of a high-intensity electric field combined with a corona discharge process. The technology utilizes a high-frequency, pulsed, duty-cycle, and constantly switching high-voltage power generation circuit. A PWM signal generator produces pulses with adjustable duty cycles of 20%, 25%, 30%, 35%, and 40%, with a switching frequency of 5 kHz. These pulses are then used to control an IRFP450 power MOSFET, which in turn controls a TLF4G503F high-frequency transformer. This generates high voltage outputs of 2.64 kV, 2.96 kV, 3.12 kV, 3.36 kV, and 3.68 kV, using a high-power plasma energy cell load. Increasing the voltage results in an increased high-intensity electric field (high-intensity plasma) and increased electrical charge. When tested at 20% duty cycle, a high voltage of 2.64 kV is obtained, with an electric field strength of 0.1 V/min and a charging volume of 1.0 kV. At 25% duty cycle, the high voltage is 2.96 kV, with an electric field strength of 0.2 V/min and a charging volume of 1.8 kV. At 30% duty cycle, the high voltage is 3.12 kV, with an electric field strength of 0.3 V/min and a charging volume of 2.3 kV. At 35% duty cycle, the high voltage is 3.36 kV, with an electric field strength of 0.4 V/min and a charging volume of 2.7 kV. And at 40% duty cycle, the high voltage is 3.68 kV, with an electric field strength of 0.5 V/min and a charging volume of 3.1 kV. Testing in an electric welding room of a 200 cubic meter metal parts manufacturing and welding facility for 60 minutes showed that applying an electric field of 0.5 volts per minute and a charge of 3.1 kilovolts resulted in a reduction of PM1.0, PM2.5, PM10 particulate matter, and carbon dioxide levels as the testing time increased. The reduction in PM2.5 was 86.83%, as measured by a standard dust monitor, and the reduction in carbon dioxide (CO_2) was 60.27%. This research project can significantly help reduce air pollution and greenhouse gas emissions.

TH.7.	
Title	**PP NAT NAD SERUM**
Authors	Mrs. Woranuch Bhirom Bhakdi and Miss Puttachat Pongsuchat
Institution	**Purevera Company Limited**
Patent no.	N/A
Description	PP NAT NAD SERUM represents a next-generation innovation in cellular skin science, developed through advanced Thai biotechnology research. The formulation targets the NAD^+ activation pathway, a critical coenzyme system involved in cellular energy metabolism and DNA repair, which declines with aging and contributes to visible skin deterioration. At the core of this innovation is RejuveNAD™ , a plant-derived bio-complex that enhances NAD^+ biosynthesis via activation of the NAMPT pathway. This mechanism supports cellular regeneration, improves mitochondrial function, and promotes restoration of skin structural integrity. The formulation is further optimized through an integrated bio-engineering approach, combining functional actives to address anti-glycation, oxidative stress, and skin detoxification. The product demonstrates measurable improvements in skin parameters, including wrinkle reduction, elasticity enhancement, and texture refinement. Following its commercial introduction in Thailand, the innovation has shown strong real-world validation, with over 300,000 units sold within the first three months, indicating high consumer acceptance.

Tunisia

TN.1.	
Title	**GH/GOs/rGO reinforced alkaline and acid-activated Geopolymers**
Authors	Mouna SELLAMI, Hebat-Allah S. TOHAMY, Dumitru-Doru BURDUHOS-NERGIȘ, Petrică VIZUREANU, Andrei Victor SANDU, Mohamed TOUMI
Institution	Faculty of Sciences, University of Sfax-Tunisia Gheorghe Asachi" Technical University of Iasi
Patent	-
Description	This innovation introduces a new class of energy-efficient, graphene-modified metakaolin-based geopolymers engineered for enhanced optical performance and photocatalytic functionality. By incorporating graphene hydroxide (GH), graphene oxide (GO), and reduced graphene oxide (rGO) into geopolymer matrices activated via alkaline or phosphoric acid routes, the system enables tailored control over microstructure and physicochemical properties. A key advancement lies in the controlled integration of graphene derivatives within the geopolymeric network, as confirmed by spectroscopic and microstructural analyses (FTIR, XRD, SEM-EDS). The optimized alkaline-activated formulations, particularly those incorporating graphene hydroxide, demonstrate superior optical behavior, including increased absorbance in the visible spectrum and a reduced band gap energy (~2.38 eV). These characteristics significantly enhance photocatalytic efficiency compared to conventional geopolymer systems. The proposed material platform combines low-energy processing with advanced functional performance, offering potential applications in environmental remediation, self-cleaning surfaces, and sustainable construction materials. This innovation supports the transition toward next-generation, multifunctional geopolymers with integrated nanocarbon functionalities.

Turkey

TR.1.	
Title	**BANAİNDİRİM.TR**
Authors	Yusuf İzgi, Muhammed Enes Özhan, Serhat Pulat, Muhammed Ali Öngel, Badesu İzgi, Bedirhan Demir, Yağmur Aldemir, Muhammed Arvas, Elif Çelik, Melik Semi Şos, Sudenur Koç, Şevval Ören, Muhammed Hamza İlgöz, Muhammed Enes İnan, Ahsen Tuana Yurtsever, Abdülkadir Arzum
Institution	**Technofest institute of technology Turkey branch**
Patent	
Description	BananaIndirim is a next-generation digital marketplace built entirely around real, transparent discounts across sectors such as retail, services, travel, and education. The platform operates on a 100% discount-focused model, using AI-driven algorithms to deliver personalized and relevant offers based on user behavior, location, and demand trends. Users benefit from access to genuine high-value deals in one place, saving time while enjoying a secure and transparent shopping experience supported by reviews and seller verification. Businesses gain a powerful tool for accelerating sales, improving cash flow, and reaching large audiences without significant marketing costs, while also benefiting from data-driven insights and easy campaign management. BananaIndirim differentiates itself through smart pricing systems, elimination of misleading promotions, and a true win–win ecosystem where customers save money and sellers increase visibility and revenue. The platform is designed for scalability, starting in Turkey with the potential for global expansion, supported by future developments such as mobile applications, loyalty programs, strategic brand partnerships, and AI-based dynamic pricing.

TR.2.

Title **DIABETIC WOUND HEALING SYSTEM**

Authors Seda Cancan, Elif Çelik, Muhammed Arvas, Muhammed Enes Özhan, Serhat Pulat, Muhammed Ali Öngel, Badesu İzgi, Yağmur Aldemir, Bedirhan Demir, Melik Semi Şos, Sudenur Koç, Şevval Ören, Muhammed Hamza İlgöz, Muhammed Enes İnan, Ahsen Tuana Yurtsever, Abdülkadir Arzum

Institution **Technofest institute of technology turkey branch**

Patent

Description

Negative Oxygen Ion Therapy is a patented, next-generation medical technology developed and manufactured in Turkey, designed to enhance the healing of chronic wounds, particularly Diabetic Foot Ulcer. The system leverages negative oxygen ions to accelerate tissue regeneration, improve oxygen delivery, and provide antimicrobial protection without invasive procedures or chemical treatments.

The technology operates by generating a high concentration of negative oxygen ions that stimulate cellular activity within the wound environment. This process enhances local oxygenation, activates fibroblast function, promotes collagen synthesis, and supports angiogenesis, while simultaneously neutralizing bacteria and reducing infection risk.

Clinically, the system enables faster wound healing, improved tissue quality, and reduced complications. Its non-invasive, drug-free approach makes it suitable for repeated use, offering a safe and patient-friendly alternative to conventional therapies.

A key competitive advantage lies in its dual-action mechanism, combining tissue regeneration with antimicrobial protection without relying on antibiotics, thereby contributing to efforts against antimicrobial resistance. Additionally, it delivers oxygenation benefits without the complexity and cost associated with Hyperbaric Oxygen Therapy.

The device is designed to be portable and scalable, allowing deployment in hospitals, specialized diabetic care centers, clinics, home healthcare services, burn units, and elderly care facilities.

Positioned as a breakthrough innovation in wound management, this patented technology demonstrates strong potential for global adoption, with future developments targeting integration with smart monitoring systems, AI-assisted diagnostics, and expansion into broader regenerative and dermatological applications.

TR.3.

Title **QM, Quantum Environmental Memory Explorer**

Authors Dr.Kambiz Golshani

Description

QM, Quantum Environmental Memory Explorer, a system designed to reveal the most recent informational traces of motion belonging to all solids, liquids, and living or non-living entities in past time. At present, this detection is achievable within a range of up to 300 meters, and if required, up to several kilometers, covering a temporal span of up to 90 days in the past. The system precisely identifies the latest trace of existence along with the time and spatial coordinates of movement of any type within the designated environment We have solved...selected a bucket of flowers to conduct the test. A sample leaf from this bucket is placed inside the device chamber. As observed, along the designated and marked path, the device shows no response regarding the movement or prior existence of this bucket in the past. This is evidenced by the fact that the device's antenna exhibits no detectable reaction. Next, along the same path, the bucket is moved, placed on one of the tables, then removed and taken out of the environment. You can observe that the device's antenna now responds precisely along the path the bucket followed moments earlier. In other words, the system reveals the residual quantum traces left behind by the bucket within the environment. Even if we return several days later, this detection remains possible, with the device indicating the time of the bucket's last trace of presence, for example, 15 days earlier, and so on, up to a maximum of 90 days.

We now perform the same test to identify a specific individual. Using the scissors, several strands of hair are taken from the person of interest and placed inside the device chamber. Initially, we observe that since this person has not moved along the designated path toward or into the shop, the device shows no response. Next, we ask another individual, whose hair sample has not been placed inside the device chamber, to walk along the marked path toward the shop. We test the path of their movement and observe that the device again shows no response or detection. This is expected, as this person's hair sample is not present within the device chamber. Now, we ask the person of interest, whose hair samples have been placed inside the device chamber, to enter and exit the shop along the same marked path. When the path is tested once more, we observe that only the movement of the targeted individual is detected by the device. The device responds by clearly identifying the person's past movement path. This

demonstrates the quantum identification of residual traces left by the individual within the environment, traces that have been preserved within the memory of time. The technology for accessing information derived from the quantum effects of a target's movement in past time, regardless of its wide range of potential applications, is of exceptional importance and value.

TR.4.

Title	**Magnetic field based device for exhaust emission and smoke reduction**
Authors	Mehrdad fojlaley ,Seda Cancan, Bedirhan Demir, Yağmur Aldemir, Muhammed Enes Özhan, Serhat Pulat, Muhammed Ali Öngel, Badesu İzgi, Muhammed Arvas, Elif Çelik, Melik Semi Şos, Sudenur Koç, Şevval Ören, Muhammed Hamza İlgöz, Muhammed Enes İnan, Ahsen Tuana Yurtsever, Abdülkadir Arzum
Institution	**Technofest institute of technology turkey branch**
Patent	
Description	Magnetic Arc Tech is a patented, next-generation emission control technology developed and manufactured in Turkey, designed to eliminate harmful pollutants from industrial and commercial exhaust systems without the use of filters or chemicals. The system integrates a dual-action mechanism combining plasma arc decomposition and magnetic field separation. High-energy plasma arcs break down gaseous pollutants such as volatile organic compounds (VOCs), smoke, and toxic gases at the molecular level, while magnetic fields capture and separate particulate matter, including fine dust, soot, and grease. This process ensures not only filtration but active neutralization of emissions. The technology offers major operational advantages, including filter-free functionality, elimination of consumables, reduced maintenance costs, and chemical-free purification with no secondary pollution. It delivers high efficiency in removing complex pollutant mixtures while maintaining optimized energy consumption and long-term operational reliability. A key competitive strength lies in its patented hybrid approach, which surpasses traditional filtration and electrostatic systems by destroying pollutants rather than

merely capturing them. The absence of consumables and minimal servicing requirements further position it as a cost-effective and sustainable alternative to conventional scrubbers and filter-based technologies.
Magnetic Arc Tech is highly versatile and scalable, suitable for applications ranging from industrial manufacturing facilities and energy plants to commercial kitchens, waste management systems, and petrochemical industries.
Positioned as a forward-looking environmental solution, the system has strong global market potential, with future developments focused on integration with IoT-based monitoring, AI-driven performance optimization, and deployment within smart city and environmental protection infrastructures.

TR.5.

Title

NANOTiO2 PLASMA ACTIVATED WATER FOR WASTE WATER RECYCLING

Authors

Mehrdad Fojlaley, Yusuf İzgi, Muhammed Ali Öngel, Badesu İzgi, Muhammed Enes Özhan, Serhat Pulat, Bedirhan Demir, Yağmur Aldemir, Muhammed Arvas, Elif Çelik, Melik Semi Şos, Sudenur Koç, Şevval Ören, Muhammed Hamza İlgöz, Muhammed Enes İnan, Ahsen Tuana Yurtsever, Abdülkadir Arzum

Institution

Technofest institute of technology turkey branch

Patent

Description

TiO_2 Plasma Oxygen Technology is a patented, next-generation water treatment system developed and manufactured in Turkey, designed to deliver high-efficiency, chemical-free purification of industrial and municipal wastewater.
The system is based on a synergistic mechanism combining plasma-activated oxygen generation with nano-scale TiO_2 photocatalysis. Plasma energy produces highly reactive species such as hydroxyl radicals and ozone-derived oxidants, while TiO_2 enhances catalytic oxidation, enabling rapid degradation of organic pollutants, pathogens, and persistent compounds through an advanced oxidation process.
In addition to oxidation, the technology promotes natural

sedimentation by facilitating the aggregation and settling of suspended solids without the need for chemical coagulants or flocculants. This results in improved water clarity, reduced turbidity, and significantly lower sludge toxicity.

The solution provides near-complete microbial disinfection, eliminates reliance on chemical additives, and reduces operational costs while maintaining environmentally sustainable performance. Its ability to degrade recalcitrant contaminants offers a clear advantage over conventional biological and chemical treatment systems.

A key competitive strength lies in the patented hybrid plasma–TiO_2 approach, which ensures superior oxidation efficiency, reduced sludge generation, and safer byproducts, while simplifying treatment processes through chemical-free operation.

The technology is suitable for a wide range of applications, including municipal wastewater treatment plants, industrial effluent management, agricultural water reuse, hospital wastewater treatment, and aquaculture systems.

Positioned as a scalable and future-oriented solution, TiO_2 Plasma Oxygen Technology has strong global potential, with further development focused on integration with IoT-based monitoring, AI-driven optimization, decentralized treatment units, and expansion into advanced water purification and pre-treatment systems.

TR.6.	
Title	**3D-Printed Microneedle Patch for the Treatment of Melanoma via Synergistic Chemotherapy and Photothermal Therapy**
Authors	Hilal Yilmaz, Louna Karzoun, Berfin Ilayda Ozturk Guzelcan, Hakan Sahin, Yagmur Kazancioglu, Mohammad Yaman Habra, Esra Yuca Yilmaz, Elif Guzel, Oguzhan Gunduz, Yavuz Nuri Ertas, and Cem Bulent Ustundag
Institution	Yildiz Teknik university, Health Biotechnology Joint Research and Application Center of Excellence, Istanbul, Türkiye.
Patent	Patent application No. 2024/016590 Patent application No. 2025/016447
Description	This invention presents a 3D-printed microneedle patch for localized melanoma treatment, developed to overcome the limitations of conventional systemic chemotherapy, including poor targeting, systemic toxicity, and low treatment efficiency at the skin tumor site. The platform is composed of DLP-fabricated hydrogel microneedles based on sodium alginate and GelMA, combined with a GelMA support layer containing the anticancer drug 5-fluorouracil (5-FU) and graphene oxide quantum dots (GOQDs) dispersed in a polyvinylpyrrolidone (PVP) matrix. In this design, the microneedles provide minimally invasive transdermal penetration and local delivery, while the GOQDs generate a photothermal response under 808 nm near-infrared irradiation, enabling a synergistic combination of chemotherapy and photothermal therapy in a single patch. According to the article, the microneedles had an average height of 917.6 ± 47 µm and a tip radius of 26.9 ± 0.4 µm, showed rapid initial 5-FU release with 63 ± 0.665% released in the first hour and complete release within 96 h, and reached 46.3 °C within 5 min under NIR exposure, confirming effective photothermal performance. Altogether, this invention offers a multifunctional, localized, and minimally invasive therapeutic platform with strong potential for improved melanoma management and reduced systemic side effects.

TR.7.

Title

Eco-Friendly Bone Regeneration: Utilizing Olive Pit Powder in 3D-Printed PVA/HAp Scaffolds

Authors

Gulpembe Ustundag[1,2], Mohamed Bella Jagitay[1], Tuba Bedir[1], Oguzhan Gunduz[1]

Institution

[1]Department of Metallurgical and Materials Engineering, Faculty of Technology, Marmara University, Istanbul, Turkiye

[2]Aljazari International Schools of Science and Technology, Istanbul, Turkiye

Patent

Description

This invention presents a sustainable and bioactive scaffold for bone tissue engineering, fabricated using extrusion-based 3D printing. The scaffold is composed of polyvinyl alcohol (PVA), olive pit powder (OPP), and hydroxyapatite (HAp), combining a synthetic polymer, an agro-industrial biowaste, and a bioactive ceramic into a single composite system.

Olive pit powder, a lignocellulosic byproduct of the olive oil industry, is utilized as a natural, low-cost filler to enhance porosity, surface roughness, and sustainability of the scaffold. Hydroxyapatite is incorporated to mimic the mineral phase of bone and promote osteoconductivity. The PVA matrix provides structural integrity, printability, and mechanical stability.

The scaffolds are fabricated via extrusion-based 3D printing, enabling precise control over pore architecture and geometry, which are critical for cell infiltration and tissue regeneration. By adjusting the ratio of PVA to OPP, the mechanical and biological properties of the scaffold can be tuned to achieve optimal performance. The developed scaffolds exhibit interconnected porous structures suitable for bone regeneration, improved surface characteristics, and favorable cytocompatibility at optimized compositions.

This approach offers a cost-effective and environmentally friendly alternative to conventional bone graft materials, while also advancing the integration of circular economy principles into biomedical applications.

Ukraine

UA.1.

Title	**Automatic machine for forming blanks from plastic ceramic mass.**
Authors	Viktor BILICHENKO, Yurii A. BURIENNIKOV, Yurii Yu. BURIENNIKOV, Leonid KOZLOV, Viacheslav PEREPELITSIA, Oleksandr PETROV, Viktor PURDIK
Institution	**Vinnytsia National Technical University**
Patent	Patents of Ukraine No. 154492
Description	The research presents an automatic machine for forming blanks from plastic ceramic materials. The machine is manufactured in accordance with the utility model patent of Ukraine No. 154492. The machine consists of the following main units: a hydraulic power unit, a plastic bar feeding unit, a carriage, and a traverse driven by a hydraulic system. Six cutting wires are mounted on the traverse for cutting the blanks. The operation of the installation is controlled by a programmable logic controller (PLC). Based on the mathematical modeling and experimental studies, the influence the shape of the control signal generated by the controller on its static and dynamic characteristics has been identified. This made it possible to determine the dynamic trajectory of the cutting wires relative to the bar, which defines the dimensional accuracy and shape of the blanks and their compliance with standards. It was found that representing the controller output signal as a piecewise function with three gain coefficients ensures a dimensional error of the blanks not exceeding 0.96×10^{-3} m. The automatic machine for producing blanks from a plastic ceramic bar ensures a productivity of up to 6500 units per hour. The maximum dimensions of the blanks are: width up to 100 mm, height up to 200 mm, and length up to 300 mm, with 6 blanks formed in one working stroke. The hydraulic drive power is 3 kW. The machine is intended for use at enterprises with an annual production volume of (5–10) million units.

United Arab Emirates

UA.1.	
Title	**InnerVoice**
Authors	Siavash Zafar Esmaeili Bana
Institution	**Siyavos**
Description	InnerVoice is a next-generation, non-invasive brain–computer interface embedded in an ultra-light headband (≤ 50 g). It supports continuous 24/7 use and recharges wirelessly once per month. A hybrid array of 16–24 dry or semi-dry EEG electrodes over fronto-temporal-parietal regions settles below 5 kΩ impedance within 30 s—no gel or expert fitting required. Raw EEG is cleaned by an adaptive pipeline that applies active noise cancellation (ANC), motion-artifact rejection from a nine-axis inertial measurement unit (IMU), and feature extraction with short-time Fourier transform (STFT) plus continuous wavelet transform (CWT). Signals are then processed on a low-power edge microcontroller unit (MCU) with an integrated neural-processing unit (NPU). A compressed 12-layer Transformer-Lite model (INT8, < 32 M parameters) converts inner speech or mental intent into text with end-to-end latency under 200 ms, including preprocessing. Federated learning personalises the language model locally while sharing only encrypted weight updates; raw EEG never leaves the device. Decoded text travels via Bluetooth LE 5.3, Wi-Fi 6, or LTE Cat-M1 to a mobile app or an HL7 FHIR tele-medicine backend, where it can be live-translated or issued as multi-modal IoT commands for smart-home control. Linear haptics, bone-conduction audio, and status LEDs provide immediate feedback. Designed for non-verbal children, people with aphasia or ALS, and socially isolated seniors, InnerVoice offers intuitive thought-to-text communication in a compact, affordable form factor. Its cloud-scale deployability and adaptive AI aim to set a new standard in assistive technology while meeting the rising global demand for elder-care and remote-health solutions.

United States of America

US.1.	
Title	**CRISPlasma Kit: An Innovative Tool for Precision Gene Editing**
Authors	Sara Sheikhlary
Institution	**The University of Arizona**
Patent no.	N/A
Description	The CRISPlasma Kit is an advanced gene-editing solution that integrates cold plasma technology with the CRISPR-Cas9 platform to address key challenges like inefficient delivery, off-target effects, and DNA repair limitations. Featuring a compact, automated cold plasma generator, the kit enables safe and precise delivery of CRISPR components by transiently permeabilizing cell membranes, eliminating the need for viral vectors or chemical transfection agents. This innovative approach ensures high efficiency and minimal damage, making it ideal for research, clinical therapy, and agricultural applications. Combining efficiency, safety, and affordability, the CRISPlasma Kit is set to redefine standards in gene editing.

Vietnam

By SANVIC

VN.1.	
Title	**BILLET**
Authors	**Trần Thị Huấn, Đoàn Thị Kiều Thanh**
Institution	NAM SUNG Aluminum Company Limited; Tay Ninh Province, Vietnam
Description	Billet is embryo of alloy aluminum casted from origin aluminum bar with standard quality, mixed with other alloys such as Cu, Mg, Ti, Si, Cr … and baked by different metallurgy processes (660 C degree – 730 C degree) then is refined up with impurity and poured into mound with circular shape. Aluminum Billet is applied widely in all fields of construction, energy, transportation,… Products Billet of Nam Sung Company are manufactured by modern machines and from imported material Ingot, mixed with other alloys such as Cu, Mg, Ti, Si, Cr… according to the international standards: ASTM B221M-13 and JIS H4100:2015. Nam Sung Aluminum Company delivers to the market the following aluminum products: 3003, 6063, 6061, 6005, and 6463… with various dimensions from 3.5 to 8 inch. Capacity of the Company reaches to 35.000 tone/year. Different features of aluminum BILLET: deoxidized; highly durable; non-toxic.

NATIONAL EXHIBITORS

Universities
Research Institutes
Companies
Individuals

THE NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY POLITEHNICA BUCHAREST

RO.1.	
Title EN	Proposed Architecture for an Anonymous Passenger Mobility Data Collection System
Authors	Chiva Ionuț Cosmin, Semenescu Augustin
Institution	National University of Science and Technology POLITEHNICA Bucharest
Patent no.	*Research project*
Description EN	The proposed solution consists of an anonymous data collection system for monitoring passenger mobility in public transport, based on the detection of Wi-Fi and Bluetooth devices carried by passengers. The network is composed of strategically placed Access Points (APs), approximately 35 meters apart, which operate as passive sensors and collect information such as anonymized MAC addresses, Received Signal Strength Indicator (RSSI) levels, and detection timestamps. The collected data are transmitted to a local server for storage and preliminary processing, and then through a VPN connection to a central data center, where they are analyzed using artificial intelligence algorithms (Delaunay–Voronoi triangulation and k-means clustering) to estimate passenger positions and flow patterns. The system is energy-efficient, does not require cellular networks, and can provide valuable insights into congestion levels, passenger routes, and the optimization of public transport operations.

RO.2.	
Title EN	System and Method for Detecting Active Unmanned Aerial Vehicles (Drones) Using Sound and Image Analysis with Deep Learning
Authors	Chiva Ionuț Cosmin, Semenescu Augustin
Institution	National University of Science and Technology POLITEHNICA Bucharest
Patent no.	*Research project*
Description EN	To develop an intelligent detection system capable of identifying and classifying unmanned aerial vehicles (UAVs) in real time by analyzing acoustic and visual data. The goal is to enhance airspace security and critical infrastructure protection through reliable drone monitoring.Detection is

based on the unique acoustic signature generated by drone propellers. A microphone array with an integrated video camera captures environmental sound and image data. Deep neural networks process and classify signals using Cohen-class spectrogram analysis and image recognition.The system allows simultaneous detection of multiple UAVs, even in noisy or complex environments

RO.3.

Title EN	Innovative tools in occupational health and risk management
Authors	Anca Cristina Tatarcan, Semenescu Augustin
Institution	National University of Science and Technology POLITEHNICA Bucharest
Patent no.	*Research project*
Description EN	The innovative methodologies proposed are intended for assessing compliance with occupational health and safety regulations, using auditing tools and mathematical approaches such as METESPRRS. Analysis of the relationships between occupational safety, risk level, and probability of risk occurrence. An innovative tool such as MSSM.EXE 01 facilitates the management of system documents. Analysis of the relationships between occupational safety, risk level, and probability of risk occurrence.

RO.4.

Title EN	**Contributions to Innovation in Entrepreneurship and in the Management of Businesses Financed through Non-Repayable Funds**
Authors	Manea Ciprian,Semenescu Augustin
Institution	National University of Science and Technology POLITEHNICA Bucharest
Patent no.	*Research project*
Description EN	The research highlights the need to move beyond classical models of entrepreneurship toward integrated models oriented around sustainability, digitalization, and innovation. It confirms that non-repayable funding represents a major catalyst for entrepreneurial development, that the success of a start-up depends on the alignment of its economic, social, and environmental dimensions, and that the standardization of innovative models for the evaluation and implementation of business plans is necessary.

The research contributes to the development of a modern analytical framework for entrepreneurship financed through public funds.

RO.5.

Title EN	**Research on the robotic welding of complex oversized parts**
Authors	Semenescu Augustin
Institution	National University of Science and Technology POLITEHNICA Bucharest
Patent no.	*Research project*
Description EN	The research focuses to develop a manufacturing technology of a heat exchanger assembly related to a CCAE 15-300 industrial centrifugal air compressor. The goal is to establish the replacement of the soldering process used in developing the assembly with the robotic welding process for economic and performance reasons. The results are: ➢ Design and adaptation of the test piece for GTAW welding with the robotic system. ➢ Design of a positioning, fixing and support device that allows the placement of the heat exchanger assembly on the rotary table. ➢ Development of a dedicated software program through which the robotic system welds components of the heat exchanger assembly. Analysis of production costs by applying robotic welding process management.

RO.6.

Title EN	**Method for obtaining hydroxyapatite scaffolds with predetermined physico-chemical characteristics for major bone reconstruction**
Authors	Florin Miculescu, Andreea Maidaniuc, Mihnea Costoiu, Augustin Semenescu, Marian Miculescu, Florentina Ionita-Radu, Marius Arghirescu
Institution	National University of Science and Technology POLITEHNICA Bucharest
Patent no.	***Patent RO 131943***
Description EN	The invention relates to a process for producing a material for the reconstruction of bone defects, based on hydroxyapatite, with a predetermined ratio between hydroxyapatite and tricalcium phosphate HAP/TCP,

including a preliminary phase of obtaining hydroxyapatite by thermal deproteinization, by boiling, of bovine bone, mechanical removal of the protein material and heat treatment of the deproteinized bone at temperatures between 800 and 1200°C and grinding, after which the hydroxyapatite powders obtained are mixed and homogenized with sodium pyrophosphate solution of concentration between 0.1 and 0.5 molar, at a ratio: solution/HAP between 1/3 and ¼, predetermined in correlation with the desired HAP/TCP ratio, and then compacted by pressing into cylindrical shapes with diameters between 10 and 50 mm, with pressing forces between 10 and 500 MPa, depending on the porosity and desired mechanical characteristics for the final product which is obtained by sintering at 700°-1300°C for 2-6 hours, in an air-argon atmosphere. The product is finally dried at room temperature between 24 and 240 hours and mechanically processed by drilling at a hole diameter varying between 1 and 3mm, the holes being drilled in axial directions, perpendicular to the circular surface and in radial directions, with the distance between any two ends of the holes between 1 and 3mm

RO.7.

Title EN	Cobalt, chromium and noble metal containing alloy used for manufacturing metal-ceramic dental prostheses, comprises cobalt, chromium, silicon, ruthenium, zirconium and silver
Authors	ANTONIAC Vasile Iulian, RAU Dzhulietta, SEMENESCU Augustin, DAWOD Nazem, GEANTA Victoras, VOICULESCU Ionelia, MATES Ileana Mariana, SOLEA Marina Roxana
Institution	National University of Science and Technology POLITEHNICA Bucharest
Patent no.	RO134132 B1
Description EN	NOVELTY - Cobalt, chromium and noble metal containing alloy comprising 58-61 %mass cobalt, 28-30 %mass chromium, 3.4-4.4 %mass silicon, 2-4 %mass ruthenium, 0.7-1.4 %mass zirconium and 0.8-1.2 %mass silver and obtained by elaboration in an electric arc furnace in a neutral atmosphere, with or without magnetic levitation. USE - The alloy is useful for manufacturing metal-ceramic dental prostheses. ADVANTAGE - The alloy has high biocompatibility.

DETAILED DESCRIPTION - Cobalt, chromium and noble metal containing alloy of formula: CoCrMn comprises 58-61 %mass cobalt, 28-30 %mass chromium, 3.4-4.4 %mass silicon, 2-4 %mass ruthenium, 0.7-1.4 %mass zirconium and 0.8-1.2 %mass silver and obtained by elaboration in an electric arc furnace in a neutral atmosphere, with or without magnetic levitation.

RO.8.

Title EN	Dental alloy of cobalt-chromium-molybdenum type used for making metal-ceramic dental prostheses, comprises cobalt, chromium, molybdenum, silicon, niobium, ruthenium, zirconium and silver
Authors	ANTONIAC Vasile Iulian, RAU Dzhulietta, SEMENESCU Augustin, DAWOD Nazem, GEANTA Victoras, VOICULESCU Ionelia, MATES Ileana Mariana, SOLEA Marina Roxana
Institution	National University of Science and Technology POLITEHNICA Bucharest
Patent no.	RO134131 B1
Description EN	NOVELTY - Dental alloy of cobalt-chromium-molybdenum type comprises 47-53 wt.% cobalt, 22-26 wt.% chromium, 4-7 wt.% molybdenum, 0.9-1.2 wt.% silicon, 3-5 wt.% niobium, 0.8-1.1 wt.% ruthenium, 10-14 wt.% zirconium and 2-4 wt.% silver, where the alloy has biocompatible metals comprising molybdenum, zirconium, niobium, silver and ruthenium, and is prepared by elaboration in electric arc furnace in neutral atmosphere. USE - The alloy is used for making metal-ceramic dental prostheses. ADVANTAGE - The alloy exhibits excellent biocompatibility and corrosion resistance.

RO.9.

Title EN	***High Entropy Alloy From the MoNbTaTiZr System Microalloyed with Yttrium for Medical Applications and Consolidation Process***
Authors	***Voiculescu Ionelia****, Geantă Victor, Ștefănoiu Radu, Kelemen Hajnal, Vizureanu Petrică, Codescu Mirela, Sandu Andrei Victor, Bălțatu Simona, Delia Patroi*
Institution	***National University of Science and Technology Politehnica Bucharest***

Patent no.	*Patent application No. RO 134977/2025.03.08*
Description EN	*The present invention relates to a biocompatible multi-element metallic alloy from the MoNbTaTiZr system (high entropy alloy - HEA) microalloyed with Yttrium, characterized in that it is composed of biocompatible chemical elements, possesses very good corrosion resistance in biological environments, acquires mechanical hardness characteristics after the application of appropriate heat treatments.* *The multi-element metal alloy microalloyed with Y that is the subject of the invention simultaneously presents high hardness and compressive strength values, being composed of five metallic elements of advanced purity, having equimolar chemical composition and mass composition located in the value ranges: Mo=18.86%; Nb=18.27%; Ta=35.56%; Ti=9.43%; Zr=17.88%: Y = 0.1 – 0.5%, with density in the range 10.5 - 11.3 g/cm^3 and liquidus temperature between 2300 - 2500°C.* *The alloy can be obtained by melting in a vacuum arc melting equipment, and to obtain high hardness values they must be subjected to a homogenization for 2 hours at 900°C, followed by rapid cooling in water. Before applying heat treatments, this alloy has average hardness values between 515 - 565 HV0.5, and after applying specific heat treatments, it has an associated hardness between 940 - 1000 HV0.5.* *Micro alloying with Yttrium allows the grain size refinement and decreases the brittle fracture tendency.* *Applications: manufacturing components for medical devices, such as plates, bars, rods or wire.*

RO.10.

Title EN	**High Entropy Alloy from the FeMoTaTiZr System for Medical Applications and Obtaining Procedure**
Authors	**Geantă Victor**, Voiculescu Ionelia, Ștefănoiu Radu, Binchiciu, Horia, Vizureanu Petrică, Kelemen Hajnal, Codescu Mirela, Sandu Andrei Victor, Bălțatu Simona, Marinescu Virgil
Institution	**National University of Science and Technology Politehnica Bucharest**
Patent no.	Patent application No. RO 134978/2025.02.08
Description EN	The present invention relates to a biocompatible multi-element metallic alloy from the FeMoTaTiZr system (high

entropy alloy - HEA) consisting of elements with the lowest biotoxicity to the human body, used for the production of orthopedic implants. It is characterized by a good biocompatibility, appropriate behavior during mechanical processing and high mechanical strength under conditions of use of the bone-alloy system and to a process for obtaining it.

The HEA alloy from the FeMoTaTiZr system consists of five metallic elements of advanced purity, with the chemical composition: Fe = 9.5 – 12.5 %, Mo = 19 – 22 %, Ta = 36 – 40 %, Ti = 9 – 11.5 %, Zr = 18 – 21 %, with a density of 2300 – 2400ºC. The material, obtained by melting and homogenization in a vacuum arc remelting installation under a protective argon atmosphere, presents, before heat treatment (in cast condition), an average microhardness value of 694 $HV_{0.5.}$ After the specific heat treatments (heating for 2 hours to 900ºC and quenching in water) presents a hardness value of 800 $HV_{0.5.}$

The process of obtaining HEA uses metallic materials Fe, Mo, Ta, Ti, Zr of advanced purity (over 99.3%), selected and prepared mechanically suitable for the RAV (Vacuum Arc Remelting) installation, which ensures a working temperature of at least 3500ºC, with a pressure level of $3x10^{-3}$ atm

The losses of elements during the process were computed and the working method takes into account the order of addition of the pure elements (Ti, Zr, Ta, Mo, and Fe) for a metal bath capable of rapidly dissolving elements with high melting temperature.

RO.11.

Title EN	Innovative flotation installation with hybrid ecological nanomaterials, used in wastewater treatment
Authors	Ileana Cristina COVALIU-MIERLA, Ioana Corina MOGA, Gigel PARASCHIV, Sorin Ștefan BIRIȘ
Institution	National University of Science and Technology POLITEHNICA Bucharest, Romania DFR Systems SRL Bucharest, Romania
Patent no.	PN-IV-P7-7.1-PTE-2024-0200
Description EN	The project develops an innovative technology for treating industrial wastewater rich in fats and colloids, using flotation supported by eco-friendly magnetic nanomaterials. The

process, advancing to pilot scale (50 m^3/day), employs dissolved air flotation with fine-bubble diffusion and hybrid nanomaterials that stabilize foam, capture pollutants, and prevent recontamination. These materials are magnetically recoverable and reusable, enhancing efficiency and sustainability. The technology achieves 96–100% pollutant removal, minimizes environmental impact, and generates patentable know-how, offering superior technical, economic, and ecological performance over conventional treatment methods.

RO.12.

Title EN	Development of alternative adsorbents derived from blast furnace slag and hazelnut shells for the removal of heavy metals from wastewater
Authors	Sorin IONESCU, Bogdan VASILE, Maria RÂPA, Ecaterina MATEI, Ileana Cristina COVALIU-MIERLA
Institution	National University of Science and Technology POLITEHNICA Bucharest, Romania
Patent no.	*Innovation in Phd thesis*
Description EN	In order to find sustainable solutions for wastewater treatment, the development of adsorbent materials, derived from industrial and agricultural waste, was sought, which can be used in the adsorption process. The use of blast furnace slag and hazelnut shells as alternative adsorbent materials was investigated, and an increased efficiency of removing pollutants from wastewater was observed. For this reason, a mixture of blast furnace slag and hazelnut shells was created, which showed an efficiency of removing some heavy metals of over 95%, thus obtaining an adsorbent that is effective in removing heavy metals, contributing in a sustainable way to reducing the amount of waste, as well as to wastewater treatment.

RO.13.

Title EN	Advancing Wastewater Treatment: A Novel Blastofiltration System with Hydroponic of Lead, Nickel, and Hexavalent Chromium ions removal using Brassica juncea Seedlings for removal
Authors	Alexandru BECHERU, Ileana Cristina COVALIU-MIERLA, Iuliana DELEANU, Loredana DIACONU

Institution	National University of Science and Technology POLITEHNICA Bucharest, Romania
Patent no.	*Innovation in Phd thesis*
Description EN	Industrial effluents containing heavy metals such as lead, nickel, and hexavalent chromium pose serious risks to aquatic ecosystems and human health. Phytoremediation is widely proposed as a green alternative to conventional treatment, but its implementation has been limited by the long cultivation periods required for mature plants. Brassica juncea (Indian mustard) is one of the most thoroughly documented hyperaccumulator species for heavy metals, yet its behavior at the seedling stage, within a high-density hydroponic configuration analogous to microgreens cultivation, remains largely unexplored. The present research addresses this gap by investigating the blastofiltration capacity of B. juncea seedlings for the removal of Pb^{2+}, Ni^{2+}, and Cr^{6+} from synthetic wastewater. Seeds are germinated for seven days in distilled water, after which the seedlings are exposed to monometallic solutions at 1 mg/L for each target pollutant, with a distilled water control maintained in parallel. Residual metal concentrations are monitored photometrically, and removal efficiencies are calculated. The study aims to determine whether the hyperaccumulating properties of B. juncea observed at maturity are expressed at the seedling stage.

RO.14.

Title EN	Smart Real-Time Compost Monitoring System Based on IoT for Environmental Parameters Optimization
Authors	Ionela Simona POPESCU, Ileana Cristina COVALIU-MIERLA, Ionut Bogdan DECUSEARĂ, Violeta Carolina NICULESCU
Institution	National University of Science and Technology POLITEHNICA Bucharest, Romania National Research and Development Institute for Cryogenic and Isotopic Technologies – ICSI Râmnicu Vâlcea SC CODE STRUCTURES SRL
Patent no.	*Innovation in Phd thesis*
Description EN	This project presents the design, implementation, and operational framework of an innovative Compost Monitoring System developed to enable real-time tracking of key

environmental parameters in composting facilities. The system was built around a programmable TinyControl LAN Controller v3.9, integrated with industrial-grade sensors to continuously monitor four critical composting parameters: temperature, humidity, carbon dioxide (CO_2) concentration, and pH level. The composition of the compost studied was: grass, cardboard, leaves, apples, sawdust, apple peels, banana peels, and orange peels.

The proposed solution operates autonomously, acquiring data at fixed intervals of 15 minutes and transmitting it to a custom web-based application for visualization, analysis, and alert management. Temperature, humidity, and CO_2 levels are measured automatically dedicated probes connected directly to the controller, while pH measurements are performed manually using an analog pH sensor interfaced via an Arduino Nano module.

The web-based control panel provides real-time monitoring of sensor readings, detailed insights for each probe including the latest measurements, and historical trend analysis over a period of up to four months interactive graphical representations. Additionally, the system supports multi-location deployment, enabling operators to monitor and compare environmental conditions across multiple composting units within a facility.

The proposed system enhances process efficiency, improves compost quality control, and provides a scalable and cost-effective solution for modern waste management and sustainable agriculture applications.

RO.15.

Title EN	From Seeds to Remediation: Blastofiltration of Lead, Nickel and Hexavalent Chromium ions using Hydroponic Helianthus annuus Seedlings
Authors	Alexandru BECHERU, Ileana Cristina COVALIU-MIERLA, Iuliana DELEANU, Gigel PARASCHIV
Institution	National University of Science and Technology POLITEHNICA Bucharest, Romania
Patent no.	*Innovation in Phd thesis*
Description EN	Heavy metal contamination of water remains a major environmental challenge, and conventional treatment methods are often costly and generate secondary waste.

Phytoremediation offers a sustainable alternative, but most studies focus on mature plants with long cultivation cycles. This research investigates blastofiltration, the use of plant seedlings for pollutant removal from aqueous media, as an underexplored branch of phytofiltration. The study uses Helianthus annuus (sunflower) cultivated in a hydroponic system inspired by microgreens farming. Sunflower seeds are germinated for seven days in distilled water, after which the seedlings are exposed to synthetic wastewater containing lead (Pb^{2+}), nickel (Ni^{2+}), or hexavalent chromium (Cr^{6+}) at an initial concentration of 1 mg/L. Residual metal concentrations are monitored photometrically at regular intervals, and removal efficiencies are calculated for each sampling point. Morphological indicators of metal stress are also recorded. The study aims to identify metals for which sunflower seedlings display promising remediation capacity and to support the development of a rapid, low-cost, and scalable phytoremediation technology.

RO.16.

Title EN Recycling of residual mixed microalgae-bacterial biomass into a functional biosorbent for metal removal

Authors Tatiana BUȘE[1,2], Olga TIRON[1], Cristina-Ileana COVALIU-MIERLĂ[2] ,Mihai Niță-LAZĂR[1]

Institution [1]National Research and Development Institute for Industrial Ecology - ECOIND
[2]National University of Science and Technology Politehnica Bucharest,

Patent no. *Innovation in Phd thesis*

Description EN The discharge of heavy metals into aquatic environments represents a major environmental challenge due to their persistence, toxicity, and accumulation in ecosystems and food chains. Conventional treatment methods are often costly and inefficient at low metal concentrations, highlighting the need for sustainable alternatives. In this context, the valorization of residual biomass from wastewater treatment offers a promising solution aligned with circular economy principles. In this study, a mixed microalgae–bacteria consortium derived from municipal wastewater was recycled and transformed into a functional biosorbent. The biomass was used in suspended form and

after immobilization in a polymeric alginate matrix to obtain stable granular structures. Morphological and SEM analyses revealed a heterogeneous consortium and porous granules (~5 mm), while biochemical characterization indicated a protein content of approximately 31%, suggesting a high density of active binding sites. Biosorption experiments showed that pH 4 is optimal for both metals. Immobilization significantly improved performance, with adsorption capacities of 16.2 mg/g for Zn(II) and 12.07 mg/g for Ni(II). Isotherm analysis indicated Langmuir behavior for Zn(II) and partial Freundlich behavior for Ni(II). These results demonstrate the potential of recycling residual biomass into a low-cost and efficient biosorbent for sustainable heavy metal removal from wastewater.

Technical University of Cluj-Napoca, România

RO.17.	
Title EN	**AUTOMATED MEDICAL INSTRUMENT FOR RADIOFREQUENCY ABLATION**
Authors	Pîslă Doina Liana, Vaida Liviu Călin, Bîrlescu Iosif, Crăciun Cristea Florin, Gherman Bogdan George, Graur Florin, Plitea Nicolae
Institution	**Technical University of Cluj-Napoca**
Patent no.	Patent OSIM no.: RO132965- B1 / 28.11.2025
Description EN	The invention relates to an automated medical instrument for radiofrequency ablation which employs an ablation needle mounted in the instrument holder, having two degrees of mobility. The first degree of freedom is for inserting and retracting the needle, and the second one is for inserting and retracting the antennas inside the ablation needle cannula. The instrument is designed to be guided by a positioning and orientation device relative to the patient's position, which may be a hand-held setting device or a medical robot that fixes the instrument prior to insertion and keeps it fixed throughout the entire period of the ablation procedure, thus increasing the precision of needle positioning for the ablation procedure.

RO.18.	
Title EN	**AUTOMATED MEDICAL INSTRUMENT WITH MULTIPLE NEEDLES INSERTED ON PARALLEL TRAJECTORIES FOR INTERSTITIAL BRACHYTHERAPY**
Authors	Bîrlescu Iosif, Gherman Bogdan George, Burz Alin, Pîslă Doina Liana
Institution	**Technical University of Cluj-Napoca**
Patent no.	Patent OSIM no.: RO134940-B1 / 30.10.2025
Description EN	The invention proposes an automated medical instrument for interstitial brachytherapy, capable of loading, guiding and sequentially inserting multiple needles along parallel trajectories. The system integrates an insertion module, a needle storage module and a tip-guidance module driven by two motors. The solution improves positioning accuracy, reduces needle buckling risk and limits the need to reposition the device between insertions.

RO.19.	
Title EN	**APPARATUS AND METHOD FOR LINEARIZATION OF CONTROL CODE-OSCILLATION FREQUENCY CHARACTERISTIC FOR MULTI-BAND DIGITALLY CONTROLLED OSCILLATORS AND APPARATUS CUSTOMIZATION FOR A FREQUENCY-LOCKED LOOP**
Authors	Kirei Botond Sandor, Ţopa Marina Dana, Groza Robert Gheorghe, Farcaş Călin Adrian
Institution	**Technical University of Cluj-Napoca**
Patent no.	Patent OSIM no.: RO134011-B1/ 28.03.2025
Description EN	This invention describes a system and method for improving the accuracy of digitally controlled oscillators (DCOs). A DCO generates a signal whose frequency is set by a digital control code. Ideally, changes in the control code would result in proportional (linear) changes in frequency. However, in practice, the relationship between control code and output frequency is often nonlinear. This invention corrects that problem by automatically measuring and compensating for the oscillator's nonlinear behavior. The system includes three main parts: a digital frequency converter, a control algorithm, and a linearization block. The linearization block operates in two modes: a calibration (or activation) mode and a normal operation mode. A calibration unit selects the mode and controls a multiplexer that switches between signal paths.

RO.20.	
Title EN	**TOF NORMAL ESTIMATION FOR PULSE BASED TOF CAMERA USING CNN**
Authors	Szilard Molnar, Levente Tamas
Institution	**Technical University of Cluj-Napoca**
Patent no.	Patent OSIM no.: RO137263- B1 / 28.11.2025
Description EN	A system and method for automatically computing spatial surface normals in 3D data from the pulse based Time-of-Flight(ToF) cameras is provided. Moreover, the system comprises a component which is using convolutional neural network (CNN) for computing the normals of a 3D pointcloud sensed and returned from the ToF camera depth images. The CNN is based on the 3 channel composition of

	information which is trained on a large real and synthetic dataset, for which an automatic 3D point processing chain is used to determine the normals. During the evaluation mode, the CNN is able to compute the normals of the pointcloud from the ToF camera, ensuring a fast and robust normal estimation for the pointclouds.

RO.21.	
Title EN	**THERMOPLASTIC COMPOSITE SELECTION METHOD FOR POWERING AN AUTOMATIC THERMOFORMING LINE**
Authors	Ciupan Cornel, Filip Ioan, Ciupan Emilia, Ciupan Mihai
Institution	**Technical University of Cluj-Napoca**
Patent no.	Patent OSIM no.: RO137477-B1 / 30.05.2025
Description EN	The method involves dividing the products into classes with a representative benchmark, then static studies are performed by the FEA method, the minimum wall thickness is determined so as to meet simultaneously the requirements of the FOS and displacement, for each available composite material, after which determines the cost of the section. Select the composite that offers the minimum section cost, and for any other part of the part group representative, the FEA analysis will be made only with the material selected for the representative part and the wall thickness that satisfies the technical restrictions will be determined.

RO.22.	
Title EN	**PVA FIBER REINFORCED CEMENTITIOUS COMPOSITE WITH FLY ASH AS A REPLACEMENT FOR NATURAL AGGREGATE AND PROCESS OF OBTAINING**
Authors	Negruţiu Camelia-Maria, Şoşa Pavel-Ioan, Câmpian Cristina Mihaela, Pop Maria-Ileana
Institution	**Technical University of Cluj-Napoca**
Patent no.	Patent OSIM no.: RO138196- B1 / 30.09.2025
Description EN	This invention relates to the composition and process of obtaining a fiber reinforced cementitious composite with 2% Polyvinyl Alcohol (PVA) fibers and fly ash as a substitute for natural aggregates. The innovation involves the complete replacement of aggregates specific to conventional concrete with thermal power plants waste, such as fly ash, to obtain a new eco-friendly material with compressive and tensile

strengths comparable to those of traditional concrete but with significant improvements in deformability properties.

RO.23.	
Title EN	**ULTRA-HIGH-PERFORMANCE CONCRETE PRECAST PILOT WITH C-SECTION, AND DISPERSED STAINLESS STEEL FIBER REINFORCEMENT, INTENDED FOR THE SUPPORT STRUCTURE OF GROUND-MOUNTED PHOTOVOLTAIC PANELS**
Authors	Şoşa Pavel Ioan, Negruţiu Camelia Maria
Institution	**Technical University of Cluj-Napoca**
Patent no.	Patent application OSIM no.: A/00485/29.10.2025
Description EN	The invention relates to a precast ultra-high-performance concrete pile, reinforced with dispersed stainless-steel fibers (UHPFRC), intended for the support structure of ground-mounted photovoltaic panels. The element features a C-shaped cross-section, like metal profiles, which provides increased stiffness, durability, and resistance to aggressive environments. The pilots are installed by driving, without conventional reinforcement and without the need for bracing. The invention reduces concrete volume, costs, CO_2 emissions, and corrosion risk, offering a sustainable and predictable solution for photovoltaic system foundations.

RO.24.	
Title EN	**FLEXIBLE PERSONALIZED ROBOT FOR THE REHABILITATION OF HUMAN HAND MOVEMENTS**
Authors	Vaida Liviu-Călin, Zima Ionuț Marian, Sebeni Dragoș-Daniel, Gherman Bogdan George, Tucan Paul-George-Mihai, Machado Jose, Pîslă Doina Liana
Institution	**Technical University of Cluj-Napoca**
Patent no.	Patent application OSIM no.: A/00047/04.02.2025
Description EN	The invention relates to a flexible personalized robot for the rehabilitation of human hand movements. The robot consists of five components made from a flexible material integrated with rigid elements, fixed on each of the five fingers, along with two palm support parts and two wrist support parts, all secured with Velcro strips. Nylon or textile wires are passed through rigid guiding tubes within the components and then

guided through the palm part and wrist part, enabling independent flexion and extension movements for each finger through tensioning.

RO.25.	
Title EN	**ELECTROTHERMAL EVAPORATOR WITH FLAT FILAMENT**
Authors	Dorin Petreuş, Cadar Sergiu
Institution	**Technical University of Cluj-Napoca**
Patent no.	Patent application OSIM no.: A/00136/15.04.2025
Description EN	The invention relates to an electrothermal evaporator with a flat molybdenum filament (1) intended for evaporating micro liquid samples and introducing them into the plasma of an analyzer based on optical emission spectrometry for the simultaneous determination of the constituent elements. The flat molybdenum filament evaporator is characterized by the fact that the entire drying and evaporation process of the micro sample is carried out without contaminating the plasma with oxygen through the use of an iris-type closing mechanism (14) and a new type of flat molybdenum filament (1).

RO.26.	
Title EN	**INSTRUMENT FOR DIGITALIZING THE HUMAN EXPOSURE ASSESSMENT PROCESS TO ELECTRIC AND MAGNETIC FIELDS**
Authors	Giurgiuman Nicoleta-Adina, Păcurar Claudia, Constantinescu Claudia-Alana, Gliga Marian-Răzvan, Andreica Sergiu-Iulian, Bojiță Adrian-Ioan
Institution	**Technical University of Cluj-Napoca**
Patent no.	Patent application OSIM no.: A/00156/05.05.2025
Description EN	The automated instrument was designed for digitalizing the process of assessing human exposure to electric and magnetic fields generated by conductors of overhead power distribution and transmission lines. The instrument according to the invention comprises: a software application developed for the digitalization of the process, which can be accessed via a mobile phone or a laptop (featuring three modules: a module for commanding and controlling the robotic platform, a module for recording, storing and graphically displaying the measured values and a module for selecting exposure limits to electric and magnetic fields); a

commercial device for measuring electric and magnetic fields; a robotic platform containing the electronic components required for its automation and a wooden tripod.

RO.27.	
Title EN	**MODULAR DEVICE FOR THERMAL WEED DESTRUCTION**
Authors	Șerdean Mihai - Dan, Șerdean Maria - Florina, Mândru Silviu - Dan
Institution	**Technical University of Cluj-Napoca**
Patent no.	Patent application OSIM no.: A/00287/07.07.2025
Description EN	The invention relates to a modular device for the thermal destruction of weeds, intended for integration on an autonomous or semi-autonomous mobile platform. The device injects steam directly into the root zone of weeds, ensuring their complete elimination. The active assembly, consisting of a high-pressure pipe and a detachable nozzle, is vertically actuated by a screw–nut mechanism driven by an electric motor. A roller guiding system and slotted optical switches ensure precise vertical movement. The modular architecture and compact dimensions allow easy integration on autonomous platforms and enable adaptation to different types of soils and weeds.

RO.28.	
Title EN	**TEST BENCH FOR ASSESSING THE ACCURACY AND SYNCHRONIZATION OF CNC AXES**
Authors	Ciupan Mihai
Institution	**Technical University of Cluj-Napoca**
Patent no.	Patent application OSIM no.: A/00187/11.08.2025
Description EN	The stand consists of support provided with n slots in which all the kinematic axis motors that are part of a CNC machine tool, a robot or another automation system are mounted. The stand is equipped with loading systems that reproduce the inertia forces and moments from the axis operation. The axes are controlled using the CNC controller that communicates with the drivers via an EtherCAT bus. The system is commanded from a PC computer connected to the CNC controller via a network cable. Communication between the computer and the CNC controller is via the Ethernet (LAN) protocol.

RO.29.	
Title EN	**SEALED-CONTAINER AIR FRESHENER WITH ADJUSTABLE SCENT DIFFUSION**
Authors	Oțel Călin Ciprian
Institution	**Technical University of Cluj-Napoca**
Patent no.	Patent application OSIM no.: A/00211/02.06.2025
Description EN	The invention relates to a sealed-container air freshener provided with adjustable openings for controlling the amount of perfume released, with a constructive form as simple as possible, which allows the reuse of the container by quickly changing the gel, the material soaked with perfume by dismantling a single component, a container that allows an adjustable dispersion of the perfume by gradually covering the perfume outlet openings according to the user's preferences, and which, in addition, requires the smallest possible number of movements when using the air freshener.

RO.30.	
Title EN	**LATHE WITH CONSTANT SPEED USED FOR THE ECONOMICAL PROCESSING OF A BATCH OF PARTS WITH DIFFERENT DIAMETERS**
Authors	Oțel Călin Ciprian
Institution	**Technical University of Cluj-Napoca**
Patent no.	Patent application OSIM no.: A/00212/02.06.2025
Description EN	The lathe is characterized by the fact that the main motor used for processing the batch of parts is at constant speed, without a gearbox within the lathe, speed determined in advance according to the diameters of the parts in the batch to be processed, by a process also proposed by this invention. The fixing of the parts to be processed in the lathe is carried out by a universal chuck and the replacement of the movable tailstock, the lathe not having a movable tailstock, the movement of the carriage on the two guide bars, mounted above the frame, will be achieved without friction, or with reduced friction, due to the strong permanent magnets inside the carriage and the inside of the guide bars, but also due to the component acting as a counterweight (the counterweight is proposed in 3 variants of realization) necessary for the uniform distribution of the weight of the carriage on the two guide bars.

RO.31.	
Title EN	**COMPOSITE PLATES FROM TETRA PAK® PACKAGING WASTES**
Authors	Miron Sorin Rancea, Ovidiu Nemeș, Nicoleta Alina Holhoș
Institution	**Technical University of Cluj-Napoca**
Patent no.	Patent pending
Description EN	Obtaining advanced materials with high performance is a major challenge worldwide, in the context of increasingly stringent requirements imposed by sustainable development, resource efficiency and reduced environmental impact. Current research is focused on identifying new materials and manufacturing technologies that allow improving the functional properties of products, reducing production costs, optimizing energy consumption and limiting the risks associated with pollution.

RO.32.	
Title EN	**METHOD FOR COMPARATIVE EVALUATION OF TECHNOLOGICAL DEVELOPMENT BASED ON THE NUMBER OF REGISTERED PATENTS**
Authors	Cornel Ciupan, Mara-Alina Chifor, Mihai Ciupan
Institution	**Technical University of Cluj-Napoca**
Patent no.	Project „EspacenetUTech”
Description EN	The project analyzes patent activity in unconventional manufacturing technologies, including electrical discharge machining (EDM), plasma cutting, abrasive waterjet cutting (AWJ), laser cutting, and additive manufacturing. It is based on the premise that technological emergence is typically preceded by increased patenting, followed by a rapid growth phase once technologies reach industrial application, reflecting intensified research and development efforts. Methodologically, the study applies to a structured patent analysis, where technologies are selected according to their innovation potential and relevant CPC codes are used to ensure standardized and comparable data. The analysis relies on data extracted from patent databases and spans the period 1971–2020, enabling the identification of long-term technological trends.

RO.33.	
Title EN	**Composite materials from plant fibers and mushroom farming waste**
Authors	Nicoleta Alina HOLHOȘ, Ovidiu NEMEȘ
Institution	**Technical University of Cluj-Napoca**
Patent no.	**Hempmat project**
Description EN	Natural Fiber Composites (NFCs) are gaining prominence as sustainable alternatives to conventional composite materials, with reduced environmental impact. By using renewable resources such as hemp fibers and mycelium-based matrices, these composites offer advantages including biodegradability and a low environmental footprint. Despite their benefits, these materials face several challenges, primarily the tendency of natural fibers to absorb moisture. To overcome these limitations, various surface treatments are being investigated, including chemical, plasma, and biological methods. These modifications aim to reduce water absorption, thereby improving mechanical properties, thermal insulation, dimensional stability, and wear resistance. Hemp fibers offer distinct advantages, including high and competitive stiffness, as well as a favorable strength-to-weight ratio.

"Gheorghe Asachi" Technical University of Iasi

RO.34.	
Title EN	**Translating research results into a product on the economic market**
Authors	Claudia Maxim, Daniela Suteu
Institution	**"Gheorghe Asachi" Technical University of Iasi, Faculty of Chemical Engineering and Environmental Protection, Iași, România**
Patent no.	-
Description EN	In the (dermato)cosmetic field, in-depth research is essential for the development of safe, effective and compliant products and, according to the European Commission (2013), any declared effect associated with a cosmetic product must be supported by relevant studies demonstrating its veracity (Commission Regulation (EU) No 655/2013). The placing on the market in the European Union of (dermato)cosmetic products is regulated by Regulation (EC) No 1223/2009 on cosmetic products, adopted in 2009 and entered into force on 11 July 2013. It includes several requirements relating to safety, labelling and the Person Responsible for placing on the market, a process that includes several essential steps (Regulation (EC) No 1223/2009, 2009). Currently, one of the formulas developed during the doctoral research has already been translated into a finished product and introduced on the market under the name Phyto retinol, having fully completed the validation, safety assessment and notification stages according to the legislation in force. Another 2 formulations developed based on the extract of Acmella oleracea are in an advanced phase of finalizing the technical documentation and safety files, with a view to notification and introduction on the market, followed by the development of separate ranges with the extracts of Dacota carota subsp.carota and Artemisia annua.

RO.35.	
Title EN	**GreenLean 4.0: A Novel LSS–Industry 4.0 Integration Framework for Sustainable Textile SMEs**
Authors	**Nicoleta-Mihaela CASANEANU (DASCALU)[1], Marius PISLARU[2],Adrian VILCU[3], Ionuț Viorel HERGHILIGIU[4], Geanina GIOSAN[5],Laura-Crina MIRAUTE (COCA)[6]**
Institution	"Gheorghe Asachi" Technical University of Iasi, Faculty of Industrial Design and Business Management, Iasi, Romania
Patent no.	Patent no. – / Patent application No. –
Description EN	GreenLean 4.0 is a practical integration framework designed to help textile SMEs become both leaner and greener without needing a huge digitalization budget. The idea came directly from factory reality: small and medium manufacturers are under strong pressure from the EU Green Deal, CSRD and the future Digital Product Passport, but most tools on the market are built for large corporations and focus either on cost or on sustainability, not both. The framework connects three elements that, in practice, are usually managed in separate projects: Lean Six Sigma (DMAIC), environmental performance and Industry 4.0 tools. In GreenLean 4.0, each DMAIC phase is linked to a small, realistic package of technologies and indicators: value stream mapping with energy and waste “hotspots”, IoT sensors for real-time monitoring, SPC and Pareto analysis for root causes, then Digital Twin simulations and SCADA dashboards to stabilise improvements. The concept is designed for textile SMEs with up to 250 employees and a total implementation budget below 50,000 EUR. A literature-based scenario shows that applying GreenLean 4.0 could reduce defect rate, energy use, textile waste and cycle time simultaneously, while improving sigma level. These values are theoretical benchmarks derived from published case studies; a pilot study in a North-East Romanian textile SME is planned for 2027 to validate them. In terms of applications, GreenLean 4.0 offers managers a concrete roadmap to align existing production lines with EU sustainability requirements, while improving quality, costs and competitiveness in a highly vulnerable sector.

RO.36.	
Title EN	**Sustainability of Digitalization Management in Higher Education Institutions**
Authors	Andrei MIHAI [*1], Petrina-Delia VAGIUC[1], Ștefana-Cătălina POHONȚU-DRAGOMIR[1], Cătălin Dumitrel BALAN[1], Larisa-Victoria IVAȘCU[2], Marius PISLARU[1], Adrian VILCU [1], Bogdan BUDEANU[1], Ionuţ-Viorel HERGHILIGIU[1]
Institution	[1]„Gheorghe Asachi" Technical University of Iasi – Romania [2] Polytechnic University of Timisoara, Romania
Description EN	Digitalization in Romania has advanced rapidly, yet unevenly, reflecting an incomplete transition between Industry 3.0, 4.0, and the emerging Industry 5.0 paradigm. In Romanian universities, this process reveals significant disparities in digital competencies among academic and administrative staff, as well as inconsistencies in infrastructure implementation. Moreover, resistance to change often hinders digital transformation, generating redundant workflows and persistent administrative inefficiencies. While Industry 4.0 emphasized automation, Industry 5.0 promotes a human-centric approach, focusing on human–technology collaboration, sustainability, and social impact. However, its implementation in higher education institutions is constrained by the lack of standardized models and uneven levels of digital training. Administrative processes remain rigid, characterized by the duplication of physical and digital procedures and insufficient continuous training. In this context, research on digitalization management becomes essential to assess infrastructure, evaluate competencies, and analyze the impact of technology on institutional resources and stakeholders. This work highlights the importance of university-based research in developing applicable digitalization models and preparing professionals capable of driving change across sectors. As a preliminary case study, the procurement process at a Romanian technical university was analyzed, revealing an average duration of 36 days due to idle times, reliance on physical documentation, and multiple approval stages. These findings underline the need for genuine, integrated digitalization beyond formal adoption.

RO.37.	
Title EN	**WOOD-DERIVED CATECHIN COMPLEX FROM PRUNUS SPINOSA: A NOVEL STRATEGY FOR SKIN PHOTOPROTECTION AGAINST UV AND URBAN OXIDATIVE STRESS**
Authors	**Oana Teodora APREUTESEI[1], Ana Simona BARNA[2] Claudia MAXIM[2], Mălina CIUMAȘU-RÎMBU[3] , Dana Elena MÎNDRU[4]**
Institution	[1] "Stejarul" Research Centre for Biological Sciences, National Institute of Research and Development for Biological Sciences, Piatra Neamt, Romania [2]"Gheorghe Asachi" Technical University of Iasi, Faculty of Chemical Engineering and Environmental Protection, Iași, România [3] Spitalul Clinic Militar de Urgență I.Czihac Iași, România [4]"Grigore T. Popa" University of Medicine and Pharmacy Iasi,, Iasi, Romania
Patent no.	-
Description EN	This invention presents a novel dermocosmetic formulation based on a catechin-rich extract obtained from Prunus spinosa (blackthorn) branches, representing an innovative valorization of woody plant biomass as a source of bioactive compounds. The extract, previously characterized and standardized, contains a complex profile of flavan-3-ols (catechins), with a total content of approximately 120 mg/g dry extract, including catechin, epicatechin, epigallocatechin and their gallated derivatives. The innovation consists in the successful incorporation of this extract into a stable oil-in-water (O/W) topical emulsion, specifically designed to maintain the stability and activity of catechins without the use of additional antioxidant actives. The formulation exhibited good physicochemical stability, with pH values maintained around 5.0–5.2 and peroxide index remaining within acceptable limits, indicating controlled oxidative processes. Due to the high content of bioactive catechins, the formulation demonstrates significant potential in protecting the skin against oxidative stress induced by ultraviolet (UV) radiation and environmental pollution. The catechins act as multifunctional agents by scavenging reactive oxygen species (ROS), modulating inflammatory responses, and contributing to the protection of extracellular matrix components, which are essential in preventing photoaging. Potential applications include daily facial skincare products designed for urban environments, offering protection against UV-

	induced oxidative stress, pollution, and environmental aggressors. Additionally, the formulation may support anti-photoaging effects and improvement of skin appearance, including the maintenance of skin tone uniformity. This work highlights a sustainable and innovative approach for developing advanced cosmetic products by utilizing underexploited natural resources with high dermocosmetic potential.

RO.38.	
Title EN	**Evaluation of a Hemostatic and Healing Hydrogel with Applications in Dentistry**
Authors	**Elizabeth Quesada-Tudor, Anca Mihaela Mocanu**
Institution	**Gheorghe Asachi Technical University of Iasi**
Patent no.	-
Description EN	The present study aims to create a bioadhesive matrix capable of adhering to the moist environment of the oral cavity by developing an innovative, multifunctional hydrogel intended for dental use. The polymeric matrix was synthesized using Carbopol and active ingredients to promote tissue regeneration. Structural integrity and chemical composition were evaluated through Fourier Transform Infrared Spectroscopy (FTIR), confirming the successful integration of the active compounds. Morphological analysis via Scanning Electron Microscopy (SEM) revealed an interconnected porous network, ideal for fluid absorption and support of blood coagulation. Furthermore, Thermal Analysis (TGA/DSC) demonstrated the stability of the gel under physiological conditions.

RO.39.	
Title EN	**Saturation Mapping: From DC-Bias Inductance Measurement to Nonlinear LTspice Modeling of Saturable Inductors**
Authors	Giani Constantin Braescu, Marian-Silviu Poboroniuc
Institution	**Faculty of Electrical Engineering/ GHEORGHE ASACHI Technical University of Iaşi**
Patent no.	N/A – PhD Research Project
Description EN	Previous studies have shown that nonlinear reluctance and permeance-based magnetic models predict saturation effects more accurately than fixed-inductance models, but their practical use is often limited by implementation complexity

and weak connection with experimental validation. In conventional design, inductors are frequently selected for the maximum circuit current, increasing cost, volume, and weight even when peak operation is rare. This work explores a practical workflow that supports inductor selection closer to nominal operating conditions, using nonlinear LTspice simulation, low-cost DC-bias inductance characterization, and validation on a SEPIC converter prototype. The approach enables a more realistic evaluation of saturation effects and helps reduce the mismatch between simulated and real converter behavior.

RO.40.

Title EN **INTEGRATION OF THE ENVIRONMENTAL MANAGEMENT SYSTEM AND ITS INFLUENCE ON BUSINESS PERFORMANCE**

Authors Catalin-Ioan BUDEANU
Institution „Gheorghe Asachi" Technical University of Iasi, Romania
Patent no. -

Description EN

Environmental concerns and increasing regulatory pressures have prompted organizations worldwide to adopt structured frameworks for managing their environmental impact. The Environmental Management System (EMS), standardized under ISO 14001, represents one of the most widely recognized tools for integrating environmental governance into organizational strategy. This study examines the integration of EMS within business organizations and investigates its influence on overall business performance, covering both environmental and financial dimensions. The research draws on a systematic review of recent academic literature combined with an empirical analysis of ISO 14001-certified small and medium-sized enterprises (SMEs) listed on the AeRO segment of the Bucharest Stock Exchange. Key methodological tools include Principal Component Analysis (PCA) to compute a composite EMS Integration Score, logistic regression to estimate business performance probability measured by Return on Assets (ROA), and fuzzy logic modelling to capture nonlinear relationships between integration levels and performance outcomes. Findings indicate that deeper EMS integration — particularly across leadership commitment, operational control, and continuous

monitoring — is consistently associated with improved environmental and financial performance. Management-level integration strengthens the link between EMS and environmental performance, while financial benefits are most pronounced at high levels of technical integration. This research contributes to the growing body of evidence supporting the strategic value of environmental management and provides a practical framework for SMEs seeking to leverage EMS integration as a driver of sustainable business performance.

Keywords: Environmental Management System, ISO 14001, Business Performance, Return on Assets, SMEs, Sustainability, PDCA, Fuzzy Logic

RO.41.	
Title EN	**Environmental Audit Platform for ESG governance, fraud risk screening and DNSH compliance support**
Authors	Aura DOMIL[1], Iulia SARAC[1], Bogdan-Ioan ROBU[2], Catalina Stefana POHONTU-DRAGOMIR[3], Ionut Viorel HERGHILIGIU[3]
Institution	[1]West University of Timişoara, Romania [2]„Alexandru Ioan Cuza" University of Iasi, Romania [3]„Gheorghe Asachi" Technical University of Iasi, Romania
Patent no.	-
Description EN	Traditional audit and compliance tools focus mainly on sample-based checks and retrospective financial ratios, providing limited support for ESG governance and EU Taxonomy alignment. Fraud detection is often rule-based, opaque for users, and poorly integrated with sustainability and DNSH (Do No Significant Harm). The Sustainable Audit Platform is a digital decision-support system that integrates: camera-based scanning and OCR of financial statements and documents, explainable AI (XAI) models for fraud and anomaly screening, ESG governance dashboards with risk indicators and incidents, DNSH assessment workflows aligned with EU sustainable finance rules, continuous audit trail for all alerts, assessments. Combines fraud screening, ESG governance, and DNSH compliance in a single platform, uses explainable AI summaries instead of black-box fraud scores, links transaction-level anomalies with entity-level ESG and governance risks, pre-fills

ESG/DNSH assessments from scanned financial data, reducing manual input, provides a structured audit trail. Financial statement audit and continuous monitoring, corporate ESG and governance risk oversight, DNSH screening for EU Taxonomy and sustainable finance projects, internal control and compliance for companies and public institutions. Scan or upload financial statements and documents (camera / PDF / image), extract key figures via OCR & NLP and map them to standard financial fields, generate risk scores and alerts for suspicious transactions or entities, display ESG governance dashboards (KPIs, incidents, trend charts), run DNSH assessments with checklists, evidence upload, and final compliance rating, document every action in an audit trail (who, when, what decision, justification).

RO.42.

Title EN

Advanced Simulation Framework:
Human-in-the-Loop Validation of SynRM Powertrain

Authors

Silvia-Nicoleta Plăcintă, Yannick Rauch, Patrick Rebling, Philipp Nenninger, Marian – Silviu Poboroniuc

Institution

Faculty of Electrical Engineering/ GHEORGHE ASACHI Technical University of Iaşi

Patent no.

PhD project

Description EN

Developing efficient electric vehicles requires testing methodologies that reduce costs and time. This project focuses on a Synchronous Reluctance Machine (SynRM), which is a sustainable alternative to electrical machines using rare-earth magnets. The main goal was to integrate a dynamic model of this electrical machine into the CarMaker simulation environment to test its performance.

The integration follows a two-step approach:

- Software-in-the-Loop (SiL): The motor model and its control strategy were developed in Simulink and integrated into CarMaker using automatic code generation. This allows testing the SynRM energy consumption and speed tracking under the standard NEDC driving cycle.
- Human-in-the-Loop (HiTL): To see how the electrical machine behaves in real conditions, the simulation was connected to a physical driving simulator. This setup uses a 180° dome projection,

force-feedback steering wheel, and a professional pedal set.

Unlike standard automated tests, this real-time simulator allows a human driver to control the vehicle. This is essential for observing how the electrical machine responds to sudden acceleration, braking, and steering maneuvers performed by a person.

RO.43.

Title EN

Towards Sustainable Organizations: Strategic Models in the Context of Industry 5.0

Authors

Petrina-Delia VAGIUC[1], Andrei MIHAI[1], Ștefana-Cătălina POHONȚU-DRAGOMIR[1], Cătălin Dumitrel BALAN[1], Larisa-Victoria IVAȘCU[2], Marius PÎSLARU[1], Adrian VÎLCU[1], Ionuţ-Viorel HERGHILIGIU[1]

Institution

[1]„Gheorghe Asachi" Technical University of Iasi, Romania

[2]Polytechnic University of Timisoara, Romania

Patent no.

-

Description EN

The Industry 5.0 concept represents a paradigm shift, marking the transition from the predominantly technological orientation of Industry 4.0 to a human-centric, resilient and sustainable industrial model. Organizations are increasingly determined to integrate sustainability into their strategies, not just as an operational objective, but as a principle of operation. This paper explores strategic models that can facilitate the transition towards sustainable organizations, in line with the principles of Industry 5.0. Although literature on Industry 4.0 analyzed the digital transformation in an extensive way, the strategic dimension of sustainability in Industry 5.0 remains insufficiently conceptualized and discussed. The study adopts an integrative conceptual approach, bringing together perspectives from sustainability management, organizational strategy and digital transformation, to assess the relevance and applicability of existing strategic models in the sustainable transition process. The analysis is guided by three research questions regarding the key strategic models for Industry 5.0, the possibility of integrating the sustainability and human-centric innovation into a unified frameworks and the identification of a conceptual model capable of guiding organizations towards the sustainability objectives of this

new industrial paradigm. The results show both the contributions and the limitations of current models and the need for a coherent conceptual framework. The paper proposes the Sustainable Transition Guide (STG), an integrative and unified framework intended for the strategic alignment of organizations to the principles of Industry 5.0. The conclusions underline the theoretical relevance and practical utility of the model, as well as limitations and future directions for empirical validation.

RO.44.

Title EN

A Bibliometric Mapping Study on Human-Centricity in Industry 5.0

Authors

Petrina-Delia VAGIUC[1], Andrei MIHAI[1], Ștefana-Cătălina POHONȚU-DRAGOMIR[1], Cătălin Dumitrel BALAN[1], Larisa-Victoria IVAȘCU[2], Marius PÎSLARU[1], Adrian VÎLCU[1], Ionuţ-Viorel HERGHILIGIU[1]

Institution

[1]„Gheorghe Asachi" Technical University of Iasi, Romania

[2]Polytechnic University of Timisoara, Romania

Description EN

Human centricity represents one of the defining pillars of the Industry 5.0 concept, marking the transition from the dominant technological orientations of Industry 4.0 to an industrial model in which the role oh humans, collaboration with advanced technologies, and sustainability become priorities. This study contributes with a bibliometric analysis of the literature on human-centricity within this new industrial paradigm, based on scientific articles published between 2022 and 2026, which are indexed in the Web of Science Core Collection. Using the VOSviewer tool and techniques for analyzing co-occurrence of keywords, co-citations for sources and authors, and bibliographic coupling, this research seeks to explore the evolution of the domain, the principles, and inspiring directions of study. The maps reveal authors and notable publications, as well as thematic clusters relevant to human-centrism, the interaction between humans and advanced technologies, and rising concepts. This paper draws attention to the evolution of certain research areas and the emergence of new themes related to smart systems, decisional transparency, and the impact of technologies on human roles in organizations. By outlining

the results, limitations and future research directions, this study offers a helpful starting point for researchers and experts aiming to balance technological progress with sustainable development, and human-centricity in the context of Industry 5.0.

RO.45.	
Title EN	**Electromagnetic Spring with Controllable Elastic Force**
Authors	R. Olaru, G. Muraviev, C. Petrescu
Institution	**Technical University Gheorghe Asachi Iași**
Patent no.	A/00071 – 13.02.2026 RO Patent pending
Description EN	The invention relates to an electromagnetic device of the electromagnetic spring type, in which the elastic force and stiffness can be varied in real time by applying an electric control current. The device is intended to be used as an adjustable and controllable elastic element in systems such as variable stiffness actuators for object gripping, robotic joints and linkages, and active vibration dampers. The electromagnetic spring with controllable elastic force comprises a mobile magnetic assembly including a ferromagnetic shaft and two ring-shaped permanent magnets having the same radial magnetic polarization and fixed on the shaft. It also comprises a stationary magnetic assembly consisting of two ferromagnetic cores shaped to create magnetic air gaps with the magnets, and two coils separated by a ferromagnetic ring and arranged within the space defined by the two ferromagnetic cores. When the same electric current or different currents flow through the two coils, the elastic force and stiffness of the electromagnetic spring are varied.

RO.46.	
Title EN	**Multifunctional Electromagnetic Actuator with Magnetic Spring**
Authors	R. Olaru, G. Muraviev, C. Petrescu
Institution	**Technical University Gheorghe Asachi Iași**
Patent no.	A/00329 – 25.07.2025 OSIM Patent request
Description EN	The invention relates to an electromagnetic device of the actuator type with magnetic spring, which can operate mainly as an electromagnetic spring actuator, a linear displacement actuator, and/or a vibration actuator, the

operating mode depending on the connection of two coils and the characteristics of the applied control current, such as magnitude, direction, and waveform.
The multifunctional electromagnetic actuator with magnetic spring, according to the invention, comprises a stationary magnetic assembly including a housing with a cylindrical sleeve and two end caps, all made of ferromagnetic material, and two coils mounted in the cylindrical sleeve within spaces formed by an annular portion of the housing.
The actuator further comprises a mobile magnetic assembly consisting of a ferromagnetic shaft and a permanent magnet with radial polarization fixed at the center of the shaft. The shaft passes through openings in the end caps, allowing the transmission of external mechanical forces or the delivery of controllable elastic forces to the exterior when an electric current is applied to the coils.

RO.47.

Title EN	**A Filter-Bank CSP–Shrinkage-LDA Motor-Imagery Brain–Computer Interface for Real-Time Wheelchair Control**
Authors	**[1]Alexandru Buzamat (PhD), [1]Adelina Bonceag, [1]Daniela Dolhascu, [2]Ana Maria Roșca, [1]Daniel Mihai Pantazi, [1]Alexandru Mitocaru, [1]Danuț Constantin Irimia, [1]Marian Silviu Poboroniuc**
Institution	**[1]GHEORGHE ASACHI Technical University of Iasi, Faculty of Electrical Engineering, [2]Free International University of Moldova, Chișinău**
Description EN	EEG-based brain-computer interfaces (BCIs) for wheelchair control must balance low latency with high safety. This study implements a two-stage decoding architecture using **Filter-Bank Common Spatial Patterns (FBCSP)** and **shrinkage Linear Discriminant Analysis (sLDA)** to translate motor imagery (MI) into commands. By utilizing a four-state finite-state machine, the system prevents dangerous misclassifications during motion, achieving a cross-validation accuracy of **78.11% ± 1.73%**..

RO.48.	
Title EN	**TERRASEN: Autonomous UAV–AR–AI Geospatial Intelligence Platform for Real-Time Earthworks Diagnostics, Volumetric Control and Structural Risk Prediction in Active Construction Sites**
Authors	**George-Călin Baltariu, Florin-Alexandru Luca, Adrian-Alexandru Șerbănoiu**
Institution	**Gheorghe Asachi Technical University of Iași Transilvania University of Brașov**
Description EN	Active construction earthworks — comprising excavations,embankments, compaction zones, and subgrade preparation phases — remain among the most hazardous and data-deficient stages of any civil engineering project.Conventional monitoring relies on periodic topographic surveys, manual density testing, and visual inspection,generating discontinuous, low-frequency data that systematically fails to detect slope instabilities, volumetric deviations, and compaction anomalies before they escalate into structural failures or costly rework. TERRASEN (Terrestrial and Aerial Real-time Environmental Sensing and Earthworks Network) addresses these challenges through an autonomous geospatial intelligence platform deploying hexacopter UAVs equipped with multi-sensor payloads integrating high-resolution RGB cameras,LiDAR scanners, radiometric thermal imaging, and optional ground-penetrating radar modules, all geo-referenced through Real-Time Kinematic GPS at sub-centimeter accuracy. A dual-layer AI architecture combines onboard edge inference for real-time compaction anomaly classification and slope irregularity detection within 800 milliseconds, with a cloud-based pipeline performing full semantic segmentation of LiDAR point clouds, volumetric differencing against BIM/IFC design models, and geotechnical risk score generation. The augmented reality interface overlays live risk zone demarcations, volumetric deviation heatmaps, and predictive slope stability alerts directly onto the engineer's field of view, enabling real-time intervention during active earthmoving operations. TERRASEN further introduces an Universal Earthworks Data Schema (UEDS), standardizing all inspection outputs for native interoperability with GIS databases and automated compliant reporting, setting a new benchmark for safe, scalable, and intelligent construction site monitoring.

RO.49.	
Title EN	**AEGIS: Automated Energy and building services Geospatial Intelligence System**
Authors	**George-Călin Baltariu, Florin-Alexandru Luca, Teodor-Andrei Baltariu**
Institution	Gheorghe Asachi Technical University of Iași Transilvania University of Brașov
Patent no.	-
Description EN	AEGIS is an integrated multi-domain geospatial and artificial intelligence platform designed to revolutionize the commissioning, verification, and continuous performance monitoring of building services systems in passive and active houses. The transition to nearly Zero-Energy Buildings and Passivhaus-certified construction, mandated across the European Union by the recast Energy Performance of Buildings Directive, demands unprecedented precision in the installation and verification of HVAC with heat recovery ventilation, electrical and photovoltaic installations, sanitary and heating networks, building automation and control systems, and smart home integration layers — domains that conventional commissioning approaches address in isolation, through periodic manual testing campaigns that systematically fail to detect thermal bridging deficiencies,hydraulic imbalances, ventilation inefficiencies, and electrical harmonic anomalies before they compromise certification outcomes. AEGIS deploys distributed IoT sensor networks capturing thermal, acoustic, air quality, pressure differential, flow rate, and electrical parameters at high temporal resolution across all MEP zones, fusing these streams into a continuously updated Building Services Digital Twin anchored to a georeferenced three-dimensional semantic model. Mobile augmented reality inspection modules overlay live diagnostic data onto the BIM model for field engineers,while onboard AI architecture combining LSTM and transformer-based models perform cross-domain fault classification, Indoor Environmental Quality, and real-time energy performance modeling, delivering predictive fault alerts before system failure manifestation. AEGIS further introduces a Building Services Compliance Schema, a standardized semantic output framework enabling automated generation of digital handover documentation directly from live sensor data, eliminating manual compliance documentation and setting a new benchmark for intelligent,

continuous, and certifiably accurate passive house commissioning verification.

RO.50.	
Title EN	**Prosthetic System for Detecting and Compensating Human Lower Leg Length Discrepancy**
Authors	Dimitrie-Cristian FODOR, Neculai-Eugen SEGHEDIN, Vasile-Ion MANTA, Otilia ZVORIȘTEANU, Dragoș-Florin CHITARIU, Ștefan-Daniel ACHIREI
Institution	**Gheorghe Asachi** Technical University of Iasi
Patent	**Patent application no. a 00055 - 16.02.2024**
Description EN	The invention describes the use of a computer vision-based method that uses image processing to restore the symmetry of the body of a prosthetic patient. The method involves positioning the anatomical mannequin in front of a wall, ensuring that a series of markers strategically placed on the wall and on the mannequin are visible. An Internet Protocol (IP) camera was mounted on a tripod in front of the mannequin and detected the markers on the wall and those placed on the lower limbs. The captured images were then transmitted to a computing unit via a Wi-Fi connection. The algorithm for detecting and compensating for leg length discrepancy (LLD) then involved simulating the LLD at different values, using a mobile application, and managing the lengthening or shortening of the length of a transtibial prosthesis. Marker detection took place using the HUE – Hue, Saturation, Value method, followed by the application of a binary mask for marker visualization, morphological marker dilation operations and LLD detection by comparing the initial and final position of the landmarks and, finally, the activation of the prosthesis which led to the restoration of the symmetry of the prosthetic mannequin's body.

RO.51.	
Title EN	**A zinc–zirconium–strontium-based phosphating solution and a method for using it to treat titanium alloys**
Authors	Diana-Petronela Burduhos-Nergis, Andrei-Victor Sandu, Petrica Vizureanu, Dumitru-Doru Burduhos-Nergis, Anca Cazac, Nicanor Cimpoesu, Costica Bejinariu
Institution	„Gheorghe Asachi” Technical University of Iasi
Description EN	The invention relates to a solution and a process for phosphating titanium alloys, in particular Ti6Al4V, using a zinc–zirconium–strontium (Zn–Zr–Sr) composition, designed to produce phosphate conversion coatings with improved electrochemical and functional properties. The

phosphating solution contains zinc, zirconium, and strontium ions in an acidic phosphating medium, under controlled pH and temperature conditions, promoting the formation of an adherent and uniform layer on the substrate surface. The process involves the preliminary preparation of the titanium alloy surface through degreasing and activation, followed by immersion in the phosphating solution for an optimized duration. During the treatment, a conversion coating with a microcrystalline structure forms, characterized by good adhesion and a homogeneous distribution of the elements Zn, Zr, and Sr. The presence of zirconium contributes to increased compactness and stability of the layer, while zinc and strontium influence the electrochemical properties and bioactive potential of the surface. The resulting layers exhibit improved corrosion resistance in simulated physiological environments and can promote interaction with biological tissue. The invention provides an effective and reproducible solution for modifying the surface of titanium alloys, with applications in the biomedical field, particularly for implants, where high electrochemical stability and biocompatibility are required.

RO.52.	
Title EN	**Process for phosphating titanium alloys using a zinc-magnesium-calcium-based solution**
Authors	Diana-Petronela Burduhos-Nergis, Andrei-Victor Sandu, Costica Bejinariu, Maria-Adriana Acasandrei, Elena-Luiza Epure, Nicanor Cimpoesu, Bogdan Istrate, Nicoleta-Monica Lohan
Institution	„Gheorghe Asachi" Technical University of Iasi
Project	A/00550
Description EN	The invention relates to a process for phosphating titanium alloys using Zn-Mg-Ca-based phosphating solutions, in order to obtain thin, porous layers capable of promoting osseointegration and biocompatibility of implants made of titanium alloys, by increasing corrosion resistance and achieving a morphology that favors cell adhesion. This involves depositing a Zn-Mg-Ca-based phosphate layer through a phosphating process that includes grinding, degreasing, pickling, and surface activation steps. The phosphating solution contains zinc, magnesium carbonate, calcium nitrate tetrahydrate, as well as corrosion accelerators

and inhibitors. Furthermore, the parameters of the phosphating process were established with the aim of obtaining a uniform coating capable of improving the properties of the titanium alloy, thereby reducing the risk of implant failure. In practice, the invention offers the following advantages: it is easily applied by immersion at low cost; it allows for the formation of coatings with high adhesion to the substrate; the formed layers exhibit long-term stability; it improves osseointegration due to increased corrosion and wear resistance of the substrate, as well as due to morphological characteristics favorable to cell adhesion.

RO.53.	
Title EN	**Advanced Titanium Alloys with Tailored Properties for Next-Generation Medical applications**
Authors	Madalina Simona BALTATU, Petrica VIZUREANU, Dumitru-Doru BURDUHOS-NERGIS, Andrei Victor SANDU
Institution	Gheorghe Asachi Technical University of Iasi.
Description EN	The innovation integrates advanced alloy design with tailored thermomechanical processing and surface engineering strategies to optimize phase stability, microstructural refinement, and surface reactivity. The resulting alloys exhibit enhanced superelastic behavior, improved fatigue resistance, reduced stress shielding effects, and superior electrochemical stability in simulated physiological environments. Furthermore, the incorporation of antibacterial and osteogenic functionalities promotes improved osseointegration while reducing the risk of implant-associated infections. The developed titanium alloys are suitable for a broad range of biomedical applications, including orthopedic implants, dental systems, spinal fixation devices, cardiovascular components, and personalized additively manufactured implants. The innovation also supports compatibility with advanced manufacturing technologies such as selective laser melting and surface biofunctionalization processes, enabling patient-specific implant architectures and multifunctional medical devices. By combining optimized mechanical performance, enhanced biological response, and long-term durability, this innovative titanium alloy platform represents a significant advancement

toward safer, lighter, and more adaptive biomaterials for next-generation regenerative and implantable medical technologies.

RO.54.	
Title EN	**Innovative Zeolite-Enhanced Geopolymer Systems for Marine Pollution Remediation and Seawater Decontamination**
Authors	Dumitru Doru BURDUHOS NERGIS, Petrica VIZUREANU, Madalina Simona BALTATU, Andrei Victor SANDU
Institution	Faculty of Materials Science and Engineering, "Gheorghe Asachi" Technical University of Iasi, Prof. D. Mangeron Street, No. 41, 700050, Iasi, Romania. National Institute for Research and Development in Environmental Protection, 294 Splaiul Independenței, 6th District, 060031, Bucharest, Romania.
Description EN	The innovation focuses on the development of metakaolin-based geopolymer systems modified with zeolite aggregates to enhance structural connectivity, active surface area, and ion-exchange capability. Comparative investigations between conventional geopolymer matrices and zeolite-reinforced systems demonstrate significant microstructural improvements, including increased open porosity, more homogeneous phase distribution, and the formation of interconnected adsorption pathways favorable for contaminant capture. Morphological and chemical analyses confirm that the incorporation of zeolite aggregates substantially improves the adsorption and retention capacity for pollutants commonly encountered in marine environments. The hybrid geopolymer–zeolite structures exhibit enhanced functionality for the immobilization of toxic ions, organic contaminants, and petroleum-related compounds, while maintaining excellent physicochemical stability in saline conditions. The proposed innovative material platform provides an environmentally friendly and low-energy solution for seawater purification, coastal remediation, and emergency environmental response scenarios. Owing to their adaptability, durability, and sustainable synthesis route, the developed geopolymer composites represent promising candidates for next-generation remediation technologies

targeting marine ecosystems affected by industrial contamination and conflict-related pollution.

RO.55.	
Title EN	**AgriWater True Cost Accounting or Cost Benefit Analysis Simulator**
Authors	Nicoleta Mihaela Căsăneanu(Dascălu), Larisa Ivașcu, Marius Pîslaru, Alin Artene, Aura Domil
Institution	**Gheorghe Asachi Technical University of Iaşi, Politehnica University Timisoara**
Description EN	AgriWater cost benefit analysis simulator is a digital decision support tool designed to evaluate circular economy infrastructure projects by combining traditional CBA with TCA. The innovation allows users to assess not only direct financial costs and benefits but also hidden environmental, social, human, natural, produced and financial impacts that are usually ignored in standard project appraisal. The simulator enables scenario analysis, long-term forecasting and transparent comparison between conventional CBA results and broader TCA based results. Users can input project assumptions, adjust discount rates and cost categories, calculate indicators such as NPV, BCR, IRR, and payback period and visualize annual and cumulative results through dashboards and tables The innovation can be applied in wastewater treatment projects, circular infrastructure planning, industrial symbiosis systems, municipal sustainability strategies, grant evaluation, environmental project justification and ESG decision support. It can be useful to public authorities, consultants, investors, and researchers who need to demonstrate the broader value of circular economy investments, including avoided pollution, resource recovery and social environmental benefits.

RO.56.	
Title EN	**NEURO-COGNITIVE DISSONANCE IN DIGITAL ENVIRONMENTS** **A BCI APPROACH TO MEDIA MANIPULATION**
Authors	Ana Maria ROȘCA, Daniel Mihai PANTAZI, Marian-Silviu POBORONIUC
Institution	**Faculty of Electrical Engineering/ GHEORGHE ASACHI Technical University of Iaşi**

Description EN	Traditional sociological methods often fail to capture the precise moment when individuals stop critically processing information and begin reacting purely emotionally due to digital stimuli. Whether neurophysiological data can objectively supplement subjective evaluations in the context of media manipulation remains a key challenge in understanding modern digital alienation. Within this research, we used Brain-Computer Interface (BCI) systems to monitor the objective relationship between environmental stimuli and involuntary cognitive states. A very interesting result shows that BCI technology demonstrated 89% fidelity in identifying stress, compared to 45% accuracy in traditional tests. Exposure to fake news generated sudden Beta Power Spikes (20-30 Hz) and a latency in Frontal Alpha Asymmetry (FAA), consistent with cognitive blockage and the physiological evidence of emotional withdrawal.

RO.57.	
Title EN	**QUANTIFYING CONFORMITY THROUGH BCI ARCHITECTURES**
Authors	Ana Maria ROȘCA, Daniel Mihai PANTAZI, Marian-Silviu POBORONIUC
Institution	**Faculty of Electrical Engineering/ GHEORGHE ASACHI Technical University of Iași**
Description EN	Methodological platforms using BCI allow for the connection between the neurobiological level of cognitive processes and the dynamics of social behavior, yet the objective mapping of social conformity remains a challenge. Whether the presence of groups can be highlighted in the form of measurable neurological indices across real or online environments is a key question in modern social research. Within this research, we used EEG hyperscanning (Unicorn Hybrid Black, 8-channel montage) to integrate neural activity into a virtual replication of the Asch paradigm. A very interesting result shows a critical ratio between the Conformity Resistance Index (CRI = 1.19) and Moral Conflict (Theta power = 5.61), with the desynchronization of the mu rhythm (8–13 Hz) reflecting the mirror neuron system activity. These findings demonstrate that group pressure becomes a measurable mathematical signal,

validating the 33% conformity rate through objective neurophysiological indicators.

RO.58.	
Title EN	**VIOLENCE IN PUBLIC AND ONLINE ENVIRONMENTS: AN INNOVATIVE REPLICATION OF THE MILGRAM EXPERIMENT USING BCI TECHNOLOGIES**
Authors	Ana Maria ROȘCA, Daniel Mihai PANTAZI, Marian-Silviu POBORONIUC
Institution	**Faculty of Electrical Engineering/ GHEORGHE ASACHI Technical University of Iaşi**
Description EN	Research Project: Understanding why individuals submit to authority despite their personal beliefs remains a fundamental challenge, as traditional observational methods cannot explain the internal mechanisms of obedience. While ethical barriers often limit the study of extreme behaviors, the use of immersive technology provides a new path for investigating social compliance without causing real-world trauma. This research utilizes a hybrid framework combining Nexus 10 MKII (4-channel montage) and a custom Ursina/Python virtual environment to map the neurophysiological profile of obedience. Significant findings reveal a dominant Frontal Alpha Asymmetry (0.85) and an elevated Frontal Midline Theta (5.61), signaling the exact moment cognitive engagement overrides moral hesitation. Furthermore, high Parietal Alpha power indicates a state of cortical inhibition and sensory detachment, allowing for the objective measurement of empathy erosion. These results demonstrate that social obedience can be transformed into a quantifiable mathematical variable, enabling real-time adaptive safety triggers in digital environments.

RO.59.	
Title EN	**Design and Evaluation of an Eye-Tracking Control System for Electric Wheelchairs for Users with Severe Motor Impairments**
Authors	Marian-Adrian Filip, Marian-Silviu Poboroniuc
Institution	**Faculty of Electrical Engineering/ GHEORGHE ASACHI Technical University of Iaşi**

Description EN	Gaze tracking can be used to control the travel direction of an electric wheelchair, to help people who suffer from paralysis regain environmental mobility. By using a classic screen or augmented reality glasses for visual feedback, additional functionalities can be added. Thanks to advancement in technology and increased computing power for single-board computers, gaze tracking systems can become more reliable, more energy efficient, deliver more functionalities than before and achieve increased autonomy for portable, battery-operated devices.

RO.60.	
Title EN	**STEM project: Brain Synchrony in Live Dance - A Wireless EEG Hyperscanning Study**
Authors	Marian-Silviu Poboroniuc, Alexandru Buzamat, Dănuţ-Constantin Irimia, Stefanescu Mirela, Sandra Elizabeth Mavhima
Institution	**Faculty of Electrical Engineering/ GHEORGHE ASACHI Technical University of Iaşi**
Description EN	Research Project: „STEM. Dance and Neuroscience" (Grant no.420/29.04.2025) EEG hyperscanning studies show inter-brain coupling in musical ensembles and coordinated movement, but the neural dynamics of performer–audience interactions in live dance remain largely unknown. Whether synchronization is meaningful across the asymmetric roles of performers and observers is also unresolved. Within the STEM project we used EEG hyperscanning to simultaneously record neural activity from a team dancers and audience members. A very interesting result shows that aaudience members exhibited remarkably high Inter-Subject Correlation (ISC = 0.98÷0.999) and Phase Locking Value (PLV) = 0.92÷0.97, with bilateral posterior dominance in delta and gamma bands, consistent with collective visual-emotional processing.

RO.61.	
Title EN	**THE EARTHCORE SHELTER**
Authors	Neculai Oana, Cojbirna Maria, Dascalu Lia-Valentina, Martin Stefania, Spumă Dumitrița-Diana
Institution	**Technical University "Gheorghe Asachi" of Iasi**
Description EN	The concept consists in an emergency underground shelter organized around a central core, with peripheral radial modules

connected by short galleries. The structure combines stabilized earth prefabricates with an integrated metal framework, forming a segmented dome optimized for compression, lateral loads, and external pressure. It rests on a mixed stone–earth foundation that ensures structural stability, drainage, and thermal mass.
The system is partially buried and vegetated for insulation and camouflage. Perimeter vertical shafts enable rainwater collection, storage, and natural ventilation via stack effect, while light tubes provide passive daylighting.
A greenhouse is placed in the middle of the common space, benefiting from overhead light, serving both for food production and air purification.
Water is filtered for consumption and reused through phytoremediation for irrigation. Waste is managed via composting, biothermal recovery, and a sealed multilevel containment system for hazardous materials, supported by negative pressure airflow and advanced filtration.
The shelter integrates passive cooling (underground refrigeration), renewable thermal energy (biomass), and secure communications (fiber optics), functioning as a self-sufficient, resilient habitat designed for long-term operation in extreme condition, in case of artificial disasters, such as war or extreme climate changes.

RO.62.

Title EN **THE GLASS ABYSS**

Authors Neculai Oana, Caleniuc Andreea, Mascan Elisa, Morari Emil, Trofin Denisa- Anamaria

Institution **Technical University "Gheorghe Asachi" of Iasi**

Description EN

"The Glass Abyss" is an innovative subterranean museum featuring a continuous peripheral glass envelope for in-situ geological observation.
The structure is supported by a central metallic core housing a spiral staircase, ensuring stability through the core and the top slab's perimeter bearing, eliminating the need for corner columns.
The excavated surfaces are reinforced with soil-nailing and geogrids, to permit an almost vertical angle. A key feature is the "buffer chamber" (ventilated air gap) between glass and soil, which integrates a geo-composite drainage system to manage groundwater and prevent erosion. This ensures the soil layers to remain dry and visible.
The chamber also includes a high-CRI LED system for raking light to emphasize soil textures. The base level serves as a

protected, landscaped recreational zone integrated into the central structural axis.

RO.63.	
Title EN	**ALL LIGHTS MUSEUM**
Authors	Neculai Oana, Avram David, Gvinda Anda-Lidia, Obreja Tania, Semendeaev Ana-Maria
Institution	**Technical University "Gheorghe Asachi" of Iasi**
Description EN	All Light Museum is conceived as an architectural and sensory exploration of light in its physical, perceptual, and emotional forms. The concept explores light in all its forms: from aquariums featuring deep-sea bioluminescent creatures, to phosphorescent paintings and sculptures, to a sky-light exhibition in a planetarium and an astronomical observatory. The building is designed as a compact monolithic volume (Ground Floor + 5 Floors, approximately 24m high), with an opaque exterior that conceals an extremely dynamic and luminous interior. This contrast symbolizes the transition from the unknown to revelation. The volume takes the form of a simple parallelepiped, wrapped in a secondary skin made of recycled metal rods. This outer layer acts as a filter of light and perception. During the day, it generates complex shadow patterns and depth on the façade, while at night the building transforms into a diffuse, glowing volume. At the center of the building lies a vertical cylindrical core, which represents the spatial, functional, and symbolic nucleus. Inside this cylinder, a technical column integrated with living vegetation introduces movement and a sensory dimension. At the top level, the cylinder expands into a funnel equipped with directional mirrors that capture zenithal light and distribute it deep into the building. The entrance is marked by a recessed opening in the volume, where the outer metal skin opens, creating a threshold between the urban environment and the immersive interior experience.

RO.64.	
Title EN	**THE ROLLING HUB: A MOBILE YOUTH CENTER FOR EVERYONE**
Authors	Neculai Oana, Costantin Maria, Gliga Ioana, Moloci Roxana-Margareta, Rotaru Denisa Anamaria
Institution	**Technical University "Gheorghe Asachi" of Iasi**
Description	The Mobile Youth Center is an innovative project that

EN	transforms an industrial tank trailer into a modern space for youth activities. Its purpose is to offer a flexible and fast solution for communities that do not have a permanent youth center. This mobile center brings education and social activities to smaller secluded communities, in smaller towns or rural areas. It provides teenagers a space to connect, interact with each-other and learn new things, being the perfect place for reading, playing board games, and doing meaningful activities. The Center has a dynamic structure, containing a retractable roof that can be raised to create more space and bring in natural light. In addition, one side of the trailer rotates sideways, becoming an outdoor terrace. The center includes an accessibility ramp for people with disabilities, so everyone can enjoy the space. The innovation of this project lies in its ability to transform a rigid industrial object, such as a tank trailer, into a dynamic architectural space that adapts to the needs of young people by raising the roof and extending the metal terrace. Beyond these technical solutions, the true value of the concept comes from its social impact, offering a "mobile center" for young people in isolated communities. This Mobile Youth Center is not just a converted vehicle, but a support hub that brings education and socialization directly to young people, regardless of geographical barriers.

RO.65.	
Title EN	**THE ECO-BUS STOP**
Authors	Neculai Oana, Anastasiei Sofia, Craiu Beatrice, Gheorghiu Cosmin, Mirt Andreea-Silvia
Institution	**Technical University "Gheorghe Asachi" of Iasi**
Description EN	The concept represents one way to modernize existing bus-stations, making them more sustainable and pleasant. This enhanced urban bus station is organized on two levels: on the ground floor, there is a curved bench where passengers can rest and wait for public transport, and above the main waiting area, there is a first floor, organized as a terrace with a seating area and a small integrated automatized café, accessible via a side staircase. All these facilities are meant to offer passengers a more pleasant way to spend their waiting time. On the ground floor, various facilities are integrated, such as an electric scooter charging area, interactive eco-bikes (which allow users to generate electrical energy in exchange for a free bus ticket), digital information panels, an urban library, and discussion boards designed to bring people together and

stimulate creativity and interaction.
With glass walls and a green roof, the station allows for the collection and filtration of rainwater, transforming it into potable water for passengers.
The structure is composed of multiple relaxation spaces, with a bench extending along its entire length to provide a more comfortable waiting experience, while two alcoves also create areas for conversation. At ceiling level, it is decorated with small lights that create a pleasant and calming atmosphere, evoking the impression of a starry sky.

RO.66.

Title EN **Sustainable inorganic materials with increased durability**

Authors Mihaela Caftanachi[1], Mihai Vrabie[1], Gabriela Apostolescu[1], Ofelia Corbu[2], Maria Harja[2]*

Institution **[1]Gheorghe Asachi Technical University of Iasi, [2]Technical University of Cluj-Napoca**

Description EN Economic and industrial development has increased waste generation. Portland cement significantly impacts the environment through high CO_2 emissions and natural resource consumption, creating the need for sustainable alternatives with a lower carbon footprint. One such alternative is inorganic alkali-activated materials. In this study, different aluminosilicate precursors were used to develop formulations and evaluate their durability under aggressive chemical environments (acids, hydroxides, and sulphates) and freeze–thaw conditions. Material performance was assessed through immersion tests, surface analysis, and mass loss measurements. The results showed that the precursor type strongly influences the reaction gel and, consequently, the chemical resistance of the materials. Due to the formation of compact and chemically stable structures, the samples exhibited high durability. In NaOH solutions, mass losses remained below 2%, while formulations containing furnace slag showed enhanced resistance in acidic environments, with maximum losses of 4%. Freeze–thaw tests indicated less than 5% reduction in compressive strength after 100 cycles. This study highlights the relationship between precursor composition, gel formation, and chemical resistance, supporting the development of durable materials with reduced environmental impact.

RO.67.	
Title EN	**Exploratory Pilot Study For Measuring Information System Success In Organizational Sustainability Management**
Authors	Ștefana-Cătălina POHONȚU-DRAGOMIR, Andrei MIHAI, Petrina-Delia VAGIUC, Larisa-Victoria IVAȘCU, Marius PISLARU, Adrian VILCU, Cătălin Dumitrel BALAN, Ionuţ-Viorel HERGHILIGIU, Bogdan Ioan ROBU
Institution	Gheorghe Asachi Technical University of Iași, Romania Alexandru Ioan Cuza University of Iasi
Description EN	Organizations are increasingly prioritizing sustainability, turning to information systems (IS) to support planning, monitoring, and informed decision-making. However, despite their widespread use, there is still limited understanding of how to effectively evaluate the success of these systems in the specific context of sustainability management. This study addresses that gap by examining how IS success can be defined and measured to better support sustainable organizational performance. Existing research offers established models for assessing IS success, alongside a growing body of work on sustainability management systems. Yet, these areas have largely evolved separately, resulting in a lack of integrated approaches that connect system performance with sustainability goals. To overcome this limitation, the study employs a mixed-methods approach. It begins with a systematic literature review to identify key IS success factors and relevant sustainability indicators. Based on these insights, an integrated conceptual framework is developed and empirically validated through a survey of professionals working in sustainability and information systems. The findings highlight that traditional IS success factors—such as system quality, information quality, and user satisfaction — remain essential. However, they must be expanded to include sustainability-specific dimensions, including support for environmental and social decision-making, data transparency, and stakeholder engagement. Overall, the study demonstrates that well-designed and effectively implemented information systems are critical enablers for aligning sustainability strategies with day-to-day operations, offering both practical and theoretical contributions

RO.68.	
Title EN	**Nanostructured Hybrid System Based on Hydroxyapatite and Polymers for Dental Applications**
Authors	Ana Rebeca PINTILII, Anca Mihaela MOCANU, Margareta Gabriela CIOBANU
Institution	Gheorghe Asachi Technical University of Iași, Romania
Description EN	The present study aims to develop and characterize a hybrid nanocomposite hydrogel intended for local dental applications, based on hydroxyapatite, Carbopol and various active principles. Hydroxyapatite provides bioactivity and serves as a carrier for the release of the active principles, compounds that stimulate cell proliferation and tissue healing. These hybrid materials function as controlled-release systems, preventing the sudden release of active ingredients and ensuring sustained release over an extended period, which is essential for regenerative processes.

RO.69.	
Title EN	**Advanced Porosity Evaluation in Zeolite-Modified Cementitious Systems Using NMR and X-Ray CT**
Authors	Sergiu-Mihai ALEXA-STRATULAT[1], Mihai-Marius RUSU[2], Ana-Maria TOMA[1], Ioan ARDELEAN[2], Georgiana BUNEA[1], Ionut-Ovidiu TOMA[1]
Institution	[1] **"Gheorghe Asachi" Technical University of Iasi** [2] **Technical University of Cluj-Napoca**
Description EN	The rapid global expansion of urban infrastructure demands sustainable alternatives to Ordinary Portland Cement (OPC). Utilizing natural supplementary cementitious materials (SCMs), such as micronized zeolites, offers a promising pathway to decarbonize concrete while enhancing its mechanical and durability properties. Given the intrinsic microporosity of zeolites, characterizing their impact on the evolving microstructural architecture of cementitious composites is critical. This study investigates the pore structure evolution in cement pastes incorporating 10%, 20%, and 30% natural zeolite by mass. To achieve a comprehensive multiscale evaluation, the pore network was quantified using Nuclear Magnetic Resonance (NMR) relaxometry at 1, 7, and 28 days of curing, complemented by X-Ray Computed Tomography (CT) and Scanning Electron

Microscopy (SEM). Results demonstrate an initial refinement of the pore network, with zeolite-modified pastes exhibiting finer porosity during the first 7 days. By 28 days, the formation of secondary hydration products enables the 10% zeolite matrix to achieve a consolidated pore structure comparable to the OPC reference. Conversely, the 30% substitution level induces pore coarsening, quantitatively evidenced by elevated NMR transverse relaxation times. This integrated non-destructive approach elucidates the complex microstructural dynamics of zeolite incorporation, providing critical insights for optimizing high-performance, sustainable cementitious systems.

Lucian Blaga University of Sibiu

RO.70.	
Title EN	Mechanical device for the controlled extraction of bearings embedded in the motor housing
Authors	Aurel Mihail TITU, Daniel BALC, Emanuel BALC, Stefan TITU
Institution	Lucian Blaga University of Sibiu
Patent no.	Patent application in progress
Description EN	The invention refers to a mechanical assembly designed as a compact extraction device intended for removing bearings embedded in motor housings. The assembly is configured to operate in such a way as to allow the extraction of the bearing without damaging the housing or any adjacent components.The device is engineered to apply controlled, evenly distributed forces that act directly on the outer ring of the bearing, ensuring secure fixation of the bearing within the extractor. The mechanical movements and actions applied are precise, progressive, and repeatable, providing a constant force necessary for extracting the bearing from its seat, even in situations where tolerances are very tight or corrosion is present. The forces generated by the assembly are calibrated to prevent deformation of the engine housing and to eliminate the need for additional impacts or heating. Its use significantly reduces the risk of material cracking as well as the time required for maintenance operations. The primary purpose of this invention is to facilitate efficient engine maintenance by enabling the safe extraction of bearings with minimal operator effort and high precision, regardless of the housing profile or the degree of bearing wear.The device ensures a uniform distribution of forces on the bearing and allows controlled, repeatable, and progressive movements, eliminating the need for mechanical shocks or component heating. Through this approach, the risk of cracking, deformation, or damage to the motor housing is significantly reduced. Operationally, the time required to extract the bearing decreases considerably, and the compact design provides superior maneuverability, enabling use even in housings with complex geometry or limited space, while requiring minimal effort from the operator.

RO.71.	
Title EN	Smart sensor for glass detection
Authors	Emanuel BALC, Aurel Mihail TITU, Daniel BALC, Stefan TITU
Institution	Lucian Blaga University of Sibiu
Patent no.	Patent application in progress
Description EN	The invention relates to an autonomous sensory device, configured as a compact module, designed for identifying materials based on the physical properties specific to glass. The device is intended to determine, in real time, whether the analyzed material is glass, without requiring direct contact or invasive procedures. The sensory assembly uses a measurement principle based on ultrasound, measuring the response time of the sound reflected from the piece under analysis, in order to differentiate glass from plastic, composite, or metallic materials. The system is designed to operate autonomously, performing discrete measurements depending on the application. Its operation is stable, repeatable, and calibrated so that it is not influenced by moderate variations in temperature or lighting. The compact form allows integration of the sensor into industrial lines, portable devices, or automatic sorting systems.The purpose of this invention is to enable fast and reliable detection of glass materials in industrial, recycling, automated inspection, or safety applications. The use of this sensor reduces material classification errors, optimizes processing workflows, and improves the reliability of systems that require accurate identification of glass.

RO.72.	
Title EN	Adaptive track system with variable configuration for different types of terrain
Authors	Daniel BALC, Aurel Mihail TITU, Emanuel BALC, Stefan TITU
Institution	Lucian Blaga University of Sibiu
Patent no.	Patent application in progress
Description EN	The invention relates to an adaptive track assembly designed for autonomous or user-operated ground vehicles, intended to enable efficient movement across terrains with varying properties. The device is engineered to adjust in real time the

configuration, stiffness, and shape of the track's contact elements, thereby optimizing traction, stability, and energy consumption regardless of the surface type. The track assembly consists of a series of interconnected flexible modules equipped with internal mechanisms that control the tension and position of each segment. These mechanisms can be electrically actuated, allowing for modifications to ground pressure distribution, adjustments to the contour of the exterior shape, and adaptation to obstacles, uneven surfaces, or slippery terrain. Sensors integrated into the track structure continuously monitor grip, vibrations, and local deformations, transmitting data to the central processor. The control unit processes this information and coordinates the necessary adjustments so that the track maintains optimal ground contact, minimizes traction loss, and ensures smooth movement. The system enables the vehicle to efficiently adapt to sand, gravel, mud, snow, hard surfaces, or rough terrain without manual intervention and without changing any physical components. The adaptive track assembly offers the major advantage of superior mobility on terrains with variable properties, thanks to its ability to adjust its stiffness, shape, and ground pressure distribution in real time. By using interconnected flexible modules and internally electric-actuated mechanisms, the track continuously maintains optimal contact with the running surface, reducing traction losses and improving vehicle stability even in challenging conditions such as sand, mud, or snow.

RO.73.	
Title EN	Robotic device for safety transport until school
Authors	Daniel BALC, Aurel Mihail TITU, Emanuel BALC, Stefan TITU
Institution	Lucian Blaga University of Sibiu
Patent no.	Patent application in progress
Description EN	The invention relates to an autonomous robot designed specifically for school environments, conceived as a compact mobile module that fully replaces the traditional backpack. The robot is engineered to safely transport textbooks, notebooks, sports equipment, and other personal items

belonging to the student, moving automatically in close proximity to them without requiring physical effort or manual operation. The device uses a set of optical sensors, ultrasound, lidar, and 3D cameras to identify and track the student, maintaining a safe and optimal distance during movement. Internal processing algorithms calculate safe routes, avoid obstacles, and ensure stable trajectories in crowded environments such as during recess or class transitions. For social safety, the robot includes an AI based anti bullying system capable of detecting potentially aggressive situations such as hostile following, abnormal proximity, raised voices, or threatening gestures. In such cases, the robot can alert the student, send a notification to teachers, or record the incident anonymously in accordance with school policies.The storage compartment is stabilized with internal damping systems that protect the student's belongings from shocks, vibrations, or rough handling. The robot carries the full weight of textbooks and equipment, eliminating strain on the student’s back and preventing posture problems associated with carrying heavy loads. The internal AI can detect tense situations, aggressive behaviors, or unauthorized proximity, offering students an additional level of protection and enabling quick intervention from school staff.

RO.74.	
Title EN	Transport Stress Index–Based Smart Monitoring Tag for Adaptive Incoming Inspection
Authors	COVACI Claudiu, TITU Aurel Mihail
Institution	Lucian Blaga University of Sibiu
Patent no.	Scientific Research Project
Description EN	The invention refers to a compact smart monitoring system designed to record and evaluate transport and handling conditions of goods at container level, with the purpose of supporting adaptive incoming inspection in automotive manufacturing environments. The system is implemented as a reusable electronic module attached externally to standard logistics containers, such as KLTs, enabling continuous monitoring without interfering with the transported components or packaging integrity. The proposed device integrates multiple sensing capabilities, including motion and

shock detection through an inertial measurement unit, as well as environmental monitoring of temperature and humidity. These parameters are continuously recorded throughout the transport and storage phases, capturing both peak values and cumulative exposure over time. The data is stored locally and can be retrieved at goods receipt through wireless communication, ensuring rapid access to transport condition history without requiring complex infrastructure. A key element of the invention is the introduction of a Transport Stress Index (TSI), defined as a composite metric that quantifies the overall exposure of the transported goods to potentially harmful conditions. The index is calculated using a rule-based model that combines peak shock events, frequency of mechanical impacts, and cumulative duration of temperature and humidity excursions beyond predefined critical-to-quality limits. The TSI enables a structured and objective evaluation of transport-induced risks, transforming raw sensor data into actionable information.

Based on the calculated TSI, the system supports a dynamic decision-making process for incoming inspection. Instead of relying solely on static sampling plans or historical supplier performance, the inspection strategy is adapted in real time according to the actual transport conditions experienced by each container. Depending on the index value, the system recommends standard inspection, extended inspection with increased sampling, or quarantine and containment actions in case of critical exposure.

RO.75.	
Title EN	SINGLE CYLINDER MODULAR ENGINE
Authors	BARSAN ADRIAN, COSTEIU DARIUS ALEXANDRU / Coordinator Professor Aurel Mihail TITU
Institution	Lucian Blaga University of Sibiu
Patent no.	Scientific Research Project
Description EN	This modular engine invention introduces a highly adaptable system where power output is customized by assembling individual single-cylinder units. Whether you need a small motor for a generator or a high-performance engine for an automobile, you can simply add or remove modules to reach the desired cylinder count. The technical core of the design includes. Air-cooled carburetor-fed modules for simplified

maintenance. Chain-driven camshafts and integrated oil pumps in each unit. Conical spline crankshafts featuring a multi-tooth design. Self-centering couplings that eliminate radial play when bolted together. The true value of this concept lies in its extreme versatility and emergency utility. Because each module can function independently, a car engine could be disassembled and its parts repurposed to power a water pump, cultivator, or motorcycle in a crisis. This plug-and-play nature makes it an ideal teaching aid and a flexible solution for DIY projects, ATVs, and racing. Furthermore, the engine offers a level of reliability traditional engines lack. If a single cylinder suffers a mechanical failure, it can be removed from the assembly entirely. The remaining modules can then be reconfigured at the appropriate timing angles to keep the vehicle or machine operational, albeit at a slightly lower power level. This ensures that a single point of failure does not leave the user stranded. Ultimately, this invention provides a universal mechanical platform that scales according to the specific needs of the user, ensuring that one engine system can serve a lifetime of diverse applications.

RO.76.	
Title EN	Adaptive Robotic Gripper with Silicone Contact Surfaces
Authors	Constantin Roberto DOARA, Petru Daniel CIORAN, Alexandru George MAMULARU / Coordinator Professor Aurel Mihail TITU
Institution	Lucian Blaga University of Sibiu
Patent no.	Scientific Research Project
Description EN	The designed robotic arm is an advanced mechanical system engineered for precision handling and adaptability, featuring three slim, articulated arms that end in specialized silicone gripping heads. Each gripping head is designed with a slightly rectangular shape and fine, step-like micro-textures on one side, enhancing friction and improving control during object manipulation. The silicone material, available in blue or black, provides a soft yet secure contact surface, allowing the system to handle delicate, irregular, or sensitive objects without causing damage. The arm is powered by high-precision servo motors or electric actuators, enabling smooth, controlled, and repeatable movements. Its lightweight yet durable structure supports efficient operation

in various environments, from industrial settings to research laboratories. The three-point gripping configuration ensures balanced force distribution, increasing stability and reducing the risk of slippage. Additionally, the modular design allows for easy customization, maintenance, and integration into automated systems, making this robotic arm a versatile and reliable solution for modern applications. The advantages include high versatility due to the three silicone gripping heads that can handle fragile or irregular objects. A secure grip is ensured by silicone without applying excessive force, protecting sensitive surfaces, and pressure distribution across three contact points improves the stability of the handled object. The system is energy efficient and can be programmed for repetitive or complex tasks. Moreover, the risk of product damage is significantly reduced compared to traditional rigid grippers. The design also allows easy maintenance and quick replacement of worn components. The field of applications of the robotic arm spans the food industry, where it can handle delicate products such as fruits, pastries, or fragile packaging.

RO.77.	
Title EN	Intelligent Mechanical-Hydraulic Adaptive Suspension System
Authors	Constantin Roberto DOARA, Petru Daniel CIORAN, Alexandru George MAMULARU / Coordinator Professor Aurel Mihail TITU
Institution	Lucian Blaga University of Sibiu
Patent no.	Scientific Research Project
Description EN	This product is an adaptive suspension system designed to automatically adjust its stiffness and damping depending on road conditions, while avoiding complex electronics. Instead of using sensors and control units, the system relies mainly on mechanical and hydraulic components to react naturally to vibrations. The suspension uses a hydraulic shock absorber with multiple chambers filled with oil and pressurized gas. Inside the damper, a specially designed mechanical valve controls the flow of hydraulic fluid. The key element is an inertial mechanism (a small moving mass combined with a spring) that reacts to the intensity of vibrations. When the vehicle travels on relatively smooth roads, the valve stays more open, allowing the oil to flow

	easily and making the suspension softer for better comfort. When the suspension experiences strong impacts, such as large bumps or rough terrain, the inertial mass moves and partially restricts the fluid flow. This increases the damping force, making the suspension temporarily stiffer and improving stability. A major advantage of this system is that it adapts in real time without needing electronics, which keeps the design simpler, cheaper, and more reliable. Because of this, the suspension could be useful for low-cost cars, ATVs, bicycles, electric scooters, or agricultural vehicles where durability and affordability are important.

RO.78.	
Title EN	Enhancing machining processes using black phosphorus nanoparticles
Authors	BUSILA Dumitru, CISMAS Roberto, ENACHE Alisia, FIRTONEA Iuliana / Coordinator Professor Aurel Mihail TITU
Institution	Lucian Blaga University of Sibiu
Patent no.	Scientific Research Project
Description EN	The enhancement consists of a cutting fluid composition comprising a base fluid and black phosphorus nanocapsules dispersed therein which can be used in machining processes. black phosphorus is a two-dimensional single crystal layered material being an allotrope of phosphorus whose structure consists of atomic chains stacked together through weak van der Waals forces making exfoliation feasibile. The main properties of black phosphorus are mechanical flexibility, good surface adherence, rolling effect, tribofilm formation, mending effect, polishing effect and heat transfer capacity, dissipating high temperatures in the less active areas of the process.

RO.79.	
Title EN	Medical rod for fracture stabilization and monitoring using ultrasound
Authors	BUSILA Dumitru, CISMAS Roberto, ENACHE Alisia, FIRTONEA Iuliana / Coordinator Professor Aurel Mihail TITU
Institution	Lucian Blaga University of Sibiu
Patent no.	Scientific Research Project

Description EN	The invention consists of a rod incorporated with sensors and ultrasonic transducers integrated at both ends of the implant. The system enables the transmission and reception of ultrasonic waves through the bone in order to supervise the fracture consolidation process. The operating principle is based on integrating an ultrasound generator at one of the rod and an ultrasound receiver at the other end. The generator produces ultrasonic signals that passes through the fractured bone and the implant material. The receiver detects these signals and measures the time of flight of ultrasound waves between transmitter and receiver.

RO.80.	
Title EN	Mobile Intelligent System For Rapid Redesign And Manufacturing Of Industrial Mechanical Components
Authors	Andrada Maria IANC , Tudor Andrei SUMULENCIU, Marius Ioan MURESAN, Robert Adrian CIUCIU, Paul Gheorghe ISTRATE / Coordinator Professor Aurel Mihail TITU
Institution	Lucian Blaga University of Sibiu
Patent no.	Scientific Research Project
Description EN	The invention consists of a mobile intelligent system designed for the rapid redesign and on-site manufacturing of critical mechanical components used in industrial production systems. Its purpose is to reduce production downtime caused by sudden failures of essential parts such as gears, bushings, shafts, or structural connectors.Unlike conventional maintenance methods that rely on external suppliers and long delivery times, the system enables immediate digital reconstruction and fabrication of replacement components directly at the industrial site. The system includes a compact mobile manufacturing unit equipped with high-resolution 3D scanning technology, AI-assisted design software, and a modular fabrication module capable of producing metallic parts through additive manufacturing or powder metallurgy processes. When a component fails, the damaged part is scanned to capture its geometry and structural characteristics. The data is then processed by an intelligent design module that reconstructs the digital model, corrects wear or deformation, and optimizes the geometry based on operational stresses and

material properties. The manufacturing module produces high-precision replacement components using controlled metal powder deposition and sintering technologies. The system automatically selects suitable materials according to mechanical loads, thermal conditions, friction, and fatigue requirements. An integrated quality-verification subsystem checks The process begins with precise scanning of the damaged part, followed by AI-based analysis that reconstructs and, when necessary, optimizes the digital model, which is then directly manufactured on site using high-precision metal powder technologies to produce fully functional replacement components.

RO.81.	
Title EN	Smart Torque Wrench with Automated AI-Based Tightening System
Authors	Marius Ioan MUREȘAN, Robert Adrian CIUCIU, Tudor Andrei SUMULENCIU, Paul Gheorghe ISTRATE, Andrada Maria IANC / Coordinator Professor Aurel Mihail TITU
Institution	Lucian Blaga University of Sibiu
Patent no.	Scientific Research Project
Description EN	The invention consists of a high-precision manual torque wrench integrated with an AI-assisted control system designed to eliminate human error in mechanical assemblies. Unlike standard tools, this smart system allows the operator to perform the tightening manually while the device acts as an intelligent supervisor. The device utilizes an advanced energy-efficient microcontroller architecture to ensure long-term operational autonomy in demanding industrial environments, featuring a dual-layer protection circuit for electronic stability. The main fields of application include: the automotive industry, critical for assembling safety-sensitive components such as braking systems, engine cylinder heads, and suspension links where precise torque is vital for passenger safety; aerospace maintenance, ensuring structural integrity in aircraft components where over-tightening can lead to catastrophic fatigue cracks and failure under pressure; industrial assembly lines, used as a semi-automated solution in environments requiring human dexterity and zero-defect quality standards for mass production; high-end electronics and carbon composites, particularly suited for fragile materials such as carbon fiber

	or aluminum alloys that can be easily damaged by manual error; infrastructure and energy, for the maintenance of wind turbines, telecommunication towers, and solar panel arrays where reliability and portability are essential; medical equipment assembly, facilitating the precise calibration of robotic surgical arms and diagnostic hardware where mechanical tolerances are measured in microns; and maritime engineering, ideal for ship engine maintenance in high-vibration environments where fasteners must be secured against specific resonant frequencies to prevent loosening..
RO.82.	
Title EN	HEARTBEAT MONITORING DEVICE
Authors	ISTRATE Paul-Gheorghe, MUREȘAN Marius – Ioan, CIUCIU Robert – Adrian, SUMULENCIU Tudor-Andrei, IANC Andrada-Maria / Coordinator Professor Aurel Mihail TITU
Institution	Lucian Blaga University of Sibiu
Patent no.	Scientific Research Project
Description EN	The Heartbeat Monitoring Device is an advanced non-invasive cardiac monitoring system, integrated directly into the steering wheel of the vehicle. It uses state-of-the-art sensors to detect heartbeat, heart rate and through complex algorithms, can estimate blood pressure variations and the risk of major cardiovascular events, such as myocardial infarction, in real time while driving. The system was designed to increase road safety by early detection of severe heart problems while driving. The main goal is to prevent accidents caused by the driver's sudden incapacity for medical reasons by providing early warning and actively intervening in critical situations. It also offers drivers a discreet way to monitor their heart health during their daily commute.
RO.83.	
Title EN	Development of a hybrid 3D dynamic scanning system for gait and posture analysis
Authors	CIUCIU Robert Adrian, MURESAN Marius Ioan, ISTRATE Paul Gheorghe, SUMULENCIU Tudor Andrei, IANC Andrada Maria / Coordinator Professor Aurel Mihail TITU
Institution	Lucian Blaga University of Sibiu

Patent no.	Scientific Research Project
Description EN	The Hybrid 3D Dynamic Scanning System represents a sophisticated biomechanical diagnostic platform designed to capture a “4D Digital Twin” by merging a high-precision motorized treadmill with a continuously rotating annular gantry. Unlike traditional static imaging modalities like CT or MRI that require patients to remain motionless, this system is explicitly designed to capture volumetric surface geometry and kinematic behavior during functional movement. It utilizes a multimodal sensor fusion of LIDAR for sub-millimeter geometric accuracy and high-speed stereophotogrammetry for rich surface textures and RGB color mapping. By employing an annular scan geometry, the device achieves continuous 360-degree topographical mapping, which effectively eliminates the optical shadows and occlusions that typically plague fixed-camera setups where swinging limbs often obscure key anatomical markers.The core acquisition mechanism relies on phase-shifted fringe projection, a technique analogous to those described in patent CN112571426A, where mathematically precise sinusoidal patterns are projected onto the subject. These distorted patterns are captured by high-speed cameras and translated into dense The data processing pipeline also rigorously compensates for Soft Tissue Artifacts (STA)—the deformation of skin and fascia over bone—by applying rigid joint motion constraints to calculate the most mathematically probable trajectory of the underlying skeletal structure.The primary advantage of this hybrid system is its ability to provide objective precision, replacing the subjective human error and poor repeatability associated with manual marker placement or “eyeballing” joint angles. Because the platform is non-invasive and markerless, it captures the patient’s natural and uninhibited gait, ensuring that the resulting data is a true reflection of real-world biomechanics.

RO.84.	
Title EN	Electromagnetic Sensor for Detecting Rim Ovalization
Authors	SUMULENCIU Tudor-Andrei, / Coordonator Professor TITU Aurel Mihail
Institution	Lucian Blaga University of Sibiu
Patent no.	Scientific Research Project
Description	The invention relates to the field of vehicle running system

EN	diagnostics and proposes a device capable of detecting rim ovalization or deformation by analyzing variations in an electromagnetic field. The system uses an electromagnetic sensor mounted near the rim, which generates a stable electromagnetic field. During wheel rotation, the metal rim interacts with this field. If the rim has a correct circular shape, the distance between the sensor and the rim surface remains constant, and the electromagnetic signal shows minimal variations. If the rim is deformed, the distance from the sensor varies periodically, producing detectable changes in the electromagnetic signal. These variations are analyzed by an electronic processing unit that identifies deviations from reference values. To avoid false alarms caused by potholes or road irregularities, the algorithm analyzes the periodicity of the deviations. Real rim deformations generate repetitive signals with each wheel rotation, while vibrations caused by road surfaces occur randomly and are filtered out. The system also includes a customizable calibration function that allows new reference values to be recorded when different rims are installed. The sensor operates automatically during driving, offering continuous supervision without driver intervention. Its adaptive calibration enables compatibility with various rim types, while easy integration with vehicle electronics allows data transmission to onboard systems or mobile applications. Additionally, the system detects early wheel imbalance, improving driving comfort by reducing vibrations and noise, and supports predictive maintenance by enabling timely interventions..

RO.85.	
Title EN	Advanced Mechanical Deployable Ladder Structure
Authors	Sebastian Mihai GIURGIU, Bianca Cassiana GRADINARU / Coordinator Professor Aurel Mihail TITU
Institution	Lucian Blaga University of Sibiu
Patent no.	Scientific Research Project
Description EN	The Automatic Extendable Ladder System is an innovative mechanical structure designed to provide a compact, portable, and efficient solution for reaching elevated areas. The system is based on a scissor-like (pantograph)

mechanism that allows the ladder to expand and retract smoothly while maintaining stability and strength. When in its compact form, the ladder occupies minimal space, making it easy to transport and store. Upon activation, a mechanical actuation system such as a manual crank, spring-assisted mechanism, or motor enables the structure to extend vertically or at an inclined angle. The design ensures synchronized movement of all segments, resulting in a uniform and controlled deployment. The ladder is constructed from lightweight yet durable materials such as aluminum or reinforced steel, ensuring both portability and load-bearing capacity. Safety features may include locking joints, anti-slip steps, and stabilizing supports to prevent accidental collapse during use. Additionally, it combines ease of transportation and compact storage with a lightweight construction that maintains strong load-bearing capacity.

RO.86.	
Title EN	Dynamic Omni-Terrain Morphing System with Programmable Structural Rigidity
Authors	Darius GORDITA, Catalin GUMAZESCU / Coordinator Professor Aurel Mihail TITU
Institution	Lucian Blaga University of Sibiu
Patent no.	Scientific Research Project
Description EN	The Omni-Terrain Morphing Wheel represents a paradigm shift in mechanical engineering by integrating a non-pneumatic auxetic lattice with a central iris-driven actuation system, allowing the wheel to physically alter its diameter and tread geometry in response to varying topographic conditions. This mechanism replaces traditional air-filled tires with a tensegrity-based internal framework and magnetorheological damping, enabling the wheel to transition seamlessly from a rigid, low-friction circular profile for high-speed pavement travel to a compliant, high-traction lugged configuration for navigating extreme obstacles. By achieving programmable structural rigidity through real-time feedback loops, this innovation eliminates the risk of mechanical failure due to punctures while providing an unprecedented level of energy efficiency and adaptive stability for autonomous exploration and heavy-duty industrial vehicles. The Omni-Terrain Morphing Wheel

offers instant adaptability to any terrain. It adjusts its shape in real time. It eliminates the risk of punctures completely. This ensures zero-failure reliability in harsh conditions. This innovation can be successfully implemented in space exploration because planetary rovers must navigate unknown terrains with sharp rocks, where a puncture would be fatal to the mission.In the field of emergency services, search and rescue robots can use these wheels to cross debris or climb stairs in collapsed buildings where standard vehicles would get stuck.

RO.87.	
Title EN	Milling Tool Holder with Integrated Mechanical Wear Indicator
Authors	GRADINARU Bianca Cassiana, Catalin GRUMAZESCU / Coordinator Professor Aurel Mihail TITU
Institution	Lucian Blaga University of Sibiu
Patent no.	Scientific Research Project
Description EN	The invention consists of a mechanical diagnostic system designed for industrial CNC machining, created with the purpose of reducing the negative economic effects and the technical risks associated with cutting tool wear during prolonged automated processes. Based on its facilities, the system allows the real-time monitoring of tool degradation, eliminating the uncertainty of manual inspections and preventing current damage to both the workpiece and the machine spindle due to tool failure or excessive axial stress. The diagnostic system consists, as shown in the technical assembly, of an ergonomic housing unit integrated into the tool holder with a layout for clear observation, additionally equipped with an internal signaling sub-assembly featuring a tri-stage color-coded cylinder (Green, Yellow, Red) that serves as the visual interface; a mechanical transmission assembly with a specialized lever designed to translate the axial pressure exerted by the tool into vertical movement; a high-precision compression spring calibrated to provide resistance and ensure the automatic return of the indicator to its resting position; a protection system including an industrial-grade sealing O-ring created to shield the internal mechanism from coolants and metallic debris; a secure fixation assembly composed of a locking washer to maintain the structural integrity of the components during high-speed rotation.

RO.88.	
Title EN	MOBILE STRETCHER WITH AUTOMATIC MECHANICAL BRAKING SYSTEM FOR INCLINED SURFACES
Authors	Catalin GRUMAZESCU, Bianca Cassiana GRADINARU / Coordinator Professor Aurel Mihail TITU
Institution	Lucian Blaga University of Sibiu
Patent no.	Scientific Research Project
Description EN	The invention consists of a medical stretcher equipped with an integrated mechanical system designed for automatic braking, created with the purpose of reducing the negative health effects and the stressful effects of uncontrolled acceleration during transport on ramps. Based on its facilities, the system allows at certain times the automatic interruption of gravitational movement when a critical inclination is detected, by controlled interposing of certain short time sequences in which the motion is subjected to braking effects. According to the invention, the stretcher consists as of an ergonomic assembly 1 with a layout for transporting a person seated or lying down, which is additionally equipped with a sub-assembly 3 for independent gravitational detection. The system features an assembly 4 with folding levers to engage the braking action on the wheels 5, a control panel for operating the working sequences, and an electronic module 5 created around a micro-controller to create the automatic and programmable working sequences of the braking phase. Furthermore, the assembly includes a safety sub-assembly 2 with belts to stabilize the torso of the human body 7, ensuring that the patient remains securely partially suspended or fixed during the active phase of action. This is the active and intended phase of action which uses gravitational force to ensure the safety of the human body 7 by preventing the stretcher from sliding or accelerating on the ramp 6. After the period allocated for the stabilization and safe passage of the incline, the braking assembly is brought back to the resting position by electric or mechanical command, as in figure 1, being lifted or released to allow the human body to be transported in a normal in a normal position under its lower back as in any standard movement on flat surfaces.

RO.89.	
Title EN	INTELLIGENT MODULAR PAVEMENT, USED FOR GENERATING ELECTRICAL ENERGY AND PURIFYING AIR
Authors	Costeiu Darius Alexandru, Barsan Adrian / Coordinator Professor Aurel Mihail TITU
Institution	Lucian Blaga University of Sibiu
Patent no.	Scientific Research Project
Description EN	This project presents an intelligent and modular pavement system capable of generating electrical energy from urban environments. The tiles convert mechanical energy into electrical energy using integrated piezoelectric elements. When a person steps on them, the surface slightly deforms and produces electricity. At the same time, embedded solar panels capture sunlight and convert it into electrical energy. Both sources are collected and transmitted to a central storage unit. Each module measures 400x400 mm and has a height of 60 mm. The structure includes a durable, anti-slip top layer for safety, a layer of solar panels, an intermediate layer with piezoelectric elements, and a layer with materials that contribute to air purification. The base layer ensures structural strength and module connection. The modules connect through a magnetic system using protected neodymium magnets, allowing precise alignment. Copper electrical contacts enable energy transfer between tiles toward the central storage system. Installation is fast, while maintenance and replacement are simple. Key advantages include the use of existing urban surfaces for energy production, dual energy sources, easy installation, and contribution to reducing air pollution. The system is suitable for pedestrian areas, university campuses, parks, public transport stations, and commercial spaces.

RO.90.	
Title EN	**Advanced Analysis of Energy Recovery from HVAC Airflows Using Helical Turbine Systems: A Technical and Aerodynamic Evaluation**
Authors	Mihai-Victor ZERBES, Liliana Georgeta POPESCU, Elena-Andreea BUCĂ, Ada-Rahela BARAC, Alexandru OLTEANU, Sorin SOARE, Laura Maria FUMUREANU
Institution	**Lucian Blaga University of Sibiu /National Research And**

	Development Institute For Cryogenic And Isotopic Technologies (ICSI), Râmnicu Vâlcea/The Creation and Invention Club within Student Culture Center of Sibiu
Patent no.	In preparation
Description EN	This study explores the potential of recovering energy from exhaust airflows generated by HVAC (Heating, Ventilation, and Air Conditioning) systems through the integration of small-scale helical wind turbines. Unlike natural wind, HVAC exhaust airflow represents a controlled and predictable energy source, offering favorable conditions for micro-generation. The research focuses on vertical or horizontal axis wind turbines (VAWT), particularly helical and Archimedean spiral designs, due to their superior performance at low and variable airflow velocities. The analysis highlights key aerodynamic challenges, such as backpressure and efficiency loss within HVAC systems, and proposes solutions including flow augmentation devices like diffusers and guide vanes. Computational Fluid Dynamics (CFD) simulations and experimental studies demonstrate that optimized configurations can significantly improve energy recovery without compromising system performance. The paper concludes that integrating such systems can contribute to energy efficiency in buildings, especially when combined with advanced power management and storage technologies.

RO.91.	
Title EN	**Waste-to-Hydrogen: Modular Hybrid System for Converting End-of-Life Tyres into Green Hydrogen**
Authors	Claudiu ISARIE, Mihai-Victor ZERBES, Mihaela ROTARU, Liliana Georgeta POPESCU, Marinela INȚĂ, Alexandru OLTEANU, Sorin SOARE, Laura Maria FUMUREANU
Institution	**Lucian Blaga University of Sibiu /National Research And Development Institute For Cryogenic And Isotopic Technologies (ICSI), Râmnicu Vâlcea/The Creation and Invention Club within Student Culture Center of Sibiu**
Patent no.	In preparation
Description EN	The invention proposes a modular hybrid system for converting end-of-life tyres (ELTs) into high-purity green hydrogen through an integrated thermochemical and catalytic process. It addresses both the global challenge of tyre waste management and the increasing demand for clean

energy, supporting circular economy principles.

The process starts with thermochemical conversion in an oxygen-free environment via pyrolysis and gasification, producing synthesis gas (syngas) composed mainly of hydrogen, carbon monoxide, carbon dioxide and light hydrocarbons, along with liquid and solid by-products. The syngas is further upgraded through catalytic reforming, including the water-gas shift reaction, to enhance hydrogen yield, using transition metal-based catalysts for improved efficiency and stability.

Hydrogen is then separated and purified using advanced methods such as pressure swing adsorption (PSA), selective membranes or cryogenic technologies, achieving purities above 99.9% for industrial and energy use. Secondary products, including recovered carbon black and liquid hydrocarbons, are valorized, increasing overall sustainability.

The system features a modular and scalable design, suitable for laboratory, pilot and industrial applications, and integrates digital monitoring for real-time process optimization. Compared to conventional methods, it reduces environmental impact and carbon emissions while generating a valuable clean energy resource.

Stefan cel Mare University of Suceava

RO.92.	
Title EN	**SYSTEM FOR SLEEP QUALITY ENHANCEMENT**
Authors	**Valentin POPA, Ciprian BEJENAR, Laurențiu-Dan MILICI, Mihai DIMIAN, Constantin UNGUREANU, Mihaela PAVĂL**
Institution	„Ștefan cel Mare” University of Suceava
Patent no.	Patent No. EP 4 520 229 B1
Description EN	System for sleep quality enhancement assumes a unitary body composed of an elastic rectangular structure of thermo-sensitive elements that react to the local temperature variation, depending on which it adapts the shape of the rest mattresses between the layers of which it is embedded, that it modifies according to the shape of each user's body and returns to its original shape after each use, so that it represents an appropriate solution for the role it fulfills.

RO.93.	
Title EN	**SYSTEM FOR AIRING AND VENTILATION**
Authors	**Marian BEJENAR, Ciprian BEJENAR, Oana-Vasilica GROSU, Visarion-Cătălin IFRIM, Mihaela PAVĂL, Laurențiu-Dan MILICI, Eugen IAVORSCHI, Daniel-Sebastian SOLOVĂSTRU**
Institution	„Ștefan cel Mare” University of Suceava
Patent no.	Patent Application No. RO A 2025 00006
Description EN	System for airing and ventilation features a disc/propeller with flaps/blades made partly of an intelligent material of metallic nature, with the property of two-way shape memory, with variable geometry, automatically depending on the temperature of the blocked or circulated air flow, while the constructive shape of the disc/propeller ensures the modification of the incidence angles or the stabilization of the angular momentum.

RO.94.	
Title EN	**THERMOSTATIC VALVE**
Authors	**Ciprian BEJENAR, Marian BEJENAR, Vasile-Eusebiu TOADER, Laurențiu-Dan MILICI, Eugen IAVORSCHI, Vlad-Mihai CREȚU**
Institution	„Ștefan cel Mare” University of Suceava
Patent no.	Patent Application No. RO A 2026 00062
Description EN	Thermostatic valve involves a seamless construction with hydrophobic surfaces, along with a cavity of proper shape, in which there is a mechanism with a single moving part for controlling the flow of liquids or gases, driven both due to the contact with these fluids and/or through power supplying of certain electrical inductors, which ensures a bidirectional transition to one of the two memorized forms of the special actuator, used for the thermos-mechanical unlocking or locking of the flow through the circulation channel.

RO.95.	
Title EN	**AUTOMATIC CONTROL SYSTEM OF FLUID FLUX**
Authors	**Vasile-Eusebiu TOADER, Laurențiu-Dan MILICI, Ciprian BEJENAR, Eugen IAVORSCHI, Mihaela PAVĂL**
Institution	„Ștefan cel Mare” University of Suceava
Patent no.	Patent Application No. RO A 2026 00217
Description EN	Automatic control system of fluid flux assumes an integrated solution within the ventilation grilles frame, that enables the automatic and gradual control of the fluid flux through the shutter flaps with which it is equipped, using temperature-dependent actuation mechanisms, that determine the angular position of each flap, to assure heating or force cooling of the assemblies it can equip.

„Grigore T. Popa” University of Medicine and Pharmacy Iasi, Romania

RO.96.	
Title EN	**Medical Device For Ankle Joint Rehabilitation**
Authors	Ciornei Claudiu-Ilie, Cozma Teodor-Cristian, Ungureanu Davide, Andrițoi Doru-Ionuț
Institution	**Grigore T. Popa University of Medicine and Pharmacy Iasi, Romania, Faculty of Medical Bioengineering**
Patent no.	
Description EN	Functional rehabilitation of the ankle joint is a common clinical need, addressing conditions such as fractures, ligament tears, postoperative reconstructions, as well as neurological disorders such as stroke with drop foot syndrom, spastic cerebral palsy, or peroneal nerve injuries. Traditional passive mobilization methods require the continuous presence of a physical therapist to manually perform joint movements, placing a heavy burden on staff and limiting the patient’s access to continuous or home-based therapy. Given the shortage of medical rehabilitation specialists, automating repetitive procedures has become a systemic necessity. This paper presents a medical device that automates passive ankle mobilizations, performing controlled physiological movements of the joint. The system integrates a DC motor and a stepper motor coupled to a mechanical subassembly, and therapeutic parameters can be customized via a dedicated app. The low cost and compact size allow for home use, eliminating geographical and economic barriers to access to rehabilitation. Preliminary results confirm the mechanical functionality of the prototype, with prospects for further clinical validation, integration of force and position sensors for real-time monitoring, and adaptation for telemedicine protocols.

RO.97.	
Title EN	**Possibilities of improving irreversible hydrocolloids by adding natural chemical compounds**
Authors	Bianca-Iulia Ciubotaru[1,2], Irina Grădinaru[3], Alexandra Bargan[2], Delia Turcov[1], Mădălina Paraschiv[1], Anca-Irina Galaction[1]
Institution	**[1]Grigore T. Popa University of Medicine and Pharmacy Iasi, Romania, Faculty of Medical Bioengineering** **[2]"Petru Poni" Institute of Macromolecular Chemistry, Iaşi, Romania, Department of Inorganic Polymers** **[3] Grigore T. Popa University of Medicine and Pharmacy Iasi, Romania, Faculty of Dental Medicine**
Patent no.	-
Description EN	Irreversible hydrocolloids (alginates) are among the most required impression materials. For this study were prepared and analyzed alginate impression materials, with and without a chemical natural compound, often used for medical applications - Allantoin, regarding their properties concerning the morphology of the surface, the swelling behavior in simulated salivary fluid and glutaraldehyde solution, 2%, often used in the sterilization steps for impression materials. The surface morphology of the impression materials was evaluated by microscopy which revealed homogenous materials before and after the addition of the natural chemical compound. The addition of Allantoin slightly improves the swelling degree parameter in all cases as the obtained data shows. These assessments provide important information regarding the accuracy of the clinical impression-recording phase, which has an impact on the success of prosthetic treatment.

RO.98.	
Title EN	**Researches regarding the enhancement of some biomaterials by the addition of silver nanoparticles doped with hydroxyapatite**
Authors	Irina Grădinaru[1], Bianca-Iulia Ciubotaru[2,3], Alexandra Bargan[3], Corina Cheptea[2], Cristian-Cătălin Gavăt[2],Delia Turcov[2], Mădălina Paraschiv[2], Anca-Irina Galaction[2]
Institution	**[1] Grigore T. Popa University of Medicine and Pharmacy Iasi, Romania, Faculty of Dental Medicine**

[2] **Grigore T. Popa University of Medicine and Pharmacy Iasi, Romania, Faculty of Medical Bioengineering**
[3] **"Petru Poni" Institute of Macromolecular Chemistry, Iaşi, Romania, Department of Inorganic Polymers**

Patent no. -

Description EN

Due to the favorable properties and biological effects in dentistry are widely used biomaterials based on calcium hydroxide for pulp capping and dentin wound treatment. Two types of dental capping materials have been used for this study: a light-curing radiopaque calcium hydroxide paste material (A) and a hard-setting calcium hydroxide cavity material (B), both prepared as reference samples. To these two materials, hydroxyapatite (HA) doped with silver nanoparticles has been added to obtain a combination of pulp capping materials, as this represents a promising material, leading to better patient outcomes and enhanced oral health, with the improvement of the functionality and effectiveness of those biomaterials.

It is important to preserve pulp vitality in deep cavities, as this is essential for the long-term maintaining of teeth in the dental arch. Researches regarding the enhancement of these biomaterials have been conducted for the pre-clinical assessment.

RO.99.

Title EN **Initial assessment of choline and silver nanoparticle-based dermatological formulations**

Authors Bianca-Iulia Ciubotaru[1,2], Mirela-Fernanda Zaltariov[2], Alina-Mirela Ipate[2], Delia Turcov[1], Mădălina Paraschiv[1], Corina Cheptea[1], Irina Grădinaru[3], Anca-Irina Galaction[1]

Institution
[1] **Grigore T. Popa University of Medicine and Pharmacy Iasi, Romania, Faculty of Medical Bioengineering**
[2] **"Petru Poni" Institute of Macromolecular Chemistry, Iaşi, Romania**
[3] **Grigore T. Popa University of Medicine and Pharmacy Iasi, Romania, Faculty of Dental Medicine**

Patent no. -

Description EN

From its barrier function to extremely intricate biochemical and photobiochemical processes, the skin has several functions. Skin care products do not represent basic cosmetics meant to improve the appearance of the skin. Complex combinations of active chemicals with poorly

established interactions are seen in many cosmetic compositions. These then have an impact on the skin's structure, function, or both. Cosmetics have comparatively few major adverse events and are generally highly safe, in contrast to medications. However, similar to medications, these active compounds can affect a wide range of skin processes, and in many situations, the consequences of these actions are not completely grasped. The effects of skin care products are driven by active substances that are administered through vehicles depending on specific technologies. Emulsifiers, surfactants, oils and butters, waxes, and hydrophilic solutions are only a few of the vehicles available in skin care.
By combining eutectic solvent-based components made from choline, urea, and glycerol with silver nanoparticles, this study aims to create novel cosmetic formulations in the form of creams and ointments. The obtained formulations' pH, stability over time, consistency, and homogeneity have been evaluated.

RO.100.

Title EN

Sensory Mats as Innovative Devices in the Neuromotor Rehabilitation of Children with Hydrocephalus in Tanzania

Authors

Iustina Condurache, Gabriela Dascălu, Cezar Mucileanu, Cătălin Ionițe, Luminița Confederat, Mariana Rotariu

Institution

Grigore T. Popa University of Medicine and Pharmacy Iasi, Romania, Faculty of Medical Bioengineering

Patent no.

Description EN

Introduction: Pediatric hydrocephalus is frequently associated with disturbances in muscle tone, postural control, and coordination, affecting neuromotor development and functional independence. In Tanzania, limited access to rehabilitation services necessitates the identification and use of accessible and effective therapeutic approaches.
Methods: The sensory mat is defined as a modular surface composed of diverse materials (varied textures, soft and rigid elements), designed to stimulate tactile and proprioceptive receptors. The therapeutic program includes exercises focused on support, mobility, balance maintenance, and postural re-education, performed on these surfaces and adapted to each child’s functional level. Intervention

outcomes were assessed using motor development indicators such as head and trunk control, coordination, and static and dynamic balance.

Results: The integration of sensory mats into the rehabilitation program led to significant improvements in muscle tone, postural control, and balance, while also enhancing active participation and overall functional performance.

Conclusions: Sensory mats represent an innovative, accessible, and sustainable therapeutic solution in resource-limited settings, contributing to improved neuromotor development and increased functional independence in children with hydrocephalus.

RO.101.

Title EN

Smart Rehab: adaptive system based on ESP32 and machine learning

Authors

Călin Corciovă, Cătălina Luca, Mădălina Simion, Cristiana Onița, Ilie Onu, Robert Fuior

Institution

Grigore T. Popa University of Medicine and Pharmacy Iasi, Romania, Faculty of Medical Bioengineering

Patent no.

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Description EN

The project proposes an advanced conceptual model of an intelligent rehabilitation system, based on the ESP32 hardware platform, which integrates wearable sensors, data processing, and analysis modules, as well as interactive interfaces, with the aim of supporting personalized recovery and continuous monitoring of patients. The system is based exclusively on the use of inertial sensors (IMU) and electromyographic (EMG) sensors, interconnected with the ESP32 microcontroller, for the real-time acquisition of relevant biomechanical and physiological parameters, such as movement amplitude, segmental coordination, and muscle activation level. The system architecture leverages the Wi-Fi and Bluetooth connectivity functionalities of the ESP32 platform, facilitating the transmission of data to a scalable digital infrastructure, within which they are subjected to advanced analysis processes, based on artificial intelligence algorithms and machine learning techniques. These processes allow for the objective assessment of patient progress, the identification of deviations from optimal

therapeutic trajectories and the automatic adaptation, in near real time, of rehabilitation protocols. At the same time, the implementation of local preprocessing mechanisms (edge computing) contributes to reducing latency, optimizing energy consumption, and increasing system robustness. Interactive interfaces, developed in the form of mobile applications and immersive environments based on virtual and augmented reality, ensure the provision of multimodal feedback (visual, auditory, and haptic), having a significant role in increasing patient motivation, involvement, and adherence to the therapeutic program. The system also allows remote monitoring by medical personnel, supporting the efficient implementation of telerehabilitation and expanding access to specialized services.

RO.102.

Title EN

Enhancing neonatal care through IoT based real-time vital signs monitoring

Authors

Robert Fuior, Cătălina Luca, Mădălina Simion, Cristiana Onița, Călin Corciovă

Institution

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Patent no.

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Description EN

Continuous monitoring of vital parameters in neonates is essential for the early identification of physiological abnormalities and the timely initiation of medical interventions, particularly in premature infants or those presenting underlying health conditions. In this context, advanced technological solutions are required to ensure accurate, dependable, and non-invasive monitoring in neonatal care environments. This paper presents the design and development of an integrated system for real-time monitoring of neonatal vital signs, based on Internet of Things (IoT) technologies. The proposed solution utilizes an ESP32 microcontroller to enable wireless data acquisition, processing, and transmission. The system incorporates multiple biomedical sensors, including an NTC thermistor for body temperature measurement, a photoplethysmography (PPG) sensor for monitoring heart rate and blood oxygen saturation (SpO_2), and an AD8232 module for electrocardiogram (ECG) signal acquisition. Physiological

data are processed locally and transmitted to a remote monitoring platform, allowing continuous supervision and real-time visualization by healthcare professionals. The system is designed to detect abnormal parameter values and trigger early warning mechanisms, thereby supporting rapid and informed clinical decision-making. Furthermore, the proposed design emphasizes ergonomic considerations and non-invasive sensor integration to ensure neonatal comfort and safety during prolonged monitoring periods. Through its scalable architecture and wireless capabilities, the system enhances accessibility to continuous monitoring, including in remote or resource-limited settings. Overall, this approach provides an efficient and reliable solution for improving neonatal care quality, facilitating early diagnosis, and supporting modern, data-driven healthcare practices.

RO.103.

Title EN

Redefining Solvent Functionality through Natural Oil Based Systems for Antibiotic Recovery

Authors

Mădălina Paraschiv, Delia Turcov, Bianca-Iulia Ciubotaru, Alexandra Cristina Blaga, Alexandra Tucaliuc, Dan Cașcaval, Anca-Irina Galaction

Institution

Grigore T. Popa University of Medicine and Pharmacy Iasi, Romania, Faculty of Medical Bioengineering

Patent no.

Description EN

The sustainability of antibiotic production is increasingly constrained not by synthesis, but by the environmental cost of downstream processing. Conventional extraction relies heavily on toxic, volatile solvents, raising critical concerns regarding safety, scalability, and ecological impact.

This study introduces a nature-inspired alternative, where natural vegetable oils function as green, bio-based media for the reactive extraction of 7-aminocephalosporanic acid (7-ACA), a key intermediate in β-lactam antibiotic synthesis. In combination with tri-n-octylamine, these renewable solvents enable the formation of selective ion-pair complexes, facilitating the recovery of amphoteric compounds directly from aqueous systems.

Despite inherent limitations associated with lower polarity and higher viscosity, natural oils such as grapeseed, sweet almond, and flaxseed demonstrate notable extraction performance, achieving efficiencies of up to 63.4%. Beyond

quantitative results, the findings highlight the decisive role of solvent physicochemical properties in governing mass transfer, interfacial interactions, and extraction equilibria.
This approach advances the concept of solvent functionality, positioning natural oils not merely as passive diluents, but as active contributors to separation mechanisms. By integrating green chemistry principles with process engineering, the study outlines a scalable pathway toward safer and more sustainable biotechnological operations, redefining solvent selection in the context of next-generation bioprocesses.

RO.104.

Title EN

Engineering Hydrodynamic Regimes for Smarter Fermentation through Advanced Mixing Design

Authors

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Patent no.

Description EN

The performance of fermentation processes is fundamentally governed by hydrodynamic conditions, yet the complexity of real biological systems often limits the applicability of conventional design approaches. A key challenge lies in accurately predicting mixing behavior in heterogeneous media, where simplified model fluids fail to fully reproduce the dynamics of real fermentation broths.
This study addresses this gap by comparatively evaluating hydrodynamic regimes in simulated and real systems, using Newtonian fluids, non-Newtonian carboxymethylcellulose solutions, and Saccharomyces cerevisiae suspensions. Experiments were conducted in a mechanically stirred bioreactor, employing two distinct impeller geometries (perforated paddle and anchor) across a wide range of rotational speeds (50–300 rpm).
The results demonstrate that mixing efficiency is strongly influenced by the interplay between fluid rheology, impeller design, and operating conditions. While CMC-based systems partially reproduce viscosity-related effects, they fail to capture the complexity of multiphase biological suspensions, leading to discrepancies in hydrodynamic behavior. Notably, impeller performance was shown to be medium-dependent, with the anchor design outperforming in heterogeneous

systems due to improved bulk circulation and particle mobilization.

By revealing the limitations of conventional model systems and highlighting the need for adaptive mixing strategies, this work provides a framework for more accurate design and optimization of fermentation processes, contributing to enhanced efficiency, scalability, and process control in biotechnological applications.

RO.105.	
Title EN	**Study on the Influence of Hydrogen Peroxide on the Caustic Effect of Trichloracetic Acid (TCA) Used in Dermatology**
Authors	Delia Turcov, Ecaterina Șuba, Delia-Mihaela Nuță, Mădălina Paraschiv, Anca Zbranca-Toporaș, Bianca-Iulia Ciubotaru, Anca-Irina Galaction
Institution	**Grigore T.Popa University of Medicine and Pharmacy, Iași, Romania, Faculty of Medical Bioengineering**
Patent no.	-
Description EN	Trichloroacetic acid (TCA) is a highly versatile agent in clinical dermatology; however, its application at high concentrations (over 30%) is often limited by aggressive protein denaturation and the resultant "frosting" effect. This study presents a novel approach to optimize dermal stimulation using a high-performance medical device formulation that ensures maximum efficacy with minimal epidermal damage. The methodology involved engineering a biphasic system combining 35% TCA with low-concentration hydrogen peroxide (H_2O_2) and precise pH modulation. To validate this non-caustic concept, an in vitro simulation was performed on an ex vivo tissue model. Results demonstrate that the synergistic presence of H_2O_2 and controlled pH levels significantly reduce the depth of structural damage, completely eliminating the visible caustic frosting effect. By modulating the acid's aggressiveness, this biphasic formula preserves the integrity of the skin's outer layer while promoting deep tissue regeneration. This advancement provides a scientific foundation for a well-tolerated, high-concentration TCA solution, transforming a traditionally caustic procedure into a controlled, non-aggressive medical intervention for superior dermatological outcomes.

RO.106.	
Title EN	**Stability Studies of Vitamin C (L-Ascorbic Acid) Associated with Kojic Acid in Depigmenting Products**
Authors	Delia Turcov, Delia-Mihaela Nuță, Ecaterina Șuba, Mădălina Paraschiv, Anca Zbranca-Toporaș, Bianca-Iulia Ciubotaru, Anca-Irina Galaction
Institution	**Grigore T. Popa University of Medicine and Pharmacy Iasi, Romania, Faculty of Medical Bioengineering**
Patent no.	
Description EN	Vitamin C remains a gold standard of dermato-cosmetic ingredients, due to its triple action as a potent antioxidant, a crucial promoter of collagen synthess and a facilitator of skin immunity. However, its therapeutic application is hindered by significant challenges, including rapid oxidative degradation, hydrolytic instability and potential skin sensitivity. This study addresses these limitations by developing and characterizing an anhydrous suspension featuring vitamin C and kojic acid, optimized for antioxidant and depigmenting synergy. To eliminate the aqueous environment responsible for hydrolytic degradation, the methodology utilized a lipophilic base of squalane and beeswax. The anhydrous concept was validated via conductivity testing, confirming the system's non-polar nature and the total absence of water. Physicochemical stability was evaluated under real-use conditions, demonstrating superior performance compared to single-active control formulations. The results confirm a balanced, stable delivery system that meets modern dermato-cosmetic requirements. This formulation ensures the integrity of volatile actives while providing optimal sensory attributes, such as rapid absorption and the absence of greasy residues, offering a high-precision solution for managing oxidative stress and hyperpigmentation.

RO.107.	
Title EN	**Sustainable Bioprospecting: Harnessing Kalanchoe blossfeldiana and Floral Bio-residues for Advanced Dermato-Cosmetic Therapy**
Authors	Iulia-Daniela Baştea, Denisa Bartic, Delia Turcov, Mădălina Paraschiv, Anca Zbranca-Toporaș, Bianca-Iulia Ciubotaru, Marin Zagnat, Anca-Irina Galaction
Institution	**Grigore T. Popa University of Medicine and Pharmacy Iasi, Romania, Faculty of Medical Bioengineering**

Patent no.

Description EN

Despite its widespread availability, Kalanchoe blossfeldiana remains an underutilized resource in pharmacological bioprospecting.
This research highlights its biotechnological potential as a sustainable adjuvant for inflammatory dermatoses, such as acne and rosacea. Adopting a „green" extraction strategy, the study utilized glycerin as a biocompatible solvent, combining ultrasound-assisted extraction (UAE) with room-temperature maceration to preserve thermolabile compounds while minimizing environmental impact.
The methodology quantified total flavonoid content (TFC) via spectrophotometry and assessed radical scavenging capacity through DPPH assays. Results revealed a high flavonoid concentration in flowers (43.25 mg RE/g), while stem extracts demonstrated superior antioxidant inhibition (71.09 %). A key innovation of this work is the valorization of every biological resource, exploring the synergy between Kalanchoe b. and Crocus s. floral bio-residues to support a circular economy model. Antimicrobial testing against Lactobacillus and Bifidobacterium confirmed the extracts act as gentle bacteriostatic agents, preserving the skin microbiota.
By addressing the current lack of data regarding this species, the study provides a scientific foundation for eco-friendly, high-performance formulas capable of restoring skin homeostasis and mitigating oxidative stress without the adverse effects of synthetic drugs.

RO.108.

Title EN

Precision Antioxidant Engineering: A Biotechnological Analysis of Antioxidant Systems in Modern Dermato-Cosmetics

Authors

Delia Turcov, Raluca-Cristina Ceică, Anca-Mihaela Teletin, Mădălina Paraschiv, Anca Zbranca-Toporaș, Bianca-Iulia Ciubotaru, Anca-Irina Galaction

Institution

Grigore T. Popa University of Medicine and Pharmacy Iasi, Romania, Faculty of Medical Bioengineering

Patent no.

Description EN

The management of exposome-induced oxidative stress requires an evolution from conventional antioxidants to

engineered protection systems.
This study presents a rigorous biotechnological analysis of 56 commercial formulations (35 serums/creams and 21 after-sun products) to validate their efficacy against molecular damage.
Our research highlights that therapeutic performance is dictated by intelligent molecular synergy, specifically the combination of ascorbic acid (10 – 20%), vitamin E and ferulic acid, which maximizes free radical neutralization through mutual regeneration. Moving beyond simple neutralization, we examine how biotechnology redefines active ingredient production (2020 – 2026 data). The analysis distinguishes between primary UV-induced ROS and secondary intracellular ROS, the latter being responsible for triggering matrix metalloproteinases (MMP-1, MMP-3) and collagen degradation. We evaluate advanced delivery systems, including liposomes and exosomes, as essential vectors for enhancing bioavailability and chemical stability. Results demonstrate that advanced biotechnology approaches transform antioxidant protection into a high-precision therapeutic intervention. By correlating daytime barriers with restorative after-sun exposure protocols, this multidisciplinary approach optimizes both skin redox reprogramming and economic viability in dermo-cosmetic manufacturing.

RO.109.

Title EN **Green NADES-based extraction of Sempervivum tectorum L. for ready-to-use cosmetic applications**

Authors Alexandra Cristina Blaga, Anastasia Chiriac, Berta Estevinho, Dan Cascaval, Anca Irina Galaction,

Institution **Grigore T. Popa University of Medicine and Pharmacy Iasi, Romania, Faculty of Medical Bioengineering Gheorghe Asachi Technical University of Iași University of Porto**

Patent no. -

Description EN This invention presents a green and efficient strategy for obtaining bioactive extracts from Sempervivum tectorum L. using a Natural Deep Eutectic Solvent (NADES) composed of betaine and propanediol, both certified cosmetic ingredients. This biocompatible solvent system enables selective extraction of valuable secondary metabolites

(polyphenols and flavonoids) while ensuring direct compatibility with cosmetic formulations, eliminating the need for solvent removal. A key innovation is the integration of microencapsulation applied to the NADES-based extract, process that significantly enhances polyphenols stability and, protects them from degradation (e.g., oxidation, light), enabling controlled release upon application. The resulting microencapsulated extract demonstrates improved shelf-life, and sustained bioactivity. The developed technology delivers ready-to-use, multifunctional cosmetic ingredients with strong antioxidant and skin-protective properties.

RO.110.

Title EN

Smart Emergency Care: an AI-driven platform for integrated patient management

Authors

Mădălin Geru, Andreea Matei, Flavia-Iuliana Neculai, Andreea-Larisa Țiploiu, Călin Corciovă

Institution

Grigore T. Popa University of Medicine and Pharmacy Iasi, Romania, Faculty of Medical Bioengineering

Patent no.

-

Description EN

The primary objective of this project is to improve the rapid evaluation and management of patients in the Emergency Department through the development of an integrated digital platform enhanced with artificial intelligence. In high-pressure clinical environments, timely access to accurate and well-structured information is essential for effective decision-making and optimal patient outcomes. The proposed system centralizes both clinical and administrative data, including patient medical history, vital parameters, diagnostic investigations, admission records, and discharge documentation. This integration ensures a coherent, structured, and traceable workflow, reducing fragmentation and improving data accessibility across the care continuum. A key component of the platform is the incorporation of artificial intelligence modules designed to support triage prioritization, facilitate the organization and interpretation of clinical data, and assist healthcare professionals in making informed decisions throughout the patient care process. By leveraging AI-driven insights, the system aims to enhance diagnostic accuracy and reduce response times in critical situations. In addition to its analytical capabilities, the platform provides practical functionalities such as electronic

health records management, investigation tracking, automated generation of discharge summaries in PDF format, and SMS-based patient notifications. These features contribute to improved communication, documentation efficiency, and overall workflow optimization.

Designed with scalability and adaptability in mind, the proposed solution supports the implementation of modern, data-driven healthcare practices. It aims to increase operational efficiency, minimize errors associated with data fragmentation, and enhance the ability of medical staff to deliver timely, accurate, and high-quality care in emergency settings.

RO.111.

Title EN

Integrating Computer Vision and Biomechanical Modeling for Objective Assessment of Finger Joint Swelling in Rheumatoid Arthritis

Authors

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Patent no.

Description EN

Rheumatoid arthritis (RA) requires frequent assessment of joint inflammation (digital edema) to guide treatment. Clinical evaluation is subjective, while imaging tools like ultrasound are expensive and inaccessible for home use. Conventional 2D photography is low-cost but fails to provide consistent, rotation-invariant measurements due to variable lighting, hand pose, and lack of depth information. To develop a reproducible, camera-based method for measuring finger proximal interphalangeal (PIP) joint width as a proxy for RA-related swelling, using only a standard RGB camera and computer vision techniques. A single RGB camera captures hand images alongside a coplanar reference object of known dimensions (e.g., a coin) for metric scale calibration. Hand landmarks, including the PIP joints of the index, middle, ring, and little fingers, are detected using MediaPipe. For each finger, the local finger axis is calculated from adjacent landmarks, and a perpendicular line is sampled

at the PIP location. Edge detection along this line yields finger width in pixels, which is converted to millimeters via the reference object. Longitudinal measurements are compared to a healthy baseline to flag significant increases (>12%) suggestive of inflammation.
The framework provides rotation- and scale-consistent width measurements without requiring specialized hardware. By enforcing a standardized flat-hand pose and fixed camera distance, environmental variability is minimized. The method is deployable on smartphones or laptops for potential home monitoring. This offers a low-cost, accessible tool for RA patients and clinicians to track swelling trends between clinical visits, pending prospective validation against gold-standard imaging.

RO.112.

Title EN

Toward Intelligent Acoustic Localization Systems for Search and Rescue: A Real-Time Direction Detection Approach

Authors

Daria-Georgiana Opria[1], Andrei Gheorghiță[1] , Duduca Irina[1,2], Rotariu Mariana[1,2], Indrei Lucian[1], Marius Turnea[1]

Institution

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Patent no.

Description EN

Search and rescue missions are frequently characterized by complex operational challenges in critical situations, challenges that can be overcome with the aid of versatile and intelligent devices. The aim of this study is to conceptualize a sound direction detection system intended for search and rescue missions and other similar emergency situations, designed to provide an efficient, cost-effective, and easy-to-use solution. The system consists of five acoustic sensors positioned along a 180-degree circular arc, with an angular spacing of 45 degrees between adjacent sensors. It further includes two microprocessors: an Arduino Due, which receives and processes the data from the sensors, and an ESP32 module, which enables real-time visualization of the information by connecting to a local Wi-Fi network. This

system represents a promising and reliable solution, as it can be adapted to a wide range of operational scenarios and easily integrated with other technologies used by emergency response teams.

RO.113.

Title EN **Cardio-Respiratory Feedback System for Athletic Recovery and Performance Optimization**

Authors Andreea Popovici[1], Densa Porumb[2], Andrei Gheorghiță[1]

Institution 1. **Grigore T. Popa University of Medicine and Pharmacy Iasi, Romania, Faculty of Medical Bioengineering**
2. **"Gheorghe Asachi" Technical University of Iasi, Iași, Romania, Faculty of Machines Manufacturing and Industrial Management,**

Patent no.

Description EN Athletic performance and safe recovery rely on the coordinated function of the heart and the respiratory system, particularly during effort and post-exercise recovery. Most accessible wearables provide simplified or estimated metrics, while clinical systems are primarily intended for medical assessment rather than continuous training feedback. This work proposes a cardio-respiratory feedback system based on a compact thoracic patch connected to a dedicated mobile application. The patch acquires ECG and thoracic impedance signals to extract heart rate, respiratory rate and cardio-respiratory coupling (CRC), which reflects the temporal synchronization between heartbeats and breathing cycles. The hardware is built around an ADS1292R analog front-end and a Seeed XIAO ESP32C3 microcontroller, enabling real-time wireless transmission to the application. Functional validation was performed on three subjects with distinct training profiles during a 25-minute stationary cycling protocol (warm-up, intense effort and recovery), with Apple Watch data used as a reference dataset. CRC values decreased during intense effort and returned toward baseline in recovery, with the performance athlete showing the lowest heart rate during effort and the fastest CRC recovery. These preliminary results suggest that CRC can support the differentiation of training status and recovery capacity. The proposed solution may contribute to personalized training monitoring and early identification of persistent deviations that warrant medical evaluation, without replacing clinical diagnosis.

RO.114.	
Title EN	**FonoStart: Standalone Interactive System for Auditory Training and Speech Sound Recognition**
Authors	Teodor Popa [1], Andrei Gheorghiță [1], Marius Turnea [1], Mara-Ștefania Apostol [2] Oana-Roxana Bitere-Popa [1]
Institution	[1] **Grigore T. Popa University of Medicine and Pharmacy Iasi, Romania, Faculty of Medical Bioengineering** [2] **Alexandru Ioan Cuza University of Iasi, Faculty of Psychology and Education Sciences**
Patent no.	
Description EN	FonoStart is a standalone interactive system designed for auditory training and speech sound recognition, targeting patients with hearing impairments using hearing aids or cochlear implants. Auditory training plays a crucial role in early speech development. While many existing solutions are implemented as mobile applications, they may introduce distractions and do not ensure standardized audio output, as performance depends on the device and environment. The proposed system integrates a microcontroller-based hardware platform with audio playback, touchscreen interaction, and visual feedback. It includes a set of structured auditory exercises (Learn, Recognize, Compare) designed to develop sound identification and discrimination skills. Randomization is implemented to ensure objective evaluation of auditory perception. Audio stimuli were recorded in controlled acoustic conditions and validated using spectral analysis (FFT) in MATLAB to ensure accuracy and consistency. Experimental testing demonstrated stable system operation, accurate interaction, and reliable audio playback. The results support the feasibility of FonoStart as an effective tool for auditory training and speech-related learning. Future developments may include expanding the stimulus database and enabling progress monitoring.

RO.115.	
Title EN	Smart cardiac patch for panic attack management
Authors	Rotaru Roxana-Andreea, Agaci Mariana, Fuior Robert, Luca Cătălina
Institution	**Grigore T. Popa University of Medicine and Pharmacy**

	Iasi, Romania, Faculty of Medical Bioengineering
Patent no.	
Description EN	Panic attacks are acute episodes characterized by intense physiological manifestations, such as tachycardia, fear, and anxiety, which are difficult to manage without early detection. Cardiac activity, regulated by rhythmic electrical impulses, directly reflects these states, as the heart acts as an essential pump for tissue oxygenation and the elimination of metabolic waste. In this context, the project proposes the development of a smart cardiac patch designed for the continuous monitoring of physiological signals and providing real-time feedback to the user. The device integrates simultaneous monitoring of cardiac activity and galvanic skin response, offering a portable, accessible solution applicable in both individual patient management and clinical decision support.

RO.116.	
Title EN	**A multimodal approach to fatigue assessment using physiological and behavioral parameters**
Authors	Andreea Matei, Flavia-Iuliana Neculai, Andreea Larisa Țiploiu, Geru Mădălin, Călin Corciovă
Institution	**Grigore T. Popa University of Medicine and Pharmacy Iasi, Romania, Faculty of Medical Bioengineering**
Patent no.	-
Description EN	Occupational fatigue in high-stakes professional environments represents a major risk factor, significantly impairing cognitive performance and decision-making during critical operations. This paper presents the design and development of a multimodal monitoring system intended to assess fatigue levels and enhance workplace safety among personnel in high-responsibility roles. The proposed architecture integrates a dual-stream data acquisition framework that combines an Arduino-based hardware platform for collecting physiological signals—specifically photoplethysmography (PPG) and galvanic skin response (GSR) with a software module that utilizes a standard camera to analyze Percent Eye Closure (PERCLOS) and other ocular dynamics. System performance was evaluated through a four-stage experimental protocol, including baseline assessment, passive monitoring during routine activities, active monitoring via a vigilance task, and a

recovery phase. This structured approach enabled the identification of both physiological and behavioral changes associated with progressive fatigue. By fusing these heterogeneous data streams, the system computes an objective fatigue index based on a robust analytical model. This index incorporates key parameters such as PERCLOS, reaction time, slow blink rate, heart rate (BPM), and GSR levels. The proposed solution supports the implementation of initiative-taking safety strategies, offering a reliable tool for reducing human error and improving operational resilience in demanding professional environments.

RO.117.

Title EN	**Optimization of Neuro-Orthopedic Rehabilitation through the Integration of a Dual-Screen System and Electromyography-Based Neuromuscular Feedback**
Authors	Georgiana Miron, Dragos Sardaru, Andrei Tutu, Daniela Viorelia Matei
Institution	**Grigore T. Popa University of Medicine and Pharmacy Iasi, Romania, Faculty of Medical Bioengineering**
Patent no.	-
Description EN	The virtual reality system with therapeutic game-based applications is designed as an interactive system for the rehabilitation of neurological and orthopedic patients, aiming to enhance balance, coordination, motor control, range of motion, and joint stabilization. It is primarily conceived as an individual-use device, in which the patient is positioned on a stabilometric platform and is able to control visually displayed cues for clearly defined tasks. During training, no details on muscle activation are highlighted, and the lack of neuromuscular feedback limits the differentiation between functional and compensatory movements. The development of a dual-screen system will enable the feasibility of simultaneous training for two patients with the same pathology and functional capacity, introducing identical motor tasks and therapeutic objectives. The proposed integration of motion sensors and electromyography (EMG) as a technological extension of the system aims to monitor muscle activity in real time, yielding more efficient outcomes than the existing system. This concept contributes to correlating EMG data with the visual performance displayed on the screen, ensuring an objective evaluation of

movement execution. The main objective is to enhance patient rehabilitation by combining social interaction with visual and objective neuromuscular feedback. Thus, improved motor control, reduction of compensatory strategies, and increased active engagement are expected outcomes of a complex system that standardizes training through the inclusion of competitive tasks and EMG support integration. Simultaneous patient training aims to harness motivational effects through interaction and competition, thereby increasing adherence to exercise programs and activities. Patient engagement, driven by motivation, visual feedback, and neuromuscular feedback, demonstrates significant potential, and this combination enables both analysis and improved quality of movement execution. The dual perspective of the virtual reality-based system proposes increased therapy efficiency, being adaptable to the pathological condition of patients.

RO.118.

Title EN **Interactive grip controller for hand motor rehabilitation**

Authors Beatrice-Marina Moja, Ștefania-Ioana Danu, Robert Fuior, Călin Corciovă

Institution **Grigore T. Popa University of Medicine and Pharmacy Iasi, Romania, Faculty of Medical Bioengineering**

Patent no.

Description EN

Musculoskeletal and neuromuscular disorders, particularly stroke, represent a major public health challenge and are among the leading causes of long-term motor disability worldwide. In this context, effective rehabilitation requires the development of therapeutic solutions that are not only clinically efficient but also accessible, engaging, and capable of supporting the recovery of motor control and functional mobility. This project presents the design and implementation of a grip controller device intended to assist the rehabilitation process in patients with neuromotor impairments. The proposed system integrates both hardware and software components into a unified rehabilitation framework. The hardware module consists of pressure sensors embedded within a handheld spherical device, designed to capture grip force variations during therapeutic exercises. These sensors are connected to an Arduino Nano development platform, which enables real-time signal

acquisition, processing, and transmission. The software component is represented by an interactive application that interprets sensor data as control inputs within a virtual environment. By translating physical interaction into digital actions, the system provides real-time visual feedback, enhancing user engagement and motivation during therapy sessions. This interactive approach supports repetitive training, which is essential for neuroplasticity and motor recovery. Through its user-centered and scalable design, the proposed solution has the potential to improve adherence to rehabilitation programs, optimize therapy outcomes, and contribute to more efficient functional recovery in individuals with motor and neuromotor impairments.

RO.119.

Title EN

Fine Motor Control Training of the Hand Using a New Labyrinth-Based Device with Sensory Feedback in Occupational Therapy

Authors

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Institution

Grigore T. Popa University of Medicine and Pharmacy Iasi, Romania, Faculty of Medical Bioengineering

Patent no.

Description EN

Introduction: Fine motor control of the hand is essential for performing daily activities and maintaining functional independence. Deficits occurring in neurological, traumatic, or rheumatologic conditions impair movement precision, coordination, and stability, requiring rehabilitation approaches based on sensory feedback and coordinative training.

Methods: This paper proposes the use of a labyrinth-type occupational therapy board for functional hand rehabilitation. The device consists of a defined pathway and an integrated Velcro system applied both along the labyrinth and on the guiding tool. The patient is instructed to follow the path while avoiding contact with the walls, maintaining fine control of movement. Exercises are progressive and adapted to the functional level, targeting hand–eye coordination, grip force control, and segmental stability.

Results and discussions: The intervention was associated with improvements in movement precision, coordination, and fine motor control. Sensory feedback provided by the

Velcro interaction facilitates real-time movement regulation. The interactive nature of the task contributes to increased patient compliance and active engagement in the rehabilitation process.

Conclusions: The labyrinth-type board represents an effective tool for functional hand re-education, integrating sensorimotor stimulation into task-oriented activities and supporting improvements in functional performance.

RO.120.

Title EN

Plasma-agriculture – highlighting the chemical free germination enhancement

Authors

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Institution

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Patent no.

-

Description EN

Atmospheric pressure plasma technology stands as a groundbreaking innovation poised to revolutionize sustainable agriculture, particularly through its application in seed treatment prior to sowing. This cutting-edge method is not just promising; it is a beacon for future research endeavors. Our study delved into the germination of wheat seeds (Triticum aestivum L.), aiming to meticulously evaluate the profound direct and indirect impacts of plasma therapy on wheat seedlings, utilizing plasma-activated water. The procedure employed helium and argon as operational gases for plasma ignition, a critical step in generating nitrogen and oxygen reactive species, which were

meticulously identified and analyzed. Over a 14-day period, corresponding to the wheat grass stage, our research triumphantly demonstrated enhanced germination and growth. Biochemical analyses revealed that plasma-treated variants boasted significantly elevated levels of chlorophyll, flavonoids, and polyphenols, underscoring the transformative potential of this technology. While the quantity of soluble proteins, antioxidant activity, and coloration remained unchanged, the compelling evidence of increased biochemical markers positions plasma treatment as a pivotal advancement in agricultural science [1].

References:

[1] I. Burducea, et al. Helium Atmospheric Pressure Plasma Jet Effects on Two Cultivars of Triticum aestivum L. Foods, (2023), 12 (1), 208.

RO.121.

Title EN **Wine-Plasma- - from grapes must to young wine**

Authors Ramona Huzum[1], Andrei Vasile Nastuta[2]

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Patent no. 0

Description EN

Plasma discharges at atmospheric pressure (appj) are revolutionizing diverse fields such as agriculture, medicine, and industry. It is imperative to meticulously characterize plasma sources from both electrical and optical perspectives to ensure they meet the stringent demands of these applications. In our groundbreaking study, we harnessed an appj specifically engineered for liquid media, targeting fresh must (grape juice) to significantly enhance the storage capacity and quality of wine. By employing advanced electro-optical techniques, alongside UV-Vis spectroscopy, ATR-FTIR, and comprehensive pH and volatile component analyses, we have unequivocally demonstrated that plasma discharge stands as the most potent method for activating the

medium and preserving wine. This innovative approach not only promises to elevate wine quality but also sets a new standard in plasma application technology.

References:
R. Huzum, A.V. Nastuta, Helium Atmospheric Pressure Plasma Jet Source Treatment of White Grapes Juice for Winemaking, Applied Sciences, 11 (18), (2021), 8498

RO.122.	
Title EN	**Real-time finger movement evaluation platform using inertial measurement sensors**
Authors	Flavia-Iuliana Neculai, Mădălin Geru, Andreea Matei, Andreea-Larisa Țiploiu, Robert Fuior
Institution	**Grigore T. Popa University of Medicine and Pharmacy Iasi, Romania, Faculty of Medical Bioengineering**
Patent no.	-
Description EN	Recovery of hand motor function requires clear, repeatable, and easy-to-monitor evaluation methods, especially in patients with reduced mobility or impaired coordination. Since finger movements are important for daily activities, monitoring them can provide useful information about the patient's progress and the correctness of the exercises performed. The developed system uses MPU6050 sensors to capture finger movements and an Arduino Mega board for data acquisition. The information is transmitted through the serial port to the computer, where it is processed using the Python programming language. Subsequently, the data are displayed in a web interface that allows real-time monitoring of the angle, movement status, number of repetitions, and evolution graph. The platform includes the evaluation of flexion-extension and abduction-adduction movements, and their detection is performed by comparing the current values with experimentally established thresholds. For the rehabilitation component, two interactive games were developed, aiming to increase patient motivation and transform the exercises into a more engaging activity. The LEDs provide immediate visual feedback, indicating whether the movement is performed correctly.

RO.123.	
Title EN	**Heart Rate Variability in Virtual Reality Exposure. A Predictor of Behavioral Responses**
Authors	Cristiana A. Oniţa, Daniela-Viorelia Matei, Anca-Irina Galaction, Laura-Mihaela Trandafir,Robert Fuior,Călin Corciovă,Stéphane Bouchard, Veronica Mocanu
Institution	**Grigore T. Popa University of Medicine and Pharmacy Iasi, Romania, Faculty of Medical Bioengineering**
Patent no.	
Description EN	**Background:** Stress-related changes in autonomic and neuroendocrine activity play a key role in shaping eating behavior, particularly in children and adolescents with obesity. This study examined autonomic and neuroendocrine responses to an immersive virtual reality social-emotional stressor and their associations with perceived stress and eating behavior in youth with obesity. **Methods:** Thirty children and adolescents with obesity (8-17 years) completed a VR protocol including relaxation and stress-inducing game phases. Physiological responses were assessed using heart rate variability (HRV), salivary cortisol, and alpha-amylase. Subjective stress and eating behavior were evaluated using visual analogue scales and the TFEQ-R21C. **Results:** Two distinct autonomic response patterns emerged: (1) parasympathetic reactivity (↑RMSSD, SDNN; ↓LF/HF), associated with lower perceived stress but higher uncontrolled eating; and (2) sympathetic activation (↑heart rate, alpha-amylase; ↓RR intervals), associated with higher anxiety and greater cognitive restraint. Cortisol reactivity was blunted. **Conclusions:** Immersive VR exposure elicits measurable stress responses in youth with obesity. Distinct autonomic profiles are differentially associated with eating behaviors, suggesting potential targets for personalized interventions.

RO.124.	
Title EN	**"Combined Robotic Glove-Assisted Finger Mobilization and Neuromuscular Electrostimulation in Hand Rehabilitation: A Sensor-Synchronized Approach for Flexor and Extensor Activation"**
Authors	**Ana Onu, Daniela Matei, Ilie Onu**
Institution	**Grigore T. Popa University of Medicine and Pharmacy Iasi, Romania, Faculty of Medical Bioengineering**
Patent no.	
Description EN	This project proposes an innovative multimodal approach to functional hand rehabilitation by integrating a robotic rehabilitation glove with synchronized neuromuscular electrostimulation of the finger flexor and extensor muscles. The protocol uses a robotic glove, designed for hand and finger rehabilitation, that can assist flexion and extension movements through multiple training modes, including passive mobilization, mirror training, extension, fine motor skills, and functional exercises. The innovative element lies in synchronizing the mechanical movement produced by the glove with the selective activation of electrostimulation. Thus, during assisted finger flexion, the system activates the electrostimulation circuit applied to the flexor muscles, facilitating the neuromuscular recruitment associated with the grasping gesture. During assisted extension, stimulation of the flexors is interrupted, and the system activates the extensor circuit, supporting hand opening and antagonistic control of the movement. Through this controlled alternation between flexors and extensors, the project aims to transform passive mobilization into active-assisted neuromuscular training, with the potential to increase neuroplasticity, reduce atrophy, prevent joint stiffness, and improve fine motor coordination. The integration of electrostimulation with robotic movement allows for more physiological muscle activation, correlated with the actual phases of movement, compared to the separate application of the two therapies. The protocol can be used in the rehabilitation of patients with hand motor deficits following stroke, neurological trauma, orthopedic surgeries, or other conditions causing loss of voluntary control of the fingers. The proposed model offers a reproducible, adaptable solution that is easy to integrate into physical therapy clinics, with the goal of accelerating functional recovery and improving the patient's independence in daily activities.

RO.125.	
Title EN	**Electronic Device for Uterine Contractions Monitoring**
Authors	Larisa-Gabriela Rădeanu[1], Mihai Aron[1,2], Gladiola Gabriela Petroiu[1], Cristian Rotariu[1]
Institution	[1] **Grigore T. Popa University of Medicine and Pharmacy Iasi, Romania, Faculty of Medical Bioengineering** [2] **"Gheorghe Asachi" Technical University of Iasi**
Patent no.	
Description EN	The monitoring of uterine contractions constitutes an essential aspect in the progression of pregnancy and labor, playing a significant role in the prevention of maternofetal complications. This device proposes the design and implementation of an electronic device, connected wirelessly to a smartphone, intended for the monitoring of uterine contractions, based on the acquisition and processing of bioelectrical signals recorded from the abdominal musculature. The device incorporates instrumentation amplifiers, active filtering stages, and a level-adaptation circuit, all implemented using low-cost operational amplifiers and connected to an ESP32 microcontroller board. The analog signal is converted to digital form by means of the analog-to-digital converter integrated within the ESP32 microcontroller and processed in order to detect uterine contractions. The processed data in form of computed uterine contractions parameters (frequency of contractions and their durations) are transmitted to an application running on the smartphone via Bluetooth technology. The application displays the monitored parameters, store them into the nonvolatile memory and performs statistically analysis. The results obtained demonstrate the device capability to reliably detect and monitor uterine contractions, indicating its potential for integration into more sophisticated clinical and medical applications.

RO.126.	
Title EN	**Portable Electronic Peak Flow Meter with Wireless Communication**
Authors	Cătălin Sorin Costea[1], Teofil Ilie Ursache[1,2], Gladiola Gabriela Petroiu[1], Cristian Rotariu[1]
Institution	[1] **" Grigore T. Popa University of Medicine and Pharmacy Iasi, Romania, Faculty of Medical Bioengineering** [2] **"Gheorghe Asachi" Technical University of Iasi**
Patent no.	
Description	Monitoring respiratory function is essential for

EN	patients with bad pulmonary conditions. This proposed electronic device uses a differential pressure sensor for indirect flow measurements, transducers and operational amplifiers for signal amplifications and filtering. The signal is applied to an analog input of the ESP32 microcontroller development board that computes the Peak Expiratory Flow (PEF) value, and transmits it wirelessly to an application running on the smartphone for displaying and/or storing for further processing. The device represents a very efficient and non-invasive solution for modern respiratory diagnostics at low cost.

RO.127.	
Title EN	**Exoskeletal System for Functional Neuromotor Rehabilitation of the Hand**
Authors	Tudor-Andrei Rezmeriță[1], Teofil Ilie Ursache[1,2], Mihai Aron[1,2], Cristian Rotariu[1]
Institution	[1] **Grigore T. Popa University of Medicine and Pharmacy Iasi, Romania, Faculty of Medical Bioengineering** [2] **"Gheorghe Asachi" Technical University of Iasi**
Patent no.	
Description EN	The development of robot-assisted rehabilitation devices is a rapidly expanding field; however, solutions specifically targeting functional hand recovery remain limited. This system represents a 3D-printed hand exoskeleton designed to ensure structural reliability and durability while accommodating the anatomical characteristics of the user's hand. The proposed system integrates an ESP32 microcontroller, enabling real-time control and wireless communication with a dedicated mobile application used for configuring and managing rehabilitation exercises. Actuation is achieved by using stepper motors, each assigned to an individual finger, allowing precise and independent flexion and extension movements. The system supports the controlled execution of repetitive motion patterns, contributing to the restoration of motor function and the improvement of hand coordination and mobility. Preliminary results demonstrate the effectiveness of the proposed system and highlight its potential as an accessible and scalable solution for modern neuromotor rehabilitation.

RO.128.	
Title EN	**Next-Generation Vestibular Diagnosis and Rehabilitation Using Virtualis MotionVR Technology**
Authors	Nicoleta Saulea[1], Oana Bitere-Popa[1], Raluca Olariu[2], Sebastian Cozma[2]
Institution	**[1]Grigore T. Popa University of Medicine and Pharmacy Iasi, Romania, Faculty of Medical Bioengineering** **[2] Grigore T. Popa University of Medicine and Pharmacy Iasi, Romania, Faculty of Medicine**
Patent no.	-
Description EN	Within the Audiology and Vestibular Unit of the Iași Clinical Rehabilitation Hospital, the use of the Virtualis MotionVR system adds a modern functional component to the assessment and rehabilitation of patients with vertigo, postural instability, and balance disorders. The system combines computerized dynamic posturography with immersive virtual reality and a 360° dynamic force platform, allowing postural control to be assessed under conditions that closely resemble real-life situations. From a diagnostic perspective, MotionVR enables the assessment of how the three major sensory systems involved in balance are integrated: the visual, somatosensory, and vestibular systems. Through tests such as SOT, ADT, LOS and, depending on the configuration, MCT, objective data can be obtained regarding stability, limits of stability, postural adaptation, and the patient's response to changes in the support surface or to conflicting visual stimuli. Therefore, posturography does not assess visual dependence alone, but provides a functional balance profile that is useful as an adjunct to the clinical vestibular examination. In rehabilitation, the system allows the training of vestibular adaptation, substitution, and habituation strategies. Virtual reality creates controlled contexts, such as dynamic visual environments or situations similar to everyday life, while real-time objective feedback helps the patient actively correct their posture. The dynamic platform stimulates the entire balance system, including the vestibulospinal component, and allows the safe progression of exercise intensity. By integrating MotionVR, vestibular assessment becomes more objective, and rehabilitation can be better personalized.

In the hospital setting, this technology supports an integrated approach, in which audiological and vestibular investigations are correlated with functional rehabilitation adapted to each patient's needs.

RO.129.

Title EN

Shifting Paradigms in Gastric Cancer: Early Outcomes of Neoadjuvant vs. Primary Surgery

Authors

Dragos-Viorel Scripcariu, Bogdan Filip, Ana Grigoraș, Mihaela-Mădalina Gavrilescu, Dragoș Predescu, Viorel Scripcariu

Institution

Grigore T. Popa University of Medicine and Pharmacy of Iasi, Faculty of Medicine, Iași, România

Patent no.

Description EN

Gastric cancer remains one of the most common abdominal malignancies, ranking fifth worldwide in incidence, and is frequently diagnosed at advanced stages. Perioperative chemotherapy has been introduced to improve oncological outcomes; however, concerns remain regarding its potential to increase postoperative complications following radical gastrectomy. In this retrospective study, we analyzed a continuous cohort of gastric cancer patients who underwent radical gastrectomy between January 2016 and December 2025. Patients were stratified into two groups: those who received neoadjuvant treatment (NAT) and those who underwent upfront surgery (US). We compared demographic and clinical data, intraoperative variables, postoperative complications, 30-day mortality, and pathological outcomes. In conclusion, Neoadjuvant treatment does not appear to increase the rate of postoperative complications following radical gastrectomy. These findings support the surgical safety of perioperative treatment strategies in patients with advanced gastric cancer. Further research is needed to evaluate long-term outcomes.

RO.130.

Title EN

AI-GENERATED MOTION ANALYSIS INTERFACE WITH MATLAB VALIDATION

Authors

Denisa Șmadici[1,2], Sînziana Anca Butnaru-Moldoveanu[1]

Institution

[1] Grigore T. Popa University of Medicine and Pharmacy Iasi, Romania, Faculty of Medical Bioengineering

[2]"Gheorghe Asachi" Technical University of Iași,

Department of Mechanical Engineering, Mechatronics and Robotics Iasi, Romania

Patent no.

Description EN

Current tools for biomechanical motion analysis are expensive or require proprietary software licenses, limiting their accessibility in academic and clinical settings. This work presents a novel interface for quantifying elbow joint kinematics using motion sensors. Developed with AI assistance, the system processes raw sensor data via a quaternion-based algorithm to compute joint angles, range of motion, and angular velocity. No installation or software license is required, making it accessible to users without technical expertise. An automated segmentation algorithm distinguishes slow and fast movement phases, enabling comparative analysis between subjects. Validation against MATLAB confirmed strong agreement between the two approaches. The tool was successfully applied in a biomedical engineering laboratory, demonstrating its potential as a cost-effective solution for both education and clinical biomechanical assessment.

RO.131.

Title EN

CAMERA-BASED FATIGUE ANALYSIS IN BALLET DANCERS

Authors

Veronika Tsarfina[1], Denisa Șmadici[1,2], Sînziana Anca Butnaru-Moldoveanu[1]

Institution

[1]Grigore T. Popa University of Medicine and Pharmacy Iasi, Romania, Faculty of Medical Bioengineering [2]"Gheorghe Asachi" Technical University of Iasi, Romania

Patent no.

Description EN

Ballet dancing is a highly demanding physical activity that involves repetitive movements and high loads on the lower limbs.. The relevé position, when the dancer rises onto the forefoot, places great mechanical demand on the plantarflexor muscle group, particularly the gastrocnemius muscles. This type of movement, especially when tired, has been linked to a higher risk of lower-limb injuries, such as muscle strains and Achilles tendinopathy..Recent advancements in biomechanics and sensing technologies have enabled more flexible monitoring of human movement outside controlled laboratory settings.Existing methods are

often tied to lab-based instrumentation or single measurement modalities, restricting their use in real-world dance environments. In the area of ballet dancing, the combination of motion analysis and physiological signals such as electromyography is still not completely investigated.This study proposes an integrated, multi-modal framework combining EMG, motion sensors, and video-based pose estimation to investigate fatigue in ballet dancers. EMG data are used to derive a physiological fatigue index, while kinematic features are extracted from both IMU and video data. The developed application measures joint kinematics and motion-derived biomechanical features from video recordings to estimate muscular fatigue. Machine learning techniques are further employed to model fatigue progression and assess injury risk based on movement patterns.The proposed methodology aims to support the development of accessible, non-invasive tools for monitoring fatigue and optimizing performance in both training and clinical settings.

RO.132.

Title EN **Development of an assistive system for gait analysis in the rehabilitation process**

Authors Andreea-Larisa Țiploiu, Mădălin Geru, Andreea Matei, Flavia-Iuliana Neculai, Robert Fuior

Institution **Grigore T. Popa University of Medicine and Pharmacy Iasi, Romania, Faculty of Medical Bioengineering**

Patent no. -

Description EN

Recovery of gait is essential in the rehabilitation process, and the objective monitoring of how the patient uses the walking frame can provide useful information about their progress. Although a conventional walking frame provides stability, it does not allow the evaluation of the pressure applied on the handles, weight distribution, or movement correctness. The developed system transforms a conventional walking frame into an intelligent assistive device capable of collecting data during use. The prototype is based on an Arduino UNO board, which receives information from several sensors: the MPU6050 for acceleration and orientation, FSR sensors for hand pressure on the handles, a load cell with an HX711 module for measuring the load applied to the frame, and an ultrasonic

sensor for distance estimation. The data can be saved on an SD card for later analysis. Sensor programming and data acquisition were conducted in Arduino IDE, while a visualization application was developed in Processing. This allows the monitoring of parameters such as step length, load, and number of steps in a form that is easier to interpret than raw values. By integrating hardware and software components, the prototype demonstrates the possibility of using an accessible system for gait analysis and for supporting the personalization of the rehabilitation process.

RO.133.

Title EN **A screening device for sensorineural hearing loss using Raspberry Pi technology**

Authors Alessia-Maria Toma, Robert Fuior, Călin Corciovă

Institution **Grigore T. Popa University of Medicine and Pharmacy Iasi, Romania, Faculty of Medical Bioengineering**

Patent no. -

Description EN

Sensorineural hearing loss constitutes a significant global public health challenge, contributing to communication deficits, delayed cognitive development, and diminished quality of life. Early detection is critical, as timely intervention remains the most effective approach for mitigating long-term functional impairment and reducing the risk of social isolation. Nevertheless, access to dependable, scalable, and widely deployable screening solutions remains limited, particularly in community-based and non-specialized healthcare settings. This project presents the development of a digital screening system aimed at facilitating the early identification of sensorineural hearing loss. The proposed architecture is based on the high-performance Raspberry Pi 5 platform and incorporates a dedicated hardware module for the generation and precise delivery of calibrated acoustic stimuli. The hardware infrastructure is complemented by a software suite capable of executing standardized audiometric protocols, thereby ensuring consistent testing conditions and high-fidelity data acquisition. Emphasis is placed on portability, cost-effectiveness, and ease of deployment, enabling the extension of auditory screening beyond conventional clinical environments. The integration of a modern user interface and advanced data analysis algorithms supports continuous

monitoring and enhances the early detection of auditory impairments. Furthermore, the system is designed to streamline the initial diagnostic pathway, facilitating timely referral to specialized clinical evaluation. By improving accessibility to early screening and increasing diagnostic efficiency, the proposed solution has the potential to reduce the overall burden of untreated hearing loss and to contribute to the advancement of preventive healthcare strategies.

RO.134.

Title EN

Interdisciplinary Approach to Heart Rate Variability in Parkinson Disease, Predictor of Functional Outcomes

Authors

Daniela-Marilena Trofin[1], Bogdan Patrut[2,*], Bogdan-Emilian Ignat[1,3], Cristina Grosu[1,3], Dan Trofin[1,*], Gabriela Rusu-Zota[1], Andrei Tutu[1], Ana Onu[1], and Daniela-Viorelia Matei[1]

Institution

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[3]**Clinical Rehabilitation Hospital, 700661 Iasi, Romania**.

Patent no.

Description EN

The heart rate variability (HRV) links autonomic impairment to overall functionality in Parkinson's Disease (PD). Medication interactions, side effects, multisystem involvement, and overall methodological variability, often complicate the pharmacological management of non-motor symptoms (NMS). Hence, physiotherapy is frequently challenged to adjust to difficulties arising from autonomic instability, medication scheduling or exercise modality. Altered HRV measurements can be detected by Holter-derived assessments and autonomic tests. HRV investigation has emerged as a popular noninvasive indicator of autonomic heart regulation. The Standard Deviation of NN Intervals (SDNN) represents the standard deviation of time between normal heartbeats (NN intervals) over a period of time, while the Root Mean Square of Successive Differences (RMSSD) measures short-term variations. Autonomic dysfunction in PD typically includes orthostatic hypotension and decreased reflex control, promoting the relationship between HRV metrics as a tool to analyse the balance between sympathetic and parasympathetic activity. The HRV literature in PD is still not entirely consistent across traditional time- and

frequency-domain measurements, nevertheless it provides context for the development of novel analytical techniques. We propose the Parkinson's NMS Copilot® application, for analyzying HRV variability in relation to NMS, correlated with pharmacological interventions. The application is accesible at https://www.edusoft.ro/brain/apps/1968/. The purpose is to help guide the recovery protocol by better addressing each patient in a personalized way, contributing to better outcomes, especially related to the risk of falls and impaired ambulation.

RO.135.

Title EN **"Adaptive Neurorehabilitation System Based on BioPAC Multimodal Monitoring and Transauricular Vagus Nerve Stimulation for Post-Stroke Functional Recovery"**

Authors Andrei Țuțu, Dragoș Petrică Sardaru, Daniela Trofin, Ana Onu, Georgiana Miron, Daniela Viorelia Matei

Institution **Grigore T. Popa University of Medicine and Pharmacy Iasi, Romania, Faculty of Medical Bioengineering**

Patent no.

Description EN

This invention proposes an adaptive neurorehabilitation system integrating heart rate variability (HRV) biofeedback with transauricular vagus nerve stimulation (taVNS) to enhance functional recovery in post-stroke patients.

The system utilizes real-time electrocardiography (ECG) signals to extract HRV parameters, which reflect autonomic nervous system balance. Based on these parameters, a control algorithm dynamically adjusts the timing and intensity of taVNS, aiming to promote parasympathetic activation and facilitate neuroplasticity.

A key feature of the system is the synchronization of vagal stimulation with controlled respiratory patterns, guided through biofeedback, to maximize vagal tone engagement. This closed-loop approach allows individualized therapy adaptation, ensuring optimal stimulation according to the patient's physiological state. Surface electromyography (EMG) may be used as a complementary assessment tool to monitor neuromuscular activation and functional progress, without being directly involved in the control loop. This solution provides a clinically feasible and scalable approach to personalized neurorehabilitation, focusing on autonomic modulation as a driver of motor recovery.

RO.136.	
Title EN	**WEAR iM**
Authors	I. Tărăboanță, N. Cimpoeșu, S. Stoleriu, A.C. Tărăboanță-Gamen, S. Andrian
Institution	**Grigore T. Popa University of Medicine and Pharmacy**
Patent no.	A/00274/30.06.2025
Description EN	WEAR iM is an original modular device designed for the integrated simulation of dental enamel wear under combined mechanical, chemical, thermal, and abrasive challenges. The system applies controlled mechanical loading (up to 50 N, 20 rpm) and enables up to 240,000 cycles (≈8 days), while simultaneously performing automated pH (3.8–6.8) and thermo-cycling (5–55°C). Performance evaluation on 90 enamel specimens demonstrated the device's ability to differentiate wear conditions: mechanical loading produced 21–28 µm loss, while acidic cycling increased wear to 67–102 µm, with thermo-cycling showing intermediate effects. Abrasion further amplified enamel loss ($p < 0.001$). Through its integrative design and precise control, WEAR iM provides a reproducible platform for accelerated and clinically relevant simulation of dental wear, with applications in biomaterials testing and dental research.

RO.137.	
Title EN	**Cerebral arteriovenous fistula associated with pulmonary arterial hypertension and severe heart failure in an infant**
Authors	Alina-Costina Luca, Cosmin Diaconescu, Dana Elena Mîndru, Valentin Munteanu, Lavinia Ionescu, Andrei Pușcașu, Alin-Constantin Iordache, Chiriac Alexandru, Nicolae Dobrin
Institution	**Grigore T. Popa University of Medicine and Pharmacy**
Patent no.	-
Description EN	We report the case of a 2-month-old infant with a high-flow cerebral arteriovenous fistula, severe pulmonary arterial hypertension, complex congenital heart disease, and advanced heart failure. Endovascular coil embolization achieved major reduction of shunt flow and improved

cerebral perfusion. This case highlights the important hemodynamic impact of cerebral arteriovenous shunts in infancy and supports endovascular occlusion as a key therapeutic option within multidisciplinary care.

RO.138.

Title EN **Drug Delivery Approaches For Paclitaxel Formulation**

Authors Andreea Crețeanu, Claudiu N. Lungu

Institution Grigore T. Popa University of Medicine and Pharmacy Iasi
Dunărea de Jos University of Galați

Patent no.

Description EN

This work presents an innovative, multi-functional drug delivery strategy centered on nano-engineered paclitaxel systems designed to enhance therapeutic performance in both oncology and cardiovascular interventions. The research addresses key limitations of conventional paclitaxel administration—namely poor solubility, systemic toxicity, and limited targeting efficiency—through the development of advanced liposomal and nanostructured carriers.

The core innovation lies in integrating liposomal encapsulation with implantable and interventional platforms such as drug-eluting stents and drug-coated balloons. These systems enable controlled and localized drug release, significantly increasing paclitaxel concentration at the target site while minimizing systemic exposure. Compared to traditional formulations, liposomal paclitaxel demonstrates superior pharmacokinetics, enhanced bioavailability, and improved anti-tumor efficacy.

A novel aspect of this approach is the exploration of synergistic drug combinations, particularly the co-delivery of paclitaxel with agents such as sirolimus, to simultaneously inhibit cell proliferation, angiogenesis, and restenosis processes. This dual-action mechanism provides a unified therapeutic platform capable of addressing both tumor progression and vascular re-narrowing.

Overall, this research redefines paclitaxel as part of an advanced, application-specific delivery system, opening new perspectives for precision medicine in cancer treatment and interventional cardiology through highly efficient, targeted, and controlled therapeutic platforms.

"Carol Davila" University of Medicine and Pharmacy, Bucharest, Romania

RO.139.

Title EN	**Cellular bioenergetic and migratory responses of human gingival fibroblasts to 940 nm diode laser photobiomodulation**
Authors	Isaac Kably Mizrahi, Cristina Neculau, Bianca Voicu Balasea, Florentina Rus, Marina Imre, Ana Cernega, Alexandra Popa, Alexandra Ripszky & Silviu Mirel Pituru
Institution	The Interdisciplinary Center for Research and Development in Dentistry – Dentistry Faculty – UMF CAROL DAVILA
Patent no.	-
Description EN	This study employed a standardized 1-second PBM exposure at 940 nm on gingival fibroblast monolayers, using fluences of 6.4, 8.84, and 14.92 J/cm² achieved by controlled adjustment of spot size. We assessed ATP output, metabolic activity, membrane integrity, nitric oxide signaling, and migration dynamics. The goal was to identify fluence ranges that promote regenerative behavior while maintaining cytocompatibility. Understanding how 940 nm PBM modulates fibroblast activity in a controlled model provides a foundation for refining laser-assisted soft-tissue management in oral surgery.

RO.140.	
Title EN	**Full-Body Airbag System Equipped With Essential Survival Tools**
Authors	Mohammad Ali Mirzaei Nanaji
Institution	**Carol Davila University Of Medicine And Pharmacy**
Patent no.	Iran Patent Certificate – Registration No.100513
Description EN	Avalanches are among the most dangerous natural hazards in mountainous regions and represent a serious threat to mountaineers, skiers, and rescue teams. People trapped in an avalanche are often buried under dense snow, which may cause severe injuries, pressure on the body, and lack of oxygen. Because rescue operations may take significant time, improving personal survival systems is essential.This invention introduces a wearable full-body avalanche airbag system equipped with essential survival tools. The system is designed to protect vital areas of the human body and increase the chances of survival during avalanche incidents. It consists of inflatable airbags attached to theuser's body through a reinforced belt structure. When an avalanche occurs, the airbags can be rapidly activated, inflating around the body and creating a protective cushion that reduces pressure and impact from heavy snow.In addition to the protective airbag system, the design integrates basic survival tools such asa Swiss knife and a lighter placed near the user's hands. These tools allow the trapped person to cut compacted snow,create breathing space, and attempt partial

„Victor Babes”
University of Medicine and Pharmacy Timisoara

RO.141.	
Title EN	**LUMBAR REGION MOLD FOR PRACTICING LUMBAR PUNCTURE AND LOCO-REGIONAL ANESTHESIA**
Authors	Ovidiu Alexandru MEDERLE, Dumitru ȘUTOI, Romeo Theodor STOIANOV, Cosmin Iosif TREBUIAN, Cosmin LIBRIMIR, Octavian Marius CREȚU, Augustin SEMENESCU
Institution	„Victor Babeș” University of Medicine and Pharmacy Timișoara
Patent no.	Patent of Invention – No. 134788
Description EN	The invention describes an innovative educational method and simulation device designed to teach and refine lumbar puncture and spinal anesthesia, essential procedures in Anesthesiology and Intensive Care. The model is built from five lumbar vertebrae made of polylactic acid, integrated into a layered structure that realistically reproduces anatomical features and tissue resistance. It allows trainees to identify intervertebral spaces through palpation and perform procedures using standard techniques with real needles, providing authentic tactile feedback, including the “loss-of-resistance” sensation. The device enhances technical skills, anatomical understanding, and patient safety by offering a controlled, risk-free training environment. Its advantages include reducing procedure-related complications, increasing success rates and operator confidence, and ensuring adherence to procedural standards. Additionally, the model is cost-effective and quick to manufacture, making it suitable for widespread use in medical education. Overall, it represents a practical and scalable solution for competency-based training in neuraxial procedures.

RO.142.	
Title EN	**Comparative Evaluation of Injectable Platelet-Rich Fibrin with and Without Microneedling in Periodontal Regeneration: A Prospective Split-Mouth Clinical Study**
Authors	Iulia Muntean , Alexandra Roi , Lavinia Cosmina Ardelean, Laura-Cristina Rusu
Institution	„Victor Babeș" University of Medicine and Pharmacy Timișoara
Patent no.	
Description EN	Periodontal disease is a chronic inflammatory condition that can lead to progressive and irreversible destruction of periodontal tissues. The present study aimed to evaluate the clinical efficacy of a minimally invasive regenerative periodontal therapy by comparing a conventional protocol with an enhanced combined approach. A prospective split-mouth clinical study was conducted on 54 patients diagnosed with stage II–III periodontitis according to the 2018 EFP/AAP classification. Periodontal treatment consisted of scaling and root planing (SRP) combined with injectable platelet-rich fibrin (i-PRF), applied in the upper arch (control), and SRP + i-PRF associated with microneedling (MN), applied in the lower arch (test). Clinical parameters, including clinical attachment level (CAL), bleeding on probing (BOP), and plaque index (PI), were evaluated at baseline, and after 1, 3, and 6 months. Both treatment protocols resulted in significant improvements in all periodontal parameters over time. The most pronounced reduction in BOP was observed during the first month, while CAL showed a gradual improvement that stabilized after six months. The combined protocol (SRP + i-PRF + MN) demonstrated a slightly greater CAL gain at six months, suggesting a modest but significant advantage in periodontal attachment recovery. These findings indicate that both regenerative approaches are effective in improving periodontal health, while the addition of microneedling may enhance vascularization and collagen remodeling, supporting improved periodontal healing.

"Alexandru Ioan Cuza" University of Iasi

RO.143.	
Title EN	**Method for specific detection of short single-stranded DNA sequences for biomedical applications in field of bionanotechnology, involves monitoring specific imprint of response given by interaction of peptide nucleic acids-gold nanoparticles coagulant complexes which changes**
Authors	Tudor LUCHIAN[1]; loredana MEREUTA[1]; Alina ASANDEI[2]; Isabela DRAGOMIR[2]; Cezara BUCATARU[2]
Institution	**"Alexandru Ioan Cuza"University of Iasi** [1]**Department of Physics** [2]**Department of Exact Sciences and Natural Sciences, Interdisciplinary Research Institute**
Patent	**RO135679-A2;**
Description EN	Rapid, low-cost, and easy-to-use nucleic acid detection technologies are crucial for mitigating pathogenic threats and play an essential role in forensic analysis, food safety, and infectious disease surveillance. This invention presents a nanopore-based electrophysiology platform capable of real-time, selective identification of target single-stranded DNA (ssDNA). The method integrates protein nanopores with unmodified citrate-coated gold nanoparticles (AuNPs) and charge-neutral peptide nucleic acids (PNAs), creating a highly sensitive hybrid detection system. Traditional DNA detection approaches—including culture assays, immunological tests, PCR amplification, and sequencing—are often slow, costly, and dependent on specialized personnel. Colorimetric AuNP assays, while simpler, are prone to false positives due to nonspecific nanoparticle aggregation. Even current nanopore technologies face challenges such as rapid DNA translocation and limited resolution. This invention overcomes these limitations by exploiting resistive-pulse sensing through a single α-hemolysin (α-HL) nanopore to monitor PNA-induced changes in AuNP surface properties and aggregation behavior. Negatively charged AuNPs introduced into the cis chamber are electrophoretically drawn into the nanopore vestibule under a positive transmembrane potential, producing stochastic ionic current blockades. When AuNPs interact with PNAs, they form coagulated complexes that generate a

distinct ionic signature. In the presence of complementary ssDNA, PNA hybridization prevents nanoparticle aggregation, resulting in a markedly different current pattern. By translating these current signatures into molecular recognition events, the system enables rapid, selective detection of target DNA at micromolar concentrations. This nanopore-AuNP-PNA strategy provides a powerful, low-cost alternative to conventional nucleic acid diagnostics, offering enhanced specificity and real-time readout.

RO.144.

Title EN **Analysis of Circular Causality in Integrated Reporting: A Feedback-Based Perspective**

Authors Ionela-Daniela SANDU, Ioan-Bogdan ROBU

Institution **Alexandru Ioan Cuza University of Iasi**

Description EN

Research purpose: The main objective of this research is to analyze circular causal relationships in integrated reporting, highlighting the role of feedback mechanisms in the relationships between strategy, performance, and informational transparency. The study proposes a feedback-based conceptual framework that explains integrated reporting as a dynamic system influencing decision-making processes and long-term value creation, supporting the integration of financial and non-financial information and stakeholder engagement.

Research methodology: The research methodology adopts an exploratory qualitative approach, based on a systematic review of the literature on integrated reporting, circular causality, and feedback mechanisms. The study employs conceptual analysis and content analysis of the integrated reports of companies listed on the Bucharest Stock Exchange (BVB) for the period 2021–2025. Additionally, elements of system dynamics are integrated through the use of causal loop diagrams to highlight interdependent relationships.

Preliminary results: Preliminary results show that integrated reporting can be analyzed through circular causality, highlighting feedback loops between strategy, performance, and informational transparency, which impact decision-making and long-term value creation. An analysis of reports from companies listed on the Bucharest Stock Exchange (BVB) for the 2021–2025 period indicates that feedback is present but used inconsistently, keeping

reporting predominantly descriptive.
Originality: The originality of this research lies in its approach to integrated reporting as a system of circular causal relationships, in which feedback mechanisms are used as an analytical tool to explain organizational dynamics. The study moves beyond a static perspective on reporting, proposing a process-oriented interpretation based on interdependencies and feedback loops that simultaneously influence strategy, performance, and information disclosure. Furthermore, the research offers an empirical application in the context of companies listed on the Bucharest Stock Exchange (BVB), contributing to the development of a systemic perspective on integrated reporting.
Keywords: integrated reporting, feedback, multiple capitals, sustainability, long-term value creation, financial capital, natural capital, human capital, intellectual capital, social capital, companies listed on the Bucharest Stock Exchange, organizational performance, causal loop diagrams, system dynamics.

RO.145.	
Title EN	**From Digital Readiness to Audit Quality: Evidence from European Union Member States**
Authors	Andreea MOCANU, Ioan-Bogdan ROBU
Institution	**Alexandru Ioan Cuza University of Iasi**
Description EN	The rapid advancement of digital technologies and artificial intelligence is transforming the context in which financial audits are performed, affecting both the execution of audit procedures and the quality of outcomes. Although European Union member states operate within a relatively uniform regulatory framework, empirical evidence suggests the existence of notable differences in audit quality across countries. These disparities call for a deeper understanding of the factors that may influence audit outcomes at the national level. This study aims to investigate variations in audit quality across European Union member states and to explore whether these differences are related to the level of digital development and the capacity to adopt artificial intelligence technologies. A comparative analysis is conducted at the country level, relying on proxies of audit quality such as audit opinions and indicators of earnings

management. These are complemented by macro-level variables that describe the broader technological and economic environment, including internationally recognized indices measuring digital readiness and artificial intelligence preparedness. This approach allows for the examination of potential associations between national digital capabilities and audit quality.

RO.146.

Title EN

Applying Supervised Machine Learning to Detect Fraudulent Financial Reporting

Authors

Georgiana BURLACU[1], Ioan-Bogdan ROBU[1], Ionuț Viorel HERGHILIGIU[2]

Institution

[1]Alexandru Ioan Cuza University of Iasi

[2] Gheorhe Asachi Technical University of Iasi

Description EN

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Fraudulent financial reporting is a complex issue, and solutions and methods are being sought to help prevent it. Given the success of machine learning techniques in many fields, there have been efforts to integrate them into addressing various issues in the economic sphere. In recent years, the integration of supervised machine learning methods has accelerated, proving beneficial in addressing a variety of tasks. This research aimed to apply several machine learning techniques to fraud risk analysis, determining the extent to which they can contribute to the effective detection of fraudulent reports. This study focused on companies listed on the Bucharest Stock Exchange. Of these, 62 were selected for analysis over a seven-year period (2018–2024). A set of variables was analysed, with the fraud risk in financial reporting acting as the dependent variable — calculated based on the F-score, and a set of independent variables including return on assets, return on equity, leverage, working capital, net profit margin and audit opinion. The analysis was conducted using the following machine learning methods: Decision trees, Support vector machines, Naive Bayes and Narrow neural networks. The results showed an accuracy rate of over 90% for Decision trees, Narrow neural networks and Support vector machines, which confirms their effectiveness in analysing fraud risk in financial reporting.

RO.147.

Title EN

Uncovering Fraud Risk Profiles in Central and Eastern European Listed Companies: A Machine Learning Approach

Authors

Maria-Cosmina IORDACHE, Ioan-Bogdan ROBU, Costel-Sorin CHIRU

Institution

Alexandru Ioan Cuza University of Iași, Faculty of Economics and Business Administration, Iași, România

Description EN

Financial fraud remains a major concern for capital markets, affecting the reliability of financial reporting and increasing uncertainty for investors. The growing complexity of earnings management highlights the limitations of traditional detection methods, which often fail to capture hidden patterns in financial data. This study addresses these challenges by adopting a machine learning approach focused on identifying fraud risk profiles rather than direct detection. Given the absence of labeled data, an unsupervised method is employed. K-means clustering is used to classify firms based on key financial indicators associated with earnings management and financial pressure, including discretionary accruals, profitability, leverage, working capital, and retained earnings. The empirical analysis is based on a sample of listed companies from Central and Eastern Europe (CEE), namely Romania, Poland, the Czech Republic, Slovakia, Bulgaria, and Hungary, over the period 2015–2024. This regional focus is particularly relevant due to differences in market development and firm characteristics across countries. The results reveal three distinct fraud risk profiles. The high-risk cluster is characterized by firms with elevated discretionary accruals, high leverage, and negative profitability, indicating financial distress and a higher likelihood of earnings management. The low-risk cluster includes financially stable firms with lower accrual levels and positive performance, while the moderate-risk cluster reflects firms with intermediate characteristics. Further analysis reveals significant cross-country differences. Romania exhibits a higher proportion of firms in the moderate-risk category, while Poland displays a heterogeneous distribution across clusters. In contrast, Bulgaria records the highest proportion of high-risk firms.

University Politehnica of Timișoara

RO.148.	
Title EN	**INNOVATIVE TECHNOLOGICAL APPROACHES TO CIRCULARITY AND URBAN–INDUSTRIAL SYMBIOSIS WITHIN THE WATER–ENERGY–MATERIALS–FERTILIZERS**
Authors	Larisa Ivascu, Florica Manea, Sebastian Muntean, Corina Orha, Constantin Tudoran, Gelu Mateescu, Ionel Nicolae, Gabriel Dumitraș
Institution	**Politehnica University of Timisoara, Academica Română – Filiala Timișoara, National Institute of Research and Development for Electrochemistry and Condensed Matter (INCEMC), S.C. Datcomp S.R.L., S.C. Datronic S.R.L., S.C. Grimet Construct S.R.L., S.C. Ozonfix S.R.L.**
Patent no.	390074 PCIDIF, Smart Growth, Digitization and Financial Instruments Program, 2021-2027
Description EN	The aim of this project is to achieve a technological transfer between the three research institution partners, i.e., Politehnica University of Timisoara (coordinator), Romanian Academy - Timisoara Branch and National Institute for Research in Electrochemistry and Condensed Matter, to the four SMEs, i.e., DATCOMP Ltd, GRIMET Ltd, DATRONIC Ltd and OZONFIX Ltd. The technological transfer will allow the development of two major pilot plants, one for advanced innovative modular (waste)water treatment and the other for pyrolysis of biomass, and the creation of innovative services in the field of technologies for solid waste and wastewater management. The circular wastewater treatment solutions will be developed including innovative electrodosing based coagulation and advanced electrochemical filtering processes integrated within conventional wastewater treatment technology, reaching out the recovery of nutrients from water, reuse/recycling of treated water, recovery of hydrogen resulting as a by-product in electrochemical water treatment processes. Also, the biomass conversion into biochar, bio-gas and bio-oil that will be further valorized within the value-added products will be achieved through pyrolysis plant. In addition, water-related synergies for the development of the water treatment

processes are emphasized.

RO.149.	
Title EN	**DIRECT SUPERSUCTION AIR FILTER WITH MULTIPLE DIFFUSERS**
Authors	Corneliu BIRTOK BANEASA
Institution	**Politehnica University of Timisoara, Faculty of Engineering Hunedoara, CITT Politehnica 2020, Romania**
Patent no.	A 2023 00684 / RO-BOPI 4/2024
Description EN	The invention refers to an air filter, capable of capturing, recovering, accelerating and modulating the air flow used to form the fuel mixture intended for the operation of internal combustion engines in accordance with their operating regime. The invention can be applied mainly in the field of the construction industry of motor vehicles equipped with internal combustion engines and in the aerospace, naval, petroleum industry or in any other sector that uses internal combustion engines.

RO.150.	
Title EN	**MODULAR SYSTEM WITH FLOATING PANEL FOR FLOOD PROTECTION**
Authors	Ştefan Pavel, Daniel-Viorel Ungureanu
Institution	**Politehnica University of Timisoara, CITT Politehnica 2020, Romania**
Patent no.	A 2025 00282 / 04.07.2025
Description EN	The invention relates to a modular flood protection system composed of floating modules (I), each consisting of a support frame (1), stiffened at its ends by plates (2) provided with at least four guide bolts (3), and having a slot (a) for positioning a panel (4), which is firmly fixed within the module by mounting lugs (5). On the support (1), on both sides of the panel (4), watertight polypropylene floats (6) are installed, each secured to the module using straps (7). The panel (4) is stiffened by a horizontal stiffening element (10a) at the top, and by two lateral profiles (10b) and (10c), which ensure the mechanical connection between adjacent panels. Signaling is provided by reflective devices (11). The chain of modules thus formed can be arranged along the perimeter of the area to be protected against flooding, within

enclosures, such that when these are flooded, the floats (6) ensure the lifting of the modules and the formation of a flood protection barrier. After the floodwater recedes, the enclosures remain filled with water, and in order to lower the panels and floating modules, the water must be evacuated using a pump, controlled via a wireless module by the personnel supervising the protected area. The pump operation is automatically stopped when a sensor signals to the microprocessor (M) the absence of water in the enclosure.

In the case of a functional test (lifting) of the protection system, using the same components of the control and command system (AMC) and its auxiliary modules, but by reversing the pumping direction, the enclosures can be filled with water taken from an available external source (public network, lake, river, etc.). The operation of components requiring electrical energy is ensured by a generator equipped with photovoltaic panels.

RO.151.

Title EN **INSTALLATION FOR LIMITING THE SPREAD OF AN INCIPIENT FIRE AND ITS EFFECTS ON BEDRIDDEN PERSONS**

Authors Ştefan Pavel, Daniel-Viorel Ungureanu

Institution **Politehnica University of Timisoara, CITT Politehnica 2020, Romania**

Patent no.

Description

The invention relates to an installation designed to limit the negative effects of a fire on a bedridden person, within specialized facilities providing medical or social care. The proposed solution consists of a rectangular parallelepiped frame, easily attachable to a medical bed equipped with swivel wheels, intended for the care of a vulnerable person. The system is fitted with dedicated temperature, smoke, and carbon monoxide sensors, which detect the onset of a fire at or near the patient's bed and instantly transmit an alarm signal to the caregiving staff and to the Emergency Services. The installation ensures the automatic perimeter isolation of the patient's bed from the rest of the room by deploying initially folded curtains—four lateral curtains and one upper curtain. Additionally, by means of a dedicated unit, a non-toxic extinguishing agent is distributed within the enclosed volume, while a fan introduces a forced airflow into this space through an air intake located near the

floor. Thus, for a short but sufficient period to allow evacuation, the system provides the patient with protection against the harmful effects of exposure to high temperatures and combustion products (smoke, soot, and combustion gases).

RO.152.	
Title EN	**CARBOFER TYPE BY-PRODUCTS FOR THE STEEL INDUSTRY**
Authors	Adriana BOBORA, Ana SOCALICI, Corneliu BIRTOK BANEASA, Petre Lucian GHERMAN
Institution	**Politehnica University of Timisoara, Faculty of Engineering Hunedoara, CITT Politehnica 2020, Romania**
Patent no.	Doctoral research study
Description EN	The Carbofer process represents an innovative solution for the recovery of powdery waste (such as mining tailings, steelmaking sludge and dust, or slag from secondary steel treatment), transforming industrial residues into strategic resources. Given the massive volume of iron- and carbon-rich waste currently sent to landfills, Carbofer technology facilitates its recycling as a slag foaming agent or as a raw material for blast furnaces. This approach ensures an optimal balance between environmental sustainability, technical feasibility, and economic efficiency in metallurgy. The efficiency of this process was tested through an experimental program focusing on three primary delivery forms of the by-product, each optimized for specific operating conditions: - Carbofer as a mechanical mixture (powder): this form proved optimal for direct lance injection systems, offering the fastest chemical reaction rate and minimal processing costs, making it ideal for the instantaneous formation of foamy slag; - Carbofer in the form of pellets: Experiments demonstrated that pellets offer controlled porosity and a high surface area, facilitating high reactivity within the slag bath. Their uniform size allows for easy pneumatic transport and precise dosing in automated processes; - Carbofer in the form of briquettes: Briquettes exhibited the highest mechanical strength and density, essential qualities for gravity charging in electric arc furnaces or blast furnaces. They effectively penetrate the slag layer to reach the metal interface without being entrained by the flue gas stream.

Transilvania University of Brasov

RO.153.	
Title EN	**Resonant Synergies-a transdisciplinary model of interactive education through wood, sound and light**
Authors	Mariana Domnica Stanciu, Florin Dinulică, Aureliu Florin Hălălișan, Cristian Tilea, Lucian Țilea
Institution	**Transilvania University of Brașov, B-dul Eroilor 29,Brasov 500036, Romania** **Tilia Art Light, Brăila,B-dulA.I.Cuza231,810125 Brăila, Romania3"Dunărea de Jos" University of Galați,Str. Domnească nr.111, Galați, 800201, Romania**
Patent no.	-
Description EN	The prototype highlights the synergy between art and science, nature and technology, engineering and music,being an interactive product connected via QR code to a database about themodel concept.The noveltyconsists in the use of electronic systems to highlight the chromatic and acoustic resonance properties of thesevendeciduous wood species.The sevenwooddiskswere mechanically processed and protected against humidity and temperature variations by coatings with transparent varnishes and resins. Their exposure andfixationareachieved using a removable metal structure inspired by biomimetics. The chromaticity of the wood was highlighted with high-power LED-COB light sources designed and executed using 3D printing.The

Dunarea de Jos University of Galati

RO.154.	
Title EN	**Experimental and computational investigations on noise control capabilities of cellulosic fibers-based foams**
Authors	Silviu Marian NASTAC[1,2], Maria Violeta GUIMAN[2,1], Petronela NECHITA[1], Mihai SECIUREANU[1]
Institution	**[1]Dunarea de Jos University of Galati, Research Centre for Mechanics of Machines and Technological Equipment and [2]Transilvania University of Brasov / Romania**
Patent no.	This research was partially funded by the National R&D Program PN-III-P4-PCE-2021-0714, PCE 22/2022, https://susthc-coatpack.ugal.ro/, and the Research Grants of the Dunarea de Jos University of Galati RF 3646/30.09.2021, RF 9418/30.03.2023, RF 2475/31.05.2024
Description EN	This study focuses on the available and useful computational models for characterizing the acoustic properties of foam-type materials, especially those obtained based on cellulose fibers, and, respectively, on the potential capability of implementing and using these models in practical applications. In the studies, both the empirical Delany - Bazley model and its variants were considered, as well as the phenomenological group of models (Johnson-Champoux-Allard, Johnson-Champoux-Allard-Lafarge, Johnson-Champoux-Allard-Pride-Lafarge). Also, Prediction of Sound Absorption Coefficient using the Transfer Matrix Method (PSAC-TMM) was considered. For the evaluation of transport properties, based on numerical modeling and computational simulations, the Lattice Boltzmann Method – LBM was used. In the framework of computational research, comparative analyses between compatible simulation approaches were developed. The simulation applications were designed having as reference the experimental data obtained for groups of foam-formed materials based on cellulose fibers.

RO.155.	
Title EN	**Comparative advanced investigations on operational acoustic capabilities of Romanian and S-E Asia tone-woods for violin resonant box**
Authors	Silviu Marian NASTAC[1,2], Mariana Domnica STANCIU[2], Maria Violeta GUIMAN[2,1], Long WAY[3]
Institution	**[1]Dunarea de Jos University of Galati, Research Centre for Mechanics of Machines and Technological Equipment / Romania, [2]Transilvania University of Brasov / Romania, and [3]National Pingtung University of Science and Technology / Taiwan**
Patent no.	This research was partially funded by the National R&D Program, National Research Agency, project PN-III-P2-2.1-PED-2019-2148, no. 568PED/2020 MINOVIS, http://minovis.unitbv.ro; National Research Agency, project PN-III-P4-PCE-2021-0885, no. PCE61/2022 ACADIA, http://acadia.unitbv.ro
Description EN	The research explores the dynamic behavior of different wood species in the form of violin boards, based on experimental modal analysis using various practical response evaluation configurations. The purpose of these studies was to investigate the acoustic and dynamic properties of tropical species from South-East Asia (Taiwania, Japanese cedar and Chinese parasol) and other European wood species (poplar, willow), with potential in the construction of stringed musical instruments, especially the violin, instead of the traditional ones (spruce and maple wood). The novelty of the study consists in the analysis of the physical, acoustic and dynamic characteristics of violin boards made of wood species from tropical and temperate areas, compared to the traditional ones (spruce and maple).

RO.156.	
Title EN	**COMPOSITE MIXTURE BASED ON HEMICELLULOSE ESTERS, PROCESS FOR OBTAINING IT, AND TESTING THE SPECIFIC PROPERTIES OF PACKAGING FOR AGRI-FOOD PRODUCTS**
Authors	Petronela Nechita, Mirela Iana-Roman, Mihaela-Aida Vasile, Rodica -Mihaela Dinică, Silviu- Marian Năstac, Alina-Mihaela Ceoromila, Andreea-Veronica Botezatu, Bianca Furdui, Cristian-Silviu Simionescu

Institution	"DUNĂREA DE JOS" UNIVERSITY OF GALAȚI, ROMANIA
Patent no.	Patent application No. WO2025216645-A1
Description EN	The invention refers to a composite mixture based on xylan hemicelulose esters, with improved thermal stability and hydrophobic properties and a method for obtaining it. The composite mixture, according to the invention, is used for surface treatment of paper for agri-food products packaging. The preparation process of the composite mixture involves, in the first stage, obtaining hemicellulose esters of the xylan type through an acetylation reaction between native xylan, ionic liquids based on imidazolium salts, and acetic anhydride. These are then mixed with other natural polymers (chitosan) and/or metal oxide nanoparticles (ZnO and CuO). The mixture is homogenized at a temperature of 20°C for 12...24 hours using magnetic stirring, and the specific properties of the food packaging are tested by applying the mixture as a layer/film with a mass of 2.5 – 5 g/m² on each side of the paper/cardboard base, followed by drying for 10 minutes. The paper/cardboard treated with this composite mixture ensures protection of agri-food products against bacterial action and provides resistance to moisture, water vapors, oxygen, oils, and fats.

RO.157.	
Title EN	**Development of functional surfaces for dental implants: Hydroxyapatite enriched with bioactive agents for osseointegration and antimicrobial protection, Acronym BIOHAF (Biocompatible Implants Optimized with Hydroxyapatite and Functional Additives)**
Authors	Bușilă Mariana
Institution	**„Dunărea de Jos" University of Galați, Romania**
Patent no.	Scientific research project no. 828/11.12.2024 funded by ARTZ DENT SRL, Galați-Romania Period of implementation: 12.12.2024 – 12.12.2026
Description EN	The project proposes research and development of functional surfaces for dental implants, using hydroxyapatite (HA) enriched with bioactive agents, to optimize osseointegration and reduce the risk of peri-implant infections, thus addressing critical challenges in modern implantology. Hydroxyapatite will be modified by integrating bioactive elements, antimicrobial nanoparticles and growth factors,

and the deposition of these layers on implants will be achieved by advanced methods.
The functionalized surfaces will be tested in vitro for cell adhesion, mineralization and antimicrobial activity, using osteoblastic cells and clinically relevant bacteria. The expected results include obtaining biocompatible surfaces with improved osteogenic activity and effective antibacterial properties.
The project is expected to contribute to the development of improved dental implant solutions and to the reduction of post-implant complications, thereby having a significant impact on the field of regenerative medicine. By preventing infectious complications and reducing the need for premature implant replacement, a decrease in medical costs is anticipated, alongside the creation of new economic opportunities through the development of innovative products and an increased demand for implantology specialists.
In the long term, the project will promote sustainability in medicine by using environmentally friendly materials, such as biomimetic hydroxyapatite, and stimulate continuous innovation by opening new research directions and applications in regenerative medicine.
The results will be widely disseminated by publishing at least 2 scientific papers in ISI-listed journals and by participating in national and international events. Knowledge protection will be done through a national patent application registered with OSIM.
The research will be conducted within the Faculty of Engineering, Dunărea de Jos University of Galați.
Acknowledgements: This work was funded by ARTZ DENT SRL, Galați-Romania, contract no. 828/11.12.2024.

RO.158.

Title EN **CROSS2MAP – INTERACTIVE ONLINE MAPPING FOR SUSTAINABLE TOURISM PROMOTION (ROMD 00389)**

Authors Silvius STANCIU, Sergiu CORNEA, Silvia STRELCIUC, Daniela ISTRATI, Maria Magdalena TUREK RAHOVEANU, Adrian ZUGRAVU, Ion Gheletchi, Ina FILIPOV, Bogdan BRATOVEANU, Elena MANDAJI, Alina HUMĂ, Marius MITREA, Carmen ȘTEFĂNESCU

Institution	*** "Dunărea de Jos" University of Galați, Romania** **** The State University "Bogdan Petriceicu Hasdeu" from Cahul, Republic of Moldova** ***** "VIA Cahul" Tourist Cluster, Republic of Moldova**
Patent no.	CROSS2MAP (ROMD00389), a cross-border research and innovation project funded under the INTERREG NEXT Romania–Republic of Moldova Programme
Description EN	The CROSS2MAP project (ROMD 00389) represents a digital innovation designed to promote sustainable tourism and enhance the cultural and natural heritage of the Galați–Cahul–Găgăuzia cross-border region. The core innovation consists of an interactive online platform based on GIS technologies, integrating thematic tourism routes (gastronomic, cultural, wine, and eco-tourism), local attractions, and rural accommodation units into a unified digital system. The platform incorporates advanced multimedia elements, including images, videos, and 360° virtual tours, offering users an immersive and accessible experience. The solution addresses a critical challenge in regional tourism development: the low digital visibility and fragmented promotion of rural and peripheral destinations. By combining digital mapping, field data collection, stakeholder engagement, and cross-border cooperation, the platform enables coordinated tourism planning and strengthens collaboration between local communities, tourism operators, and academic institutions. The implementation of CROSS2MAP has led to improved accessibility of tourism resources, increased regional visibility, and enhanced cross-border interaction between Romania and the Republic of Moldova. The platform provides a scalable and replicable model for the digital transformation of tourism promotion in border regions. This innovation contributes to sustainable tourism development by supporting responsible travel practices, preserving cultural and natural heritage, and increasing the competitiveness of rural destinations within the international tourism market. The solution demonstrates high potential for scalability and replication in other cross-border regions.

RO.159.	
Title EN	**CBOL – ONLINE CROSS-BORDER UNIVERSITY LIBRARY FOR EQUITABLE ACCESS TO HIGH-QUALITY EDUCATIONAL SERVICES (ROMD 00388)**
Authors	Silvius STANCIU, Diana ANTOCI, Alexandra BARBĂNEAGRĂ, Riana RADU, Bogdan BRATOVEANU, Iulian Liviu PETCU, Lenuța URSACHI, Ecaterina SCHERLET, Alina HUMĂ, Mihaela GUȚU, Marius MITREA
Institution	*** "Dunărea de Jos" University of Galați, Romania** **** "Ion Creangă" State Pedagogical University of Chișinău, Republic of Moldova**
Patent no.	Not applicable – CBOL (ROMD00388), a cross-border research and innovation project funded under the INTERREG NEXT Romania–Republic of Moldova Programme
Description EN	The Cross-Border Online Library (CBOL) represents a pioneering digital innovation that establishes the first cross-border digital university library between Romania and the Republic of Moldova, developed within the INTERREG NEXT Programme framework. The platform provides integrated and equitable access to scientific publications, educational materials, and research outputs through a unified and interoperable digital infrastructure. By incorporating advanced technologies for digitalization, metadata management, secure access, and open dissemination, CBOL supports the principles of open science and cross-border academic collaboration. This initiative addresses a critical regional challenge: unequal access to academic resources and fragmented digital infrastructures. Through a multilingual interface (Romanian, English, and Russian) and a user-oriented architecture, the platform ensures accessibility for students, researchers, and educators, while facilitating knowledge exchange and institutional cooperation. CBOL stands out as one of the first digital platforms of its kind developed within the INTERREG NEXT programmes, contributing to the modernization and integration of academic infrastructures at the cross-border level. The results demonstrate improved accessibility to academic resources, increased visibility of regional research, and enhanced cross-border academic connectivity. The platform contributes to reducing the digital divide and strengthening the educational ecosystem within the European Higher Education Area. This innovation provides a scalable and replicable model for other European cross-border regions seeking to enhance access to knowledge and accelerate digital transformation in higher education.

RO.160.	
Title EN	**SPICY PINT - An Innovative Value-Added Dark Beer with Enhanced Sensory and Functional Properties**
Authors	**Georgiana Horincar, Ioana Gabriela (Savin) Popa, Iuliana Aprodu**
Institution	**University "Dunărea de Jos" of Galați, România**
Patent no.	**Patent application OSIM No. A/00471/15.01.2026**
Description EN	The present invention concerns an innovative recipe for dark beer produced from natural ingredients and enriched with Kashmiri chili extract. The addition of Kashimiri chili extract improves the beer's sensory properties, including taste, aroma, and color, while also enhancing the functional value of the final product. The proposed method describes the production of a value-added dark beer through the incorporation of Kashmiri chili (Capsicum annuum L.) extract. Red chili is widely recognized for its high content of biologically active compounds, which provide significant functional potential due to their antioxidant, coloring, and flavoring properties. The resulting beer is characterized by a dark brown color with subtle reddish hues, a sweet and fruity taste, and a well-balanced aromatic profile featuring notes of fruit, coffee, light smokiness, and a mild spicy aftertaste. This approach represents an original strategy for diversifying the range of specialty beers while increasing both the functional properties and the commercial value of the final product.

RO.161.	
Title EN	**Value-added pastry cream enriched with microencapsulated extract powder from eggplant (Solanum melongena L.) peels**
Authors	**Georgiana Horincar, Andronoiu Doina Georgeta, Cotârleț Mihaela, Bahrim Gabriela, Aprodu Iuliana**
Institution	**University "Dunărea de Jos" of Galați, România**
Patent no.	**Patent application A00164/8.05.2025**
Description EN	The present invention relates to the development of dessert creams for use in confectionery and pastry applications, incorporating microencapsulated eggplant (Solanum melongena L.) peel extract powder as a bioactive ingredient. Due to its content of naturally occurring colorants and

antioxidant compounds derived from eggplant peels, the microencapsulated powder contributes to an attractive product color, enhances sensory properties, and improves the overall functional value of the dessert cream. In addition, it supports product diversification while providing antioxidant activity with potential health benefits for consumers.
The objective of the invention is to replace synthetic additives with natural, non-toxic compounds extracted from eggplant peels that exhibit significant antioxidant properties. To the best of the inventors' knowledge, no prior studies have reported the development of value-added dessert creams based on eggplant peel extract as a natural colorant and source of bioactive compounds with antioxidant potential.
In conclusion, the use of microencapsulated eggplant peel extract powder as a functional ingredient in dessert-type cream represents a natural alternative to synthetic antioxidants and colorants, meeting consumer demand for natural and healthy food products.

RO.162.	
Title EN	**AI-DRIVEN NEURO-SYMBOLIC CYBERSECURITY FRAMEWORK FOR SCADA SYSTEMS**
Authors	**Marin F. B, Buruiană D. L., Marin M. , Gurău G.**
Institution	**Interdisciplinary Research Centre in the Field of Eco-Nano Technology and Advanced Materials CC-ITI, Faculty of Engineering, "Dunărea de Jos" University of Galaţi, 47 Domnească Street, 800008 Galati, Romania**
Patent no.	-
Description EN	This invention proposes an advanced approach for protecting SCADA systems by integrating artificial intelligence with neuro-symbolic reasoning to detect and interpret complex cyber threats more effectively. Through the use of AI Audacious Training, the system is capable of identifying novel, subtle, and hybrid attacks that are often missed by conventional cybersecurity methods. At the same time, the Neuro-Symbolic Harmonisation Engine correlates network anomalies with industrial process rules, enabling more accurate decisions and reducing false alarms. As a result, the invention improves the resilience of critical infrastructure and helps protect industrial operations without requiring a

full system shutdown.

RO.163.	
Title EN	**HYBRID ADAPTIVE SPINAL ORTHOSIS WITH AUXETIC METAMATERIALS AND PNEUMATIC SUPPORT**
Authors	**Marin F. B, Buruiană D. L., Marin M. , Gurău G.**
Institution	**Interdisciplinary Research Centre in the Field of Eco-Nano Technology and Advanced Materials CC-ITI, Faculty of Engineering, "Dunărea de Jos" University of Galaţi, 47 Domnească Street, 800008 Galati, Romania**
Patent no.	-
Description EN	This invention presents a hybrid adaptive spinal orthosis designed for posture correction, spinal stabilization, and medical rehabilitation. The device combines auxetic metamaterial structures with integrated pneumatic chambers, sensors, and an electronic control unit. The auxetic structure provides passive mechanical support, controlled flexibility, and directional stiffness, adapting to the user's normal movements. The pneumatic chambers allow active adjustment of pressure and support in the lumbar and lower thoracic regions according to therapeutic needs. Based on sensor feedback, the system can modify the support level in real time and apply corrective forces only when required. Compared with conventional rigid spinal braces, the invention aims to improve comfort, enable personalized treatment, and increase rehabilitation efficiency. The proposed solution has significant potential for medical recovery, daily spinal support, and prevention of incorrect posture

RO.164.	
Title EN	**Bone graft for the restoration of bone defects**
Authors	JIAN Mariana, FICAI Anton, FICAI Denisa, NACU Viorel, COBZAC Vitalie, MOTELICA Ludmila, MOSTOVEI Andrei, OPREA Ovidiu-Cristian, SOLOMON Oleg, MALCOVA Tatiana, EARAR Kamel
Institution	Dunărea de Jos University of Galati Nicolae Testemitanu State University of Medicine and Pharmacy National University of Science and Technology

	POLITEHNICA Bucharest
Patent no.	Patent No. 1898/ 2025.11.30
Description EN	The invention relates to regenerative medicine, tissue engineering, dentistry, and orthopedics, and can be used for the extraction of type I collagen from the umbilical-placental complex and for the preparation of a graft for the restoration of bone defects. The problem addressed by the proposed invention consists in the development of a method for extracting type I collagen from the umbilical-placental complex, based on the use of ionic surfactants, namely 0.5% sodium dodecyl sulfate and 0.1% sodium deoxycholate, followed by washing with the non-ionic surfactant Triton X-100, as well as the development of a graft based on this collagen. The result lies in the fact that this method ensures the extraction of high-purity type I collagen of allogeneic origin, and the production of a graft based on type I collagen extracted from the umbilical-placental complex, which enables post-transplant bone regeneration without complications and accelerates osseointegration due to its non-immunogenicity, high biocompatibility, and its capacity for osteoconductivity, osteoinduction, osteogenesis, and angiogenesis.

RO.165.	
Title EN	**Advanced Comparative Engineering of Inert Dental Ceramics for High-Performance Prosthetic Restorations**
Authors	Gabriela Stan[1], Kamel Earar[1], Iulian Antoniac[1], Andi Cristian Boanca[1], Corneliu Munteanu[2]
Institution	[1] Faculty of Medicine and Pharmacy, University “Dunarea de Jos” Galati, Romania [2] Gheorghe Asachi Technical University of Iasi, Romania
Patent no.	-
Description EN	This research introduces an integrated and advanced comparative framework for the engineering and selection of inert dental ceramics used in high-performance prosthetic restorations. The study systematically investigates zirconia, lithium disilicate, feldspathic ceramics, and zirconia-reinforced lithium silicates, combining conventional processing routes with state-of-the-art CAD/CAM fabrication technologies.

The innovation resides in the multi-scale correlation between morphology, chemical composition, and functional surface behavior, achieved through combined scanning electron microscopy and energy-dispersive X-ray spectroscopy analyses. The results demonstrate that monolithic ceramic systems exhibit superior structural homogeneity and chemical stability, while layered architectures reveal controlled interfacial phenomena that can be tailored depending on substrate compatibility.
A key contribution of this work is the identification of surface roughness and wettability as critical design parameters governing adhesion, biofilm interaction, tribological response, and long-term clinical reliability. CAD/CAM-derived ceramics display tunable surface characteristics directly linked to compositional and microstructural optimization, enabling targeted performance enhancement.

RO.166.

Title EN

Innovative Assessment of Mechanical Performance and Fracture Mechanisms in Ceramic-Based Fixed Dental Prostheses

Authors

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Patent no.

Description EN

This study proposes an advanced experimental framework for evaluating the mechanical performance and fracture behavior of ceramic-based fixed dental prostheses, addressing critical limitations of conventional strength-based assessment approaches. The research comparatively investigates metal-ceramic, zirconia-ceramic, monolithic zirconia, and monolithic lithium disilicate systems under standardized three-point bending conditions.
The innovation of the work lies in the integrated analysis of crack initiation, stiffness, damage tolerance, and fracture propagation mechanisms, providing a comprehensive understanding of structural reliability in dental prosthetics. Mechanical testing reveals distinct material-dependent responses, with metal-ceramic systems exhibiting superior resistance to crack initiation and higher load-bearing

capacity. In contrast, monolithic zirconia demonstrates a brittle fracture profile characterized by rapid crack propagation, while lithium disilicate shows enhanced damage tolerance and more stable fracture evolution.
Advanced characterization techniques, including fractographic analysis, micro-computed tomography, and scanning electron microscopy, highlight the existence of material-specific failure mechanisms. Metal-ceramic prostheses predominantly fail through interfacial delamination, whereas monolithic ceramics exhibit cohesive fracture patterns and unstable crack growth behavior.
This research redefines material selection criteria for fixed dental prostheses by emphasizing fracture mechanics and structural reliability rather than peak strength alone. The findings support the development of optimized, application-specific prosthetic solutions, contributing to the advancement of durable, high-performance, and clinically predictable ceramic restorations.

RO.167.	
Title EN	Innovative Microstructural Engineering and Functional Optimization of Inert Dental Ceramics for Advanced Prosthetic Restorations
Authors	Gabriela Stan, Kamel Earar, Alina-Ramona Dimofte, Andi Cristian Boanca, Corneliu Munteanu
Institution	Faculty of Medicine and Pharmacy, University “Dunarea de Jos” Galati, Romania Gheorghe Asachi Technical University of Iasi, Romania
Patent no.	
Description EN	This research advances a materials engineering perspective on inert dental ceramics, proposing a comprehensive approach for optimizing their performance in fixed prosthetic restorations through microstructural and surface-level design. The study focuses on clinically relevant systems, including zirconia, lithium disilicate, feldspathic ceramics, and zirconia-reinforced lithium silicates, integrating both conventional and digital fabrication routes. The innovative contribution lies in establishing direct correlations between microstructural stability, chemical composition, and functional surface properties, with implications for clinical reliability. Morphological and compositional analyses reveal that monolithic ceramic

systems maintain structural uniformity and chemical stability, whereas layered systems exhibit tunable interfacial architectures, ranging from sharp ceramic–ceramic boundaries to complex oxide-mediated bonding zones in metal–ceramic configurations.
A key aspect of this work is the functional evaluation of surface roughness and wettability as governing parameters for adhesion, biofilm interaction, antagonist wear, and long-term prosthetic performance. The results demonstrate that hydrophilicity and topographical features can be engineered to enhance biological compatibility and mechanical response.

RO.168.

Title EN	**Advanced Fracture Engineering and Mechanical Reliability Assessment of Ceramic-Based Fixed Dental Prostheses**
Authors	Kamel Earar, Madalina-Nicoleta Matei, Alina-Ramona Dimofte, Andi Cristian Boanca, Ada Stefanescu
Institution	Faculty of Medicine and Pharmacy, University “Dunarea de Jos” Galati, Romania
Patent no.	-
Description EN	This research introduces an advanced comparative framework for the mechanical reliability assessment of ceramic-based fixed dental prostheses, extending beyond conventional strength-based evaluation toward a fracture mechanics-driven approach. The study systematically analyzes metal-ceramic, zirconia-ceramic, monolithic zirconia, and monolithic lithium disilicate systems under controlled bending conditions. The innovative dimension of the work lies in the integrated evaluation of crack initiation thresholds, stiffness, deformation capacity, and fracture propagation mechanisms, providing a holistic understanding of material performance in prosthetic applications. Experimental results highlight the superior crack resistance and load-bearing capacity of metal-ceramic systems, attributed to the synergistic interaction between ductile metallic substructures and ceramic veneering layers. In contrast, monolithic zirconia exhibits a brittle fracture regime characterized by rapid crack propagation and limited energy dissipation. Lithium disilicate demonstrates a balanced mechanical

	response, combining moderate strength with enhanced damage tolerance, positioning it as a viable alternative for applications requiring improved fracture stability. Advanced failure analysis using micro-computed tomography, stereomicroscopy, and scanning electron microscopy confirms the presence of distinct material-specific fracture modes, including interfacial delamination, cohesive fracture, and unstable crack growth. This study redefines the criteria for material selection in fixed prosthodontics by emphasizing fracture behavior, energy dissipation capacity, and interfacial integrity. The proposed approach supports the development of optimized, application-oriented prosthetic systems, contributing to increased durability, structural predictability, and long-term clinical performance.
RO.169.	
Title EN	**Platelet-Rich Fibrin as a Protocol-Dependent Biomaterial in Dentistry: Biological Mechanisms and Clinical Applications**
Authors	Vladimir Buga, Alina-Ramona Dimofte, Ada Stefanescu, Sonia-Teodora Statescu-Manaila, Kamel Earar
Institution	**Faculty of Medicine and Pharmacy, University "Dunarea de Jos" Galati, Romania**
Patent no.	
Description EN	Platelet-rich fibrin (PRF) is an autologous biomaterial increasingly used in dentistry due to its regenerative potential. Its fibrin matrix, rich in platelets and leukocytes, enables sustained release of growth factors that support tissue healing and regeneration. This review highlights the biological basis of PRF, the role of preparation protocols, and its main clinical applications. Centrifugation parameters, particularly relative centrifugal force and low-speed protocols, significantly influence the composition and biological activity of PRF. Therefore, PRF should be considered a protocol-dependent biomaterial rather than a standardized product. Clinically, PRF has shown beneficial effects in periodontal regeneration, soft-tissue healing, and bone-related procedures. However, variability in preparation methods and study designs remains a limitation. PRF represents a promising adjunct in dental regenerative

therapies, although further standardization is needed to improve clinical predictability.

RO.170.	
Title EN	**Occlusal Forces and Alveolar Bone Adaptation: A CBCT-Based Investigative Approach**
Authors	Alina-Ramona Dimofte, Kamel Earar, Sonia-Teodora Statescu-Manaila, Antoanela Covaci, Petru Trifautanu
Institution	**Faculty of Medicine and Pharmacy, University "Dunarea de Jos" Galati, Romania**
Patent no.	
Description EN	The relationship between occlusal forces and alveolar bone morphology represents a key aspect of craniofacial adaptation with direct clinical relevance. This study explores how functional loading influences the structural characteristics of the alveolar bone using three-dimensional imaging techniques. Cone-beam computed tomography was utilized to assess variations in bone thickness, height, and trabecular organization in relation to occlusal force and dental positioning. The findings indicate that increased functional loading is associated with enhanced bone density and more organized trabecular patterns, suggesting a direct adaptive response of the dentoalveolar complex. Differences in tooth position and skeletal relationships were also found to influence local bone morphology, reinforcing the interaction between mechanical stimuli and structural adaptation. These observations support the concept that alveolar bone is a dynamic tissue capable of continuous remodeling under occlusal influences. The integration of advanced imaging in evaluating these changes provides valuable insight for improving diagnostic accuracy and optimizing treatment planning in orthodontics and restorative dentistry.

RO.171.	
Title EN	**Salivary and Gingival Crevicular Biomarkers for Early Detection and Precision-Oriented Periodontal Assessment**
Authors	Ludmila Vașchevici, Alina-Ramona Dimofte, Antoanela Covaci, Ada Stefanescu, Dorin Ioan Cocos, Kamel Earar
Institution	**Faculty of Medicine and Pharmacy, University "Dunarea**

	de Jos" Galati, Romania
Patent no.	
Description EN	Salivary and gingival crevicular biomarkers offer a promising approach for the early detection and biological assessment of periodontal disease. This study investigates the use of oral fluids as minimally invasive sources of molecular information related to inflammation, tissue breakdown, and microbial imbalance. The findings indicate that specific biomarker patterns are associated with periodontal activity and may reveal ongoing disease processes beyond conventional clinical evaluation. Combined biomarker analysis showed greater diagnostic relevance than single markers, supporting a multifactorial understanding of disease mechanisms. Additionally, the integration of digital analysis methods highlights the potential for individualized risk assessment and targeted therapeutic strategies. These results support the role of oral fluid biomarkers in advancing precision-oriented periodontal diagnostics, although further validation is required for routine clinical use.

RO.172.	
Title EN	**Temporomandibular Disorders: Contemporary Insights into Diagnosis and Integrated Management Approaches**
Authors	Kamel Earar, Ramona Feier, Alina-Ramona Dimofte, Gabriel-Valeriu Popa, Sonia-Teodora Statescu-Manaila
Institution	**Faculty of Medicine and Pharmacy, University "Dunarea de Jos" Galati, Romania** **Grigore T. Popa University of Medicine and Pharmacy, Iasi, Romania**
Patent no.	
Description EN	Temporomandibular disorders (TMD) are a group of conditions affecting the temporomandibular joint and masticatory muscles, leading to facial pain, joint sounds, and reduced jaw function. Their cause is multifactorial, involving biomechanical, neuromuscular, and psychosocial factors. Diagnosis is based on standardized DC/TMD criteria and supported by imaging methods such as MRI for soft tissues and CBCT for bone structures, with additional tools like ultrasonography and functional imaging used in selected cases. Treatment is mainly conservative and multidisciplinary,

including occlusal splints, physiotherapy, behavioral changes, and medication, while arthrocentesis is reserved for resistant cases.
Current approaches are moving toward more personalized management by combining clinical, imaging, and psychosocial information to better tailor therapy to each patient.

RO.173.	
Title EN	**Zirconia-Based Biomaterials for Advanced Dental Aesthetics: Tailoring Strength–Translucency Balance for Next-Generation Restorations**
Authors	Kamel Earar, Petru Trifautanu, Ramona Feier, Ada Stefanescu, Alina-Ramona Dimofte
Institution	**Faculty of Medicine and Pharmacy, University "Dunarea de Jos" Galati, Romania** **Grigore T. Popa University of Medicine and Pharmacy, Iasi, Romania**
Patent no.	
Description EN	This research explores zirconia as a high-performance biomaterial for advanced dental aesthetics, focusing on the engineering of its structural and optical properties to meet evolving clinical demands. The study emphasizes yttria-stabilized zirconia systems, where the controlled balance between mechanical strength and translucency represents a key innovation challenge in modern prosthodontics. The work highlights recent advances in material design that enable enhanced light transmission while preserving structural integrity, supporting the development of monolithic zirconia restorations with reduced risk of chipping and improved long-term reliability. The innovation lies in optimizing phase composition and microstructure to tailor both aesthetic and functional performance within a single material system. Clinically, zirconia demonstrates excellent biocompatibility, favorable soft-tissue integration, and low plaque affinity, making it suitable for crowns, bridges, and implant-supported restorations. At the same time, the study critically addresses current limitations, including bonding challenges, antagonist wear, and the still-limited translucency compared to glass-ceramic alternatives. By reframing zirconia as an engineered biomaterial rather

than a conventional restorative option, this research supports the development of next-generation aesthetic solutions with improved predictability and performance. The findings contribute to advancing personalized dental restorations through material optimization strategies that integrate mechanical durability with enhanced optical behavior.

Iasi University of Life Sciences "Ion Ionescu de la Brad", Romania

RO.174.	
Title EN	**From Agro-Waste to Clean Water: Lignin Bio-Filters for Cu(II) and Cr(VI)**
Authors	Ungureanu Elena[1]; Tofanica Bogdan-Marian[1]; Fortună Maria-Emiliana[2]; Ungureanu C. Ovidiu[3]; Volf Irina[4]
Institution	[1] "Ion Ionescu de la Brad" Iasi University of Life Sciences, Mihail Sadoveanu Alley, 700490 Iasi, Romania [2] "Petru Poni" Institute of Macromolecular Chemistry, Grigore Ghica Voda Alley, 700487 Iasi, Romania [3] "Vasile Goldis" Western University of Arad, Boulevard of the Revolution, 310025 Arad, Romania [4] "Gheorghe Asachi" Technical University of Iasi, Prof. Dr. Docent Mangeron Boulevard, 700050 Iasi, Romania
Patent	Pending
Description EN	This invention proposes the direct valorization of an abundant, low-cost agro-industrial biowaste—unmodified Sarkanda grass lignin (Tripidium bengalense)—as a highly selective, "green" adsorbent for wastewater bioremediation. The core innovation lies in using the material's extreme inherent selectivity. Through rigorous thermodynamic and kinetic modeling, we demonstrated its exceptional capacity to rapidly chemisorb divalent heavy metal cations (e.g., Cu^{2+}, achieving a remarkable q_{max} of 22.12 mg/g) via strong ion exchange and chelation at its abundant oxygenated functional groups. Under the exact same conditions, this lignin acts as a smart filter: it almost entirely ignores toxic oxyanions like Cr(VI) (q_{max} = 0.861 mg/g) naturally repelling them due to its inherent surface chemistry. The efficacy and environmental safety of this bio-filter were uniquely validated using direct ecotoxicological assays (Triticum aestivum L. and Solanum lycopersicum seed germination). The results clearly showed that the treated water is completely detoxified, while the heavy metals are firmly and irreversibly sequestered within the solid lignin matrix, preventing secondary leaching. This sustainable, "Zero-Waste" technology is directly applicable to: • **Industrial Wastewater Treatment**: Acting as a primary, low-cost bio-filter in packed-bed columns

or batch reactors to selectively target and recover high-value or highly toxic transition metal cations (like Copper, Lead, Zinc, Nickel) from mining, electroplating, or metallurgical effluents.

- **Environmental Remediation**: Deployment in passive remediation systems for contaminated surface waters or agricultural runoff.

Circular Bioeconomy: Providing pulp and biorefinery industries with a high-value, commercial application for their primary waste stream (lignin), closing the loop on biomass utilization.

RO.175.

Title EN	**BUR DOR – FUNCTIONAL LIPID SYSTEM WITH YEAST PROTEIN AND NEUROGASTRONOMIC APPLICATIONS IN HUMAN NUTRITION**
Authors	**Burlacu Dorina, Fotea Lenuța**
Institution	**Ion Ionescu de la Brad Iași University of Life Sciences, Romania, Associazione Italiana Cuochi (Ambassador of Italian Cuisine)**
Patent no.	
Description EN	The BUR DOR butter creams represent an innovation in scientific gastronomy. With a reduced-fat formulation (35%) and a balanced aqueous phase containing vegetable fibers and proteins, they offer a unique structure that enhances both lipophilic and hydrophilic aromatic molecules. All variants are gluten-free, lactose-free, additive-free, and preservative-free, and are presented as fresh products to be kept refrigerated. This balance between fat and water amplifies aromatic release, improving roundness, cleanliness, and sensory complexity. The reduction of lipid content and the controlled inclusion of water, fibers, and vegetable proteins make BUR DOR butter creams intelligent emulsions, capable of enhancing both lipophilic and hydrophilic aromatic molecules. All variants are gluten-free, lactose-free, additive-free, and preservative-free, and are fresh products that must be stored under refrigeration. For an optimal sensory experience, it is recommended to temper the product for 5–7 minutes at room temperature, allowing the natural release of aromatic compounds and improving the perception of creaminess, sweetness, and

aromatic depth.
The result is an amplified, clean, and persistent aromatic perception: a new generation of Noble Butter for international scientific gastronomy.

RO.176.	
Title EN	**FUNCTIONAL FOODS BASED ON BEETROOT AND CARROT POWDER WITH IMPACT ON CONSUMERS**
Authors	**Fotea Lenuța, Horhogea Cristina-Elena, Donosa Elena-Raluca, Rîmbu Cristina Mihaela , Palancianu Armand**
Institution	**Ion Ionescu de la Brad Iași University of Life Sciences, Romania,**
Patent no.	-
Description EN	Functional foods are defined as food products that provide essential nutrients required for maintaining good health and that, beyond fulfilling basic nutritional needs, may exert beneficial effects on human health. Food is increasingly regarded as a means of promoting health and well-being, and manufacturers are proactively responding to this perspective by developing innovative products designed to meet these demands. This study was designed to present the technology for producing the culinary preparation "Two-Colored Roses." It also aimed to investigate the functional implications of incorporating beetroot powder and carrot powder (flour). As a novel component of the research, a questionnaire was employed to assess consumer perception. The questionnaire served both to analyze the market from a marketing perspective and to evaluate the finished product.

RO.177.	
Title EN	**INNOVATIVE CONVERSION OF HYDROALCOHOLIC PLANT EXTRACTS INTO A BIOACTIVE ANTIMICROBIAL CREAM**
Authors	**Horhogea Cristina-Elena, Ipate Alina-Mirela, Onofrei Mihaela-Dorina, Fotea Lenuța, Rîmbu Cristina-Mihaela**
Institution	Ion Ionescu de la Brad Iași University of Life Sciences
Patent no.	-
Description EN	The increasing prevalence of antimicrobial resistance has intensified the search for alternative therapeutic strategies, particularly those based on natural compounds. Medicinal plants are recognized as rich sources of bioactive substances

with antimicrobial, anti-inflammatory, and healing properties.
In this context, hydroalcoholic extracts obtained from selected medicinal plants such as Origanum vulgare, Calendula officinalis, Mentha spp., Hypericum perforatum, Plantago major, and Achillea millefolium have demonstrated promising biological activity. The incorporation of these extracts into a topical cream formulation, using natural excipients like olive oil and beeswax, represents an innovative approach for enhancing their applicability and therapeutic potential.
This study aims to explore the development and antimicrobial potential of a plant-based cream formulated from hydroalcoholic extracts of medicinal plants.

The invention consists of a topical lipid-based formulation (olive oil/beeswax) loaded with hydroalcoholic plant extract, exhibiting strong antimicrobial activity, particularly against Gram-positive bacteria, combined with favorable shear-thinning rheological properties for easy application and improved skin retention.

Applications:

- ✓ Topical antimicrobial therapy for skin infections
- ✓ Treatment of Gram-positive bacterial infections
- ✓ Wound care and infected lesions
- ✓ Potential use in cosmetic and dermatological products

Sustainable alternative to conventional antimicrobial agents

RO.178.

Title EN	**The Digital Transformation of Agriculture from the Students' Perspective: Acceptance Factors and Barriers to New Technology Adoption**
Authors	Raluca-Sînziana ZAHARIA, Iuliana ROATĂ, Alin LUPAȘCU, Andrei-Florin PĂDURARU, Carmen-Olguța BREZULEANU
Institution	**„Ion Ionescu de la Brad" Iasi University of Life Sciences**
Description EN	The accelerating integration of artificial intelligence and data-driven technologies into agri-food systems is redefining the competency requirements for future agricultural

specialists.
This study investigates digital literacy dynamics and technology acceptance among undergraduate students at Iași University of Life Sciences (IULS), with the aim of identifying growth vectors and educational optimization opportunities within the Agriculture 4.0 paradigm.
A quantitative and qualitative survey was conducted with 146 undergraduate students from the Faculties of Agriculture, Horticulture and Animal and Food Resources Engineering, using Google Form and structured questionnaires based on the Technology Acceptance Model (TAM) and a 5-point Likert scale. Results reveal a competency profile in transition: while 70% of students believe AI will increase farm profitability and 66% find learning new technologies easy, the mean Digital Literacy score stands at only 2.90 — indicating a consolidation stage. A notable gap was identified between high perceived usefulness (3.97) and actual technical preparedness, while self-efficacy (3.46) was found to positively correlate with intention to adopt (3.46).
The main barriers to adoption were high implementation costs (38%), lack of practical training (33%), poor infrastructure (15%) and skepticism (14%).
These findings confirm that IULS students are in a proactive digital transition stage, characterized by strong openness to innovation but limited applied competencies. The study highlights the strategic potential of dual AgriTech education as an effective solution for addressing both economic barriers (38%) and the lack of practical training (33%), while providing a solid empirical foundation for aligning academic curricula with real labor market demands.

RO.179.

Title EN **ARTIFICIAL INTELLIGENCE IN HIGHER EDUCATION AND TEACHER TRAINING: RESPONSIBLE INTEGRATION AND IMPACT**

Authors Carmen-Olguța BREZULEANU [1], Iuliana ROATĂ[1], Raluca-Sînziana ZAHARIA[1], Florin Andrei PĂDURARU[1], Alin Mihnea LUPAȘCU[1], Mădălina-Maria BREZULEANU[2]

Institution 1 “Ion Ionescu de la Brad” Iasi University of Life Sciences

2 “Gheorghe Asachi” Technical University, Iasi

Patent no. -

Description EN

Artificial intelligence is rapidly transforming higher education, bringing new opportunities for personalized learning, data analysis, and automated feedback. This study investigates how students, doctoral candidates, and teacher training participants at the "Ion Ionescu de la Brad" University of Life Sciences (IULS), Iași, Romania, perceive and use AI in their academic and pedagogical work. A total of 120 respondents participated through structured questionnaires and case studies focused on AI applications. Results indicate that AI familiarity is generally moderate to low across all groups, with notable differences in usage patterns: students rely on AI primarily for rapid information retrieval, doctoral candidates for data analysis, and teacher training participants for lesson preparation and classroom simulations. The main perceived advantages include rapid access to information (87%) and personalized learning (72%), while the primary challenges identified are digital dependency (62%) and risk of superficial learning (52%). Data were interpreted statistically and compared with teachers' input. Findings suggest that responsible AI integration can modernize education and prepare future professionals for the demands of smart agriculture and digital learning, provided that ethical guidelines and targeted digital training programs are implemented.

RO.180.

Title EN **Meat Meets Innovation: Functional Oleogel-Infused Sausages Enriched with Plant Proteins, Buckwheat, and Dietary Fibers**

Authors Roxana-Georgiana Bobeica[1]; Andra-Sabina Neculai-Văleanu[2]; Gabriel Vasile Hoha[1]; Benone Pasărin[1]

Institution [1]Iași University of Life Sciences, Romania
[2]Romanian Academy Iasi Branch, bld Carol I, no 8, Iași

Description EN

This study proposes an innovative formulation of sausages by partially replacing animal fat with a structured oleogel obtained from cold-pressed rapeseed oil and sea buckthorn oil, combined with functional plant-based ingredients such as buckwheat. The objective is to improve the physicochemical, nutritional, and protein profile of conventional meat products while maintaining their sensory quality and consumer

acceptability.The oleogel system mimics the structural and rheological properties of animal fat, ensuring desirable texture and product stability. Additionally, it acts as a carrier of bioactive compounds, particularly unsaturated fatty acids and natural antioxidants from sea buckthorn oil, contributing to improved oxidative stability and potential cardiovascular benefits.Buckwheat, incorporated as flour or functional fractions, provides high-quality proteins, essential amino acids, dietary fibers, and bioactive compounds such as rutin. It also enhances water-holding capacity, texture, and technological stability, reducing processing losses during thermal treatment. To further improve functionality, the formulation includes plant proteins (e.g., pea protein isolate) and dietary fibers (such as inulin or oat fiber), which enhance emulsion stability, water retention, and texture while increasing protein content and supporting digestive health. Natural antioxidants (e.g., rosemary extract or tocopherols) are also added to protect lipids and extend shelf life. The developed sausages were evaluated for physicochemical properties, oxidative stability, texture, and sensory acceptability. Results indicate that combining oleogels, buckwheat, plant proteins, and fibers produces a balanced product with improved technological properties, reduced saturated fat, enhanced nutritional value, and preserved sensory quality.
This approach supports the development of sustainable, functional meat products aligned with modern consumer demands.

RO.181.

Title EN

Poultry Meat Meets Innovation: Healthy chicken with high omega-3 and omega-6 fatty acids

Authors

Gabriel Vasile HOHA[1]; Leonard STAFIE[1]; Ion BUDEANU[2], Oana TIMOFTE[3]; Roxana - Georgiana BOBEICĂ[1]; Marius Giorgi USTUROI[1]; Cătălin Emilian NISTOR[1]; Andra-Sabina NECULAI-VĂLEANU[4]; Benone PASĂRIN[1]

Institution

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[3]"Grigore T. Popa" University of Medicine and Pharmacy, Iași
[4]Romanian Academy Iasi Branch, bld Carol I, no 8, Iași

Description EN	This project presents an innovative method of enriching poultry meat with omega-3 and omega-6 fatty acids. The main objective of the project is to provide the human consumer with the daily requirement of omega-3 and omega-6 fatty acids through the consumption of healthy, easily digestible and inexpensive meat, namely poultry meat, and to eliminate the consumption of synthetic food supplements rich in omega-3 and omega-6. We also aimed to obtain healthier poultry meat for human consumption, without using synthetic products. In this regard, a bioactive ingredient, namely hemp meal, rich in omega-3 and omega-6 fatty acids, was used. Our research aligns with the latest trends in modern animal husbandry, namely the transformation of basic foods into functional foods that contribute to improving overall health and the proper functioning of the body. Research has shown that improving the feed recipe for broiler chickens by adding hemp meal in certain percentages leads to an improvement in the chemical composition of the meat obtained from them. Due to the high content of crude cellulose, which could have acted as a limiting factor, it was decided to administer a maximum of 5% in the feed recipe and only during the finishing period. In chickens that were given hemp meal, compared to those that consumed normal feed, the omega-3 content increased by over 12% and the omega-6 content by over 13%. We believe that the use of hemp meal in poultry feed represents an innovative approach with special implications for the broiler chicken farming sector and for human health. Our research uses plant-based ingredients, facilitating the production of healthy meat ideal for a balanced diet, ensuring the daily requirement of omega-3 and omega-6 fatty acids, without consuming synthetic products.

University of Life Science ”King Mihai I” from Timisoara

RO.182.	
Title EN	**EVALUATION OF THE BIOLOGICAL EFFECT OF EXTRACTS FROM CALLUS AND SAGE PLANTS – POSSIBLE PHYTOPHARMACEUTICALS SOURCES AND FOOD ADDITIVES SOURSES**
Authors	Borozan Aurica Breica[1*], Bordean Despina[2], Lăcătuș Mihaela[2], Mișcă Corina[2], Popa Mirela Viorica[2], Moldovan Camelia[2], Dumbravă Delia Gabriela[2], Poiană Mariana Atena[2], Moigrădean Diana[2], Rădulescu Laura[2], Stoin Daniela[2], Tarkanyi Patricia[2], Dobrei Alina[1], Caba Ioan Ladislau[3]
Institution	University of Life Sciences “King Mihai I” from Timisoara
Patent no.	research project
Description EN	Extracts from sage seeds, callus and plantlets, obtained by "in vitro" micropropagation, were subjected to antimicrobial and antioxidant tests, with the aim of using them in phytopharmaceutical formulas and improving food products. In most cases, the extracts had antimicrobial properties similar to or higher than those of antibiotics. Salmonella sp. was inhibited by the callus extract. Escherichia coli had a negative reaction to the plantlets extract. Good biological activity was demonstrated by the callus and seed extracts against the bacterium Shigella sp. All extracts had antifungal potential against the species Candida albicans. Higher antioxidant potential was shown by the callus extract, compared to the plantlets extract. Extracts from "in vitro" regenerated cultures can be used in the food and pharmacological fields.
RO.183.	
Title EN	**ANTIFUNGAL GEL BASED ON COLLAGEN, CLAY AND ESSENTIAL OIL AND ITS PRODUCTION PROCESS**
Authors	Mederle Narcisa, Albu Kaya Mădălina Georgiana, Kaya Durmuș Alpaslan, Mederle Ovidiu Alexandru, Morariu Sorin, Marin Ana-Maria, Radbea Oana Raluca, Hanganu (Mîrza) Mihaela
Institution	University of Life Sciences “King Mihai I” from Timisoara

Patent no.	Patent application - A/00776/2024
Description EN	The gel based on methylcellulose, collagen hydrolyzate, yellow clay and essential oil with antifungal properties was created as a treatment for bovine trichophytosis, a contagious skin condition caused by dermatophyte fungi. The gel has adequate rheological properties for easy application to the affected area due to its controlled viscosity; also the essential oil with antifungal properties released from the yellow clay has the property to destroy the pathogenic fungus Trichophyton verrucosum, and the collagen to regenerate damaged skin and is recommended for veterinary use.

RO.184.	
Title EN	**AMBIENT AIR MONITORING NETWORK**
Authors	Florin Crista, Florin Imbrea, Isidora Radulov, Nenad Zarici, Lucian Nita, Ilinca Imbrea, Sanja Bozovic, Laura Smuleac, Ionela Hotea, Lucian Botos, Ioan Banatean Dunea, Adina Berbecea, Alina Lato, Laura Crista, Milana Zaric, Stefan Batrina
Institution	University of Life Sciences “King Mihai I” from Timisoara
Patent no.	-
Description EN	An advanced air quality monitoring system was developed, based on an integrated approach that combines automated air monitoring stations equipped with real-time analyzers for major atmospheric pollutants (CO_2, NO_x, SO_2, H_2S, and BTEX compounds) with advanced laboratory analytical methods. Suspended particulate matter (PM) is collected and analyzed to identify and characterize specific contaminants, including polycyclic aromatic hydrocarbons (PAHs), pesticides, persistent organic pollutants (POPs), heavy metals, and microplastics. Microplastic analysis is performed using gas chromatography coupled with mass spectrometry (GC–MS), while heavy metal determination is carried out using inductively coupled plasma mass spectrometry (ICP–MS). This multicriteria approach enables a comprehensive and integrated assessment of air quality, providing robust scientific support for the development of environmental protection strategies.

RO.185.	
Title EN	**ANTIFUNGAL GEL BASED ON COLLAGEN, CLAY AND ESSENTIAL OIL AND ITS PRODUCTION PROCESS**
Authors	Mederle Narcisa, Albu Kaya Mădălina Georgiana, Kaya Durmuş Alpaslan, Mederle Ovidiu Alexandru, Morariu Sorin, Marin Ana-Maria, Radbea Oana Raluca, Hanganu (Mîrza) Mihaela
Institution	University of Life Sciences "King Mihai I" from Timisoara
Patent no.	Patent application - A/00776/2024
Description EN	The gel based on methylcellulose, collagen hydrolyzate, yellow clay and essential oil with antifungal properties was created as a treatment for bovine trichophytosis, a contagious skin condition caused by dermatophyte fungi. The gel has adequate rheological properties for easy application to the affected area due to its controlled viscosity; also the essential oil with antifungal properties released from the yellow clay has the property to destroy the pathogenic fungus Trichophyton verrucosum, and the collagen to regenerate damaged skin and is recommended for veterinary use.

RO.186.	
Title EN	**ASSESSMENT OF THE NUTRITIONAL AND BIOFUNCTIONAL PROFILE OF SIBIU SALAMI, VERIFICATION OF THE STABILITY OF BIOFUNCTIONAL COMPOUNDS DURING THE SHELF LIFE AND DEMONSTRATION OF THE NUTRITIONAL BENEFITS OF THE PRODUCT FOR THE HUMAN BODY**
Authors	**Diana Nicoleta Raba, Isidora Radulov, Mariana-Atena Poiana, Popescu Iuliana, Ileana Cocan, Adina Berbecea, Corina Dana Misca, Delia Gabriela Dumbravă, Camelia Moldovan, Viorica-Mirela Popa**
Institution	University of Life Sciences "King Mihai I" from Timisoara, 300645, Timisoara, Romania
Patent no.	**Research project: No. 8611/11.10.2024**
Description EN	The project aims on an in-depth investigation of Sibiu salami, one of Romania's most iconic cured meat products, with the goal of gaining a clearer understanding of its nutritional profile and potential health benefits. The analysis covers the main proximate components: moisture, protein,

fat, carbohydrates, ash, and salt, along with water activity and nitrite levels in five Sibiu salami samples produced by different Romanian manufacturers. In addition, the study examines the full fatty acid spectrum, paying particular attention to omega-3 and omega-6 fatty acids, as well as the mineral content of each sample, to evaluate their overall nutritional quality. Another important objective is to assess how these nutritional compounds change throughout the product's shelf life, ensuring that their functional properties remain stable over time. Beyond laboratory measurements, the project aims to highlight the ways in which Sibiu salami can fit into a balanced diet and contribute to maintaining essential physiological functions. By integrating detailed food analysis with principles of nutritional science, the research seeks to position Sibiu salami not only as a traditional Romanian specialty but also as a food with meaningful nutritional value. The findings have the potential to enhance consumer understanding, support informed dietary choices, and encourage producers to develop higher-quality meat products in the future.

RO.187.	
Title EN	BIOBASED AND SOCIAL INNOVATION TO REVITALIZE EUROPEAN LOCAL COMMUNITIES
Authors	Vintilă Teodor, Samfira Mirela, Șuster Gabriel, Chiș Codruța, Grozea Adrian, Pandur Ioana
Institution	University of Life Sciences "King Mihai I" from Timisoara
Patent no.	project number: HORIZON Project number 101060558, Acronym: BIOLOC
Description EN	BIOLOC enhances the role and impact of biobased and social innovation to revitalise European local communities to accelerate the all-inclusive transition to a resource-efficient and circular biobased production and consumption system. BIOLOC address non-technical challenges from the perspective of local development to elaborate on concepts and solutions that will favour a positive cascading effect on communities by fostering a participatory and inclusive approach to developing resilient innovative biobased activities open to the contribution of socially disadvantaged or marginalized groups. Local communities need solutions that connect circular bioeconomy and soil remediation to reduce the negative effects of pollution. The impact foreseen

related to their participation in the biobased circular economy includes the local economy improvement, unemployment would decrease in problematic areas, the foundations of the Circular Bio-based Economy would be laid in the area, which could represent examples of good practices for other localities. The impact could be to decrease depopulation in vulnerable areas.

RO.188.	
Title EN	**Implementation of artificial intelligence in optimizing rural tourism management** **Patent/project number: Research project**
Authors	Theodor Muntean; Larisa-Elena Briscan; Tiberiu Iancu; Ramona Ciolac; Tabita Adamov
Institution	University of Life Sciences "King Mihai I" from Timisoara
Patent no.	
Description EN	Artificial intelligence (AI) represents an innovative technological approach that can contribute to the optimization of rural tourism management and support the sustainable development of rural communities. The use of AI technologies enables more efficient management of tourist flows, improved allocation of local resources, and enhanced visitor experiences. The present study aimed to analyze the role of artificial intelligence in optimizing rural tourism management and to evaluate its potential contribution to the development of rural destinations. A bibliometric analysis of the scientific literature was conducted using relevant keywords extracted from the Web of Science Core Collection database. In addition, artificial intelligence algorithms, including machine learning and artificial neural networks, were applied to analyze tourist behavior and support the optimization of local tourism resources. The results indicate that the integration of artificial intelligence can significantly increase the attractiveness of rural destinations, improve the management of tourist flows, and enhance the effectiveness of tourism promotion strategies. The findings suggest that the implementation of artificial intelligence technologies may represent an effective solution for promoting rural tourism, contributing to sustainable regional development, economic growth, and the preservation of cultural and natural heritage.

University of Agronomic Sciences and Veterinary Medicine of Bucharest

RO.189.	
Title EN	**Smart Dairy Farming with BIoTa: Artificial Intelligence, Internet of Things, and Blockchain for Emission Reduction**
Authors	Roxana Elena Vasiliu, Iuliana Marin, Dănuț-Nicolae Enea, Diana-Alexandra Ciungan
Institution	**University of Agronomic Sciences and Veterinary Medicine of Bucharest**
Patent no.	BIoTa Project "Blockchain-Based IoT System for Monitoring and Controlling Livestock Farms", The Academy of Scientists of Romania for Young Researchers “AOȘR-TEAMS-IV”, “Digital Transformation in Science”, 2025-2026 Patent to be submitted this year
Description EN	Animal welfare and environmental stability in dairy farming requires continuous and trustworthy monitoring systems capable of integrating behavioral and microclimatic indicators. This current study presents BIoTa, a blockchain-enhanced Internet of Things (IoT) and deep learning framework designed for real-time behavioral and environmental monitoring in precision livestock farming. A CNN-LSTM hybrid model was trained to classify abnormal rumination and aggressive interactions using synchronized behavioral and environmental data collected over 30 days at a Romanian farm. Using a dataset of 18,450 labeled behavioral segments, the model achieved 91.4% accuracy, a 0.89 F1-score, and a ROC-AUC of 0.93, outperforming baseline machine learning classifiers ($p < 0.01$). Blockchain validation latency averaged 0.87 s with 99.9% data integrity and 97% system uptime. Correlation analysis revealed significant associations ($p < 0.01$) between an elevated Temperature-Humidity Index (THI > 72) and reduced rumination events, demon-strating that integrating AI-driven behavioral analytics with decentralized data governance enables proactive welfare management.

RO.190.	
Title EN	Boyar's Caviar
Authors	Hodoșan Camelia , Zaharia Florentina , David Marius Valentin , Roșu Silviu Gabriel , Preda Ana Maria , Muscă Ana Maria
Institution	University of Agronomic Sciences and Veterinary Medicine
Patent no.	Patent application No. 1103/2026
Description EN	Boyar's Caviar (Pork Fat Caviar with Onion and Vinegar) Boyar's Caviar is a traditional Romanian appetizer that transforms simple, rustic ingredients into a rich and flavorful delicacy. Despite its name, it does not contain fish roe. Instead, it is made from finely chopped or whipped pork fat (slanina), mixed with fresh onion and a touch of vinegar for brightness. The texture is creamy yet slightly coarse, while the taste balances the richness of the fat with the sharpness of onion and the acidity of vinegar. It is typically served cold, spread on fresh bread, and often accompanied by pickles or vegetables. In our modern interpretation, Boyar's Caviar is presented on a bed of brown rice infused with coffee grounds, highlighting the green and eco-conscious aspect of the product. This innovative pairing emphasizes sustainability by incorporating repurposed ingredients while adding a subtle depth of flavor and a contemporary twist to a traditional dish.

RO.191.	
Title EN	**Device, installation and process for electromagnetic stimulation of plants in hydroponic or aeroponic culture**
Authors	Velcea Marian, Draghici Maria-Elena, Tong Yuxin, Stanica Florin
Institution	**University of Agronomic Sciences and Veterinary Medicine Bucuresti**
Patent no.	Patent application A/00453/15.10.2025
Description EN	The electromagnetic device has a geometric shape of a regular polygon or circle provided with a generous central hole, on which electronic components consisting of flat coils, SMD coils, resistors and capacitors are assembled and is characterized by the fact that the flat coils are placed one above the other, and resonate with a resonance frequency in

the radio band 0.5-300 MHz, at an effective value given by the species and variety of the plant to which it is applied, also dependent on the growth phase approached. The devices are placed in the proximity of the plants either independently, in a network, or combined, and operate by individual resonance activated either by an external field from the environment or by power supply from its own sources, or external to the system. The installation for electromagnetic stimulation of plants in hydroponic-aeroponic culture is made up of at least frequency generation modules, and possibly sensory modules, electrical power supply modules, control and recording modules. It is characterized by the fact that it has as active elements for the interaction with plants - the previously opened devices and whose operating mode is determined by the data selections made corresponding to the managed growth regimes. The procedure for hydroponic cultivation of plants consists of stages of preparation of growth solutions, preparation of the growth facility provided with troughs, pumps, tanks, table supports and lighting installations with power and control modules, as well as the application of device activation regimes at frequencies appropriate to the time of plant development.

The experimental results confirmed consistent increases compared to the control in both height (11%) and plant mass (45%), while maintaining nutritional and organoleptic values. and the quality of the organic product. Horticulture, organic agriculture

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RO.192.

Title EN	**Croissants with Butter and a Filling of Salmon, Cheese, and Lovage, and the Process for Producing Them**
Authors	NICOLAE Carmen Georgeta, TOMA Ionela Florentina
Institution	**University of Agronomic Sciences and Veterinary Medicine of Bucharest**
Patent no.	Patent application A/00586/2025
Description EN	In the context of product diversification, food waste reduction and superior utilization of fish products/by-products, croissants with butter and salmon, cheese and lovage filling were created. The innovative elements consisted in the integration of fish, cheese and lovage in an attractive format - butter croissants, as well as in the

technological process of obtaining them. This approach increases the nutritional, sensory and economic value of fish products, obtaining foods rich in nutrients and omega-3 unsaturated fatty acids.
The nutritional composition of croissants/100g is: proteins-14.45%, lipids–26.60%, carbohydrates–30.35% (of which 2.53 g sugars), dietary fiber-2.95%, salt-1.29%, energy value-424.50 kcal. Sensory analysis has revealed that the product developed and studied is suitable for commercialization.
The product offers a versatile option, easy to integrate into the daily menu, from breakfast to dinner, being suitable for consumption by the whole family. It is especially recommended for active people, those who want to benefit from the nutritional intake of fish, cheese and lovage, as well as those with limited access to traditional fish dishes or who prefer innovative alternatives.
The technological field in which the invention falls is: A22C PROCESSING OF MEAT, POULTRY OR FISH.
The analysis of the OSIM, EUIPO and WIPO databases confirms that there are no similar patents, which supports the uniqueness of the product. Areas of application: Food industry (fish processing, bakery and pastry; ready-to-eat /ready-to-cook products; food service; food retail; frozen products), Human nutrition; Waste management and circular economy in the fishing industry; Durability and sustainability.

RO.193.	
Title EN	**Integrating Sustainable Strategies for Post-Harvest Control of Fruits through Bioactive Edible Coatings – SafeFruits**
Authors	Alina ORTAN, Simona MARCU SPINU, Mihaela DRAGOI CUDALBEANU, Daniela IONESCU, Justinian-Andrei TOMESCU, Carmen CIMPEANU
Institution	**University of Agronomic Sciences and Veterinary Medicine of Bucharest (USAMVB)**
Patent no.	Research Project PN-IV-P7-7.1-PED-2024-2366, contract 123PED/2025, funded by CCCDI-UEFISCDI within PNCDI IV
Description	Post-harvest losses account for approximately 50% of

EN globally produced fruits, driven by microbial contamination, dehydration, and oxidative decay. Current preservation methods rely on synthetic chemicals that raise consumer health and environmental concerns. SafeFruits proposes an integrated, fully natural technology for extending fruit shelf life through bioactive edible coatings.

The approach combines two innovations: (1) Natural Deep Eutectic Solvents (NADES) - formulated from choline chloride and glucose - as green, non-toxic solvents for extracting polyphenol-rich bioactive compounds from Lavandula angustifolia and Mentha piperita; and (2) edible coating matrices based on chitosan (animal-based polysaccharide) and alginate (plant-based polysaccharide), enriched with the extracted bioactive compounds.

The resulting coatings provide antimicrobial, antioxidant, and barrier properties while being entirely safe for human consumption. Target fruits are apricots (shelf life 5-7 days) and apples (shelf life 3-4 weeks) - two economically important species with significant post-harvest challenges.

Applications include post-harvest treatment of fresh fruits by spray, dip, or brush application, providing a sustainable, clean-label alternative to synthetic preservatives in fruit distribution and storage chains. The technology aligns with EU Farm-to-Fork Strategy, EU Green Deal, and UN SDG 2 (Zero Hunger). The project targets laboratory-scale validation (TRL 4), with deliverables including optimised NADES formulations, characterised coating prototypes, peer-reviewed ISI publications, and patent applications.

Acknowledgement: This work was supported by a grant of the Romanian Ministry of Education and Research, CCCDI-UEFISCDI, project number PN-IV-P7-7.1-PED-2024-2366, contract 123PED/2025 within PNCDI IV.

RO.194.

Title EN **Advanced Ecological Solutions for Increasing Food Safety of Fruits and Vegetables, from Producer to Consumer – SIGUR**

Authors Alina Orţan, Daniela Ionescu, Irina Chican, Justinian-Andrei Tomescu, Alexandra Ene-Manea, Irina Fierascu, Radu Claudiu Fierascu, Cristina-Emanuela Enascuta, Simona Marcu Spinu, Mihaela Dragoi Cudalbeanu, Carmen Laura Cîmpeanu

Institution	**University of Agronomic Sciences and Veterinary Medicine of Bucharest – USAMVB**
Patent no.	Research Project PN-IV-P7-7.1-PTE-2024-0607, Contract 57PTE/2025
Description EN	SIGUR (Advanced Ecological Solutions for Increasing Food Safety of Fruits and Vegetables, from Producer to Consumer) addresses the growing public health need for safe, eco-friendly solutions for washing fresh produce. The project transfers an innovative technology for producing natural surfactants - derived from hydrolyzed collagen proteins, amino acids, and carbohydrates - and conditioning them with antimicrobial phytocompounds extracted from plant processing waste, to develop an ecological washing solution for fruits and vegetables. The solution efficiently removes harmful contaminants - microbial pathogens (Salmonella, E. coli, Listeria monocytogenes), pesticide residues, and surface wax - without compromising the taste, texture, or nutritional quality of fresh produce. Unlike conventional chlorine-based washing (which generates carcinogenic by-products) or ozone treatments, the SIGUR solution relies exclusively on natural, biodegradable surfactants and antimicrobial phytocompounds from agricultural waste biomass (Helianthus tuberosus, Glycyrrhiza glabra, Inula helenium). Key innovations: natural surfactants safer for health and environment; integration of antimicrobial phytocompounds; valorization of plant waste in a dual mode (natural acetic solution plus polyphenol-rich extracts); fully eco-friendly and sustainable production process. Applications: household, semi-industrial, and food service washing of fresh fruits and vegetables. The final product is the first nationally developed, scale-ready ecological produce wash in Romania, with strong potential for EU-wide commercialization. Acknowledgement: This work was supported by a grant of the Romanian Ministry of Education and Research, CCCDI-UEFISCDI, project number PN-IV-P7-7.1-PTE-2024-0607, under contract 75PED/2025 within PNCDI IV.

„Constantin Brâncuși„ University of Târgu Jiu

RO.195.	
Title EN	**PHASE CHANGE MATERIALS COMPOSITE PANEL WITH HIGH THERMAL EFFICIENCY**
Authors	**Diaconu Bogdan Marian, Cruceru Mihai, Gorun Adrian, Popescu Georgeta Luminița**
Institution	„Constantin Brâncuși„ University of Targu Jiu
Patent no.	**RO 126853 B1/ 30.07.2013**
Description EN	The invention relates to an exterior wall construction element that ensures more efficient energy management for heating and air conditioning, compared to conventional (Sandwich-type) walls for modular constructions. The novel feature of the invention lies in the integration of two layers impregnated with phase change materials (PCM) with different phase transition temperatures (PTT) into its structure. The exterior layer – exposed to the ambient environment – is impregnated with a phase change material with a PTT around 20 °C, while the interior layer – exposed to the living space – is impregnated with a different type of PCM, with a PTT of approximately 25 °C. The exterior layer is active during the heating season, while the interior layer is active during the season requiring energy for air conditioning.

RO.196.	
Title EN	**PRACTICAL LABORATORY – DIGITAL TECHNOLOGIES IN FRUIT CULTURE: SMARTREE**
Authors	**Pecingină Irina, Grofu Florin, Călinoiu Ion, Cosmin Zah, Gîlcă Gheorge**
Institution	„Constantin Brâncuși„ University of Targu Jiu
Patent no.	**CNFIS-FDI-2020-0580**
Description EN	**PURPOSE/OBJECTIVES OF THE PROJECT** accommodation with modern technologies in the horticultural sector to ensure the monitoring and optimization of the plant growth and development process by: - getting real-time data on climate change and how it directly affects the horticultural sector

- early warning about the conditions that favor the occurrence of diseases in plants
- real-time measurement of the degree of development of trees, leaves and fruits and alerting if the parameters expected at various development thresholds are not compliant.

the use of the measurement and analysis capabilities of the practical laboratory in the field of intelligent agriculture in fruit growing - the implementation of didactic activities, research activities, internships in the field, specialty and for the development of students' diploma projects, within the undergraduate study program Engineering and Management in Public Food and Agritourism

increasing UCB's capacity for research, innovation and technology transfer, as well as expanding the partnership with relevant economic operators

West University of Timisoara

RO.197.	
Title EN	**Digitalization of Public Services and Economic Development: A Multidimensional Analysis of Influencing Factors and Governance Efficiency in the European Context**
Authors	CRISTE Cristina, LOBONȚ Oana Ramona, MIHAILA Svetlana,
Institution	**West University of Timisoara / Academy of Economic Studies of Moldova**
Patent no.	Doctoral Research Project
Description EN	The invention offers an integrated methodological framework for the empirical assessment of the impact of digital transformation in public services on economic development across European Union member states during the period 2018–2023. This approach is based on the conceptualization of the relationship between e-Governance and economic development, integrating analyses of mediation and causal mechanisms to detect pathways of influence within the digital transformation process. The process employs advanced statistical and econometric techniques, including MultiLayer Perceptron neural networks, to detect nonlinear relationships and interactions among variables. Evaluation is supplemented by a comprehensive bibliometric analysis to map research trends and collaboration patterns, alongside the application of Garson's algorithm to assess variable importance, while monitoring critical factors such as R&D spending, governance quality, and anti-corruption measures. Research reveals a statistically significant positive correlation between the level of digitalization and economic development. Empirical findings indicate that strategic investment in R&D and institutional efficiency serve as critical mediators enhancing the effect of e-governance. The MLP model demonstrates the nonuniform nature of benefits from digitalization, which depend on a particular country's investment and policy environment. The invention supports: transnational evaluation of digital governance; a foundation for sustainable economic development strategies; investment priority in R&D as an engine of development, not merely expenditure; alignment of digital policies with institutional quality standards; and optimization of transparency and efficiency by combating corruption. Trends suggest that digitalization, when organically integrated with governance quality, maximizes economic benefits and requires advanced evaluation tools for informed decision-making under contemporary European conditions.

Technical University of Civil Engineering Bucharest (UTCB)

RO.198.	
Title EN	Pilot-based Innovation Ecosystems for Smart Cities (PilotInnCities)
Authors	Florin Baltaretu, Ancuta Neagu
Institution	Technical University of Civil Engineering Bucharest (UTCB)
Patent no.	Project number: DRP0200367
Description EN	PilotInnCities (Pilot-based Innovation Ecosystems for Smart Cities) is a strategic project led by the Ministry of Industry and Trade of the Czech Republic, in which an 11-member consortium from six countries of the Danube Region participates. The aim of the project is simple: to support the introduction of innovative Smart City solutions into the practical life of cities and municipalities and, in particular, to initiate across-the-board, systemic changes in this direction. The project relies on the method of agile piloting, which supports small innovation experiments on the principle of living laboratories taking place in teamwork of actors across the innovation ecosystem. The consortium has received a grant of EUR 1.98 million for the period from 1 January 2024 to 30 June 2026 from the Interreg Danube programme. The importance of cities in the context of the future of humanity and the planet is greater than it might seem at first glance. Cities produce around three-quarters of all emissions, consume a similar percentage of energy and primary raw materials, are at the centre of most economic activities, and determine the quality of life of three-quarters of the European Union's population, for whom cities are their home. Challenges such as adaptation to climate change, energy transition or ensuring sustainable mobility have no solution unless they include a radical transformation of cities. To change the status quo, innovation is needed, and not just in the form of technology. In many cases, there is no shortage of innovations, but the process of putting them into practice is proving to be a fundamental problem. In particular, solutions whose target group is municipalities encounter financial, administrative and knowledge barriers on the customer side at an early stage. Practice shows that this hinders innovative companies from obtaining the first reference projects and thus from expansion, which could benefit cities and their citizens not only in Europe.

University of Craiova

RO.199.	
Title EN	**Modular-adaptive femural component of a hip endoprosthesis**
Authors	**Tarniță Dănuț Nicolae, Tarniță Daniela**
Institution	**University of Craiova and University of Medicine and Pharmacy, Craiova**
Patent no.	**132628/30.01.2025**
Description EN	The patent refers to modular orthopaedics implants used for the ostheosynthesis of the long bone fractures which comprise a predefined number of modules which, by mechanical coupling, and forms various dimension plates adaptable to the fractured bones and to the tensions developed in the bone by muscular forces. The coupling system of the adjacent modules with regard to the fracture place is made of shape memory alloys clips which act by the property of shape memory, enabling a continues compression over the fracture fragments, fact which represents an essential factor of the healing. by combining a certain number of modules we can obtain implants with various lengths depending of type, position or dimension of the fracture; *the use of the Nitinol staple enables the stabilization of the implants and the good union of the bone fractures, a key element in the healing process; *the small sizes of the modules enable the surgeon to use minimally invasive surgical techniques, with advantages: ▪ reduction of soft tissues destruction; ▪ eliminating intra-operator infections; reduction of blood losses.

RO.200.	
Title EN	**Elastic centromedular rod used in osteosynthesis of diaphyseal fractures of long bones**
Authors	**Tarniță Dănuț Nicolae, Tarniță Daniela, Popa Dragos Laurentiu, Vaduva Razvan Cristian, Petrovici Ilaria Lorena, Tenovivi Mihai**
Institution	**University of Craiova and University of Medicine and Pharmacy, Craiova**

Patent no.	**134477/ 27.02.2026**
Description EN	• The elastic centromedular nail made of metallic spheres centered on a central steel rod, used for osteosynthesis of long bone diaphyseal fractures is made of a biocompatible stainless steel central rod on which several metal spheres of stainless steel with diameter equal to the smallest diameter of the bone marrow can be introduced. At its head, the rod has a rounded cone that is screwed to the center rod of the centromedular nail. At the opposite end of the rod there is a threaded cylinder on the center brooch. This cylinder has a transverse slot for extracting the nail from the medullary channel after fracture healing. • It is modular and adaptable to any type of diaphyseal fracture of long bones; • it ensures a good compaction of the fragments due to the lighter slippage of the two segments of the bone fracture, reducing or eliminating the risk of pseudarthrosis; • it prevents large movements between fracture bones in the fracture area due to the optimal • adaptability of the metal spheres to the bone canal; motion stability is ensured by continuous inter-fragmentation compression provided by muscle tonus and by metal spheres than by a rigid rod;

RO.201.	
Title EN	**Device used for osteosynthesis and compaction of long bones fractures**
Authors	**Daniela Tarniță, Dănuț Nicolae Tarniță,**
Institution	**University of Craiova and University of Medicine and Pharmacy, Craiova**
Patent no.	**134429 / 30.10.2025**
Description EN	The device for the osteosynthesis and compaction of long bone fracture consists of two biocompatible metal collars, adjustable to the thickness and shape of the bone. They are made up of two halves of a cylinder, assembled at an edge with two clamps and at the opposite edge, fastened by a screw. The collars are joined by a metal bridge formed by a rectangular metal blade provided with two holes at the ends, whereby it is fastened to the two collars by two screws, thus stabilizing the fracture. On the opposite side of the metal

bridge, there is a device made steel wire with two arms articulated to each other and connected with two identical intermediate pieces placed on both sides of one of the collars.. Each piece is fixed in a hole through a bolt to a necklace, and the two lever arms are held in the other hole. One of the lever arms ends with two hooks that are applied to two bolts located on the other necklace of the system. The second lever arm has a U-shaped push-fit system that will adapt and mold on the lower collar when the lever is actuated. The two hooks of the other arm will slide under the two bolts of the other necklace creating constant tension and stabilizing the fracture area as well.
coupled together and screwed together;
· Stabilization of potential fractures of the fracture fragments;
· Ensuring a continuous compaction, which contributes to the healing of the fracture;
· Providing a very good stabilization of the fracture area;

RO.202.	
Title EN	**Process for obtaining 3D structures based on calcium phosphate**
Authors	**Laura Madalina, Chiriac Stefania, Piticescu Roxana-Mioara, Stanciu Paul, Dumitrescu Victoria-Gabriela, Tarnita Daniela**
Institution	**Institutul INMR Bucuresti, University of Craiova, Cantacuzino" National Military Medical Institute for Research and Development, Bucharest**
Patent no.	**137275 / 30.05.2025**
Description EN	The invention relates to 3D printing technology based on extrusion of nanostructured materials based on calcium phosphate, for applications in bone tissue reconstruction. The technical problem solved by the invention refers to the additive manufacturing of nanostructured hydroxyapatite obtained from natural sources (Rapana Thomasiana shells) by the hydrothermal method at high pressures, using non-toxic organic binders, resulting in stable 3D structures based on HAp, without the need to add polymers or inorganic oxides in the hydrothermal synthesis. The advantages of the hydrothermal synthesis process at high pressures consist in:- low energy consumption, by applying a very high pressure (the energy consumed to increase the temperature by 5 units

is equal to that required to increase the pressure by 4000 units in the system);- one-step synthesis of nano-crystalline materials, without the need for subsequent heat treatment;- environmentally friendly, ecological technology, in a closed system, without the release of volatile toxic compounds. For the additive manufacturing by extrusion of 3D structures based on calcium phosphate, nanostructured hydroxyapatite powder obtained from natural sources (Rapana Thomasiana) by the hydrothermal method at 100...150°C / 2...10 MPa is used, having crystallite sizes between 20 and 50 nm and spherical particles with a diameter of 1-5 µm.

Ovidius University of Constanta

RO.203.	
Title EN	**Galectin-3 in the homeostasis of cardiovascular pathology**
Authors	Alina LUPU (SURLEA)[1], Ioan-Eugen OLARIU[3], Maria-Virginia TANASA (ACRETEI)[1], Laura OLARIU[5,6], Mihaela BASA[4], Natalia ROSOIU[1,3,6]
Institution	[1]Institute of Doctoral Studies, Doctoral School of Applied Sciences, Biology Field, "Ovidius" University of Constanta, Romania; [2]"Carol Davila" University of Medicine and Pharmacy, Bucharest; [3]Faculty of Medicine, "Ovidius" University of Constanta [4]Medical Analysis Laboratory, "Alexandru Gafencu" Military Emergency Hospital of Constanta, Romania; [5]Biotehnos SA, Otopeni, Ilfov [6]Academy of Romanian Scientists, 54 Splaiul Independentei 050094, Bucharest, Romania, Biological Sciences Section, Romania
Description EN	The pathophysiological support of heart failure is based on the phenomenon of myocardial and coronary system remodeling with many morpho-functional entities. An innovative marker of fibroblast function activation, myofibroblasts, collagen synthesis rate, is Galectin 3. With an important innovative role in cardiovascular pathology, a powerful prognostic biomarker approved by the FDA, it is a therapeutic target in the management of cardiac fibrosis and in cardiac remodeling processes. Innovations express the use of Gal-3 as a prediction tool, and in combination with other markers (NT-proBNP) as synergy for a better risk stratification. In healthy tissue, Galectin-3 expression is absent/reduced, but it is expressed in different types of cells and tissues, including proliferative cells, eosinophils, neutrophils, macrophages and fibroblasts, highlighting its presence in inflammatory and fibrotic conditions, crucial in cardiac remodeling. The experimental study addresses Galectin 3 being carried out in the laboratory of Emergency Military Hospital Constanta, including patients aged 40-84 years, in certain evolutionary stages of heart failure according to the NY Heart Association classification. Galectin-3, directly involved in the processes of myocardial fibrosis, inflammation and cardiac remodeling, has increased plasma levels in heart failure and are correlated with mortality. The multifunctional biomarker plays a key role in the homeostasis of the biochemical process, cardiovascular pathology, extracellular matrix and inflammatory responses, the circulating level of which is elevated in patients with the expansion of the myocardial fibrosis space, directly correlating with the Oxidative Stress products. The results show correlations and complementarities, synergism of action, having notable innovations oriented towards the innovative

direction of development of therapeutic inhibitors for Galectin-3.

RO.204.

Title EN

Comparative, multifactorial and correlative studies of the phytochemical and pharmacological profile of dandelion, as a source of biologically active components

Authors

Maria-Virginia TANASA (ACRETEI)[1] Laura OLARIU[2,3] Ticuța NEGREANU-PÎRJOL[1,3] Alina LUPU (SURLEA)[1] Natalia ROSOIU[1],[3]

Institution

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Description EN

Although it is known that dandelion consumption has benefits, it is a raw material of interest researched nowadays, as an interesting source of bioactive principles successfully used in the pharmaceutical, cosmetic and food industries.
The paper presents descriptive, analytical and biological action studies, which can represent an important basis on which innovative concepts, experimental developments and multidirectional applications can be built. The pharmacopeial raw materials are the roots of the dandelion, leaves and also flowers. The phytochemical profile of the plant material was analyzed based on three key variables: anatomical part (Radix, Leaf, Flower, Mix), seasonal variation (May vs. October), and extraction technique (ultrasonication, Soxhlet and cold maceration). The qualitative chemical assessment of *Taraxacum officinale* was performed via successive selective extraction. The pulverized vegetal material was subjected to a polarity-guided fractionation process utilizing three solvent systems: ethyl ether (apolar), ethanol (medium polarity), and distilled water (polar). *Taraxacum* species are remarkable plant due to their phytochemical combination: polyphenols, flavonoids, phytosterols and sesquiterpenoids, inositol derivatives, polysaccharides, carotenoids, coumarins, and mineral elements. Studies have revealed the contribution of dandelion in managing oxidative stress-related conditions and chronic inflammatory diseases, antimicrobial / antiviral action and antitumor action synergisms.

RO.205.

Title EN

TOPICAL DERMATO-COSMETIC PREPARATIONS OF BIOADHESIVE GELS TYPE WITH DERMAL TISSUE REGENERATION EFFECT

Authors

Negreanu-Pîrjol Ticuța, Negreanu-Pîrjol Bogdan-Ștefan, Roncea Florentina Nicoleta, Berger Daniela-Cristina, Moldovan Lucia, Roșioru Daniela-Mariana, Gaspar-Pintiliescu Alexandra, Mitran

Raul-Augustin, Ranca Aurora, Stefan Laura Mihaela, Prelipcean Ana Maria, Matei Cristian, Bratu Mihaela Mirela, Lepădatu Anca-Cristina, Artem Victoria, Erimia Cristina-Luiza, Vasile Monica

Institution

„Ovidius" University of Constanta, RO, National Institute for Marine Research and Development „Grigore Antipa", Constanta, RO, National University of Science and Technology Politehnica Bucharest, RO, Research and Development National Institute of Biological Sciences, Bucharest, RO, „Ilie Murgulescu" Institute of Physical Chemistry, Bucharest, RO, Research and Development Station for Viticulture and Winemaking Murfatlar, Constanta County, RO

Patent no.

Patent Application no. RO134938 (A0), published in RO-BOPI no. 5/28.05.2021

Description EN

Patent application relates the development of topical dermato-cosmetic bioadhesive gels based on marine bioresource by-products, highlighting an innovative and sustainable formulation strategy. Gels incorporate lyophilized gelatin extracted and purified from *Rapana venosa* molusks, hydroalcoholic extracts of green macroalgae *Cladophora* and *Ulva* species, bioresources from Black Sea coast and peppermint essential oil, dispersed within carbopol-based hydrophilic matrices. Composition (w/w%) includes Carbopol (0.35–1%), *Rapana venosa* lyophilized gelatin (0.1–4.0%), triethanolamine (0.35–1.0%), citric acid (0.05–0.1%), grapefruit seed extract (0.1–0.5%), peppermint oil (0.1–0.6%), hydroalcoholic extract of green macroalgae 10% (1–3.0%) and ensures a homogeneous, translucent system with suitable physicochemical properties, including optimal pH, adhesiveness, spreadability and dermal penetration capacity. Formulations exhibit significant biological activity, demonstrating antimicrobial, antioxidant and anti-inflammatory effects, enhanced biocompatibility and negligible toxicity. Synergistic interaction between marine-derived bioactive compounds contributes to improved dermal efficacy, promoting tissue regeneration and wound healing. Novel bioadhesive gels are suitable for dermatological and cosmetic use, including the treatment of wounds, inflammation and sensitive or irritated skin, for anti-aging and UV-related damage protective formulations. Furthermore, they represent valuable candidates for the pharmaceutical and cosmetic industries in the development of innovative, nature-derived topical products. Main advantages of patent application include multifunctional biological activity as, antimicrobial, antioxidant, bioregenerative, superior dermato-cosmetic performance, such as hydration, elasticity, soothing effect and high biocompatibility with low allergenic risk. The superior valorization of marine resources supports a circular bioeconomy approach, offering a cost-effective alternative to synthetic formulations with comparable therapeutic

efficacy.

RO.206.	
Title EN	**Bioadhesive Oral Films Containing Usnea barbata (L.) F.H.Wigg Extract with Antimicrobial and Anticancer Properties for Potential Use in Oral Cancer Complementary Therapy**
Authors	Violeta Popovici, Emma Adriana Ozon, Dumitru Lupuliasa, Adina Magdalena Musuc, Cerasela Elena Gird, Laura Bucur, Verginica Schroder, Elena Matei, Badea Victoria
Institution	**Ovidius University / Carol Davila University of Medicine and Pharmacy**
Patent no.	PostDoc Project POCU/380/6.13/123847
Description EN	We formulated, developed, and characterized bioadhesive oral films containing the dry ethanol extract of Usnea barbata (L.) (F-UBE-HPC) and investigated their anticancer potential for possible use in oral cancer therapy. First, the physicochemical, morphological, and pharmacotechnical properties were analyzed. Next, oxidative stress, caspase 3/7 activity, nuclear condensation, lysosomal activity, and DNA synthesis induced by F-UBE-HPC in normal blood cell cultures and in the oral epithelial squamous cell carcinoma (CLS-354) cell line were evaluated, along with their influence on both cell types' division and proliferation. The results reveal that each F-UBE-HPC contains 0.330 mg dry extract with a usnic acid (UA) content of 0.036 mg. The bioadhesive oral films are thin (0.093 ± 0.002 mm), reveal a neutral pH (7.10 ± 0.02), a disintegration time of 118 ± 3.16 s, an ex vivo bioadhesion time of 98 ± 3.58 min, and show a swelling ratio after 6 h of 289 ± 5.82%, being suitable for application on the oral mucosa. They displayed in vitro anticancer activity on CLS-354 tumor cells. By considerably increasing cellular oxidative stress and caspase 3/7 activity, they triggered apoptotic processes in oral cancer cells, inducing high levels of nuclear condensation and lysosomal activity, cell cycle arrest in G0/G1, and blocking DNA synthesis. All these properties suggest that UBE-loaded bioadhesive oral films are suitable for potential application as a complementary therapy in oral cancer.

University of Oradea

RO.207.	
Title EN	**Natural Antioxidant Dermato-Cosmetic System Based on Sanguisorba minor Extract**
Authors	Alexandra Cristina (TOCAI) MOȚOC, Laura Gratiela VICAS, Octavia Dorina GLIGOR, Simona Ioana VICAS
Institution	**University of Oradea**
Patent no.	-
Description EN	**Short description of our invention** The invention concerns a novel family of plant-based dermato-cosmetic formulations developed using a synergistic Sanguisorba minor extract obtained from roots, leaves, and flowers. The choice of Sanguisorba minor is supported by its high content of bioactive phenolic compounds and by the opportunity to valorize a promising but still underexploited plant in innovative dermato-cosmetic applications. The optimized 1:2:1 (v/v/v) extract demonstrated strong antioxidant activity in DPPH, TEAC, CUPRAC, and FRAP assays and was successfully incorporated into three topical delivery systems: hydrogel, emulgel, and cream. The resulting formulations showed good physicochemical and organoleptic characteristics, together with effective polyphenol release, especially in the emulgel formulation. **Applications** Natural antioxidant topical products for skin care; dermato-cosmetic formulations with plant-derived polyphenols; hydrogel, emulgel, and cream systems for topical antioxidant delivery; products intended to protect the skin against oxidative stress and support cosmetic skin maintenance.

RO.208.	
Title EN	**Developing an antioxidant drink through a novel extraction method**
Authors	Timar Adrian Vasile, Curta Ruben Emilio, Toth Erik Mark
Institution	**University of Oradea**
Patent no.	-
Description EN	This novel method of extracting antioxidants from highly concentrated Prunus Laurocerasus spp. fruits through a sous vide semi-thermal processing and an alcoholic maceration allowed us to shorten the total time required to obtain the active compounds from 180 days to less than 48 hours, providing a significant improvement in the duration, as well as increasing the feasibility of the drink we made with the

concentrate. This method can be extrapolated to other concentrates.

RO.209.	
Title EN	**AI-based ArcNet System for Automatic Classification of Pulmonary Pathologies from Medical Images**
Authors	Negrau Dan Claudiu, Negrau Ioana Denisa
Institution	**University of Oradea**
Patent no.	-
Description EN	The realized innovation addresses the optimization of the pulmonary diagnostic process by drastically reducing clinical analysis times and ensuring high accuracy in pathology identification through the implementation of an advanced AI-driven framework named ArcNet. The innovation proposes an integrated methodological framework based on Deep Learning and Transfer Learning, utilizing a specialized MATLAB-based architecture for the real-time classification of pulmonary CT scans. By implementing innovative tools such as automated lung segmentation, interactive image selection, and intelligent pattern recognition, the study demonstrates how diagnostic subjectivity can be eliminated and the stability of the medical decision-making process improved. The obtained results highlight a significant decrease in diagnostic cycle times—from approximately 15 minutes to under 5 seconds—and a classification accuracy exceeding 94%, contributing to increased operational efficiency and enabling rapid triage in emergency medical settings.

RO.210.	
Title EN	**Reduction scrap and downtime with new design for wipper die tool**
Authors	Sumutiu Ovidiu, Bungau Constantin, Gherghea Cosmin
Institution	**University of Oradea**
Patent no.	-
Description EN	The realized innovation addresses the optimization of production process performance by reducing execution times and minimizing scrap levels, through the implementation of modern analysis and control tools. The innovation proposes an integrated methodological framework based on identifying the main causes of time and material losses, using tools such as cause-and-effect analysis, Lean methods, and real-time digital monitoring solutions. By implementing innovative tools, the study demonstrates how process

variations can be reduced and their stability improved. The obtained results highlight a significant decrease in cycle times and a reduction in the scrap rate, contributing to increased operational efficiency.

RO.211.

Title EN	**Immersive VR/XR Educational Laboratory System for Real Measurement and Validation of Electrical Circuits Using Bond Graph Modeling**
Authors	Adriana Marcela GRAVA, Bogdan Antonio PANEA, Horea-David MATES-IANCU, Cristian GRAVA, Alexandru SORIAN, Raul George HANGA, Zsolt DUDAS
Institution	University of Oradea
Patent no.	
Description EN	Implemented, validated, scalable educational XR/VR system with real experimental correlation. The proposed invention consists of an **implemented immersive VR/XR educational laboratory system** designed for the analysis, measurement, and validation of real electrical circuits through the direct correlation of **physical experimentation, system modeling, and numerical simulation**. The system faithfully replicates a real electrical laboratory based on the DEGEM EB101 board and integrates: • **real electrical measurements** performed in the physical laboratory; • **Bond Graph modeling** and **numerical simulation** using the 20-sim environment; • **full replication of the experiment in an immersive VR/XR environment**, including functional virtual measurement instruments; • **pedagogical guidance and objective assessment mechanisms**, under teacher control. By applying Ohm's law and Kirchhoff's laws, the obtained results are **validated through strong agreement between theoretical calculations, numerical simulations, real experimental measurements, and VR/XR-based measurements**. The system demonstrates the **functional equivalence** between real and virtual laboratories and provides an **applied, modular, and scalable solution**, suitable for extension to other electrical circuits, engineering disciplines, and educational institutions, including hybrid and remote learning scenarios.

”George Emil Palade” University of Medicine, Pharmacy, Science, and Technology of Târgu Mureș

RO.212.	
Title EN	**Natural Antiseptic Solutions in Control of Streptococci and Staphylococci in the Oral Cavity**
Authors	Cristina BICA, Diana CERGHIZAN, Kamel EARAR, Madalina-Nicoleta MATEI, Oleg SOLOMON,Alina-Ramona DIMOFTE, Sonia-Teodora STATESCU-MANAILA, Ada STEFANESCU
Institution	**George Emil Palade University of Medicine, Pharmacy, Science, and Technology of Târgu Mureș**
Description EN	The product was formulated as a mouthwash, with a balanced composition that allows for antiseptic, antibacterial, anti-inflammatory and aesthetic action, designed to limit the development of streptococci and staphylococci, which combines natural extracts of pomegranate, rice, jasmine, sage, chamomile, thyme and mint. Pomegranate contributes through its antiseptic and antibacterial effect, reducing the microbial load. Rice, in the form of a fine extract, has an aesthetic role, favoring light whitening and mucosal protection. Jasmine and chamomile act synergistically through their anti-inflammatory and soothing effects, reducing gingival irritation. Sage and thyme offer intense antibacterial action, functioning as natural antibiotics on the oral flora. Mint completes the formula with a moderate antiseptic effect and by improving breathing.

RO.213.	
Title EN	**Innovative method of personalized pediatric evaluation and management under general anesthesia in children with Down syndrome and neuro-psycho-motor impairment**
Authors	Leonard AZAMFIREI, Cristna-Ioana BICA,Ada STEFANESCU,Kamel EARAR
Institution	**George Emil Palade University of Medicine, Pharmacy, Science, and Technology of Târgu Mureș**
Description EN	The proposed approach aims to integrate medical, behavioral and dental evaluation into an individualized protocol for children with Down syndrome and neuro-psycho-motor impairment. The degree of cooperation, oral-dental status, treatment needs, anesthetic risk, airway particularities and associated comorbidities are analyzed to establish the indication for treatment under general anesthesia. This strategy allows for the complete planning of preventive, restorative, endodontic and extraction interventions in a single session, reducing procedural stress and the number of visits. By personalizing therapeutic conduct and multidisciplinary collaboration, the approach contributes to increasing the safety of the medical act, making treatment more efficient and improving the quality of life of the vulnerable pediatric patient.

National Institute of Materials Physics

RO.214.	
Title EN	**Portable Thermal Cycling Device for Nucleic Acids Amplification**
Authors	Botta Oana-Daciana, Beregoi Mihaela, Diculescu Victor Constantin, Enculescu Ionut-Marius, Evanghelidis Alexandru Ionut, Ignat-Barsan Madalina Maria
Institution	**National Institute of Materials Physics**
Patent no.	Patent application No. A00738 / 25.11.2024
Description	This invention describes a portable thermocycling device featuring a multilayered structure that integrates a fibrillar hydrophilic substrate with nanostructured conductive elements composed of submicrometric polymer fibers and a hydrogel. The device is capable of rapidly varying temperature values, making it highly applicable for performing nucleic acid amplification reactions, including Polymerase Chain Reaction (PCR). The core novelty lies in performing nucleic acids amplification directly within the porous matrix of the hydrophilic substrate, enabling uniform temperature distribution and high heating and cooling rates without requiring auxiliary cooling systems. A software-controlled approach allows seamless integration with a mobile application interface, delivering lab-grade diagnostics in any field setting. The scalability of this technology provides a clear path toward a fully integrated "sample-to-answer" diagnostic platform, where sample preparation, amplification, and detection occur within the same porous fibrillar matrix. The key applications include: 1. Point-of-Care Diagnostics – Enables PCR amplification in remote or low-resource settings where laboratory infrastructure is unavailable. 2. Rapid Pathogen Detection – Facilitates immediate screening for viruses, bacteria, parasites, and fungi, critical for controlling infectious disease outbreaks. 3. Personalized Healthcare – Allows clinicians to perform genetic testing and tumour marker analysis at the patient's side, enabling faster treatment decisions. 4. Sustainability and Cost-Efficiency – The use of eco-friendly materials reduces both the cost and environmental footprint of diagnostic hardware. Thus, the device represents a significant advancement in portable molecular diagnostics, combining accessibility, speed, and precision in a single integrated platform.

RO.215.	
Title EN	**Device for Simulating Passive Diffusion across the Blood–Brain Barrier Using Electrospun Fiber Membranes Modified with Crosslinked Gelatin and Method for Preparing the Membrane**
Authors	Adrian Enache, Mihaela Beregoi, Alexandru Evanghelidis, Sara Nistor
Institution	**National Institute of Material Physics**
Patent no.	Patent application No. 00410/2025
Description	The present invention describes a device designed to simulate passive diffusion across the blood–brain barrier, based on electrospun fiber membranes modified with crosslinked gelatin, together with the method used to produce the membrane. The proposed system provides a simple and cost-effective platform that mimics key structural features of biological barriers. The main advantages include the low cost of the materials and fabrication methods, as well as the high versatility offered by the electrospinning technique, which allows precise control over membrane structure and porosity. The device can be used for the study of molecular transport across barrier-like interfaces and for the preliminary screening of drug candidates intended to cross the blood–brain barrier.

RO.216.	
Title EN	**Portable Electrochemical Biosensing Device with Electrospun Polymeric Membrane for Real-Time Detection of Superoxide in Chronic Wound Cell Models**
Authors	Ignat-Bârsan Mădălina-Maria, Enache Teodor Adrian, Bratu Oprea Daniela, Mihaela Beregoi
Institution	**National Institute of Material Physics**
Patent no.	Patent application No. 00409/2025
Description	The present invention relates to an integrated electrochemical device for the real-time monitoring of superoxide anion in chronic wounds. The device includes a flexible enzymatic electrochemical biosensor, based on screen-printed electrode with immobilized superoxide dismutase, and a polymeric adhesive membrane with electrospun Nylon fibers. The adhesive membrane with electrospun Nylon fibers

allows cell growth directly on the sensor surface, mimicking the three-dimensional structure of the extracellular matrix, while its adhesion to the biosensor enables biosensor calibration in cell cultures that simulate a chronic wound.
The developed device is suitable for real-time oxidative stress profiling in wound models with potential for ex vivo and in vivo applications. Its real-time, cell-level superoxide detection capabilities represent a major step toward smart wearable biosensors for wound diagnostics, with future applications in personalized medicine.

RO.217.

Title EN	**Procedure for making flexible and waterproof photovoltaic cell structures based on a textured buffer layer of doped amorphous silicon and organic materials**
Authors	Marcela Socol, Oana Rașoga, Sorina Iftimie, Claudiu Ciubotaru, Carmen Breazu, Ionel Stavarache, Gabriel Socol, Anca Stănculescu, Gianina Popescu-Pelin
Institution	**National Institute of Materials Physics, University of Bucharest- Faculty of Physics, National Institute for Laser, Plasma and Radiation Physics**
Patent no.	Patent application No. **A00776/29.11.2023**
Description	The invention relates to the process of obtaining a flexible, waterproof organic photovoltaic cell which also contains an amorphous silicon layer in addition to organic compounds. To fabricate the device, the process commenced with the nanopatterning of the polymer substrate utilizing the lithographic nanoimprinting technique. Subsequently, indium tin oxide (ITO) anodes were deposited through pulsed laser deposition (PLD) under controlled experimental conditions that facilitated the formation of a layer with optimal optical and electrical characteristics. Thereafter, an amorphous silicon layer was deposited using magnetron sputtering. The organic active layer, formulated as either D:A or D1:D2:A, was produced employing the Matrix-Assisted Pulsed Laser Evaporation (MAPLE) technique, which ensures the successful transfer of materials onto both flexible and patterned substrates. Finally, a metal electrode was deposited atop the organic layer. Collectively, these components contribute to the cell's overall flexibility. The device's functionality after attaching the electrode consisted of tracing current-voltage characteristics specific to

photovoltaic cells.

RO.218.	
Title EN	**Process for manufacturing tunable meta-lenses that can also work as emitting sources in the infrared range, using silicone polymer as a substrate.**
Authors	Oana Rasoga, Mihaela-Cristina Bunea, Daniela Dragoman, Adrian Dinescu, Stavarache Ionel, Angela-Mihaela Baracu, Breazu Carmen-Steliana
Institution	**National Institute of Materials Physics, University of Bucharest-Faculty of Physics, National Institute for Research and Development in Microtechnologies**
Patent no.	Patent application No. **A000079/28.02.2024**
Description	The invention relates to a metasurface composed of a flexible PDMS substrate and gold nanorods, designed to function as a tunable emitting source by applying strain to the elastomer. Numerical simulations indicate that this metasurface has a resonant wavelength at 1.1 µm. Notably, its response remains largely stable, continuing to perform as an emitting source in the near-infrared range even when the polymer substrate is stretched by approximately 20%. For the fabrication of the simulated metasurface, a silicon wafer was used, onto which a germanium (Ge) sacrificial layer was deposited, which was subsequently removed by oxidation. The nanorods were created on this sacrificial layer using electron-beam lithography, followed by deposition of titanium/gold (Ti/Au) and a lift-off in acetone. This lift-off method ensured that only the Ti/Au nanorods remained on the wafer surface. These nanorods were then coated with two different PDMS dilutions. The final structure was obtained by oxidising the underlying Ge layer with a solution of ammonium hydroxide, hydrogen peroxide, and deionised water in a 1:1:30 ratio.

National Institute for Research & Development in Chemistry and Petrochemistry – ICECHIM Bucharest

RO.219.	
Title EN	**Reactor and process for water decontamination by multilayer adsorption using functional composite materials**
Authors	Radu Claudiu Fierascu, Irina Fierascu, Toma Fistos, Anda Maria Baroi, Roxana Ioana Brazdis (Matei), Irina-Elena Chican, Ioana Silvia Hosu
Institution	**National Institute for Research & Development in Chemistry and Petrochemistry – ICECHIM Bucharest**
Patent no.	A-00215/2026
Description	The invention relates to a reactor and a process for water decontamination by multilevel adsorption using composite adsorbent materials. The reactor consists of a multilayer system operated under upward-flow conditions, in which a lower layer retains heavy metals and reduces interferences, while an upper layer performs the removal of organic compounds. Through its configuration, the reactor enables a synergistic effect between the adsorbent layers, leading to increased process efficiency, optimal distribution of the adsorption load, and in situ regeneration of the material, without the need for external regeneration. The invention exhibits high operational stability and is applicable to the treatment of waters with complex composition. This work was supported by the Ministry of Research, Innovation and Digitization (Ministry of Education and Research—National Authority for Research), through INCDCP-ICECHIM Core Program PN 23.06.01.01 (AQUAMAT).

RO.220.	
Title EN	**Eco-friendly composition based on silver or copper nanoparticles phytosynthesized using extracts of Momordica charantia L., with antimicrobial properties, biostimulant effect for Momordica charantia L. crops, and herbicidal activity, and method for obtaining it**
Authors	Radu Claudiu Fierascu, Irina Fierascu, Toma Fistoș, Anda-Maria Baroi, Roxana-Ioana Matei, Ioana Silvia Hosu, Irina Elena Chican, Daniela Ionescu, Justinian-Andrei Tomescu, Cristina-Mihaela Luntraru, Alexandra Ene-Manea
Institution	**National Institute for Research & Development in Chemistry and Petrochemistry – ICECHIM Bucharest/**

	HOFIGAL EXPORT-IMPORT SA
Patent no.	A-00150/2026
Description	The present invention relates to an eco-friendly composition based on silver or copper nanoparticles phytosynthesized using hydroalcoholic extracts obtained from Momordica charantia L. plant waste, having antimicrobial properties, a biostimulant effect for Momordica charantia L. crops, and selective herbicidal activity, as well as to the method for obtaining the same. The plant extract is obtained from leaves derived from plant waste through water:ethanol hydroalcoholic extraction, followed by filtration. Silver or copper nanoparticles are formed by mixing the extract with silver nitrate or copper sulfate solutions, respectively, under mild conditions, without the use of other synthetic reducing agents. The resulting composition exhibits antimicrobial activity against the strains Bacillus subtilis and Bacillus cereus, anti-adhesion effects, and the ability to inhibit bacterial biofilm formation. In addition, the composition stimulates germination and root system development in Momordica charantia L., while inhibiting the germination and growth of Trifolium pratense L. and Lolium perenne L., thus demonstrating selective herbicidal activity. The invention provides an eco-friendly, efficient, and cost-effective solution for sustainable agriculture through the valorization of plant waste and the reduction of synthetic chemical pesticide use. This work was supported by a grant of the Ministry of Research, Innovation, and Digitization (Ministry of Education and Research-National Authority for Research), CCCDI-UEFISCDI, project number PN-IV-P7-7.1-PED-2024-0318, within PNCDI IV.

RO.221.	
Title EN	**Cement- and tuff-based mortar with antimicrobial properties and method for obtaining it**
Authors	Irina Fierascu, Radu Claudiu Fierascu, Toma Fistoș, Anda-Maria Baroi, Roxana-Ioana Matei, Ioana Silvia Hosu, Irina Elena Chican, Adriana Moanță, Ionela Petre, Carmen Munteanu
Institution	**National Institute for Research & Development in Chemistry and Petrochemistry – ICECHIM Bucharest/ CEPROCIM SA**

Patent no.	A-00148/2026
Description	The present invention relates to a cement- and tuff-based mortar with antimicrobial properties and to the method for obtaining the same, having potential applications in the field of conservation and restoration of cultural heritage, among others. The cement and tuff mortar is enriched with silver nanoparticles phytosynthesized using Salvia officinalis extracts (the antimicrobial component), obtained through conventional hydroalcoholic extraction at temperature. The mortar according to the invention consists of 15% Portland cement type CEM I, 75% river sand with a fraction < 2 mm, 10% volcanic tuff crushed and ground to a residue on the 90 µm sieve of approximately 3%, and a liquid phase composed of water, of which 10–30% of the total volume is replaced with hydroalcoholic Salvia officinalis extract containing silver nanoparticles (AgNPs). The cement/sand ratio is 1:3, and the binder/liquid ratio is 0.56. The mortar has a density of at least 1.70 g/cm³ and a compressive mechanical strength after 28 days of at least 42.50 MPa, while exhibiting antimicrobial effects against Gram-positive and Gram-negative bacteria. The preparation method involves producing the antimicrobial component and incorporating it into the cement- and tuff-based composition during the mortar preparation stage. This work was supported by a grant of the Ministry of Research, Innovation, and Digitization (Ministry of Education and Research-National Authority for Research), CCCDI-UEFISCDI, project number PN-IV-P7-7.1-PED-2024-0286, within PNCDI IV.

RO.222.	
Title EN	**Saponin-rich plant extract obtained from Beta vulgaris L. and Medicago sativa L. and method for obtaining it**
Authors	Irina-Elena Chican, Anda Maria Baroi, Radu Claudiu Fierascu, Irina Fierascu, Toma Fistos, Roxana Ioana Matei, Ioana Silvia Hosu, Alina Ruxandra Eugenia Ortan, Daniela Ionescu
Institution	**National Institute for Research & Development in Chemistry and Petrochemistry – ICECHIM Bucharest/ HOFIGAL EXPORT-IMPORT S.A./ University of Agronomic Sciences and Veterinary Medicine of**

	Bucharest
Patent no.	A-00237/2026
Description	The present invention relates to a process for obtaining a saponin-rich plant extract from plants belonging to the species Beta vulgaris L. and Medicago sativa L., as well as to the extract obtained by this process. The process consists in using the plant raw materials individually or in mixture, in a mass ratio ranging from 1:3 to 3:1, followed by drying to constant weight at temperatures between 40 and 45°C and grinding until a powder with particle size below 2 mm is obtained. The plant powder is subjected to hydroalcoholic extraction using a water–ethanol mixture in a volumetric ratio ranging from 1:2 to 3:1, at temperatures between 60 and 80°C, for 90–300 minutes, at a plant material:solvent ratio ranging from 1:5 to 1:15 (g/v), followed by filtration and recovery of a hydroalcoholic extract. The extract is then subjected to a concentration step by evaporation at temperatures between 35 and 55°C, followed by liquid–liquid extraction using ethyl acetate, evaporation of the organic phase, and a selective precipitation step of the bioactive compounds by addition into a miscible organic solvent at low temperature. The process enables the production of a plant extract with high saponin content using controlled and reproducible technological conditions. This work was supported by the Ministry of Research, Innovation and Digitization (Ministry of Education and Research, National Authority for Research), CCCDI - UEFISCDI, project number PN-IV-P7-7.1-PTE-2024-0607, contract 57 PTE/2025, within PNCDI IV.

RO.223.	
Title EN	**Zeolite-Chitosan Biocomposite Fillings for Retention of Aluminum and Iron Ions from Water and Method for Preparing Them**
Authors	Iordache Tanta-Verona, Miron Andreea, Sarbu Andrei, Neblea Iulia Elena, Iordanescu Marinela Victoria, Chiriac Anita-Laura, Gavrila Ana Mihaela, Olaru Andreea Gabriela, Cosasu Dan
Institution	**National Institute for Research & Development in Chemistry and Petrochemistry – ICECHIM Bucharest**

Patent no.	A-00443/2025
Description	The present invention relates to development of biocomposite fillers based on chitosan and zeolite for retaining up to 90% aluminum and iron ions from water, destined for filter cartridges or columns. The obtained biocomposite fillers have a mechanical resistance suitable for use, due to the native calcium carbonate present in the chitosan biopolymer, which reinforces the biocomposite matrix. Other advantages of the invention relate to low production costs, reusability, compostability, and reduction of environmental hazards.
	This work was supported by a grant of the Ministry of Research, Innovation, and Digitization, CNCS/CCCDI-UEFISCDI, and the European Commission, project number COFUND-WATER4ALL-WATER-BIOFIL-1, within the WATER4ALL 2022 JOINT TRANSNATIONAL CALL (ctr. 57/2024).

RO.224.	
Title EN	**Hybrid Materials Based on Boron Nitride and Bioactive Compounds and Their Preparation Process**
Authors	Florentina Monica Raduly, Valentin Rădiţoiu, Alina Rădiţoiu, Radu Claudiu Fierăscu, Andi-Cristian Nicolae
Institution	**National Institute for Research & Development in Chemistry and Petrochemistry – ICECHIM Bucharest**
Patent no.	A-00233/2026
Description	The invention refers to organic–inorganic hybrid materials based on boron nitride decorated with carbon quantum dots, loaded with various bioactive compounds, as well as to the process for their preparation. The hybrid materials are obtained through a method comprising an initial stage involving the synthesis of an inorganic support produced via a melt reaction at temperatures ranging from 500 to 1100 °C, using a mixture containing oxygenated boron compounds, melamine, a compound with a lactam structure, and water. This is followed by a subsequent stage in which the support is loaded with bioactive compounds through adsorption from aqueous, alcoholic, or hydroalcoholic solutions, in the presence of ultrasound. The resulting materials exhibit high stability and controlled release properties of the active compounds, making them suitable for applications in the medical and dermato-cosmetic fields.

This work was supported by the Ministry of Research, Innovation and Digitization (Ministry of Education and Research, National Authority for Research), CCCDI - UEFISCDI, project number PN-IV-P7-7.1-PED-2024-0838, contract 117 PED/2025, within PNCDI IV.

RO.225.	
Title EN	**In-situ bioremediation process of soils polluted with hexavalent chromium using a consortium based on Trichoderma and Clonostachys**
Authors	Cristina Firincă, Lucian-Gabriel Zamfir, Ana-Maria Gurban, Mihaela Doni, Mariana Constantin, Iuliana Răut, Roxana-Ioana Matei, Maria-Luiza Jecu
Institution	**National Institute for Research & Development in Chemistry and Petrochemistry – ICECHIM Bucharest**
Patent no.	A-00554/2025
Description	The invention refers to a method for obtaining a bioinoculant composition, based on a consortium of indigenous fungal strains of the species Trichoderma citrinum, Trichoderma reesei and Clonostachys rosea isolated from soil heavily contaminated with chromium. The purpose of the invention is the simultaneous reduction of Cr^{6}, biostimulation of potential hyperaccumulator plants and real-time, in-situ electrochemical monitoring. The consortium is characterized by the ability to solubilize chromium from the structure of soil particles and by the metabolic reduction of Cr6+ to Cr^{3+}. The method according to the invention consists of the fact that the soil contaminated with chromium is treated with the fungal consortium, which acts as an agent for mobilizing chromium from the soil matrix in a percentage of up to 60% and for reducing Cr^{6+} with a yield of >96% in 8 weeks, contributing, at the same time, to stimulating the development of Tagetes erecta for further phytoextraction.
	This work was supported by the Ministry of Research, Innovation and Digitization (Ministry of Education and Research—National Authority for Research), through INCDCP-ICECHIM Core Program PN 23.06.01.01 (AQUAMAT).

RO.226.	
Title EN	**Development of eco-friendly solutions based on silanes and nanoparticles for buildings and heritage consolidation**
Authors	Madalin Vasile Coman, Radu Claudiu Fierascu, Denisa Ficai, Ionel Claudiu Badea, Andrei Dragos Marcu, Roxana Ioana Matei, Irina Fierascu, Irina Elena Chican, Cristian-Andi Nicolae, Ludmila Motelica, Roxana Doina Trusca, Ovidiu Cristian Oprea, Anton Ficai
Institution	**POPP & ASOCIAȚII S.R.L./ National Institute for Research & Development in Chemistry and Petrochemistry – ICECHIM Bucharest/ National University of Science and Technology POLITEHNICA Bucharest**
Patent no.	47 PTE/2025, PN-IV-P7-7.1-PTE-2024-0522
Description	The structures of buildings and monuments (those belonging to cultural heritage being a particular case of interest) are susceptible to deterioration caused by natural forces (such as weather, earthquakes and erosion), but also those resulting from anthropogenic actions. Climate change amplifies these risks, underlining the urgency of implementing strengthening measures to mitigate the impact on the environment. The goal of the project NanoConsol is the transfer and development of a consolidation technology (based on innovative nanomaterials with self-repairing properties and antimicrobial effect), dedicated to different types of materials in the composition of buildings and monuments (especially immovable heritage objects), to an economic agent with experience in creating and applying solutions for the consolidation of such objects, in order to increase its economic competitiveness, as well as its implementation in target sites, in an integrated monitoring/consolidation technology, with the ultimate goal of achieving a viable technology for the consolidation of heritage buildings. This work was supported by the Ministry of Research, Innovation and Digitization (Ministry of Education and Research, National Authority for Research), CCCDI - UEFISCDI, project number PN-IV-P7-7.1-PTE-2024-0522, contract 47 PTE/2025, within PNCDI IV.

RO.227.	
Title EN	**Bee-hive based active principles intensified extraction and smart encapsulation for controlled release: a synergistic bioeconomy and bioengineering approach**
Authors	Cristina Emanuela Enășcuță, Manuel Drugulescu, Irina Fierascu, Elena-Emilia Sîrbu, Radu Claudiu Fierascu, Vasile Lavric
Institution	**National Institute for Research & Development in Chemistry and Petrochemistry – ICECHIM Bucharest/ ACTIV CPC&I SRL**
Patent no.	86PED/2025, PN-IV-P7-7.1-PED-2024-0973
Description	The project goal is represented by the development and validation of an efficient laboratory technology for the extraction and encapsulation of active principles from bee products. The capsules, containing active compounds with a time-controlled release profile, should also have appropriate qualities for human consumption as nutraceuticals. Also, through this project proposal, a new direction of research in terms of obtaining new nutraceutical products will be opened, by developing new innovative methods of extraction, separation and microencapsulation of bioactive compounds. This work was supported by the Ministry of Research, Innovation and Digitization (Ministry of Education and Research, National Authority for Research), CCCDI - UEFISCDI, project number PN-IV-P7-7.1-PED-2024-0973, contract 86 PED/2025, within PNCDI IV.

RO.228.	
Title EN	**Enhancing food safety through drug residues monitoring in food chain using innovative biosensitive portable tools**
Authors	Ana-Maria Gurban, Lucian-Gabriel Zamfir, Mihaela Doni, Cristina Firincă, Iuliana Răut, Mariana Constantin, Cătălina Gîfu
Institution	**National Institute for Research & Development in Chemistry and Petrochemistry – ICECHIM Bucharest**
Patent no.	PN-IV-P7-7.1-PED-2024-1277
Description	The project aims to develop the first integrated electrosensitive and optical platform for miniaturized portable bioanalytical tool based on an innovative nanomaterial, with enhanced electrochemical, optical and mechanical properties, for specific and sensitive

determination of drug residues (DRs) in food. Food safety is critical for human health, thus the need to monitor the food quality has led to a growing interest for the detection of toxic compounds, such as the veterinary drug residues which through excessive and illegal use pose serious threats to human health. The innovation of the project consists in the design of the miniaturized biosensitive tools by modifying flexible sensor templates with customized-MXene – an emerging transition metal carbides and nitrides-based 2D conductive materials, with specific aptamers for determination of sulfadimethoxine, ciprofloxacin and ractopamine residues in food resources. The project will contribute to the improvement of the life quality and to a significant research progress in the field of functional materials for sensing applications.

This work was supported by the Ministry of Research, Innovation and Digitization (Ministry of Education and Research, National Authority for Research), CCCDI - UEFISCDI, project PN-IV-P7-7.1-PED-2024-1277-SafeBioChain.

RO.229.	
Title EN	**Integrating novel biopreservatives for the optimization of food safety in dairy products, BIOSAFE4DAIRY**
Authors	Diana Pasarin, Andra-Ionela Ghizdareanu, Mihaela Doni, Catalin Bogdan Matei, Mariana Constantin, Iuliana Raut, Luiza Capra, Sergiu Dragu, Noemi Elena Virna, Gabriel Iuliu Malos, Jose Manuel Garcia Madero, Lidia Gil Martinez
Institution	**National Institute for Research & Development in Chemistry and Petrochemistry – ICECHIM Bucharest/ Dunarea Prod SRL/ Universitatea de Științe Agronomice și Medicină Veterinară din București/ DOMCA S.A.U.**
Patent no.	Project No. 10/2025, E!6956
Description	The project proposes the development of natural preservatives destined for dairy products, based on innovative formulas combining plant extracts, essential oils, and postbiotics, selected for their strong antimicrobial properties against spoilage and pathogenic microorganisms. The active ingredients are encapsulated in order to ensure controlled release, enhanced stability, and effective integration into dairy matrices, contributing to improved microbiological safety and extended shelf life. Unlike

conventional synthetic additives, the proposed natural alternatives act without compromising the nutritional quality or sensory characteristics of the final products. By combining the bioactive potential of botanical compounds with the functional role of postbiotics, the project aims to deliver effective, clean-label preservation solutions that meet both consumer expectations and current food safety standards.

This work was supported by a grant of the Ministry of Research, Innovation and Digitization, CNCS – UEFISCDI, project number 10/2025, BIOSAFE4DAIRY, within PNCDI IV

National Research and Development Institute for Cryogenic and Isotopic Technologies - ICSI Rm. Valcea

RO.230.	
Title EN	**INNOVATIVE EDGE THOMSON SCATTERING DIAGNOSTICS IN NUCLEAR FUSION REACTORS. Experimentally and FEA-Validated for Fusion Reactor Integration**
Authors	**Sorin SOARE, Alexandru OLTEANU, Mihai-Victor ZERBES, Laura-Maria FUMUREANU**
Institution	**National Research And Development Institute For Cryogenic And Isotopic Technologies (ICSI), Râmnicu Vâlcea / (Lucian Blaga University of Sibiu; University Cultural Center of Sibiu)**
Patent no.	In preparation
Description	The invention related to an advanced Edge Thomson Scattering diagnostic system designed for high-precision control of plasma measurements in the world's largest experimental tokamak, positioned extremely close to plasma edge. Nuclear fusion is a leading candidate for clean energy, with potential to deliver low-carbon power with minimal environmental impact. Its realization depends on precise measurement and control of plasma behavior in edge region, where strong gradients, instabilities, and intense heat fluxes critically affect reactor performance, efficiency, and component lifetime. Fusion plasma reaches temperatures of hundreds of millions of degrees, requiring advanced diagnostic techniques such as Thomson Scattering for determination of key parameters, especially electron temperature and density. Existing diagnostic systems face challenges in accurately measuring plasma edge, having limited access and extreme conditions. Exposure to intense radiation, electromagnetic fields, and high thermal loads degrades components, reducing measurement accuracy and long-term reliability. Our Edge Thomson Scattering diagnostic system, designed and manufactured for extreme fusion conditions, addresses these limitations by enabling high-precision alignment control (15 DOF). It operates under ultra-high vacuum and strong electromagnetic fields, with

experimentally validated performance: leak rates down to 6.4×10^{-11} Pa·m³/s, electrical insulation above 20 MΩ, and reliable operation of integrated protection and cooling subsystems under pressures up to 0.8 MPa. Structural integrity is confirmed with a safety factor of 1.56 under transient loads.

The innovation lies in the integration of optical protection, high-precision alignment, and a hybrid cooling system, enabling accurate and reliable plasma diagnostics, supporting ITER development and the next generation of commercial fusion reactors (DEMO).

RO.231.

Title EN	**DEVELOPMENT OF AN ADVANCED VUV DIVERTOR SPECTROMETER FOR PLASMA DIAGNOSTICS IN THE WORLD'S LARGEST TOKAMAK. Design and Validation for Harsh Fusion Conditions**
Authors	**Sorin SOARE, Alexandru OLTEANU, Mihai-Victor ZERBES, Laura-Maria FUMUREANU**
Institution	**National Research And Development Institute For Cryogenic And Isotopic Technologies (ICSI), Râmnicu Vâlcea / (Lucian Blaga University of Sibiu; University Cultural Center of Sibiu)**
Patent no.	In preparation
Description	The invention relates to an advanced Vacuum Ultraviolet (VUV) divertor spectrometer developed for the world's largest experimental tokamak, enabling high-precision plasma diagnostics in extreme conditions. VUV spectroscopy is a key passive method for diagnosing impurities in plasma, essential for controlling plasma stability and reactor performance. In general, old VUV systems rely on direct line-of-sight configurations, resulting in limited diagnostic coverage, reduced flexibility, and restricted alignment control. In contrast, our system introduces a dual tandem pair of high-precision toroidal mirrors manufactured from Zerodur, an extremely low thermal expansion material ensuring stability under thermal loads. The optical surfaces are coated with gold to maximize reflectivity and prevent oxidation. This mirror-based optical relay extends the diagnostic field

of view, enabling full coverage of the divertor region.

Precision is ensured through an advanced alignment system integrating laser-guided positioning and 22 degrees of freedom (DOF). Fine alignment is achieved using remotely controlled piezoelectric actuators, ensuring high accuracy and stable operation in ultra-high vacuum and strong electromagnetic fields.

The structure is compatible with ultra-high vacuum conditions, using polished SS316 to reduce radiative heat exchange and ensure thermal stability. The system integrates active optical protection through a remotely controlled shutter and an additional protective lid.

Structural integrity and stability are validated through finite element analysis (thermal and seismic), while experimental testing confirms leak rates down to 10^{-11} $Pa \cdot m^3/s$.

The innovation enables full divertor-region impurity diagnostics with high-precision control, remote alignment, and integrated optical protection in extreme fusion environments, supporting ITER and future commercial fusion reactors.

RO.232.

Title EN	**Hybrid Fuel Cell Powertrain, Power Control Method and Vehicle Including the Same**
Authors	Mircea Răceanu, Nicu Bizon, Alin Corbu, Adrian Enache, Mariana Iliescu, Mihail Culcer, Mihai Varlam
Institution	**Your Company/Institute/University**
Patent no.	CBI A/00711/18.11.2024 – Patent Application
Description	The invention relates to a hybrid electric vehicle powered by a modular fuel cell system combined with a battery and an ultracapacitor energy storage unit. The fuel cell system consists of two configurable fuel cell modules supplied with hydrogen from a high-pressure tank and connected to a unidirectional DC/DC converter. The battery is interfaced through a bidirectional converter, while the ultracapacitor is directly connected to the DC bus for fast energy recovery during regenerative braking. A rule-based energy management method divided into 11 operating zones determines the reference power of the fuel cell system according to load demand and battery state of

charge (SoC). This strategy ensures that the fuel cells operate predominantly in their optimal efficiency region, avoids low-power idle operation and frequent start/stop cycles, and protects auxiliary components from transient stress.
Experimental validation on the NEDC driving cycle demonstrated a hydrogen consumption of 0.74 kg/100 km and a driving autonomy of approximately 680 km, with improved durability and energy efficiency.

RO.233.	
Title EN	**The process of obtaining carbon fibers decorated with cobalt, by electrospinning**
Authors	Adriana Marinoiu, Mihaela Iordache, Anisoara Oubraham, Simona Borta, Irina Vagner, Elena Carcadea
Institution	**National Research and Development Institute for Cryogenic and Isotopic Technologies – ICSI Rm Valcea**
Patent no.	CBI nr. A/00248/14.05.2024
Description	The invention refers to a process of obtaining carbon fibers deposited with cobalt and their use for the manufacture of carbonaceous porous materials, with application in the production of carbonic porous layers for various electrochemical devices. The process, according to the invention, leads to non-woven carbon fibers decorated with cobalt particles, which, with graphite additions, can be used in obtaining diffusion layers with improved properties, especially hydrophobicity. The carbon fibers produced are formed by mass from 15.0 to 28.0 % cobalt, have a total volume of pores between 0.008 and 0.069 cm^3 g^{-1}. The diffusion layers obtained from these decorated carbon fibres have hydrophobic material characteristics.

RO.234.	
Title EN	**Autonomous system of production and supply of hydrogen for power sources in open field**
Authors	Marinoiu Adriana, Vagner Irina, Băltoiu Sebastian
Institution	**National Research and Development Institute for Cryogenic and Isotopic Technologies – ICSI Rm Valcea**
Patent no.	CBI A/00709/18.11.2024
Description	The invention refers to an autonomous system of production and supply of hydrogen, by the catalytic hydrolysis method of sodium borohydride, for open field power sources and a process for obtaining it. The autonomous system according

to the invention is constituted by a reactor composed of an external cylindrical body in which there is another inner cylindrical body, in which the reagent holder is positioned. The reagent holder shall be mounted on a two-rod cylinder fitted with a helical spring, a blocker and a limiter. The process of obtaining according to the invention has the following steps: a) the introduction of the $NaBH_4$ reagent pill into the holder; b) the introduction of water into the reactor with the dissolved $CoCl_2$ catalyst; c) the assembly of the reactor by threading the inner cylindrical body on the reactor cover and mounting the support on the pneumatic piston rod (5); d) the fitting of the reactor cover with the previously assembled elements on the reactor body; e) water penetration by catalyst through the holes (O_{id}) by moving down the support and initializing the chemical reaction of H_2; f) shutting down the water access to the bracket, which will be done upon reaching the fixed pressure threshold, given by the tensioning of the coil spring by operating the pneumatic cylinder; the reopening of the water access to the support will be made to lower the pressure below the minimum level fixed.

RO.235.	
Title EN	**ELECTROCHEMICAL SEPARATION CELL**
Authors	Iordache Andreea Maria, Zgavarogea Ionela Ramona, Ionete Elena Roxana, Ionete Ilarian Eusebiu, Spiridon Ionut Stefan, Chitu Alin-Mugurel
Institution	National Research and Development Institute for Cryogenic and Isotopic Technologies
Patent no.	Patent application No. A/00238/12.06.2025
Description	The invention relates to an electrochemical separation cell for lithium isotopes, namely ^6Li and ^7Li, from a solution. The separation cell according to the invention comprises two separation vessels (1) provided with two electrode-support chambers (2), namely an anode chamber and a cathode chamber, interconnected through a pathway with an inclined base that facilitates the electromigration of the isotopes. The chambers (2) have a cylindrical base and include an electropermeable polymer membrane (3) on which electrocatalytic mixtures are deposited. The membrane (3) is fixed between a lower connector (4) and an upper connector (5), which are designed to ensure the secure fastening and folding of the membrane (3) between them during the assembly procedure.

The cell further comprises a number of straight or inclined openings which increase the separation surface through the membrane (3) and facilitate filling with the liquid from which the isotopic separation is carried out. The vessels (1) are provided at one end with a liquid inlet connector (6) and at the opposite end with a liquid outlet connector (7), thereby forming a common element.

RO.236.

Title EN **Process for obtaining bioethanol from grape pomace through simultaneous saccharification and fermentation**

Authors Elisabeta-Irina Geană, Ciucure Corina Teodora, Oana Romina Botoran, Roxana Elena Ionete

Institution **National Research and Development Institute for Cryogenic and Isotopic Technologies – ICSI Rm. Valcea**

Patent no. CBI A/00707/18.11.2024

Description

Grape pomace (Vitis Vinifera L.) is a valuable resource for the production of cellulosic bioethanol, offering sustainable solutions for the valorization of a secondary stream generated by wineries and reducing the impact on the environment. The use of bioethanol obtained from pomace as a biofuel reduces greenhouse gas emissions compared to conventional ethanol and fossil fuels, thus contributing to improving environmental quality and energy security by limiting dependence on fossil fuels resulting from the oil industry.

The invention relates to a process for obtaining bioethanol from grape pomace (Vitis Vinifera L.) by saccharification and simultaneous fermentation (SSF). According to the invention, the process consists of the following steps: 1) pretreatment of grape pomace by autohydrolysis in a 50 mM citrate buffer solution (pH 5) at a solid-to-liquid ratio of 1:15, carried out at 121 °C for one hour, followed by ultrasonic treatment for 15 minutes; 2) Simultaneous hydrolysis and fermentation (SSF) of the released sugars for 55 hours at 30 °C in the presence of hydrolytic enzymes (cellulase and hemicellulase), detoxification enzymes (laccase), and Saccharomyces cerevisiae yeast; 3) Separation of the solid fraction by centrifugation to obtain the fermentation broth; 4) Recovery of bioethanol through distillation and dehydration of the fermentation mixture; and 5) Determination of the purity of the obtained bioethanol by GC-FID. The bioethanol obtained according to the invention reaches a purity of 92.85% and can be used as a biofuel or as a solvent, supporting integration into the circular bioeconomy framework.

National Institute for Chemical - Pharmaceutical Research and Development, Bucharest, Romania ICCF

RO.237.	
Title EN	**Quinoline-3-carboxylic acid derivatives with antimicrobial activity**
Authors	Lucia Pintilie, Maria Maganu, Constantin Draghici, Miron Teodor Caproiu, Ioana-Cristina Marinas
Institution	**National Institute for Chemical - Pharmaceutical Research and Development, Bucharest, Romania**
Patent no.	Patent application No. A/00745 din 27.11.2024
Description	The invention relates to the identification by design and "in silico" simulation of some quinoline-3-carboxylic acid derivatives and their obtaining by chemical synthesis, used as agents with antimicrobial activity against gram-positive and gram-negative microorganisms, as intermediates in the synthesis of hybrid combinations or as ligands in the obtaining of complex combinations. The comparative study of the antimicrobial activity of the series of fluorinated (FPQ) and non-fluorinated (HPQ) compounds highlights the superiority of the FPQ series in inhibiting the growth of microorganisms, especially Gram-positive (S. aureus, E. faecalis) and Gram-negative (K. pneumoniae, P. aeruginosa) bacteria. The presence of fluorine in the molecule led to a significant increase in antimicrobial activity against Gram-negative bacteria and improved the properties of the compounds FPQ202, FPQ203 and FPQ205. Significant microbicidal effects were observed with FPQ200 and FPQ205 on S. aureus and only with FPQ200 on E. faecalis.

RO.238.	
Title EN	**Design and development of a new antimicrobial agent with activity against multidrug-resistant microorganisms**
Authors	Lucia Pintilie
Institution	**National Institute for Chemical - Pharmaceutical Research and Development, Bucharest, Romania**
Patent no.	Project PN 23-28 01 01
Description	Resistance developed by bacteria threatens virtually all classes of antibacterial agents. The economic impact of antibiotic resistance is considerable and will continue to grow. "A post-antibiotic era means the end of modern

medicine as we know it. Things as common as strep throat or a child's scraped knee could kill again." (Margaret Chan-Director-General WHO-2012). Identifying a new molecule with activity against multidrug-resistant microorganisms and developing it into a new drug would be an important step in the fight against antibiotic resistance, leading to improved health and life expectancy of the population, reduced medical costs, increased productivity. The project aimed to develop new compounds with activity against multidrug-resistant microorganisms. Molecular design studies and molecular docking studies were performed to make predictions, to identify and visualize the most likely mode of interaction of the ligand with the receptor (target protein). The compounds selected following molecular docking studies, bicyclic quinolones and bio-essential metal complexes, were obtained by chemical synthesis, structurally characterized and from the point of view of biological activity on strains of S. aureus, E. faecium, K. pneumoniae, P. aeruginosa, C. albicans. The tested bio-essential metal complexes demonstrated a selective activity of inhibiting microbial adhesion, more pronounced on Gram-positive bacteria. The values of the minimum concentrations of inhibition of microbial adhesion to inert substrate generally higher than the MIC, indicate distinct mechanisms involved in preventing cell adhesion and support the potential of these combinations as adjuvant agents in controlling biofilm formation.

RO.239.

Title EN	**Process for obtaining bacterial nanocellulose from renewable raw materials**
Authors	Angela CASARICA, Corina BUBUEANU, Gabriela SAVOIU
Institution	**National Institute for Chemical-Pharmaceutical Research & Development, Bucharest, Romania**
Patent no.	RO139322 (A2)/30.12.2025, BOPI 12/2025
Description	The invention relates to a biotechnological process for obtaining bacterial nanocellulose (BC/BNC) using the Acetobacter xylinum DSMZ 2004 strain, on culture media containing a triple source of carbon derived from renewable resources, namely: apple extract of inadequate quality, molasses from sugarcane as a byproduct of its processing,

and glycerin as a byproduct resulting from biodiesel production. The purpose of the process is to reduce the costs of bacterial nanocellulose biosynthesis and to valorize renewable resources, constituting an efficient solution for obtaining biodegradable materials with high added value. Furthermore, the process increases the production yield, reaching values of up to 8.95 g/L, and enables the use of bacterial nanocellulose in the biomedical field, particularly for wound healing applications, wound dressings, and dermatological treatments.

RO.240.

Title EN **Topical product based on Hay Flowers' Extract for skin condition and projected diseases combining inflammation and infectious processes**

Authors Lucia PIRVU, Minerva PANTELI, Sultana NITA, Cristina BAZDOACA, Iuksel RASIT

Institution **National Institute of Chemical Pharmaceutical Research and Development, INCDCF – ICCF Bucharest**

Patent no. Patent application no. A 00617 / 07.10.2022;
BOPI no. 4 / 2024

Description

Hay Flowers represent a very complex vegetal raw material consisting in flowers, seeds, stems and leaves of the pastoral flora from a specific geographical region.

Given the high diversity of pastoral flora, the extracts from Hay Flowers cumulate a plethora of bioactive compounds, able to manage oxidative stress, inflammation, and many other cell' impairments.

The current invention, a topical product for the purpose as medical device, formulated as hydrogel and cream, is addressed to acne and folliculitis skin conditions, as well as to other inflammatory diseases projected at the skin level, such as joints' contusions and arthritis.

The topical product contain the following ingredients: (93%) water and formulation ingredients (e.g., carbopol, pemulen, plurol), (2%) natural conservatives (Vitamin E, tamanu oil) and (5%) Hay Flowers' Extract (HFE).

As technological and analytical aspects, the HFE is an ethanolic extract standardized in gallic acid equivalents (GAE), prevailing in quercetin and caffeic acid derivatives. As pharmacological aspects: the HFE indicated efficacy against Staphylococcus aureus; also, studies on rats with paw

edema induced with carrageenan, two test groups in comparison with the negative control group, indicated that the topical product with 5% HFE affords an anti-inflammatory effect superior to that offered by the reference commercial product based on 5% diclofenac.
Altogether, the topical product with **5% HFE** appears to be effective in skin conditions and skin projected diseases combining inflammation and infectious processes.

RO.241.

Title EN	**Innovative solutions for obtaining a range of products with applications in regenerative cosmetics**
Authors	Fawzia SHAAT (ICCF Project Manager), Echipa: Ramona-Daniela PAVALOIU, Corina BUBUEANU, Angela CASARICA, Mariana FODOR, Ciprian FODOR, Emilian ROMAN
Institution	**National Institute For Chemical-Pharmaceutical Research and Development – ICCF, Bucharest**
Patent no.	Project PN-IV-P7-7.1-PTE-2024-0317, Ctr.10PTE/2025
Description	The objective of this project is to transfer laboratory-validated technologies to develop an innovative range of products for skin care and regeneration, and to demonstrate their functionality at a pilot scale. Currently, the project focuses on creating a range of three products: a hydrogel for soothing skin irritations caused by solar radiation, a cream to alleviate symptoms associated with dermatological conditions such as eczema and atopic dermatitis, and an ointment for extremely dry or xerotic skin. By developing these products, the project aims to enhance the quality of life of individuals affected by these skin conditions, providing more effective and comfortable treatment options. The innovative aspect of the project lies in the incorporation of nanosystems based on microbial polymers or liposomes into the formulations for skin care and regeneration. The project begins at a technological readiness level (TRL) of 4 and is expected to reach TRL 6 upon implementation. It will be carried out in three stages over a 24-month period.

RO.242.	
Title EN	**Materials with applications in hard tissue engineering**
Authors	Dr. Ing. Dana-Maria Miu
Institution	National Institute for Chemical-Pharmaceutical Research and Development – ICCF Bucharest
Patent no.	Project- doctoral thesis
Description	This doctoral thesis addresses the field of regenerative medicine by developing experimental models for innovative biomaterials intended to treat damaged hard tissues. The research is guided by specific objectives focused on enhancing the biocompatibility of metallic supports through ceramic coatings and the microbial biosynthesis of polyhydroxyoctanoate (PHO) using the Pseudomonas fluorescens strain. A particular emphasis is placed on creating and characterizing complex systems such as PHO and hydroxyapatite composite films, as well as polymeric nanoparticles made of PHO and pullulan, both versions being loaded with curcumin to ensure a controlled release of the active substance. The originality of the work stems from the unique combinations of materials proposed, merging the properties of bioceramics with those of microbial polymers and natural therapeutic agents. Structurally, the thesis is organized into two fundamental sections. The first part is dedicated to a critical study of specialized literature structured across seven theoretical stages. These include the classification and description of essential biomaterial properties, detailed analysis of ceramics like wollastonite or hydroxyapatite, and the presentation of biodegradable polymers from the polyhydroxyalkanoate class. The second part materializes the author's original contributions through four extensive experimental studies. These investigations focus on depositing thin bioceramic layers on titanium substrates, optimizing biopolymer biosynthesis, and utilizing experimental design to perfect curcumin-loaded composite films. The final phase centers on producing and biologically testing polymeric nanosystems, demonstrating their potential in tissue engineering. The entire work culminates in a synthesis of conclusions validating the efficiency of these new materials within the targeted clinical context.

National Institute for Research and Development in Microtechnologies - IMT Bucharest

RO.243.	
Title EN	Matrix nanocomposite for temperature sensor
Authors	Bogdan- Catalin Serban, Octavian Buiu, Niculae Dumbravescu, Marius Bumbac, Cristina Pachiu, Oana Brancoveanu, Cristina Nicolescu
Institution	National Institute for Research and Development in Microtechnologies - IMT Bucharest/ Valahia University of Târgoviște -UVT
Patent no.	Ro Patent application A/00436, RO OSIM, 01.10. 2025
Description	The technical problem addressed by the present invention consists in the fabrication of a temperature sensor using, as sensitive layers, nanocomposite matrices based on onion-like carbon nanomaterials and polyvinylpyrrolidone. The substrate used is Kapton, while the electrodes are made of gold. The synthesis of the nanocomposite matrices is carried out in an ultrasonic bath, at different CNO/PVP mass ratios, using dimethylformamide as the solvent.The sensitive layer exhibits a negative temperature coefficient of resistance (TCR) of approximately -1.05 × 10^{-2} K^{-1} in the temperature range of 25–50 °C. Considering the linear behavior of the resistance variation between 25 and 50 °C, the temperature sensor can be used in the medical field. The use of CNO/PVP nanocomposite matrices as the sensitive layer for the design of a temperature sensor in the medical field offers several important advantages: -CNOs exhibit good electrical conductivity, which is crucial for temperature sensors that rely on changes in electrical resistance with temperature variation; -linear resistance variation in the 25–50 °C range; -CNOs demonstrate good thermal stability, maintaining their structural integrity even at high temperatures. This makes them suitable for applications in which temperature sensors must operate in high-temperature environments or are exposed to thermal fluctuations; -CNOs are biocompatible; -the small size and unique properties of CNOs make them suitable for the development of miniaturized and portable temperature sensors; -PVP is an excellent binder, ensuring a homogeneous distribution of carbon nanoparticles within the nanocomposite matrix.

RO.244.	
Title EN	Acetone resistive sensor
Authors	Bogdan- Catalin Serban, Octavian Buiu, Maria Roxana Marinescu, Marius Bumbac, Cristina Nicolescu
Institution	National Institute for Research and Development in Microtechnologies - IMT Bucharest/ Valahia University of Târgoviște -UVT
Patent no.	Romanian Patent application A/00435, RO OSIM, 01.10. 2025
Description	The technical problem solved by the present invention consists in obtaining new resistive sensors for monitoring acetone vapor concentration. The sensitive layers described in this invention, which can be used to obtain resistive acetone vapor sensors, are nanocomposite matrices of the oxidized carbon nanohorns / fluorinated graphene oxide (FGO) type. The synthesis of oxidized carbon nanohorns is carried out by treating single carbon nanohorns in Ar-O_2 plasma. The synthesis of FGO is carried out through the reaction of graphene oxide with HF at a temperature of 180°C. From the standpoint of the detection principle, the resistance of the sensitive layer increases as the concentration of acetone vapors increases. The functionalization of carbon nanohorns in Ar-O_2 plasma has the advantage that, by changing the type of plasma, the exposure time, and its power, it can ensure an optimal C:O atomic ratio, thus providing suitable sensitivity. The sensor substrate is made of Kapton or PET, while the electrodes are made of the same material (gold, chromium) or of different materials. They may be linear or may have an interdigitated configuration. The acetone vapor monitoring capability is investigated by applying a constant current between the two electrodes and measuring the voltage at different values of acetone concentration to which the sensitive layer of oxidized carbon nanohorns / fluorinated graphene oxide type is exposed.

RO.245.	
Title EN	Acetone gravimetric sensor
Authors	Bogdan- Catalin Serban, Octavian Buiu, Maria Roxana Marinescu, Marius Bumbac, Cristina Nicolescu
Institution	National Institute for Research and Development in Microtechnologies - IMT Bucharest/ Valahia University of Târgoviște -UVT
Patent no.	Romanian Patent application A/00433, RO OSIM, 01.10. 2025
Description	Technical problem solved by the present invention consists in obtaining new sensitive layers for monitoring the concentration of acetone vapors. The sensitive films described in this invention are used in the design of a surface acoustic wave (SAW) sensor. These sensors use as films new nanocomposite matrices of the type oxidized carbon nanohorns / oxidized onion-like nanocarbon materials / carboxymethyl cellulose. The sensitive films are deposited onto the quartz piezoelectric substrate by the drop-casting method. The use of oxidized carbon nanohorns, oxidized onion-like nanocarbon materials, and carboxymethyl cellulose in monitoring acetone vapor concentration with gravimetric surface acoustic wave (SAW) sensors provides several undeniable advantages: -the presence of ox-CNH provides a high specific surface area-to-volume ratio, affinity for acetone molecules (“mass loading”), as well as a change in the resistance of the sensitive layer upon contact with them (“electric loading”); -the presence of ox-CNO provides a high specific surface area-to-volume ratio, affinity for acetone molecules (“mass loading”), as well as a change in the resistance of the sensitive layer upon contact with them (“electric loading”), while also acting as a dispersing medium for the oxidized carbon nanohorns; -carboxymethyl cellulose is an excellent binder, generating hydrogen bonds both with the two nanocarbon materials and with the analyte molecules. Additional advantages of the sensor are: -rapid response to variations in acetone concentration; -reversibility; -detection at room temperature; -superior mechanical properties.

RO.246.	
Title EN	Oxifluoronanocarbonic sensitive layers for the resistive detection of acetone.
Authors	Bogdan-Cătălin Serban, Octavian Buiu, Roxana Marinescu, Marius Bumbac, Cristina Mihaela Nicolescu
Institution	National Institute for Research and Development in Microtechnologies - IMT Bucharest/ Valahia University of Târgoviște -UVT
Patent no.	Romanian Patent application A/00434, RO OSIM, 01.10. 2025
Description	The technical problem addressed by the present invention is the development of new resistive sensors for monitoring acetone vapor concentration. The sensitive layers described in this invention, which can be used to fabricate resistive acetone vapor sensors, consist of nanocomposite matrices based on oxyfluorinated onion-type nanocarbon materials and fluorinated reduced graphene oxide.The synthesis of ox-CNOs-F is achieved by treating onion-type carbon materials in F_2-N_2 and Ar-O_2 plasma. The synthesis of rGO-F is achieved by treating reduced graphene oxide in F2-N2 plasma. From the perspective of the detection principle, the resistance of the sensitive layer varies depending on the concentration of acetone vapor.The functionalization of onion-type nanocarbon materials in F_2-N_2 and Ar-O_2 plasma offers the advantage that, by adjusting the plasma type, exposure time, and power, an optimal C:F:O atomic ratio can be obtained, thus providing appropriate sensitivity.The sensor substrate is made of Si/SiO2, while the electrodes are made either of the same material combination (gold and chromium) or of different materials.The electrode width is approximately 200 microns, with a separation of 6 mm between them. The electrodes may be linear or arranged in an interdigitated configuration. The acetone vapor monitoring capability is evaluated by applying a constant current between the two electrodes and measuring the voltage at different acetone concentrations to which the sensitive layer, consisting of an ox-CNOs-F/rGO-F nanocomposite matrix, is exposed.

RO.247.	
Title EN	Ternary matrix nanocomposite for humidity sensor
Authors	Bogdan-Cătălin Serban, Octavian Buiu, Niculae Dumbravescu, Marius Bumbac, Cristina Pachiu, Oana Brancoveanu, Cristina Mihaela Nicolescu
Institution	National Institute for Research and Development in Microtechnologies - IMT Bucharest/ Valahia University of Târgoviște -UVT
Patent no.	Romanian Patent application A/00437, RO OSIM, 01.10. 2025
Description	The technical problem addressed by the present invention consists in obtaining new humidity-sensitive layers responsive to changes in relative humidity, used in the design of resistive-type sensors. The ternary nanocomposite used as a sensing film for RH variation consists of onion-like nanocarbon materials, polyvinylpyrrolidone, and oxidized carbon nanohorns in a mass ratio of 84:15:1. The detection device is made of a silicon substrate, a SiO2 layer, and interdigitated gold electrodes. The electrodes may be linear or may have an interdigitated configuration. The use of the ternary nanocomposite as a sensing layer for RH variation presents several notable advantages: -both nanocarbon materials provide a high specific surface area-to-volume ratio, as well as a variation in the resistance of the sensing layer upon contact with water molecules over the entire RH range (p-type semiconductors); -the oxygen-containing functional groups present on the surface of the carbon nanohorns increase the hydrophilicity of the sensing layer and, consequently, its affinity for water molecules; -polyvinylpyrrolidone is a hydrophilic polymer with excellent binder properties, ensuring a homogeneous distribution of the carbon nanoparticles throughout the entire volume of the sensing layer; -due to its swelling effect upon contact with water molecules, polyvinylpyrrolidone increases the sensitivity of the sensing layer by interrupting the percolation channels of the nanocarbon materials; -superior reproducibility; -room-temperature detection; • chemical and thermal stability; • superior mechanical properties. .

National Institute for Research - Development of Machines and Installations designed for Agriculture and Food Industry - INMA Bucharest, Romania

RO.248.	
Title EN	**VACUUM IMPREGNATION INSTALLATION**
Authors	Cristian SORICĂ[1)], Alexandru IONESCU[1)], Elena SORICĂ[1)], Laurențiu VLĂDUȚOIU[1)], Daniela VERINGĂ[2)]
Institution	**[1)]National Institute for Research - Development of Machines and Installations Designed for Agriculture and Food Industry - INMA Bucharest, Romania** **[2)]Research and Development Institute for the Industrialization and Marketing of Horticultural Products "HORTING"**
Patent no.	Patent application No.: A-00136 / 2026
Description	The invention refers to a vacuum impregnation installation, which modifies the composition of porous food products by removing air and part of the internal liquids, followed by impregnating them with physiologically active compounds, without affecting the structural integrity of the food matrix, in order to improve the quality, nutritional content and extend the shelf life of the products.

RO.249.	
Title EN	**METHOD FOR EXTRACTION OF POLYPHENOLS FROM PLANTS BY ULTRASOUND-ASSISTED PERCOLATION AND ACTIVE THERMAL CONTROL**
Authors	Ana-Maria TĂBĂRAȘU, Valentin VLĂDUȚ, Florin NENCIU, Iuliana GĂGEANU, Dragoș ANGHELACHE, Mihai CONSTANTINESCU, Teofil-Alin ONCESCU
Institution	**National Institute for Research - Development of Machines and Installations Designed for Agriculture and Food Industry - INMA Bucharest, Romania**
Patent no.	Patent application No.: A-00094 / 2026
Description	The invention refers to a method for extracting polyphenols from plants by ultrasound-assisted percolation, associated with rigorous, continuous thermal control. The critical

process parameters – pressure, time, ultrasound power and extraction solvent temperature – are actively, continuously, controlled during the process to protect the thermosensitive polyphenolic compounds and to improve the extraction yield.

RO.250.

Title EN **DEVICE FOR PRECISION APPLICATION OF GRANULAR FERTILIZERS IN STRIP-TILLAGE**

Authors Dragoș MANEA, Eugen MARIN

Institution **National Institute for Research - Development of Machines and Installations Designed for Agriculture and Food Industry - INMA Bucharest, Romania**

Patent no. Patent application No.: A-00653 / 2025

Description The invention refers to a device for the precise application of granular fertilizers together with soil cultivation in narrow strips, intended for agricultural equipment that performs conservative soil cultivation and in particular for strip-till technology, which combines localized soil loosening with fertilizer application before sowing.

RO.251.

Title EN **BIOSTIMULATOR WITH MICROORGANISMS, FOR FOLIAR FERTILIZATION, AND PREPARATION RECIPE FOR FERTILIZATION WITH MICROORGANISMS**

Authors Anca-Rovena LĂCĂTUȘU[1)], Horia DOMNARIU[1)], Irina Ramona MORARU[1)], Dora MARICA[1)], **Nicolae-Valentin VLĂDUȚ[2)], Mihai CONSTANTINESCU[2)]**

Institution **[1)]National Research and Development Institute for Soil Science, Agrochemistry and Environment – ICPA Bucharest**
[2)]National Institute for Research - Development of Machines and Installations Designed for Agriculture and Food Industry - INMA Bucharest, Romania

Patent no. Patent application No.: A-00632 / 2025

Description The invention refers to the creation of a Biostimulator type biopreparation with Microorganisms intended for Foliar Fertilization as well as to a Fertilization Preparation Recipe

using Microorganisms.

RO.252.	
Title EN	**TUNNEL-TYPE ROTARY EQUIPMENT, WITH INTERNAL PEDESTRIAN ACCESS, AQUAPONIC NUTRIENT CIRCUIT AND MULTISPECTRAL SYSTEM, THAT STIMULATES THE GROWTH OF FLOWERS AND VEGETABLES**
Authors	Mihai OLAN, Valentin VLĂDUȚ, Mihai MATACHE, Radu CIUPERCĂ, Iuliana GĂGEANU
Institution	**National Institute for Research - Development of Machines and Installations Designed for Agriculture and Food Industry - INMA Bucharest, Romania**
Patent no.	Patent application No.: A-00652 / 2025
Description	The invention falls within the technical field of advanced agricultural technologies (AgriTech) and mechanized engineering for intensive plant cultivation, consisting of a rotating tunnel-type equipment for plant cultivation, with internal pedestrian access and aquaponic nutrient circuit, intended for the intensive cultivation of low-height flowers and vegetables, making vertical farming possible in an autonomous and modular form.

RO.253.	
Title EN	**CONTINUOUS FLOW DISINFECTION SYSTEM, FOR MICROPLANTS SEEDLING TRAYS, FOR VERTICAL AGRICULTURE**
Authors	Iuliana GĂGEANU, Gabriel-Valentin GHEORGHE, Ioan-Cătălin PERSU, Dan CUJBESCU, Mihai-Gabriel MATACHE, Nicolae-Valentin VLĂDUȚ, Ana-Maria TĂBĂRAȘU
Institution	**National Institute for Research - Development of Machines and Installations Designed for Agriculture and Food Industry - INMA Bucharest, Romania**
Patent no.	Patent application No.: A-00513 / 2025
Description	The invention presents a continuous flow disinfection system for trays sown with microplants, used in vertical farming systems, with the aim of achieving complete sterilization of the trays, substrate and seeds without the use of aggressive

chemicals and without affecting seed germination. The equipment ensures uniform, safe and energy-efficient sanitation, reducing water and disinfectant consumption, being easily integrated into modular vertical farming infrastructures.

RO.254.

Title EN	**HIGH-EFFICIENCY MULTILAYER FILTRATION SYSTEM WITH AUTOMATIC CLEANING AND BACKWASHING FOR AQUAPONICS**
Authors	Iulian VOICEA, Mihai OLAN, Valentin VLĂDUȚ, Florin NENCIU, Remus OPRESCU
Institution	**National Institute for Research - Development of Machines and Installations Designed for Agriculture and Food Industry - INMA Bucharest, Romania**
Patent no.	Patent application No.: A-00140 / 2025
Description	The invention refers to an aquaponics system and, in particular, to an integrated filtration equipment that purifies water, efficiently circulates nutrients, and minimizes maintenance through an automation system for fish culture and farming. The invention solves the problems of existing aquaponics systems, such as poor filtration, clogging, maintenance difficulties, and excessive energy consumption, and contributes to building a more stable and efficient aquaponics system.

RO.255.

Title EN	**INNOVATIVE MINIMUM TILLAGE TECHNOLOGY OF AGRICULTURAL LAND ADAPTED TO CURRENT CLIMATE CHANGES**
Authors	Valentin VLĂDUȚ[1)], Mihai MATACHE[1)], Eugen MARIN[1)], Dragoș MANEA[1)], Mihai OLAN[1)], Cătălin PERSU[1)], Iulian VOICEA[1)], Iuliana GĂGEANU[1)], Dan CUJBESCU[1)], Florin NENCIU[1)], Mihai CONSTANTINESCU[1)], Diana-Lorena POPA[2)], Gheorghe MATEI[3)], Sorin BORUZ[3)], Cristian RADU[3)], Anca-Rovena LĂCĂTUȘU[4)], Horia DOMNARIU[4)], Irina Ramona MORARU[4)], Dora MARICA[4)]
Institution	**[1)]INMA Bucharest -Romania;** **[2)]SCDA Secuieni -Romania;** **[3)]University of Craiova -Romania;**

Patent no.	**[4)]ICPA Bucharest -Romania** Patent applications No.: **A-00562 / 2024, A-00632 / 2024** **A-00185 / 2025, A-00347/2025, A-00631/2025, A-00632 / 2025**
Description	In the context of global climate change (increasing areas affected by desertification), the implementation of a new, efficient, conservative and ecological agricultural technology that promotes minimal soil work along with the application of biostimulators / biofertilizers with microorganisms in the soil, may represent a solution for degraded / desertified soils. This technology aims to use agricultural practices that are not dangerous for the soil, in order to help degraded / arid soils regenerate (through conservative work carried out with special equipment and the application of bacterial and fungal products for soil regeneration), while increasing the degree of carbon accumulation in the soil (humus).

RO.256.	
Title EN	**MOBILE ROBOT FOR TOMATO LEAF PRUNING**
Authors	Mihai MATACHE, Robert CRISTEA, Marian CHIRIȚESCU, Gabriel GHEORGHE, Iulian VOICEA, Dan CUJBESCU, Iuliana GĂGEANU, Cătălin PERSU
Institution	**National Institute for Research - Development of Machines and Installations Designed for Agriculture and Food Industry** **- INMA Bucharest, Romania**
Patent no.	Patent application No.: A-00627 / 2024
Description	The invention refers to a mobile robot intended for the shaping and maintenance of tomato crops, being composed of a robotic arm equipped with a specialized gripper for cutting leaves and a mobile platform on rails for moving between rows of tomatoes. The gripper is equipped with scissors for precise cuts and has an advanced mechanism to retain the tail of the leaves so that they are efficiently collected in a collection container.

RO.257.	
Title EN	**MOBILE STATION FOR PRODUCING BIOFERTILIZERS THROUGH PYROLYSIS**
Authors	Vasilica ȘTEFAN, Lucreția POPA, Radu CIUPERCĂ, Ana ZAICA, Mihai CONSTANTINESCU
Institution	**National Institute for Research - Development of Machines and Installations Designed for Agriculture and Food Industry - INMA Bucharest, Romania**
Patent no.	Patent application No.: A-00575 / 2024
Description	The invention refers to a mobile station for obtaining biofertilizers by pyrolysis intended for the processing of poultry droppings by pyrolysis (burning in the absence of oxygen) in order to obtain biofertilizers with a high phosphorus content.

National Institute for Research and Development in Mine Safety and Protection to Explosion - Insemex Petroșani

RO.258.	
Title EN	**Stand for pressure testing of electrical equipment with encapsulation and intrinsic safety types of protection**
Authors	Colda Cosmin, Găman George Artur, Ghicioi Emilian, Pupăzan Daniel, Burian Sorin, Darie Marius, Csaszar Tiberiu, Andriș Adriana, Botar Daniela, Grecea Dănuț, Pupăzan Gabriela, Moldovan Lucian, Jurca Adrian, Magyari Mihai, Fotău Dragoș, Păun Florin, Gabor Dan, Beldiman Alexandru
Institution	**NATIONAL INSTITUTE FOR RESEARCH AND DEVELOPMENT IN MINE SAFETY AND PROTECTION TO EXPLOSION - INSEMEX**
Patent no.	Patent application No. A 2023 00622
Description	The invention relates to the design, development, and testing of a fully operational stand intended for pressure testing. The tests are required by SR EN 60079 – 11:2012 for intrinsic safety 'i' type of protection, and SR EN 60079 – 18:2015 for encapsulation 'm' type of protection, of equipment intended for use in explosive atmospheres. The pressure testing stand for equipment with intrinsic safety 'i' or encapsulation 'm' type of protection, intended for use in explosive atmospheres, according to the invention, consists of a set of elements: compressed air cylinder; two-stage pressure regulator; precision pressure reducer; relative pressure transducer; rotameter; quick couplings for connecting the tested equipment; clamp meter; power supply; data acquisition system with multifunctional module; computer system and digital timer.

RO.259.	
Title EN	**Method for reducing methane content from coal seams**
Authors	Cioclea Doru, Găman George Artur, Ghicioi Emilian, Gherghe Ion, Ianc Nicolae, Rădoi Florin, Boantă Corneliu, Chiuzan Emeric, Tomescu Cristian, Matei Adrian, Drăgoescu Răzvan, Cămărășescu Alexandru, Vlasin Nicolae, Șimon Marinică Bogdan
Institution	**NATIONAL INSTITUTE FOR RESEARCH AND DEVELOPMENT IN MINE SAFETY AND PROTECTION TO EXPLOSION - INSEMEX**

Patent no. Patent application No. A 2024 00433

Description

The method of reducing the methane content in coal seams is based on a method of reducing the methane content in coal seams by performing mining works in thick horizontal or low-incline layers, horizontal, vertical and inclined niches and drillings that penetrate the coal seam and the roof rocks for the drainage and capture of methane gas confined in the layer and rock.

For this, a panel is chosen that is to be exploited in perspective, a connecting gallery is executed from the main conjugate directional gallery, the execution of an inclined plane from the connecting gallery that is oriented towards the upper part of the layer and at the panel limit.

The execution of a directional gallery under the roof up to half of the panel from the inclined plane, the execution of a transverse gallery under the roof up to the panel limit from the directional gallery under the roof.

The execution of several drilling niches made in a checkerboard pattern on both sides of the transverse gallery under the roof, the execution of several horizontal, vertical and inclined drillings from each niche, the creation of an isolation construction at the level of the directional gallery under the roof near the inclined plane.

The installation of a collector pipe that crosses the isolation construction and that will follow the alignment of the inclined plane up to the connecting gallery, the execution of an isolation construction at the level of the connecting gallery, the installation of a collector pipe on the alignment of the inclined plane and that crosses the construction isolation from the connecting gallery.

The two collector pipes are coupled, auxiliary measurement, isolation and control devices are mounted on the two collector pipes, the two collector pipes are connected to the transport system by means of coupling elements, the transport system is connected to the central degassing system network and finally the degassing process of the coal seam is started.

RO.260.	
Title EN	**Experimental set-up for the determination of the explosion limits of flammable liquids vapours**
Authors	Maria Prodan, Găman George Artur, Ghicioi Emilian, Lupu Constantin, Cioclea Doru, Păsculescu Vlad, Gabor Dan, Vlasin Nicolae, Jurca Adrian, Szollosi Mota Andrei, Nălboc Irina, Șuvar Marius
Institution	**NATIONAL INSTITUTE FOR RESEARCH AND DEVELOPMENT IN MINE SAFETY AND PROTECTION TO EXPLOSION - INSEMEX**
Patent no.	131748/2023
Description	The invention relates to an experimental set-up for the determination of the explosion limits of flammable liquids vapors, namely the lower explosion limit (LEL) and the upper limit of explosion (LSE). The equipments from the experimental set-up allow the recording of several processes: the explosion pressure, the vaporization of the liquid, the homogeneous air-vapor mixture and the combustion, that take place in a controlled temperature vessel at the boiling point of the liquid.

National Institute for Research and Development URBAN-INCERC

RO.261.	
Title EN	**Acoustic characteristics of human usual activities made in living spaces from residential civil buildings and human psychoacoustics perception**
Authors	**Marta-Cristina ZAHARIA**
Institution	National Institute for Research and Development in Constructions, Urbanism and Sustainable Spatial Development URBAN-INCERC
Patent no.	-
Description	Studies regarding human psychoacoustics perception, specific for residential buildings, with human usual living activities, were conducted in research projects, in INCD URBAN-INCERC institute. Human subjects have very subjective psychoacoustics noise perception about activities made by them and made by someone else; on the other side each person has a specific psychic sensitivity that depends on their temperament, health, education, etc. We have carried out researches, for 27 usual human living activities that may constitute noise sources in living spaces from residential civil buildings (living room, kitchen, bedroom, bathroom, etc.), in order to define their acoustic characteristics (their spectra and noise levels). We present some measuring situations about noise received in the interior of the rooms of the residential civil building. Conclusion: In order to improve the existing sound design method of residential building, the choice of solutions for partition building located between the functional rooms of a residential building and for structure of facade elements of the building, it would be necessary to be acoustically optimized, so as to create the acoustic comfort necessary for the users of those indoor rooms of the building, considering: 1) the types of living activities that is carry on in a room, 2) the specific acoustic characteristics (the composition of the spectral frequencies characteristics of the noise sources, the acoustic insulation to airborne sound and/or impact sound made by the interior partition walls and floors of building) resulting from living activities carried out, and 3) what is the human psychoacoustic perception of the types of noise

specific to the respective livings activities.

RO.262.	
Title EN	**FROM DATA TO RESILIENCE: NETWORKED VIBRATION-BASED SHM AND OPEN SEISMIC DATA PLATFORMS**
Authors	Daniela Dobre, Iolanda-Gabriela Craifaleanu, Emil-Sever Georgescu, Claudiu-Sorin Dragomir, Cornelia-Florentina Dobrescu, Marta-Cristina Zaharia
Institution	The National Institute for Research and Development in Constructions, Urban Planning and Sustainable Spatial Development URBAN-INCERC, The National Seismic Network for the Seismic Monitoring and Protection of Building Stock (RNMPSPC-IOSIN).
Patent no.	-
Description	Understanding the real dynamic behavior of structures at urban scale is essential for reducing seismic vulnerability and improving decision-making processes. This concept introduces a data-driven approach for continuous assessment of structural condition and system-level seismic performance, based on vibration measurements collected under operational conditions. Ambient vibrations and microseismical excitations are exploited to extract key dynamic characteristics, including natural frequencies, damping ratios, and mode shapes. Variations in these parameters provide direct insight into structural degradation, particularly stiffness loss. Using operational modal analysis tools and simplified modelling strategies, measured data are correlated with structural behavior, while drift-based criteria enable estimation of damage indices. Unlike traditional approaches that rely on simplified models or component-level testing, the method captures the actual behavior of full-scale structures under real conditions. Continuous, data-driven analysis transforms raw vibration signals into actionable knowledge, significantly reducing uncertainty in seismic response evaluation. When extended across diverse urban assets—including residential buildings, infrastructure, industrial facilities, and emergency systems—instrumented structures act as interconnected sensing nodes. These continuously feed a centralized seismic data platform at the national or

international level, forming an integrated intelligence hub where distributed data is processed, interpreted, and converted into meaningful indicators of structural performance and vulnerability.
This creates a positive impact chain in which continuous data acquisition supports reliable assessment, faster post-event decisions, and improved seismic risk awareness. Urban seismic resilience is no longer driven solely by rare hazard events, but continuously built through knowledge, resulting in reduced systemic vulnerability and improved performance before and after earthquakes.

RO.263.

Title EN	**SUSTAINABLE APPROACHES FOR ASSESSING THE BEARING CAPACITY OF CONSTRUCTION WASTE AND ECO-MATERIALS MIXTURES**
Authors	Cornelia-Florentina Dobrescu, Claudiu-Sorin Dragomir, Daniela Dobre
Institution	The National Institute for Research and Development in Constructions, Urban Planning and Sustainable Spatial Development URBAN-INCERC, The National Seismic Network for the Seismic Monitoring and Protection of Building Stock (RNMPSPC-IOSIN).
Patent no.	-
Description	In the context of current global strategies promoting sustainable development, the use of innovative technical solutions and materials in construction engineering highlights the need to develop methodologies for optimizing both functional and environmental performance of construction works. The aim of the present paper is to implement eco-efficient methodologies using eco-friendly alternative materials for further application in soil stabilization in earthworks for roads, railways and civil and industrial platforms. The experimental applications consisted of stabilization using laboratory treatment with different percentages of stabilizing agents by considering soil categories classified as unstable structures. The design and modeling of soil mixtures allowed the evaluation of key engineering performance indicators, especially deformability and bearing capacity. The results highlight the effectiveness of the proposed

stabilization techniques in improving the mechanical performance of soils, with direct implications on the durability of engineering works.
The implementation of flexible and sustainable approaches, supported by experimental methodologies, facilitates the identification and optimization of stabilization solutions adapted to specific technical requirements and site conditions.

RO.264.

Title EN **Plaster-type coatings embedding natural agro-industrial by-products. Sunflower seed husks vs. rice husks**

Authors Irina Popa, Cristian Petcu, Vasilica Vasile, Claudiu-Sorin Dragomir

Institution **NIRD URBAN-INCERC**

Description In the spirit of concerns supported at worldwide level for the development of sustainable, innovative construction materials, the work underlines the potential of superior valorization of two local agro-industrial by-products, the sunflower seed husks (SSH) and the rice husks (RH), generated by the rice processing and edible oil industries, respectively. The paper shows experimental results regarding the capitalization of SSH and RH, as a vegetal component embedded in synthetic polymer binders, resulting multi-layer plaster-type coatings, with thermal insulation properties, and good potential for use in construction. The best thermal insulation characteristics, between 72÷83 mW/m·K, were obtained with RH plaster-type two-layer coatings, at thicknesses between 4,20 ÷ 7,70 mm. Within the RH plaster-type three-layer coatings group, products S1, S2 and A3 had the best thermal insulation characteristics, between 104 ÷ 108 mW/m·K, due to the presence of the 8 mm SSH fraction, but also, to the relatively higher thickness of the coatings, 5,10 ÷ 6,25 mm. For this type of plaster, the presence of SSH and RH generates porous structures that confer thermal insulation properties to the resulting products, even at thicknesses of less than 1cm, indicating their potential for use in construction.

RO.265.

Title EN **Evaluation of Indoor Radon Levels of Residential Buildings from Different Bucharest Urban Areas**

Authors	Vasilica Vasile, Irina Popa, Cristian Petcu, Claudiu-Sorin Dragomir, Alexandra-Marina Barbu
Institution	**NIRD URBAN-INCERC**
Description	Radon is a ubiquitous environmental pollutant, widely recognized as the main element defining the natural exposure of humans to radiation, making a significant contribution to the total radiation dose, especially in indoor spaces. The presence of Radon, mainly in residential spaces, is a subject of growing concern, as the variety of sources, both natural and artificial, is very large. Epidemiological studies have confirmed the impact of the presence of Radon in homes on the risk of lung cancer. Following a linear relationship, the risk increased by 5-12% per 100 Bq/m^3 of Radon, even when its level was less than 200 Bq/m^3. In this context, the objective of our work was to evaluate radon levels obtained through in situ determinations, in 8 residential spaces in different urban areas of Bucharest (sectors 2, 3, 4 and 6), each space being monitored for 7 days. The obtained results, evaluated taking into account the internationally recommended limit of 100 Bq/m^3 as well as the limit of 300 Bq/m^3, established by national legislation, do not exceed the national limit, in relatively few cases the international limit being exceeded. The Radon levels from different Bucharest urban areas, between 18.92 ÷ 331.17 Bq/m^3, are comparable to those from the UK, lower than in Poland, but higher than in Nigeria or Burkina Faso. The exception is one of the spaces, where all recorded values are above 100 Bq/m^3 and, in a proportion of 65.8%, above 300 Bq/m^3, values that should be monitored, after implementing specific protection works.

RO.266.	
Title EN	**Development of clay composition for sustainable masonry units**
Authors	Aurelia BRADU, Alexandra MUREȘAN, Claudiu-Sorin DRAGOMIR, Alexandra-Marina BARBU
Institution	**NIRD** URBAN-INCERC
Patent no.	-
Description	The project aimed to identify practical and efficient solutions for the use of traditional and locally available materials,

primarily intended for vulnerable rural communities. These solutions are designed to be environmentally friendly, durable, and accessible from both economic and technological perspectives. A key approach of the project consisted in the integration of vegetal waste (such as straw, sawdust, and hemp) into masonry elements, promoting the use of renewable resources. In line with sustainable construction strategies, the adoption of such materials contributes to the development of eco-friendly products, reduction of natural resource consumption, improvement of building energy efficiency, and environmental protection. Clay-based construction materials are increasingly utilized at the national level, with their benefits being recognized in terms of enhanced technical performance and improved long-term durability of construction elements

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RO.267.

Title EN **Influence of Anchoring Systems on the Thermal Performance of Building Envelopes**

Authors Aurelia BRADU, Cristian PETCU, Alexandra-Marina BARBU, Claudiu-Sorin DRAGOMIR

Institution **NIRD** URBAN-INCERC

Patent no. -

Description The building envelope (external walls, roof, and floors) must comply with increasingly stringent requirements to ensure a stable indoor climate by minimizing heat losses during winter and preventing overheating in summer. In the context of sustainable development, priority is often placed on improving the performance of thermal insulation materials, while the proper installation of the thermal insulation system is frequently underestimated. Thermal performance is highly dependent on the continuity of the insulation layer and the minimization of thermal bridges; even minor discontinuities can lead to significant energy losses. This aspect becomes particularly critical in the case of nearly Zero Energy Buildings (nZEB), where performance standards are rigorous and execution errors can have substantial impacts. A common mistake in the implementation of thermal efficiency solutions is the improper mechanical fixing of the external thermal insulation system (ETICS), particularly through the use of fasteners that facilitate heat transfer. These elements create point thermal bridges, negatively affecting overall performance, increasing energy losses, and, in some cases,

contributing to the risk of condensation. Therefore, the correct selection of fixing systems and careful execution are essential for achieving the desired energy performance.

RO.268.	
Title EN	**External fire performance test stand for buildings**
Authors	**Adrian SIMION, Ștefania Cristina JUGĂNAR, Mihnea STOICA, Virgil Mario Victor BĂRBUȚ**
Institution	**National Institute for Research and Development in Construction, Urban Planning and Sustainable Spatial Development URBAN-INCERC**
Patent no.	**-**
Description	Regarding building security against fires originating nearby, international documentation is relatively sparse, as the vast majority of specialized studies focus on fires starting inside buildings. To date, no experimental tests have been conducted at a national level to evaluate the propagation of fire from the exterior of a building to its interior. To address this gap, researchers at the INCERC Bucharest branch constructed a unique national testing facility within a three-story building to evaluate how a ground-floor room behaves under various exterior fire scenarios. Following the construction of this facility, researchers conducted an experimental test to observe how a fire produced in the immediate vicinity of a building propagates inside. During the experiment, it was found that—depending on specific scenarios and atmospheric conditions—fires generated by external thermal sources can cause major, irreparable material damage in areas directly affected by flames and can spread into the building within a relatively short time after ignition. Following the test, researchers performed several simulations using the Pyrosim program to validate the experimental data using one of the most advanced numerical calculation tools for fire simulation. The results indicated that utilizing numerical fire simulations instead of experimental tests leads to significant financial savings and a major contribution to environmental protection.

RO.269.	
Title EN	**Economic Efficiency of Green Buildings**
Authors	Mircea-Iosif RUS, Aivaz-Ainur KAMER, Larissa BĂTRÂNCEA
Institution	**National Institute for Research and Development in**

	Construction, Urban Planning and Sustainable Spatial Development URBAN-INCERC
Patent no.	PN 23 35 05 01
Description	Green buildings reduce energy consumption and resource use, improve comfort, and mitigate regulatory risks. Although initial investment costs may be higher, operational savings and stronger market positioning often offset the difference. LCC integrates all relevant costs from design to end-of-life. In practice, operating costs can exceed initial investment, making energy-efficient technologies and smart systems economically decisive. Green buildings generate economic advantages through energy savings, lower maintenance costs, stable occupancy rates, and improved access to green financing. Strategic decision-making should rely on LCC analysis and transparent post-occupancy performance monitoring.

RO.270.	
Title EN	**CONCRETE DEFECT DETECTION USING ULTRASOUND METHODS**
Authors	**Cosmin CHIRILIANU, Brăduț Alexandru IONESCU, Mihail CHIRA, Andra Băraș**
Institution	**National Institute for Research and Development in Construction, Urban Planning and Sustainable Spatial Development URBAN-INCERC**
Patent no.	-
Description	Detection of defects in concrete using ultrasound represents a non-destructive testing method (NDT) used to evaluate the structural integrity of concrete elements and to identify internal defects in the structure such as cracks, segregations, voids, or areas with low density compared to concrete Traditional ultrasound measurement methods are: the direct transmission method (the transmitting and receiving transducers are located on opposite faces of the concrete element), the semi-direct transmission method (the transducers are placed on adjacent faces, with an angle between them – usually 90º), and the indirect or surface transmission method (both transducers are placed on the same surface of the concrete). Compared to these methods, there are also advanced measurement techniques that appeared in Romania in the 1990's. These modern methods use digitalization, tomography, artificial intelligence and

portable equipment.
Some of the advanced measurement methods include: Ultrasonic Pulse Velocity (UPV), which measures wave velocity between two points; Ultrasonic Tomography, which uses an array of multiple sensors to reconstruct a 3D tomographic image of the concrete's interior; and Impact-Echo and Pulse-Echo – a single transducer emits and receives the wave reflected from internal discontinuities.

RO.271.

Title EN **EVALUATION OF CEMENTIOUS COMPOSITE MATERIALS MADE WITH NATURAL AGGREGATES AND RECYCLED WASTE, WITH THE ADDITION OF NANOPARTICLES OF TiO_2**

Authors **Carmen FLOREAN, Horațiu VERMEȘAN, Brăduț-Alexandru IONESCU, Mihail CHIRA**

Institution **National Institute for Research and Development in Construction, Urban Planning and Sustainable Spatial Development URBAN-INCERC**

Patent no. -

Description

Technology transfer is essential for industrial development and innovation, ensuring that scientific research can be applied in practice. In this context, the practical applicability of research enables the optimization of production processes, cost reduction, and increased efficiency.
The proportion of TiO_2 nanoparticles added to the cementitious composite materials is a decisive factor, and based on the analysis of the cases studied in this research, it is estimated that the optimal proportion of NT is approximately 3% of the cement content. In the aim of evaluating opportunities for technology transfer, a small-scale prefabricated product was designed, specifically a paving stone intended for use in pedestrian areas. Another possibility for technology transfer has been identified in the shape of small prefabricated elements designed for wall and ceiling cladding, specifically to meet dimensional requirements.

Based on the models produced, laboratory tests were conducted to determine dimensions and deviations from flatness, water absorption, slip resistance, and splitting strength, in order to verify compliance with the requirements

specified in the standards. Water absorption falls within the recommendations for the water resistance class, ensuring the durability of small precast paving elements, and tests conducted to determine slip resistance indicated that they exhibit moderate to low slip potential for most of the cementitious composite materials.

RO.272.

Title EN **Process for producing and alkaline-activated fly ash-based geopolymer binder with self-cleaning capacity**

Authors **Andreea Cristina HEGYI, Adrian Victor LĂZĂRESCU, Claudiu-Sorin DRAGOMIR, Cristian PETCU, Alexandra-Marina BARBU, Mircea-Iosif RUS, Tudor Panfil TOADER, Alexandra CSAPAI, Carmen Teodora FLOREAN, Brăduț Alexandru IONESCU**

Institution **National Institute for Research and Development in Construction, Urban Planning and Sustainable Spatial Development URBAN-INCERC**

Patent no. Patent application No. A/00487/29.10.2025

Description

The invention relates to a process for producing a geopolymer binder based on alkali-activated fly ash with self-cleaning capacity, intended for construction applications. The raw materials include fly ash from thermal power plants in Romania (maximum 40% residue on the 0.045 mm sieve), an alkaline activator based on sodium silicate (Na_2SiO_3) and sodium hydroxide (NaOH) with a concentration of 6–8 M and a Na_2SiO_3:NaOH mass ratio of 1:2–2:1, ultrafine silica (max. 3% of binder mass), and titanium dioxide (TiO_2) nanoparticles (max. 3% of binder mass). The mass ratio between the alkaline activator and fly ash is 0.9–1.2.

The production process includes thermal treatment within 4–48 hours after preparation, at 50–80°C, followed by curing under normal temperature and humidity conditions up to 7 days, allowing geopolymerization to complete and resulting in a hardened binder.

At 7 days, the hardened geopolymer binder exhibits: apparent dry density of 1250–1450 kg/m³, flexural tensile strength of 2–4 N/mm², compressive strength of 6–30 N/mm², and water absorption of max. 6%.

After at least 5 hours of UV photoactivation, the surface develops high hydrophilicity, self-cleaning capacity with

≥85% color recovery after a UV activation–washing–drying cycle, and improved resistance to microorganisms.
The resulting self-cleaning geopolymer binder is suitable for civil and industrial construction elements and for interior and exterior finishes.

RO.273.

Title EN **Process for eco-generation of repair mortar by valorization of spent garnet waste as a partial substitute for natural aggregate**

Authors Cornelia Baeră, Aurelian Gruin, Ana-Cristina Vasile, Bogdan Bolborea, Alexandru Ion, Claudiu-Sorin Dragomir, Alexandra-Marina Barbu

Institution **NIRD URBAN-INCERC Timisoara Branch / Romania**

Patent no. Patent/project number: A/00587 – 03.12.2025

Description

The invention aims to develop and validate an eco-innovative repair mortar by transforming Spent Garnet waste (AWJ) into a controlled inert mineral addition (SG-AWJ), resulting in the sustainable repair mortar EcoGarnPlus.
The innovative character of the invention lies in the development of a validated and transferable methodology for converting Spent Garnet waste (AWJ) into a controlled inert mineral addition (SG-AWJ), incorporated in significant proportions (10–50%) as a substitute for natural aggregates in the EcoGarnPlus repair mortar. This approach ensures mechanical and durability performances comparable to or exceeding those of conventional materials, while simultaneously reducing environmental impact.

Acknowledgement:
This work was carried out within Nucleu Programme of the National Research Development and Innovation Plan 2022-2027, supported by MCID, "ECODIGICONS" project no. PN 23 35 04 01: “Fundamental-applied research into the sustainable development of construction products (materials, elements, and structures, as well as methods and technologies) that utilizes current national resources to enhance the eco-innovative and durable aspects of Romania's civil and transport infrastructure”, financed by the Romanian Government.

RO.274.	
Title EN	**Clay soil composition with biopolymer cast in formwork**
Authors	Aurelian Gruin, Cornelia Baeră, Ana-Cristina Vasile, Bogdan Bolborea, Alexandru Ion, Claudiu-Sorin Dragomir, Alexandra-Marina Barbu
Institution	**NIRD URBAN-INCERC Timisoara Branch / Romania**
Patent no.	Patent/project number: A/00571 – 28.11.2025
Description	The invention relates a clay soil composition enhanced with a biopolymer, intended for the manufacture of ecological construction elements by casting into reusable formwork. This solution is designed to capitalize on natural and renewable resources, while ensuring adequate performance for construction applications. It aligns with current trends in the development of sustainable materials with reduced environmental impact, offering a viable and eco-friendly alternative to conventional cement-based or synthetic polymer-based materials, particularly in the context of circular economy and resource efficiency. Acknowledgement: This work was carried out within Nucleu Programme of the National Research Development and Innovation Plan 2022-2027, supported by MCID, "ECODIGICONS" project no. PN 23 35 04 01: “Fundamental-applied research into the sustainable development of construction products (materials, elements, and structures, as well as methods and technologies) that utilizes current national resources to enhance the eco-innovative and durable aspects of Romania's civil and transport infrastructure”, financed by the Romanian Government.

RO.275.	
Title EN	**INNOVATION AND SUSTAINABILITY - Exploitation of industrial by-products for construction products with proven technological maturity – Project PN 23 35 05 01**
Authors	**Andreea Cristina HEGYI, Adrian Victor LĂZĂRESCU**
Institution	**National Institute for Research and Development in Construction, Urban Planning and Sustainable Spatial Development URBAN-INCERC**
Patent no.	-
Description	The transition toward a circular economy requires innovative solutions that reduce environmental impact while maintaining technical performance. The construction sector, responsible for significant resource consumption and CO_2 emissions, offers substantial potential for sustainable transformation through the valorization of industrial by-products. This study explores the integration of materials such as fly ash, blast furnace slag, silica fume, and other secondary raw materials into construction products with demonstrated technological maturity. By incorporating these by-products into cementitious composites, concrete, mortars, and prefabricated elements, it is possible to decrease the demand for virgin raw materials and reduce landfill disposal. The research evaluates mechanical performance, durability, workability, and long-term stability, confirming that optimized formulations can meet or exceed conventional standards. Additionally, life cycle assessment (LCA) results indicate significant reductions in embodied energy and greenhouse gas emissions compared to traditional materials. The findings underline that the sustainable exploitation of industrial by-products is not only an ecological necessity but also a technologically viable and economically competitive strategy. By aligning innovation with resource efficiency and performance reliability, the construction industry can advance toward resilient, low-carbon development while fostering industrial symbiosis and circular material flows.

RO.276.	
Title EN	**Integrating Green-Blue Infrastructure for Age-Friendly Urban Environments**
Authors	**Andreea Cătălina POPA, Teodora UNGUREANU**
Institution	**The National Institute for Research and Development in Constructions, Urbanism and Sustainable Spatial Development URBAN-INCERC**
Patent no.	-
Description	This paper explores how urban blue-green infrastructure can serve as an active instrument to support healthy and autonomous ageing in Romanian cities. In the context of pressures generated by climate change and the growing share of the elderly population, the research proposes reassessing the role of green and blue spaces beyond their ecological functions, highlighting their social and therapeutic dimensions. The approach is based on a qualitative analysis of the specialized literature and on the investigation of relevant international examples which demonstrate the coherent integration of nature-based solutions in urban environments adapted to the needs of seniors. The results show that these components can contribute significantly to reducing social isolation, improving health status, and increasing the degree of independence of elderly persons. Nevertheless, in the Romanian context, the integration of these principles remains fragmented and insufficiently correlated with urban policies.

RO.277.	
Title EN	**INNOVATIVE MODEL FOR ASSESSING THE PERFORMANCE OF EUROPEAN INVESTMENTS IN SUSTAINABLE MOUNTAIN DEVELOPMENT - Integrated analysis of the 2014–2020 PNDR and 2023–2027 PS PAC programs using data-based performance indicators**
Authors	**Tudor Panfil TOADER, Daniela Mihaiela BOCA, Daniela Elena REBEGA, Andra Băraș**
Institution	**National Institute for Research and Development in Construction, Urban Planning and Sustainable Spatial Development URBAN-INCERC**
Patent no.	-
Description	This study proposes an innovative mathematical framework for evaluating the performance of European investments

dedicated to the sustainable development of mountain areas in Romania. Mountain regions face structural natural constraints and socio-economic imbalances, requiring targeted public interventions supported mainly through the National Rural Development Program (PNDR 2014–2020) and the Strategic Plan under the Common Agricultural Policy (PS CAP 2023–2027). However, the absence of standardized evaluation tools limits the ability to objectively measure the real efficiency and territorial impact of these investments.

The research develops and validates a synthetic Investment Performance Index (IPI) that integrates financial efficiency indicators with territorial weighting factors. The methodological approach combines descriptive statistical analysis, indicator normalization, multi-program comparative assessment, and an engineering-based evaluation of systemic efficiency. The proposed model enables simultaneous analysis of funding volume, financial performance, and territorial relevance, transforming traditional descriptive financial assessments into a quantitative performance-based framework.

Experimental application of the model highlights differences in implementation dynamics and efficiency across intervention categories. The results confirm the necessity of a unified synthetic indicator capable of supporting evidence-based decision-making. The methodology is scalable and transferable, offering policymakers a practical analytical tool for optimizing public investment strategies and promoting sustainable territorial development in mountain regions.

RO.278.

Title EN	**Innovative Assessment of Self-Healing in Cement Mortars Incorporating Recycled Rubber**
Authors	**Tudor Panfil TOADER, Ioan Nicolae SCURTU, Călin Grigore Radu MIRCEA, Andreea HEGYI, Andreea MIRCEA, Andra Băraș**
Institution	**National Institute for Research and Development in Construction, Urban Planning and Sustainable Spatial Development URBAN-INCERC**
Patent no.	-
Description	The construction sector, a major contributor to global carbon emissions, requires innovative solutions to improve material

sustainability. In this context, cementitious mortars with self-healing properties offer significant potential by extending structural lifespan and reducing maintenance costs. The incorporation of recycled rubber granules from end-of-life tires supports waste recovery while enhancing deformation capacity and energy dissipation.

This study synthesizes recent research (2022–2025) on self-healing mortars containing recycled rubber, analyzing mechanical behavior, crack propagation, and material composition. Self-healing processes involve post-hydration reactions and the formation of $CaCO_3$ and C-S-H compounds.

Results indicate that adding recycled rubber reduces compressive strength by 10–30% but increases ductility by 20–50%, improving crack control through energy dissipation. Self-healing mechanisms enable partial recovery of mechanical properties (60–80%), depending on exposure conditions.

Overall, these sustainable mortars show strong potential despite slight strength reduction, offering improved durability and supporting construction waste reuse.

RO.279.

Title EN	**ENGINEERED CEMENTITIOUS COMPOSITE (ECC) MIXTURES DEVELOPED TO IMPROVE CONCRETE PERFORMANCE UNDER DYNAMIC LOADING, TENSILE STRESS AND SELF-HEALING CONDITIONS**
Authors	**Ioan Ștefan ZAVASCHI, Tudor Panfil TOADER, Călin Grigore Radu MIRCEA, Carmen-Teodora FLOREAN, Cosmin CHIRILIANU**
Institution	**National Institute for Research and Development in Construction, Urban Planning and Sustainable Spatial Development URBAN-INCERC**
Patent no.	**-**
Description	The intrinsically reduced tensile strength of plain concrete (PC) prompted the development of reinforced concrete (RC), followed by fiber-reinforced concrete (FRC) and, more recently, engineered cementitious composites (ECC). The incorporation of randomly oriented short fibers into the cementitious matrix significantly enhances mechanical performance, particularly in terms of tensile and flexural

strength, ductility, fatigue resistance, and impact performance. Moreover, the reduced crack widths, attributed to stress redistribution enabled by fiber incorporation, contribute to improved self-healing capacity.

The results indicate that tensile strength increases with increasing fiber volume fraction, thereby influencing crack widths and consequently, the self-healing capacity of the specimens. Specimens with crack widths up to 0.1 mm exhibited complete or almost complete crack closure, whereas specimens with larger crack widths (≥0.15 mm) showed partial or no closure, depending on the initial crack width.

Advancements in concrete technology, combined with increased attention to environmental factors, have prompted the development of novel concrete mixtures. ECC represent a natural progression in concrete materials due to their enhanced mechanical performance and durability, thereby contributing to reduced production costs and pollution while addressing current engineering challenges..

National Institute for Research and Development in Environmental Protection – INCDPM

RO.280.	
Title EN	**Alginate-based biocapsules and Ideonella sakaiensis used in PET biodegradation**
Authors	DEÁK György, STELESCU Maria Daniela*, POPA Alexandra, GHITA Gina, ILIE Mihaela, ISTRATE Iulia-Valentina, GHEORGHE Florina-Diana, MATEI Monica-Silvia, BOBOC Madalina Georgiana, HOLBAN Elena
Institution	**National Institute for Research and Development in Environmental Protection (INCDPM)**
Patent no.	Patent application No. **A/00258/13.11.2025**
Description	The market for plastics has grown significantly in recent decades, which has led to a proportional increase in the amount of plastic waste. Since they are difficult to degrade over time, major problems have arisen in the management of these types of waste. The main methods for eliminating this waste are: reuse, mechanical recycling, chemical recycling or incineration. These methods involve many costs and can lead to environmental pollution. For these reasons, various methods of biodegradation of plastics have been studied and tested that involve the use of enzymes secreted by bacteria. As an example, the bacterium Ideonella sakaiensis, through an enzymatic process, is capable of degrading and metabolizing polyethylene terephthalate (PET), a widely used type of plastic, using it as its main source of carbon and energy. When using enzymes in various applications, it has been observed that encapsulated enzymes have significantly improved stability under unfavorable conditions, compared to native enzymes. Considering these aspects, the present invention aims to immobilize / encapsulate the bacterium Ideonella sakaiensis, in a polymeric matrix of sodium alginate cross-linked with calcium chloride solution. The method of obtaining and the composition of the new biocapsules were adapted to the specific viability conditions of the bacterium Ideonella sakaiensis, as well as the enzymes secreted by it. The obtained biocapsules were characterized morphologically (SEM), thermally (TG-DSC) and structurally (FTIR). Applications: biodegradation of polyethylene terephthalate (PET) waste existing in water in the form of microplastics or nanoplastics, water purification, etc.

RO.281.	
Title EN	**Black Sea SIERRA - Heavy metals bioaccumulation and biota-sediment accumulation factors assessment**
Authors	DEÁK György, TUDOR Georgeta, POPA Alexandra, MATEI Monica, BOBOC Mădălina, HOLBAN Elena, CARACHICIU Maria, HARABAGIU Alexandra, PRANGATE Raluca; ISTRATE Iulia; CHIRESCU Alexandra
Institution	**National Institute for Research and Development in Environmental Protection – INCDPM Bucharest**
Patent no.	-
Description	The Black Sea SIERRA project, entitled "Harnessing complementary curricular preparedness via sustainable management in response to civil and military pollution on the coastline, tributaries and lagoons in Black Sea's North, West, South zone" aims to prepare and adapt decision-makers' response capacity to current/emerging marine pollution, by coordinated cross-border response to armed conflict contamination. Coordinated by INCDPM, the project implementation consortium represents an assembly of organizations from Black Sea basin countries (Romania, Bulgaria, Ukraine, Turkey) and Mediterranean basin (Italy), and its objectives concern the quantification of specific marine pollutants through in situ sampling campaigns and laboratory analysis for the areas of the 4 Black Sea consortium countries. The paper presents the results for five biota samples that were collected from the Black Sea tributaries Chilia, Sulina and Sf. Gheorghe in 2024 and 2025, within WP3, dedicated to identifying major biodiversity components threatened by pollution (bioaccumulation) in the coastal zone, tributary rivers, and lagoons of the Black Sea. In INCDPM laboratories the samples were evaluated, counted and classified in species, specific tissues selected and prepared and heavy metals concentrations (Cd, Cu, Ni, Pb, Zn and Fe) were determined using Atomic Absorption Spectroscopy (AAS) and bioaccumulation assessment has been carried out by using two indicators: Bioaccumulation Factor (BAF) and Biota-Sediment Accumulation Factor (BSAF).

RO.282.	
Title EN	**DALIA Danube Region Water Lighthouse Action Pilot Site 6 Sturgeon migration by-pass Iron Gate I and II** **INCDPM ultrasonic tagged sturgeons monitoring system and innovative by-pass solution in situ testing**
Authors	DEÁK György; TUDOR Georgeta; HOLBAN Elena; MATEI Monica; BOBOC Mădălina; CARACHICIU Maria; BUGEAC Larisa
Institution	**National Institute for Research and Development in Environmental Protection – INCDPM Bucharest**
Patent no.	A/00253/28.04.2026
Description	Financed through HORIZON, DALIA project reunites 22 expert organizations from 8 Danube countries, under the 'Restore our Ocean, seas and waters by 2030' EU Mission. INCDPM Bucharest implements the activities of DALIA DP6 - Sturgeon migration by-pass Iron Gates I and II that tackles the challenge to provide a technical and scientific solution in order to ensure the connectivity of the historical migration routes for the ultrasonic tagged sturgeon specimens upstream of the Hydropower System. The INCDPM innovative by-pass solution involves the use of a patented special transport device hidrobion to assist the ultrasonic tagged sturgeon specimens in their upstream and downstream migration and dams by-pass thus not involving major investments as required for construction of new installations by the hydropower dams and aims for a win-win Nature-Based Solution (NBS) that considers also the EU Taxonomy principles. INCDPM commissioned in situ in the Bazias – Iron Gates I Romanian Danube sector an ultrasonic tagged sturgeons monitoring system that uses both a stationary approach by installing 8 patented DKMR – type monitoring systems and a mobile – continuous approach by using VR-100 receivers mounted on INCDPM vessels to track the ultrasonic tagged specimens in the Danube areas not covered by the installed monitoring stations. The efficiency of the innovative solution has been successfully tested in situ twice in 2025 and the released sturgeons complex monitoring highlighted a large number of detections for each individual confirming its functionality and effective coverage of the Romanian Danube sector upstream of the Iron Gates Hydropower System.

RO.283.	
Title EN	**SturHabCons - Development of initial hydrodynamic models for Danube areas with anthropic submerged obstacles located on Bala Branch and Caleia Branch**
Authors	TUDOR Georgeta; DEÁK György; RAISCHI Marius; CARACHICIU Maria; FĂTU Mirela; HOLBAN Elena; MATEI Monica, BOBOC Mădălina; PRANGATE Raluca; BUGEAC Larisa; ISTRATE Iulia; CHIRESCU Alexandra
Institution	**National Institute for Research and Development in Environmental Protection – INCDPM Bucharest**
Patent no.	-
Description	SturHabCons aims to assess the anthropogenic impact on the monitored anadromous sturgeon population, to carry out numerical modelling to eliminate the risk of disruption of their migration routes and to identify their breeding habitats in order to develop complementary conservation measures and to expand the strictly protected areas boundaries, in line with the EU Mission "Restore our Ocean and Waters by 2030" and the EU Biodiversity Strategy 2030. The results presented in this paper address SturHabCons target T2.5 Calibrated and validated numerical models for the areas of submerged obstacles to determine the conditions under which the migration of sturgeon species is interrupted. By using MIKE by DHI software suite, initial hydrodynamic models were developed for Danube areas with anthropic submerged obstacles (bottom sills)located on Bala Branch and Caleia Branch. Based on in situ collected data by INCDPM experts, geometric models were created by incorporating multibeam bathymetry measurements and boundary conditions were determined from discharge – water level coupled values that were in situ measured in different hydrological conditions. The setting up for the initial hydrodynamic models represents a major significant stage in the numerical modelling process, the detail degree with which the in situ collected data is integrated into the models having direct consequences in the capability of the models to reflect the actual field conditions.

RO.284.	
Title EN	**Regional climate adaptation in Romania with Nature-based Solutions from vulnerability to microcosm CO_2 emissions**
Authors	AM Academy O.S.R. DEÁK György Ph.D Habil, LASLO Lucian Eng. Ph.D, ENACHE Natalia Eng. Ph.D, CHIRESCU Alexandra Ph.D stud., MACO Bogdan Eng. Ph.D, MATEI Monica Eng. Ph.D, BOBOC Mădalina Georgiana Eng. Ph.D
Institution	National Institute for Research and Development in Environmental Protection
Patent no.	-
Description	This study explores climate change adaptation in Romania by developing a nationally replicable framework that links climate hazards with the vulnerability of ecosystems and socio-economic systems. The study supports the use of Nature-based Solutions (NbS) as practical tools for improving resilience in urban and regional environments. The work investigates how soil–plant–atmosphere carbon dynamics respond to environmental conditions and soil amendments. CO_2 fluxes are analysed through key ecosystem processes, from plant uptake (photosynthesis) to soil carbon decomposition, expressed as Net Ecosystem Exchange (NEE). Microcosm experiments were conducted under controlled temperature and moisture conditions to measure CO_2 emissions from different soils and treatments. Results show that emissions vary significantly with environmental conditions and can be influenced by bio-based soil amendments. Different Nature-based Solutions, including alginate, zeolite, and their combinations, were tested to assess their effects on soil moisture, structure, and carbon emissions. These treatments modify soil water retention and aeration, thereby influencing microbial activity and CO_2 release.

RO.285.	
Title EN	**Investigations on the Contamination of Lakes in the Metropolitan Area of Bucharest with Emerging Pharmaceutical Pollutants and the Development of Innovative Removal Processes from Aquatic Ecosystems**
Authors	Eng. DEÁK György PhD Habil, Mihaela ILIE PhD, Gina GHITA PhD*, Florina-Diana GHEORGHE PhD, Daniela Maria STELESCU PhD, Camelia ZAMFIR, Alexandra POPA, Iulia-Valentina ISTRATE
Institution	National Institute for Research and Development in Environmental Protection (INCDPM)
Description	Emerging pharmaceutical contaminants present in the aquatic environment, even at very low concentrations (ng/L), can generate a wide range of ecotoxicological effects on aquatic organisms, ecosystems, and, indirectly, on human health. Within this project, detailed investigations were conducted on the contamination with emerging pharmaceutical pollutants of wetlands and lakes in the metropolitan area of Bucharest. The antibiotic resistance profiles of potentially pathogenic bacteria isolated from these aquatic ecosystems were also evaluated. In addition, innovative biopolymer-based adsorption processes were developed and tested for the removal of these compounds from aquatic ecosystems. The research on the presence of pharmaceutical micropollutants in surface water samples collected in 2025 identified paracetamol, caffeine, and diclofenac at maximum concentrations of 324 ng/L (Dobroiesti Lake), 1076 ng/L (Plumbuita Lake), and 2020 ng/L (Morii Lake), respectively. In the microbiological study of water samples collected from the investigated lakes, the isolated Escherichia coli strains exhibited extremely high levels of antibiotic resistance, reflecting the intense selective pressure exerted by anthropogenic contaminants on the aquatic ecosystem. Regarding antibiotics from the cephalosporin class, the strains demonstrated very high resistance to streptomycin, ciprofloxacin, and kanamycin, with the percentage of resistant isolates reaching critical levels of 89% A high level of resistance was also recorded to other major antibacterial agents, namely ampicillin, gentamicin, and tetracycline. These data highlight an extensive multi-resistance to multiple classes of antibiotics, suggesting a rapid and persistent spread of antimicrobial resistance genes (ARGs) in the aquatic ecosystem.

RO.286.	
Title EN	**A NEW GENERATION OF METALLIC BIOMATERIALS AS HEALTH SOLUTIONS FOR A SUSTAINABLE LIFE – SEM CHARACTERIZATION**
Authors	DEÁK György, GHEORGHE Florina-Diana, VIZUREANU Petrică, MATEI Monica, BOBOC Mădălina Georgiana, HOLBAN Elena
Institution	**National Institute for Research and Development in Environmental Protection**
Patent no.	ERANET-ERAMIN-3-Cool&SmartTit-1
Description	The study details the chemical and structural characterization of titanium-based materials containing molybdenum (Mo), niobium (Nb), and tin (Sn), focusing on microstructural evolution following thermal treatments. Sample preparation for scanning electron microscopy (SEM) was a critical step to ensure high-quality imaging and analysis. Each sample underwent chemical etching to highlight its internal structure before being mounted on SEM stubs using both carbon and copper tapes to ensure proper conductivity. Furthermore, the samples were coated with a gold-platinum (Au-Pt) thin film for 15 seconds to further enhance their electrical conductivity. The study also highlights the distinct roles of the alloying elements. Mo and Nb function as strong β-stabilizers, with Mo exhibiting a more pronounced stabilizing effect. Increasing the concentration of these elements effectively suppresses the formation of acicular α ″ martensite, leading to a more robust and homogeneous β matrix. Conversely, Sn acts as a neutral or weak α-stabilizer; while it influences the final morphology, higher concentrations can increase microstructural complexity and the material's sensitivity to chemical attack during preparation. Thermal treatments were used to modify the material properties by relaxing internal stresses and promoting microstructural homogeneity through controlled phase transformations. In certain compositions, heat treatment triggered the precipitation of fine secondary α phases within the β matrix, a phenomenon associated with increased hardness and mechanical strength. These findings provide essential insights into how the balance of alloying elements determines structural stability and phase evolution.

RO.287.	
Title EN	**Obtaining filters based on nanostructured materials and sensors with applications in air quality protection**
Authors	DEÁK György, GHEORGHE Florina-Diana, DUMITRESCU Cristina Rodica, GHEORGHE Petrache-Ionuț, DIACONU Teodor-Cătălin
Institution	**National Institute for Research and Development in Environmental Protection**
Description	PN 23 31 03 01 The main objective of this project phase was to develop and evaluate three novel nanomaterial-based filters intended to enhance air quality by absorbing PM10 and CO2 pollutants, complying thus to the EU's 2030 zero-pollution targets. Different advanced materials were synthesized by using a mix of pure and recycled precursors and further used into a filter. The first type was a zeolite-based filter (Zeolite X), which was synthesized through the valorization of rice husks and aluminum cans, and demonstrated the highest average PM10 retention efficiency at 92.06%. Its functional mechanism relied primarily on physical adsorption (physisorption) within a well-structured microporous framework. The second filter was a chitosan-hydroxyapatite (CS-HA) composite, produced by lyophilizing a chitosan hydrogel cross-linked with glutamic acid and incorporating biogenic hydroxyapatite derived from eggshells. This filter achieved a PM10 retention efficiency of 88.27%. Also, due to its high affinity for moisture, it facilitated the adsorption of atmospheric CO2 at normal temperatures. The third type involved alkaline titanates synthesized from coffee ground waste and deposited onto alkali-treated polyester (PET) fibers. This composite filter reached a PM10 retention efficiency of 85.24%. Unlike zeolites, these filters also use chemisorption to capture CO_2 and offer the potential for active pollutant conversion. Validated under laboratory conditions, these filters provide a sustainable, high-efficiency solution for industrial and urban air purification. The diverse capture mechanisms ensure versatility across various environmental applications, including antiviral masks and HVAC systems.

RO.288.	
Title EN	**ALGINATE BIOCAPSULES WITH IDEONELLA SAKAIENSIS FOR POLYETHYLENE TEREPHTHALATE (PET) DEGRADATION**
Authors	**AM Academy O.S.R. DEÁK György PhD. Habil., Dr. Ecol. HOLBAN Elena, Dr. Eng. GHIȚĂ Gina, Dr. Eng. ILIE Mihaela, Dr. Eng. Diana GHEORGHE, Geog. ISTRATE Iulia-Valentina, Dr. Eng. STELESCU Daniela , Vet. POPA Alexandra**
Institution	**National Institute for Research and Development in Environmental Protection**
Patent no.	PN 23 31 03 02
Description	In accordance with the European Mission objectives and Romania's National Strategy for Sustainable Development 2030, the present study proposes and evaluates an innovative technological approach for wastewater treatment, specifically targeting the removal of microplastics, with an emphasis on polyethylene terephthalate (PET). This method is based on the use of biocapsules with Ideonella sakaiensis, a bacteria known for its ability to biologically degrade PET materials. To develop the biocapsules, sodium alginate solutions at concentrations of 2% and 4% (w/v) were prepared, with or without glutamic acid. Alginate solutions were then combined with a suspension of I. sakaiensis under continuous magnetic stirring. The alginate-cell mixture was introduced dropwise into a calcium chloride solution. Upon contact, calcium ions interacted with the guluronic acid residues in the alginate chains, inducing rapid cross-linking. This process led to the immediate formation of stable, spherical biocapsules—solid, gel-like beads that effectively entrap the bacterial cells. These biocapsules provide an adequate microenvironment, enhancing bacterial stability and facilitating their application in wastewater treatment systems for efficient PET degradation.

RO.289.	
Title EN	An integrative genetic analysis of four sturgeon species from the Black Sea and their migration corridors: Insights from D-loop, Cytochrome B, and complete mitogenomes
Authors	György Deák, Raluca Prangate, Monica Matei, Mădălina Boboc, and Elena Holban
Institution	National Institute for Research and Development in

Description	Environmental Protection Sturgeons are among the world's most threatened species, currently classified as Critically Endangered due to poaching, overexploitation, pollution, and habitat fragmentation. Their slow reproductive cycles and late maturity make them exceptionally vulnerable to the loss of genetic diversity. While the Danube River remains a vital migratory corridor in the Ponto-Caspian region, only four of its six historical species survive today. This study provides a comprehensive genetic analysis of the remaining Black Sea basin species: the anadromous Huso huso, Acipenser gueldenstaedtii, and Acipenser stellatus, along with the potamodromous Acipenser ruthenus. By analyzing D-loop and Cyt B gene sequences alongside complete mitochondrial genomes, we reconstructed phylogenetic relationships and assessed population structures. These insights into evolutionary history and genetic connectivity provide a critical scientific foundation for developing effective conservation and management strategies to ensure the long-term viability of these iconic fish.

RO.290.	
Title EN	Workflow for processing and analyzing nucleic acids from diverse biological matrices
Authors	György Deák, Raluca Prangate, Monica Matei, Mădălina Boboc, and Elena Holban
Institution	National Institute for Research and Development in Environmental Protection
Patent no.	-
Description	This poster outlines an integrated methodological framework, fully operational within the INCDPM laboratory infrastructure, designed to translate complex environmental samples into high-precision genetic data. The process bridges the gap between holistic ecosystem monitoring and rigorous laboratory science, structured into five essential phases. The workflow begins with Sample Collection, utilizing specialized techniques to capture biological material from air, water, soil, and waste. This is followed by the Extraction phase, where optimized protocols isolate high-quality DNA and RNA by removing matrix-specific

inhibitors. For genetic target detection and quantification, our laboratory employs a dual-platform approach: RT-qPCR (Reverse Transcription-quantitative PCR) for rapid, real-time screening and gene expression analysis, and Digital PCR (dPCR) for absolute quantification and high-sensitivity detection of rare targets without the need for standard curves. The workflow then advances to Next-Generation Sequencing (NGS), encompassing library preparation and sequence alignment to explore the genome in depth. Finally, the Data Analysis stage transforms molecular signals into actionable insights for genotyping, microbiome profiling, and infectious disease detection. By streamlining these technical procedures within our specialized facility, this workflow provides a robust bridge between field conservation efforts and advanced biotechnology, serving as a vital tool for biodiversity preservation and environmental health surveillance.

RO.291.

Title EN	**Radar-type system with multifunctional sensors included for determining atmospheric pollutants and climatic parameters**
Authors	DEÁK György, MATEI Monica, LASLO Lucian, HOLBAN Elena, GHEORGHE Florina-Diana, TUDOR Georgeta, ILIE Andrei, ENACHE Natalia-Andreea, NISTOR Marina, CHIRESCU Alexandra Diana, BOBOC Mădălina Georgiana, BUGEAC Larisa-Mădălina
Institution	**National Institute for Research and Development in Environmental Protection**
Patent no.	A 00450 / 2025
Description	This invention presents an autonomous radar-type system designed for the high-precision measurement, reporting, and analysis of atmospheric pollutants and climatic parameters. The device is composed of three primary sections: a 360-degree rotating mobile component, a stable fixed base, and an intelligent wind-tracking unit. In contrast to traditional static stations, this system utilizes eight infrared sensors and an Arduino Mega-controlled stepper motor to dynamically orient its collection cone toward the wind source, ensuring optimal air capture for analysis. Equipped with a custom-developed multifunctional sensor

board, the system monitors twelve critical pollutants, including particulate matter (PM1.0, PM2.5, PM10), carbon dioxide (CO_2), formaldehyde (HCHO), volatile organic compounds (VOCs) and non-methane volatile organic compounds (NMVOC), nitrogen oxides (NO_2, NO_x), sulfur dioxide (SO_2), carbon monoxide (CO), and total suspended particles (TPS).

It also features a dedicated sampling chamber that utilizes advanced filtration materials to collect physical samples for subsequent laboratory analysis, adhering to SR EN 12341:2014 standards.

The collected data is transmitted in real-time through a WiFi protocol to a central server, where it is stored for the generation of 24-hour reports and accessible to users remotely through specialized software or smartphone applications. Furthermore, the system can develop mathematical models to predict the trajectory of pollutant clouds, providing critical insights into environmental risks. Powered by solar panels with a lithium battery backup, the system offers complete mobility and operational efficiency in various environmental conditions, being suitable for both outdoor monitoring and indoor filtration applications.

National Institute of Research and Development for Optoelectronics - INOE 2000

RO.292.	
Title EN	**Multilayer structures based on thin layers copper and silicon carbides, nitrides, and carbonitrides, with high transparency and heat-reflecting properties**
Authors	Catalin Vitelaru, Iulian Pana, Anca Constantina Parau, Mihaela Dinu, Alina Dragomir, Emil Adrian Kiss, Lidia Ruxandra Constantin
Institution	**National Institute of Research and Development for Optoelectronics - INOE**
Patent no.	A00477/14.08.2024
Description	The invention relates to a multilayer structure that is transparent to radiation in the visible spectral range, with wavelengths around λ=632.8 nm, and exhibits high reflection in the infrared spectral range, as well as the technology for obtaining this structure. The multilayer structures are obtained through physical vapor deposition methods (magnetron sputtering), comprising insulating materials formed in a plasma containing silicon, argon, nitrogen, and carbon atoms and ions in varying proportions, along with a metallic material obtained in a plasma containing copper and argon atoms and ions. The multilayer structures consist of three individual thin layers as follows: a first insulating layer of (SiC_xN_y) type, deposited directly on a transparent glass substrate; the second layer is a continuous metallic copper layer; and the third layer is an insulating layer of (SiC_xN_y) type, which may be identical to the first or different in terms of composition. The multilayer materials have a total thickness ranging between 85 and 150 nanometers, with optical properties that remain stable over time at ambient temperature and exposure to the atmosphere

Horia Hulubei National Institute for R&D in Physics and Nuclear Engineering

RO.293.

Title EN

Phytoremediation of Zinc-Contaminated Industrial Effluents with Phragmites australis and Typha latifolia in Constructed Wetlands

Authors

Inga Zinicovscaia [1,2,], Aneta Svozilíková Krakovská[2], Nikita Yushin[2], Alexandra Peshkova[1] and Dmitrii Grozdov[1]*

Institution

[1]Horia Hulubei National Institute for RD in Physics and Nuclear Engineering, 30, Reactorului Str., 077125 Magurele, Romania

[2] Joint Institute for Nuclear Research, Joliot-Curie 6, 141980 Dubna

Description

The ability of two plants, *Phragmites australis* and *Typha latifolia*, to bioaccumulate zinc from industrial effluents in constructed wetlands using ceramsite as a support medium was evaluated. Two types of experiments were conducted: one with real industrial effluent containing 9.4 mg/L of Zn and another with synthetic effluent containing Zn at concentrations ranging from 10 to 100 mg/L. Zinc uptake in plant segments, ceramsite, and its concentration in wastewater were determined using ICP-OES. Both plants removed 97–99% of zinc ions from the industrial effluent, with the highest metal uptake occurring in the roots. In the case of synthetic solutions, *Typha latifolia* demonstrated higher zinc removal efficiency (95–99% removal) compared to *Phragmites australis* (74–90%). Typha latifolia also accumulated significantly higher levels of Zn, primarily in the roots. Transfer factor values were calculated to assess zinc translocation within plant tissues. No visual signs of toxicity were observed during the experiment. This phytoremediation approach could represent a sustainable and environmentally friendly method for treating industrial effluents.

„Petru Poni" Institute of Macromolecular Chemistry, Iasi

RO.294.	
Title EN	**Advancements in Wound Care: Exploring Advanced Resorbable Dressings for Skin Absence and Damage**
Authors	Serbezeanu Diana
Institution	**„Petru Poni" Institute of Macromolecular Chemistry, Iași, Romania**
Patent no.	Programul Bursele UNESCO L'Oreal "Pentru femeile din stiinta"
Description	Wound care and healing can be a slow and challenging process, particularly in cases of chronic wounds, burns, and surgical incisions. Conventional wound dressings often provide limited therapeutic benefits, and there is a need for advanced wound care solutions that can accelerate the healing process and reduce the risk of infections. The idea for this project is to develop and investigate dressings based on electrospun Polyvinyl Alcohol (PVA)/Pullulan that are loaded with resorbable active principles. So, in this project, electrospinning technology will be utilized to create originality nanostructured dressings with tailored properties. The objective of the proposed project is to apply original approaches for the development of novel micro- and nanofibrous electrospun membranes based on PVA/Pullulan that are loaded with resorbable active principles with physicochemical properties, antimicrobial, and with potential application for wound care. PVA/Pullulan that are loaded with resorbable active principles synthesized and the preparation of micro- and nanofibrous membrane will be realized in our laboratory by the advanced method of electrospinning. The structure, morphology, thermal, physicochemical properties and antimicrobial of the novel fibrous electrospun membrane nanocomposites will be investigated. These dressings will offer a unique combination of benefits, including controlled release of therapeutic agents, enhanced biocompatibility, and the ability to promote tissue regeneration. ACKNOWLEDGEMENT: This work was funded by the national fellowship program L'Oreal – Unesco „For Women in Science"

RO.295.

Title EN

Bionanocomposites-encapsulating Natural Deep Eutectic Solvents-kaempferol formulations for corneal regeneration

Authors

Mirela-Fernanda Zaltariov[1], Ianoș Corețchi[2], Nicoleta Vornicu[3], Dragoș Peptanariu[1], Mihaela Balan-Porcarașu[1], Simona Luminița Nica[1], Ionela Grecu[1], Ecaterina Pavlovschi[2], Alina Beșliu[2], Cornelia Ceban[2], Igor Casian[2], Ana Casian[2], Alsaliem Sulaiman[2], Andrei Chiaburu[2], Bianca-Iulia Ciubotaru[1,4]

Institution

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Patent no.

Project code: PN-IV-PCB-RO-MD-2024-0372

Description

The main objective of the project is to develop new hybrid composites using multicomponent matrices as suitable substrates for corneal structures, through an international partnership between research teams from Romania and the Republic of Moldova. The innovation presented in this research project involves the use of kaempferol formulations based on natural deep eutectic solvents, a new generation of solvents comprising mixtures of cheap and readily obtainable components which generate eutectics with melting points significantly lower that of their individual components due to ion–dipole interaction or hydrogen bonding. The deep eutectic solvents are not volatile, not flammable and a low-cost alternative to other organic solvents and can improve the compatibilization with the multicomponent matrix, reduce brittleness and ensure wettability. More than that, the presence of kaempferol, a natural polyhydroxy flavonoid, that can inhibit the expression of inflammatory cytokines in cells and the phosphorylation of protein kinases through the p38MAPK signaling pathway, which is responsible for ocular surface inflammation, holds a great potential to neutralize inflammation and the risk of infection. The research activities aim to strengthen collaboration and research networks in the bionanocomposites field, with regard to their preparation, characterization and evaluation of their potential for application in corneal regeneration.

Acknowledgment. This work was supported by a grant of the Ministry of Education and Research, CCCDI – UEFISCDI, project number PN-IV-PCB-RO-MD-2024-0372 (Contract 13PCBROMD/2025), within PNCDI IV

RO.296.

Title EN **Floating Bio-Based Aerogels: A Dual Solution for Water Purification and Hydrogen Production**

Authors Andreea Laura Scutaru

Institution **Petru Poni Institute of Macromolecular Chemistry, Iasi**

Patent no. Programul Bursele UNESCO L'Oreal "Pentru femeile din stiinta"
Proiectul PN-IV-P1-PCE-2023-1020 (6PCE/08.01.2025)

Description

Water contamination and the growing energy demand represent two of the most pressing global challenges. Photocatalysis has emerged as a sustainable strategy for both pollutant degradation and hydrogen production, yet its large-scale application remains limited by inefficient light utilization, poor catalyst recovery, and restricted mass transfer.

This work proposes an advanced, nature-inspired solution based on floating, bio-derived aerogels designed for the simultaneous purification of contaminated water and generation of clean hydrogen fuel under solar irradiation. The platform consists of nanocellulosic hybrid aerogels with a tailored Janus structure, obtained through the controlled hybridization of cellulose nanofibers with vinyltrimethoxysilane. This structural design enables the formation of distinct hydrophilic and hydrophobic layers, ensuring both resistance and optimized interaction with water pollutants.

The upper hydrophobic layer incorporates metal-doped ZnO nanoparticles acting as photocatalysts, maximizing light exposure and enhancing photocatalytic efficiency, while the lower hydrophilic layer facilitates water uptake and pollutant transport. This architecture improves solar energy harvesting, mass transfer, and catalyst reusability, addressing key limitations of conventional systems.

The developed multifunctional platform demonstrates the potential to simultaneously degrade organic pollutants, such as industrial dyes, and produce hydrogen as a clean energy carrier, contributing to both environmental remediation and sustainable energy generation.

ACKNOWLEDGEMENT: This work was funded by the national fellowship program L'Oreal – Unesco „For Women in Science. This work was supported by a grant of the Ministry of Research, Innovation and Digitization, CNCS -UEFISCDI, project number PN-IV-P1-PCE-2023-1020 (6PCE/08.01.2025), within PNCDI IV

RO.297.

Title EN	**Silsesquioxanes as key inorganic compounds in new polysulfone-based membranes. Design, characterization and perspectives for environmental applications**
Authors	Alexandra Bargan[*1], Bianca-Iulia Ciubotaru[1,2], George Stiubianu[1], Muslum Demir[3,4]
Institution	[1]Petru Poni Institute of Macromolecular Chemistry, Iasi, Romania, [2]Grigore T. Popa University of Medicine and Pharmacy, Iasi [3]Department of Chemical Engineering, Bogazici University, Istanbul, Türkiye [4]TUBITAK Marmara Research Center, Material Institute, Gebze, Türkiye
Patent no.	Application
Description	This work aimed to develop a new method to prepare a series of composite membranes by incorporating polyhedral oligomeric silsesquioxanes (POSS) into polysulfone (PS), for obtaining new silsesquioxanes based materials in order to use them for environmental applications, as advanced, responsive materials with user-controlled adaptability for integrated management of the CO_2 gas separation or/and waste water treatment. These materials are essential for reducing the high energy consumption of traditional amine-based capture systems. The increased efficiency for CO_2 capturing, due to the consequent design of new silsesquioxanes-materials with enriched functionality is a key step in decreasing the CO_2 emissions. The new POSS-PS membranes were confirmed, characterized and applied as new hybrid materials for selective CO_2 capture and as possible waste water treatment agents.

RO.298.

Title EN	**Process for obtaining fibrous membranes based on quaternized polysulfone functionalized with antioxidants and heparin applicable in the hemodialysis process**
Authors	Anca Filimon, Diana Serbezeanu, Adina M. Dobos, Mihaela D. Onofrei, Dragos Peptanariu, Lavinia Lupa
Institution	”Petru Poni” Institute of Macromolecular Chemistry, Iasi, Romania Politehnica University Timișoara, Faculty of Chemical Engineering, Biotechnology and Environmental Protection, Timișoara, Romania
Patent no.	Patent application No. a 00343/2024

Description

Chronic kidney disease (CKD) remains a major global health challenge, with hemodialysis serving as the primary life-sustaining therapy for most patients. However, conventional dialysis membranes are limited by poor biocompatibility, oxidative stress, thrombogenicity, and reduced operational performance. The aim is to create new dialysis membranes suitable for use in extracorporeal devices, capable of overcoming the key limitations of the current dialysis systems. In this invention, we develop a novel fabrication strategy for the electrospun membranes based on quaternized polysulfone (PSFQ), cellulose acetate phthalate (CAP), and polyvinylidene fluoride (PVDF), functionalized with antioxidants and heparin. The PSFQ/CAP/PVDF blend in mixing ratios of 70/28/2 wt% was formulated in a solvent-system containing 2-methoxyethanol and N-methyl-2-pyrrolidone. In order to obtain membranes with improved porosity and functional properties, antioxidant as: α-Tocopherol and α-Lipoic Acid were added to this blend in concentration of 5 mg/mL and 40 mg/mL, respectively, the resulting solution being then electrospun. The resulting membranes demonstrated a remarkable efficiency of approximately 90% in the removal of urea, creatinine and uric acid from the simulated biological fluid, maintaining low vitamin B12 loss (<11 %), which means a high selectivity. Thus, the approach integrates the electrospinning, surface activation by cold radio frequency plasma treatment, and heparin immobilization to produce bioactive membranes with enhanced physicochemical properties, hemocompatibility, and operational performance. These findings highlight the potential of PSFQ-based bioactive membranes to significantly improve dialysis outcomes by achieving a critical balance between permeability and selectivity, thereby contributing to more effective and patient-friendly hemodialysis therapies.

RO.299.

Title EN **Membrane-hydrogel bi-layer device for wound protection and treatment**

Authors Dana M. Suflet

Institution Petru Poni Institute of Macromoleculare Chemistry, Iași

Patent no. Project PN-IV-P7-7.1-PED-2024-1639

Description

Wound management is an ongoing challenge for medical research. An ideal dressing should promote rapid healing with minimal inconvenience to the patient. In particular, it

should be biocompatible and capable of removing excessive exudate, reducing inflammation, protecting against microbial agents, and maintaining adequate moisture for healing. All these aspects can be successfully fulfilled by curdlan and its derivatives. Curdlan, a neutral bacterial polysaccharide with a linear structure, is known to be non-toxic, biocompatible, with anti-infective activity and the ability to support wound healing. In this context, the novelty of the project is to design a bilayer device to protect and treat wounds. The first layer will be a hydrogel obtained by cross-linking techniques of the curdlan derivative with quaternary ammonium groups, and the second layer will be a nanofiber membrane obtained by the electrospinning technique of curdlan phosphate. To facilitate wound healing/protection, the first layer of the new device will provide antimicrobial protection, easily adsorb exudate, and gradually release an anti-inflammatory drug, while the second layer will protect the wound from possible pathogenic agents.

ACKNOWLEDGEMENT: This work was supported by a grant of the Romanian Ministry of Research, Innovation and Digitalization, CCCDI - UEFISCDI, project number PN-IV-P7-7.1-PED-2024-1639, within PNCDI IV

RO.300.

Title EN

HYDROPHOBIC SORBENTS OF FIBROUS MORPHOLOGY FOR OIL SPILL CLEANUP

Authors

Bogdan-Constantin Condurache, Corneliu Cojocaru, Petronela Pascariu, Petrisor Samoila

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Patent no.

Pending

Description

This invention describes the development of a hydrophobic fibrous nonwoven sorbent composed of ultrafine poly(vinylidene fluoride-co-hexafluoropropylene) fibers of submicron diameters obtained through electrospinning, along with its assessment for oil sorption performance. The fabrication parameters were optimized to obtain a hydrophobic nonwoven structure consisting of submicron-scale fibers with a well-developed pore network. Comprehensive characterization was carried out using SEM, FT-IR, and mechanical testing methods. The sorption

capacity for motor oil (0.843 g/mL, 67 cP) was determined to be 9.3 g/g, while approximately 70% of the absorbed oil was recovered from the spent sorbent through centrifugation (at 5000 rpm for 1 min). Additionally, the incorporation of magnetic nanoparticles led to electrospun composites responsive to external magnetic fields. Moreover, a comparative analysis was conducted between electrospun submicron synthetic fibers and other fibers of micrometer-scale dimensions. The results demonstrated that differences in fiber diameter and pore architecture have a significant impact on both sorption capacity and the efficiency of oil recovery during centrifugation.

Acknowledgment
This work was supported by a grant of the Romanian Ministry of Research, Innovation and Digitization, CNCS–UEFISCDI, project number PN-IV-P1-PCE-2023-0144, within PNCDI IV, contract number 86PCE/2025.

National Research and Development Institute for Textile and Leather Bucharest, Romania
INCDTP

RO.301.	
Title EN	**Flexible electrodes for sensors made by plasma sputtering and electroplating**
Authors	Aileni Raluca Maria, Toma Doina
Institution	**National Research and Development Institute for Textile and Leather, Bucharest, Romania**
Patent no.	Patent application no. A/00600/ 8.12.2025
Description	The invention describes the realization of textile electrodes for sensors and electrodes by functionalizing textile fabric using RF argon plasma, plasma sputtering with a gold metallic target, and electroplating in a copper-based solution. The invention refers to a process for developing textile electrodes (E1 and E2) with conductive properties intended for technical applications in medical electronics and smart textiles, for the production of sensors. The preparation of the textile material to obtain the final electrodes (E1 and E2) consists of preliminary treatments in an RF argon plasma for cleaning and hydrophilization, for 6...30 minutes, at 50-150 W using an RF generator operating at MHz. The preliminary electrodes (D1 and D2) are obtained by gold coating in plasma sputtering using the screen masks (C1 and C2). In this way, the initial textile material (A), after argon RF plasma treatment, is functionalized using magnetron sputtering. The final electrodes (E1 and E2) are obtained by electroplating the preliminary electrodes with Cu for 15...20 minutes. The electroplating solution is based on copper sulfate. After preparing the electroplating solution, the preliminary textile electrodes are connected to the cathode (-) and immersed in the Cu-based electroplating solution. A Cu electrode is used as the anode, and an electric potential of 6...12 V is applied. After electroplating, the final electrodes (E1 and E2) are freely dried for 24h at a temperature of 15...20°C.

RO.302.	
Title EN	**Electroconductive materials based on multilayer metallization for thermoelectric systems, electromagnetic screens and biomedical sensors integrated in IoT systems**
Authors	Aileni Raluca Maria, Marin Adrian Cornel, Baciu Valentin, Tabara Octavian-Adrian, Toma Doina
Institution	**National Research and Development Institute for Textile and Leather Bucharest, Romania**
Patent no.	Project no. PN 23 26 01 03
Description	The 3D-WearIoT project focuses on developing advanced, flexible, smart composite materials by combining classical and innovative metallization technologies with computational modeling, optimization, predictive data analysis, and artificial neural networks. These materials can serve various functions, including electromagnetic (EM) shielding, thermoelectric elements for Seebeck generators, supercapacitors, and flexible electrodes for actuators and sensors in Internet of Things (IoT) wearable systems designed for biomedical monitoring and remote control. The main objective of the 3D-WearIoT project is to develop, test, and optimize the electrical, physicochemical, and mechanical properties of these advanced composite materials for flexible electronic components in strategic industries, including electronics, electrical engineering, and medicine.

Romanian Research & Development Institute for Gas Turbines COMOTI

RO.303.	
Title EN	**Ballistic protection system with individual compartmentalization for hybrid energy absorption obtained through additive manufacturing**
Authors	Alexa-Andreea CRISAN; Simona-Nicoleta DANESCU
Institution	Romanian Research and Development Institute for Gas Turbines COMOTI
Patent no.	Patent application No. 00032/28.01.2026
Description	The invention titled "Ballistic protection system with individual compartmentalization for hybrid energy absorption obtained by additive manufacturing" relates to a multi-layered protective system incorporating an additively manufactured structural matrix configured in an octagonal geometry, designed for compartmentalization and optimized kinetic energy management. The system is fabricated from lightweight synthetic materials and integrates three functional layers, separated by thin compartmentalization walls that isolate shock propagation and prevent crack transmission between layers. The frontal impact layer consists of a Silicon Carbide (SiC) plate, which initiates projectile fragmentation and transfers the primary shock wave. The intermediate damping layer is composed of Butyl Rubber (IIR), which dissipates residual energy and attenuates blunt trauma transmitted to the user. The rear support layer comprises a hybrid Carbon-Aramid (Kevlar) composite plate, designed to absorb the final mechanical load, arrest fragment penetration, and provide structural rigidity to the assembly.

RO.304.	
Title EN	**Thermally insulating multi-layered architecture with nanomaterials for cryogenic tanks, fabricated through additive manufacturing**
Authors	Alexa-Andreea CRISAN
Institution	Romanian Research and Development Institute for Gas Turbines COMOTI
Patent no.	Patent application No. 00036/02.02.2026
Description	The invention titled "Thermally insulating multi-layered

architecture with nanomaterials for cryogenic tanks, fabricated through additive manufacturing" describes a hybrid, modular, multi-layered thermal protection system for cryogenic hydrogen storage tanks, featuring an octagonal geometry produced by additive manufacturing techniques.
The system is fabricated from low-mass synthetic materials and comprises four functional compartments arranged from interior to exterior. The first layer consists of an aluminum-magnesium alloy plate, 5 mm in thickness. The second layer is a boron nitride-doped ceramic plate, 1 mm in thickness. The third compartment is hermetically sealed and houses up graphene sheets. The fourth compartment, approximately 30 µm in thickness, is positioned at the outermost boundary, interfacing with the additively manufactured load-bearing structure and in direct contact with the external environment; it contains a composite material based on iron sulfide powder (Fe_3S_4) mixed with titanium dioxide (TiO_2) nanoparticles.
The ordered arrangement of materials, the compartmentalization geometry, and the selective sealing configuration collectively contribute to a significant reduction in thermal losses and to the maintenance of effective thermal insulation in cryogenic hydrogen storage vessels.

RO.305.

Title EN	**Alternative fuel blend for aeronautical engines, derived from pyrolysis products of plastic waste**
Authors	Alexa-Andreea CRISAN; Radu Eugen KUNCSER
Institution	Romanian Research and Development Institute for Gas Turbines COMOTI
Patent no.	Patent application No. 00037/02.02.2026
Description	The invention titled "Alternative fuel blend for aeronautical propulsion systems, derived from pyrolysis products of plastic waste" describes an alternative fuel blend intended for aeronautical propulsion applications, formulated to reduce environmental impact, particularly through the mitigation of pollutant emissions. The blend is distinguished by the integration of pyrolysis oil derived from polypropylene waste pyrolysis into a formulation compatible with the operational requirements of aeronautical engines. The fuel consists of a controlled combination of three components: kerosene, pyrolysis oil,

and AeroShell 500 synthetic lubricating oil, each fulfilling a defined energetic and operational role.
In terms of composition, the blend contains 5%, 10%, 15%, or 20% polypropylene-derived pyrolysis oil by volume, complemented by kerosene as the primary fuel carrier, and 5% AeroShell 500 synthetic oil by total blend volume. The inclusion of AeroShell 500 is justified by the lubrication requirements of the majority of propulsion systems, which demand continuous and stable lubrication for proper operation.
The blend configuration is specifically designed to reduce combustion-generated emissions, with a notable decrease in sulfur dioxide (SO_2) output, particularly at high rotational speed operating regimes. Blend preparation was performed using a high-precision balance, ensuring strict adherence to established proportions, compositional homogeneity, and reproducibility of the environmental performance results obtained.

RO.306.	
Title EN	**Modular testing installation for sustainable fuels derived from pyrolysis products of plastic waste for aerospace engines**
Authors	Alexa-Andreea CRISAN; Radu Eugen KUNCSER; Madalina BOTU
Institution	Romanian Research and Development Institute for Gas Turbines COMOTI
Patent no.	Patent application No. 00059/10.02.2026
Description	The invention titled "Modular testing installation for sustainable fuels derived from pyrolysis products of plastic waste for aerospace engines" describes a modular experimental test rig for alternative fuels, conceived as an integrated gas turbine system for investigating the dynamic behavior and performance of a reduced-scale reaction engine under controlled laboratory conditions. Combustion is continuously evaluated through an exhaust gas analysis system used to determine the composition and combustion quality of fuel blends. The installation is assembled as a modular unit mounted on a mobile frame, incorporating all functional subsystems required for autonomous and safe operation. The energy conversion system comprises a compressor, an annular

combustion chamber, and a turbine mounted on a common shaft, ensuring air compression, air-fuel mixture combustion, and conversion of combustion gas energy into mechanical work and thrust.
Fuel supply is managed by a dedicated system including a tank with an attached Stirling engine for fuel mixture temperature control, electronically controlled pumping elements, and safety devices. The system operates with a liquid alternative fuel blend mixed with a lubricating agent for bearing protection, alongside an additional reference fuel blend reservoir.
The ignition and start-up sequence is fully automated, incorporating an electric drive system, an auxiliary fuel source, and an ignition element. Operational monitoring is performed via a command and data acquisition system measuring temperature, rotational speed, pressure, flow rate, and thrust in real time. Combustion stability is additionally monitored by a high-speed camera operating at 50,000 fps at 1024×1024 pixel resolution.

RO.307.	
Title EN	**Modular cryogenic installation for experimental testing of fuels at low temperatures, with advanced optical diagnostics and thermographic analysis**
Authors	Alexa-Andreea CRISAN; Radu Eugen KUNCSER; Madalina BOTU
Institution	Romanian Research and Development Institute for Gas Turbines COMOTI
Patent no.	Patent application No. 00115/27.02.2026
Description	The invention titled "Modular cryogenic installation for experimental testing of fuels at low temperatures, with advanced optical diagnostics and thermographic analysis" describes a modular experimental test rig for cryogenic fuels and low-temperature fuel blends, conceived as a reduced-scale integrated gas turbine system for investigating combustion dynamics, energy performance, and associated thermofluidic phenomena under controlled laboratory conditions. The installation enables continuous combustion evaluation through thermodynamic parameter monitoring, exhaust gas composition analysis, and an integrated Schlieren optical diagnostic system for density gradient visualization in the

combustion chamber and exhaust jet regions. A dedicated optical section features a high-temperature quartz window hermetically mounted on the flame tube, equipped with a purging system to prevent deposits and maintain optical transparency.
The energy conversion system comprises a compressor, an optically accessible combustion chamber, and a turbine mounted on a common shaft. Cryogenic fuel supply is managed by a dedicated module including a thermally insulated Dewar vessel, vacuum-jacketed transfer lines, inert gas pressurization system, cryogenic valves, and a chilldown loop for injection line thermal stabilization. Operational safety is ensured through purging, inerting functions, overpressure protection, and ambient oxygen concentration monitoring.
The fully automated ignition sequence and integrated data acquisition system enable real-time measurement of temperature, pressure, flow rate, rotational speed, and axial thrust. Combustion stability is further investigated using a high-speed camera within the Schlieren system and a thermographic camera for exhaust jet temperature field mapping, enabling correlation with acquired experimental data.

RO.308.	
Title EN	**Multilayered composite structure with incompressible core for deep-water military underwater platforms**
Authors	Alexa-Andreea CRISAN; Simona-Nicoleta DANESCU; Vlad-Stefan BUZETELU
Institution	Romanian Research and Development Institute for Gas Turbines COMOTI
Patent no.	Patent application No. 00128/05.03.2026
Description	The invention titled "Multilayered composite structure with incompressible core for deep-water military underwater platforms" describes a hybrid, modular, multilayered structural system resistant to extreme hydrostatic pressures, intended for military underwater applications. The architecture is distinguished by a concentric composite configuration with a radial elastic modulus gradient, fabricated through additive manufacturing techniques with controlled variable density. The system comprises three integrated functional levels

arranged from exterior to interior. The first level consists of a rigid structural layer of carbon fiber and/or aramid fiber reinforced high-performance polymer matrix composite, acting as a mechanical barrier and primary external pressure-bearing element. The second level comprises an elastomeric intermediate layer with closed-cell microstructure and radially variable elastic modulus, designed for stress dissipation and vibration damping under hydrostatic loading. The third level constitutes an incompressible internal core fabricated from technical silicone gel or stabilized synthetic hydrogel, configured for three-dimensional pressure redistribution and elimination of local stress concentrations.
The concentric architectural configuration, the graded arrangement of materials with differentiated mechanical properties, and the integration of the incompressible core collectively contribute to uniform volumetric stress distribution, prevention of buckling and local implosion, and enhanced structural resilience under extreme pressure conditions characteristic of deep-water military operations.

RO.309.

Title EN	**Nanostructured membrane with controlled ionic selectivity for efficiency enhancement and erosion reduction in space electric propulsion**
Authors	Alexa-Andreea CRISAN; Vlad-Stefan BUZETELU
Institution	Romanian Research and Development Institute for Gas Turbines COMOTI
Patent no.	Patent application No. 00142/12.03.2026
Description	The invention titled "Nanostructured membrane with controlled ionic selectivity for efficiency enhancement and erosion reduction in space electric propulsion" describes an advanced, hybrid, modular, multilayered membrane system for the purification and conditioning of propellant gas in space electric propulsion systems. The membrane is distinguished by a nanostructured configuration with a functional electrostatic and dimensional gradient, fabricated through controlled micro- and nanometric-scale techniques including layer-by-layer deposition, precision lithography, and directed chemical functionalization. The system comprises three integrated functional layers. The first layer, positioned at the exterior, consists of a rigid structural element fabricated from high-performance carbon-

chopped polymer matrix composite, providing mechanical support, ion bombardment shielding, and dimensional stabilization under vacuum and radiation conditions. The second layer is an active nanostructured element featuring dimensionally calibrated and electrostatically functionalized ionic channels, configured for selective separation of ionic and molecular impurities from the propellant gas stream. The controlled distribution of fixed charges within the nanochannels generates a local electrostatic field capable of discriminating ionic species by ionic radius, mobility, and polarizability, ensuring gas purification prior to the ionization stage. The third layer is an internal flow stabilization and uniformization element fabricated from a porous structure with high plasma erosion resistance, configured to reduce local turbulence, attenuate pressure fluctuations, and homogeneously distribute mass flow toward the electric thruster discharge chamber.

The multilayered configuration, the graded mechanical and electrostatic properties, and the integration of the ion-selective active layer collectively contribute to reduction of internal component deposition and erosion, stabilization of plasma discharge, and improvement of overall energy efficiency in space electric propulsion systems for orbital and interplanetary applications.

RO.310.

Title EN	**Integrated modular installation for the conversion of polymeric waste from the aerospace industry into liquid fuels, conditioning of pyrolysis fractions, automated blend formulation, and experimental validation of combustion performance on a micro turbojet engine**
Authors	Alexa-Andreea CRISAN; Radu Eugen KUNCSER
Institution	Romanian Research and Development Institute for Gas Turbines COMOTI
Patent no.	Patent application No. 00208/06.04.2026
Description	The invention, entitled relates to a modular technological system designed for the valorization of polymeric waste through thermo-catalytic conversion and for the utilization of the resulting products as alternative fuels in aerospace applications. The installation is conceived as an integrated platform ensuring, in continuous operation, the transformation of waste into fuel fractions, their separation and conditioning, the controlled

formulation of fuel blends, and the experimental assessment of combustion behavior under controlled laboratory conditions.

According to its structural design, the installation is configured as a modular assembly mounted on a mobile frame and comprises a pyrolysis module, a distillation module, an automated blending module, and a microturbine testing module.

The pyrolysis module consists of a reactor provided with a feeding chamber for polymeric waste, a catalytic zone, a vapor outlet zone, and a temperature control system based on thermocouples, the generated vapors being directed through heat exchangers for condensation and collected as pyrolysis oil.

The liquid fractions obtained are transferred to the distillation module, where they are separated according to temperature range, resulting in fractions suitable for fuel formulation. These fractions are subsequently directed to the automated blending module, which includes dedicated vessels, a mixing balance, and an electronically controlled dosing system connected to a kerosene reservoir containing 5% Aeroshell additive, thereby enabling the reproducible preparation of fuel blends, including combinations with reference fuel and additives.

The testing module is configured as a microturbine engine installation and includes an energy conversion system composed of a compressor, combustion chamber, and turbine mounted on a common shaft, intended for air compression, combustion of the air-fuel mixture, and generation of mechanical work and thrust.

Fuel supply is provided by a dedicated system equipped with tanks for the tested fuel and reference fuel, electronically controlled pumping elements, and safety devices, while thermal conditioning of the blend is also ensured.

The start-up and ignition process is fully automated and employs an electric starter system, an auxiliary fuel source, and an ignition element, ensuring initial combustion stability.

Operation monitoring and control are performed by a command and data acquisition system enabling the measurement and recording of characteristic parameters such as temperatures, rotational speed, pressures, flow rates, and thrust force, with real-time analysis capability.

The combustion process is continuously evaluated by means of an exhaust gas analysis system, while flame stability is additionally monitored using a high-speed camera, allowing detailed analysis of the dynamic combustion behavior of the formulated fuel blends.

RO.311.	
Title EN	**ULTRALIGHT PNEUMATIC RETRACTABLE TELESCOPIC ARM**
Authors	Teodor-Adrian BADEA, Raluca CONDRUZ
Institution	**Romanian Research and Development Institute for Gas Turbines COMOTI**
Patent no.	Patent application Patent A/00020/2024
Description	An ultralight, pneumatic, retractable telescopic arm with a external lattice structure that enables automatic extension and retraction by connecting to a vacuum pump or compressor. It is intended for use in aerospace industrial field where low mass is a critical requirement. The invention consists of a external lattice structure, which in turn includes numerous component cells, referred to as telescopic elements , that provide mechanical strength while maintaining a reduced mass. An additional expandable element , of the bellows type, is made of a flexible material reinforced with a helical structure that facilitates the extension and retraction of the arm through connection to a vacuum pump or compressor.

RO.312.	
Title EN	Integrated technology for processing polyhydrocarbons to obtain alternative fuels
Authors	Kuncser Radu Eugen, Paraschiv Maria Marilena, Stanescu Vatau Daniel Mihai
Institution	Romanian National Institute for Gas Turbines-COMOTI, National University for Science and Technology Politehnica Bucharest, Global Company Incorporated SRL
Patent no.	A/00093/06mar2024
Description	The present invention relates to an integrated plant for the recovery of polyhydrocarbon waste for the production of alternative energy. The integrated plant involves a pyrolysis reactor, a distillation reactor and a generator. The plant can be used for different types of polyhydrocarbons and has been tested for polypropylene waste from the food industry and chemical analysis laboratories.

RO.313.	
Title EN	**Modular Hydraulic Dynamometer**
Authors	Catană Răzvan Marius, Badea Petre Gabriel, Ungureanu Adrian
Institution	Romanian Research & Development Institute for Gas Turbines COMOTI
Patent no.	**Patent Application: RO 138717 A0**
Description	The invention relates to a modular mechanical-hydraulic assembly designed for measuring shaft power in helicopter turboshaft engines and turboprop engines. It consists of a hydraulic dynamometer intended for testing and experimental evaluation of engines delivering shaft power of up to 300 kW, enabling performance assessment and validation, as well as verification of the operating regimes of the power turbine. From a technical standpoint, the hydraulic dynamometer module is defined by a hydraulic pump that uses oil as the working fluid. When mechanically driven by the engine's power turbine, the pump generates oil pressure and flow rate. The load applied to the hydraulic pump shaft, and consequently to the power turbine shaft, is achieved by varying the oil outlet pressure. This pressure can be controlled by means of relief valves installed at the pump outlet. Thus, the pump's operating pressure can be adjusted under constant rotational speed conditions, resulting in different pump operating characteristics and enabling the achievement of various torque and power levels.

National Institute for Research Development and Testing in Electrical Engineering - ICMET Craiova

RO.314.

Title EN

CONTINOUS MONITORING AND DIAGNOSTICS SYSTEM FOR THE STATIONARY BATTERY FROM TRANSFORMER STATIONS

Authors

Dumitru SACERDOȚIANU, Ancuța-Mihaela ACIU, Fevronia-Despina ROMAN, Adrian VINTILĂ, Camelia MARINESCU, Florin TEIȘANU, Constantin CHELAN, Daniela IOVAN, Miruna Gabriela POPA

Institution

National Institute for Research Development and Testing in Electrical Engineering - ICMET Craiova

Patent no.

Research projects. NUCLEU Program within the National Research, Development and Innovation Plan 2023-2026,

Description

The digitalization of assets within SEN is not only a technology option, but also a strategical requirement for Romania as well as for European Union. It supports the efficiency, sustainability and security goals to transform the electric power infrastructure in an intelligent, flexible and resilient systemThe importance of implementing a battery monitoring system must be evaluated in relation to the amount of data that can be lost and the equipment that can be damaged in the event of a backup system failure.The analyzed system computes the battery parameters with typical cell voltage measurements, the package current, the package voltage, and the package temperature, while using these measurements for estimating the state of loading (SOC), the state of health (SOH), and the unloading depth.

The SMB_RTU software application, dedicated to monitoring the backup power supply batteries in high voltage substations, is Windows compatible and provides a user-friendly interface. This software application is compatible with the hardware architecture and has mainly 4 specified functions visible in the menu bar of the application windows: CONFIGURATION, MONITORING, ANALYSIS and ARCHIVE.

This project proposes a configurable stationary battery management system for all operating voltages: 24Vdc, 48Vdc,110Vdc, 220Vdc.

In the ANALYSIS section, the selective display of significant parameters related to components of stationary battery (for example, elementary battery cells) is performed in intuitive graphic interfaces, which also highlight the differences in the values of the analyzed parameter, from one component to another.

RO.315.

Title EN **MONITORING METHOD AND SYSTEM FOR THE SAG OF OVERHEAD POWER TRANSMISSION LINES CONDUCTORS**

Authors Sacerdoţianu Dumitru, Nicola Marcel, Vintila Adrian, Nicola Claudiu, Hurezeanu Iulian, Lazarescu Florica - ICMET Craiova;Popescu Paul - University of Craiova - Faculty of Mathematics; Purcaru Ion, Albița Anca - S.C. VIG S.A. Craiova

Institution National Institute for Research Development and Testing in Electrical Engineering - ICMET Craiova

Patent no. Patented invention RO 133444/30.12.2020, and CDI proiect POC, acronim SMLEA SEETDEE-Cod SMIS 156460, Contract no.436/390112/ 17.02.2023

Description

The invention refers to a method and a system for the continuous, monitoring of the sag of high-voltage overhead power lines in the electric, power transmission and distribution systems.

The method, according to the invention, consists in the acquisition of data from the acquisition modules located at the potential of the line conductor, by using the tilt sensors of the line conductor, and these data are used for the calculation of the conductor sag, according to a generally valid method for all types of conductors.

The system, according to the invention, consists of two acquisition modules located on a section of the high voltage overhead power line conductor, which include the tilt sensors of the line conductor, power supply sources, a WiFi module for communication with a local data acquisition and remote transmission unit, powered by an independent source, a communication module and a system for calculating the sag of the electric conductor.

For the general cases including uneven heights of suspension points and rugged ground as well as plane ground, the maximum sag is calculated according to the relationship:

$$S_{max} = \frac{l(B-A)}{C^2}\left[arcsh\frac{B-A}{C} + arcchA\right] - \frac{l}{C}\sqrt{1+\frac{(B-A)^2}{C^2}} + l\frac{A}{C}$$

where:

$$A = \sqrt{1+tg^2\theta_1}$$

$$B = \sqrt{1+tg^2\theta_2}$$

$$C = arcsh(tg\theta_1) + arcsh(tg\theta_2)$$

The proposed invention provides a system for monitoring the sag of electrical cables, simplified, precise, easy to use, generally valid for all types of cables, dependent exclusively on the inclination of the conductor.

National Institute for Laser, Plasma and Radiation Physics

RO.316.	
Title EN	**Self-Calibrated Hot Probe Method for Seebeck Coefficient Measurement in Thin Films**
Authors	C. L. Hapenciuc, M. Oane, A. Visan, C. Ristoscu, A. Stochioiu, I. Urzica, M. Dumitru , T. Borca-Tasciuc, S. Anghel, I. N. Mihailescu
Institution	National Institute for Laser Plasma and Radiation Physics
Patent no.	Patent application No. A 00267/2024
Description	The invention introduces a novel and simplified experimental method for measuring the Seebeck coefficient of thin films deposited on electrically insulating substrates. The proposed technology is based on a hand-fabricated hot probe consisting of a 50 μm diameter Pt90/10Rh wire and an analytical heat-transfer model describing the temperature distribution along the probe and the heat exchange with the sample. The key innovation of the method is the discovery that the ratio between the probe tip temperature and the average probe temperature remains constant and independent of the electrical current, film thickness, or thermal properties of the film–substrate system. In addition, the contact radius and thermal contact resistance do not need to be determined independently; only pairs of values that reproduce the probe thermal resistance are required. This property enables a self-calibrated measurement procedure and eliminates the complex calibration steps required by conventional scanning thermal microscopy or microfabricated heater-sensor techniques. The proposed device has an extremely simple design and can be fabricated at very low cost using a metallic wire probe, without the need for clean-room microfabrication. The method allows rapid measurements with an accuracy better than 1% and provides local characterization of thin films with spatial resolution below 30 μm, enabling detection of film non-uniformities. It can also be applied to small samples where traditional heater–heat-sink methods are impractical. The technology has been experimentally validated using reference thin films such as CdS, Bi, and Cr. With the growing demand for thermoelectric materials used in energy harvesting, wearable electronics, and waste-heat recovery systems, this invention offers significant scientific, technological, and economic impact. Its low cost, simplicity, and high reliability make it attractive for research laboratories, materials development centers, and industrial applications in thermoelectric device optimization.

National Institute for Research and Development in Electrochemistry and Condensed Matter Timisoara

RO.317.	
Title EN	**Rotational Experimental Platform for Ionic Momentum Measurement and Gas Characterization**
Authors	Marius Chirita, Adrian Ieta
Institution	National Institute for Research and Developement in Electrochemistry and Condensed Matter, Timisoara, Romania
Patent no.	US **11,863,040** 2024.
Description	The experimental platform presented here builds upon previously developed electrohydrodynamic rotary systems described and protected by **U.S. Patent No. 11,863,040 – *Electrohydrodynamic rotary systems and related methods*. What is it?** An original experimental device that uses a rotary ionic engine as an indirect measurement platform for ionic force and electrical-to-mechanical energy conversion efficiency in gases. **The problem:** direct ionic-thrust measurements are difficult, unstable, and poorly suited for controlled gas-mixture environments. A fast and robust comparative platform is missing. **Proposed solution:** The ionic force generated by electrical discharges is converted into a steady rotational mechanical response. The steady-state rotational speed serves as a reliable proxy for ionic momentum transfer and conversion efficiency. **What is new?** 1. Ionic engine used as a **metrological platform,** 2. Indirect, stable, and repeatable measurement method, 3. Simple in situ gravitational calibration, 4. Compatible with controlled gas environments, 5. Enables systematic study of oxygen and other electronegative species. **Why does it matter?** The same approach functions as a **general experimental platform** for: • probing momentum-transfer mechanisms in gases, • studying oxygen and other electronegative species, • ionic propulsion and energy-conversion systems, • configurations extending beyond classical EHD actuation. In terms of testing, we demonstrated, for the first time, that the use of a rotary ion engine (RIE) can be used as a practical experimental platform for investigating electrical-mechanical energy conversion in ion-wind propulsion under controlled binary N_2-O2 mixtures at atmospheric pressure. [*Adrian Ieta, Marius Chirita,* "Mapping ionic-wind strength in N_2–O_2 mixtures at atmospheric pressure using a rotary ionic engine" *Propulsion and Power Research,* manuscript ID: PPR-2026-0045].

Research and Innovation Center for CBRN Defense and Ecology

RO.318.

Title EN

Individual kit for chemical, biological and radiological (CBR) immediate decontamination

Authors Vasile Șomoghi[1], Marcel Istrate[1], Cătălin Enescu[1], Liliana Rece[2], Raluca-Elena Ginghină[2], Nicoleta Petrea[2], Alexandru Bobeș-Tureac[2]

Institution [1]**STIMPEX SA**
[2]**Research and Innovation Center for CBRN Defense and Ecology**

Patent no. -

Description

Individual protection and immediate decontamination are very important measures in order to save military personnel from all categories of military forces or from specialized intervention teams, as well as to protect the civilian population.

The individual kit for CBR immediate decontamination, developed by our team, is intended to protect military personnel against chemical warfare agents, toxic industrial compounds, biological and radiological agents by reducing contamination of exposed body surfaces, equipment, individual weapons and essential materials in the personnel's equipment.

The kit's active components are an amino-alcoholic decontamination solution and a decontaminant powder based on active charcoal. The amino-alcoholic solution is impregnated on a chemically inert, adsorbent support, such as a non-woven polypropylene fibers cloth, which is packaged in an aluminized foil sachet, in order to preserve the characteristics, the protection against solar radiation, sudden temperature variations and contact with air.

The product has a polyvalent decontamination effect, used both for decontamination of the skin and for decontamination of the affected portions of the equipment and weapons. The kit contains two packages, one for decontamination of the skin, the other for decontamination of protective equipment and individual weapons.

The product has been developed and certified according to the standards in force, covering a comprehensive testing program, in order to determine the efficiency of CBR decontamination, in accordance with specific NATO requirements.

Acknowledgements: This work was supported by two grants of the Ministry of Research, Innovation and Digitization, CCCDI-UEFISCDI project number PN-III-P2-2.1-PTE-2016-0132, within PNCDI III, and PN-IV-P7-7.1-PTE-2024-0413, within PNCDI IV.

RO.319.

Title EN

Colorimetric detector tubes for the detection of chemical warfare agents and industrial toxic substances

Authors Nicoleta Petrea[1], Liliana Rece[1], Raluca-Elena Ginghină[1], Alexandru Bobeș-Tureac[1], Rodica Lungu[1], Vasile Șomoghi[2], Aurel Pop[2]

Institution [1]**Research and Innovation Center for CBRN Defense and Ecology**
[2]**STIMPEX SA**

Patent no. -

Description

Colorimetric detector tubes for the detection of chemical warfare agents and industrial toxic substances (TI-DETCHIM) represent simple chemical detection systems designed for the identification of the main military interest chemical compounds (CWAs) and of the most common toxic industrial compounds (TIC) that can be part of chemical incidents. They are of capital importance in the protection of the force, workers and the general population by adopting measures to prevent or reduce exposure to the chemical toxic agents and enabling prompt intervention to limit the contamination spread.

In the modern context, the colorimetric detector tubes continue to play an important role in the rapid and reliable identification of toxic agents in the field. TI-DETCHIM allow for the detection and identification of substances of interest in vapour or aerosol form in the atmosphere or in enclosed spaces: TI-DETCHIM-G for detection of volatile neurotoxic agents (sarin, soman); TI-DETCHIM-ACG for detection of phosgene, diphosgene, hydrogen cyanide, cyanogen chloride; TI-DETCHIM-HD for detection of mustard gas; TI-DETCHIM-BZ for detection of BZ psychochemicals; TI-DETCHIM-NH_3 for detection of ammonia; TI-DETCHIM-Cl_2 for detection of chlorine; TI-DETCHIM-CO for detection of carbon monoxide etc.

These systems are characterized by portability and low production costs, do not require electrical power, are easy to use, provide immediate visual responses based on colorimetric chemical reactions.

TI-DETCHIM is a technology validated in relevant operational environment, maturity level in 2026.

Acknowledgements: This work was supported by a grant of the Ministry of Research, Innovation and Digitization, CCCDI–UEFISCDI project number PN-IV-P7-7.1-PTE-2024-0428, within PNCDI IV.

Agricultural Research and Development Station Secuieni – Neamț

RO.320.

Title EN **From diversity to productivity: agronomic insights into common bean (Phaseolus vulgaris L.) genotypes**

Authors Simona - Florina ISTICIOAIA, Lorena - Diana POPA, Alexandra LEONTE, Andreea - Sabina PINTILIE, Doru STANCIU, Cosmin MURARU, Nicolae - Valentin VLĂDUȚ, Ioan CABA, Gheorghe MATEI, Raluca REZI, Danela MURARIU, Dumitru – Dorel BLAGA

Institution **Agricultural Research and Development Station Secuieni**

Patent no. Project no. 1.3.3/19.07.2023 – ADER 2026 National R&D Plan (MARD Romania)

Description In the context of a limited portfolio of field bean varieties in Romania and increasing climate constraints, this research addresses the need for innovative genetic resources to enhance crop productivity and resilience. The study evaluated 60 common bean (Phaseolus vulgaris L.) genotypes from local, national, and international germplasm collections under the agro-ecological conditions of the Agricultural Research and Development Station Secuieni during the 2024–2025 growing seasons. A comprehensive comparative approach was employed to identify high-performing and climate-adapted genotypes, integrating phenological and agronomic trait analyses. The results highlighted significant genetic variability, demonstrating that genotype plays a decisive role in determining yield and adaptability under contrasting environmental conditions. Local germplasm showed superior adaptation and stability, while national and international collections contributed valuable genetic diversity for breeding innovation. Yield performance varied widely (0–4203 $kg \cdot ha^{-1}$), with an experimental mean of 1550 $kg \cdot ha^{-1}$. Several genotypes (POPTR1, GGSe4, BGR30, GGMa9, POPMOLD3, BGR25) exhibited outstanding productivity and adaptability, representing promising candidates for future cultivar development. The novelty of this work lies in the valorization of multi-origin germplasm to identify resilient genotypes suitable for sustainable agriculture under climate change. These findings provide a solid basis for breeding strategies focused on yield stability, drought tolerance, and genetic diversification, while highlighting the importance of conserving and utilizing local genetic resources for long-term agricultural sustainability and food security. This study was funded by the Ministry of Agriculture and Rural Development through ADER 2026 (Project no. 1.3.3/19.07.2023), focused on germplasm collection and breeding of drought-resistant common bean (Phaseolus vulgaris L.).

RO.321.	
Title EN	**Competitiveness of some perennial grass and legume species in simple mixtures, under the conditions of ARDS Secuieni**
Authors	**Margareta NAIE, Oana MÎRZAN, Andreea ENEA, Mihai STAVARACHE, Marcela DRAGOȘ, Mihaela POPA, Adrian Ilie-NAZARE, Diana BATÎR RUSU**
Institution	**Agricultural Research - Development Station Secuieni**
Patent no.	
Description	The composition of mixtures of perennial grasses and legumes, in the technology of establishing temporary meadows, represents the most important work on which the production potential of the meadow, the method of use, the fertilization system, as well as the economic duration of exploitation depend. The composition of the mixtures is made according to scientific criteria based on knowledge of the biology of species and varieties, relationships with environmental factors, use value and other economic characteristics. For the establishment of temporary meadows, simple mixtures consisting of a small number of species are generally recommended. The production capacity of temporary pastures is influenced by fertilization, thus obtaining good quality fodder is essential in animal husbandry to ensure animal health, high production and sustainable economic profitability. High quality fodder is not only a source of nutrients, but also a determining factor in food safety, contributing to obtaining animal products (milk, meat, eggs) safe for human consumption. Through research conducted during 2023-2025, at A.R.D.S. Secuieni, the competitiveness of the species Phleum pratense L. and Trifolium pratense L., cultivated alone or in simple mixtures, under different fertilization conditions with complex mineral fertilizers, was analyzed.

RO.322.	
Title EN	**MILLET – Forgotten Yet Resilient – Importance and Cultivation**
Authors	Enea Andreea, Cosmin Muraru, Pintilie Andreea-Sabina, Naie Margareta
Institution	**Agricultural Research-Development Station Secuieni**
Patent no.	PhD. Thesis - Research on the influence of some technological chain on certain yields parameters in millets

Description	(Panicum miliaceum L.) This poster presents data and information regarding the crop technology and importance of millet (Panicum miliaceum L.), a thermophilic, C_4-type cereal originating in Asia, whose grains are a true source of nutrition for human consumption, but which is currently undervalued. In Romania, millet cultivation is a secondary crop, and it occupies an insignificant percentage in the diet. The technology for cultivating millet is specific to cereals, being completely mechanized. Special attention is paid to weed control, especially in the first phases of millet vegetation. When harvesting the grains (80-85% of the panicle has mature grains), losses are due to shaking because ripening is staggered (from the base to the top of the panicle).

RO.323.	
Title EN	**Integrated valorization of Cannabis sativa L. for sustainable food and feed systems through development and validation of functional products and innovative applications**
Authors	Lorena-Diana Popa, Florin Nenciu, Tatiana Onisei, Petru Alexandru Vlaicu, Manuela Răscol, Simona-Florina Isticioaia, Alexandra Leonte, Nicolae-Valentin Vlăduț, Gheorghe Matei, Gabriel-Ciprian Teliban
Institution	**Agricultural Research and Development Station Secuieni**
Patent no.	Project no. 16.1.1/29.01.2024 – Sectoral Plan - ADER 2026 (MARD Romania)
Description	The project, carried out during 2024 - 2026, aims to valorize industrial hemp through the development of innovative nutritional recipes, functional foods, and dietary supplements obtained from high-performing Romanian monoecious hemp varieties developed and homologated by ARDS Secuieni. Processing seeds, leaves, and inflorescences generated valuable ingredients integrated into food products and dietary supplements, supporting modern, balanced, and sustainable nutrition. Inflorescences were subjected to a hybrid extraction method (percolation - ultrasound), yielding a full-spectrum extract formulated into dietary supplements. Hemp leaves were used to develop two herbal tea blends, while seed-derived ingredients were incorporated into protein- and fiber-enriched bakery products, including

muffins, savory crackers, gluten-free pasta, and buns.
The developed products exhibit improved nutritional quality and a high level of consumer acceptability, with sensory scores indicating strong preference and highlighting their potential for industrial-scale application.
The project also delivers applications in animal nutrition through two innovative feed formulations based on hemp seed meal, converting an industrial by-product into a high-value feed resource while contributing to waste reduction and more efficient use of raw materials.
Additionally, the project aims to put forward a legislative proposal for the amendment and/or refinement of the legal framework governing Cannabis sativa, based on updated scientific evidence, to establish clear criteria for distinguishing hemp intended for food use.
Through this integrated approach, the project aligns with European bioeconomy and sustainable food system priorities, contributing to the promotion of responsible diets, strengthening food security, and improving resource efficiency within a framework focused on sustainability and innovation.

Research and Development Station for Potato Targu Secuiesc

RO.324.	
Title EN	ROMANIAN POTATO VARIETY: ***NEMIRA***
Authors	Anca – Mihaela BACIU, Luiza MIKE
Institution	RESEARCH AND DEVELOPMENT STATION FOR POTATO TARGU SECUIESC
Patent	00723 / 12.12.2023
Description	Potato variety obtained by sexual hybridization between *Almera x Victoria*, followed by individual clonal selection. The plant has medium height, stem-like foliage structure and erect habit. The flower corolla is small in size and shows a faint intensity of anthocyanin coloration on the inner side. The tubercle is oval in shape and has medium eye depth. The color of the shell is yellow and that of the flesh medium yellow. It belongs to the group of semi-hardy varieties with an average yield of 42.5 t / ha, good culinary quality, classifying it in quality group B. Resistant to cyst nematodes, black worm and virus diseases.

RO.325.	
Title EN	ROMANIAN POTATO VARIETY: ***SECUIANA***
Authors	Anca – Mihaela BACIU, Luiza MIKE
Institution	RESEARCH AND DEVELOPMENT STATION FOR POTATO TARGU SECUIESC
Patent	00722 / 12.12.2023
Description	Potato variety obtained by sexual hybridization between *Collete x Laura*, followed by individual clonal selection. The plant is tall, has stem-like foliage structure and erect habit. The flower corolla is large in size and shows medium intensity of anthocyanin coloration on the inner face. The tubercle is short-oval in shape and the eye depth is shallow. The color of the skin is medium red and that of the flesh medium yellow. It belongs to the group of semi-early varieties with an average yield of 38 t / ha, good culinary quality, classifying it in quality group B. Resistant to cyst nematodes, black worm and virus diseases.

Vegetable Research and Development Station, Bacău

RO.326.	
Title EN	**Exploiting Vegetable Biodiversity as a Response to Climate-Change Pressure** ADER 6.3.6
Authors	Silvica Ambăruș, Minerva Heintz, Elena Barcanu, Petre Marian Brezeanu, Tina Cristea, Andreea Antal – Tremurici, Mariana Calara, Dan Ioan Avasiloaiei, Alin Iosob, Claudia Bălăiță, Carmina Benchea, Creola Brezeanu
Institution	**Stațiunea de Cercetare Dezvoltare pentru Legumicultură Bacău**
Patent	
Description	The project addresses the urgent need to develop vegetable varieties capable of maintaining productivity and quality under increasingly variable environmental conditions. The project aims to create new Romanian vegetable varieties that preserve valuable traditional traits—especially flavor and aroma—while accumulating genes associated with tolerance to thermal and hydric stress. A key strength of the initiative is its collaborative structure, bringing together three Romanian research entities with complementary expertise in vegetable science. This partnership enables the consolidation of germplasm resources, coordinated evaluation of genetic diversity, and the efficient advancement of elite genotypes through intensive breeding pipelines. The project also places strong emphasis on the active participation of PhD students (eight), who contribute to germplasm characterization, field experimentation, stress-tolerance screening, and the development of improved breeding materials. Their involvement strengthens the scientific capacity of the consortium and supports the training of a new generation of specialists in climate-smart vegetable breeding. The outcomes include: six genetically stabilized lines, and parental forms adapted to climate variability; and enhancing Romania's long-term capacity to safeguard and utilize its vegetable biodiversity.

Plant Genetic Resources Bank „Mihai Cristea” Suceava

RO.327.	
Title EN	***Studies on the sustainability of medicinal and aromatic plant species for in vitro conservation using micro propagation techniques***
Authors	*Alina Tanasă, Diana Batîr Rusu*
Institution	***Plant Genetic Resources Bank “Mihai Cristea” Suceava***
Description	Currently, biodiversity conservation is a major issue at the national level, as the loss of natural habitats and human impact have led to the genetic erosion of many species of wild flora. Today, more than ever, we have the responsability to discover new appropriate cultivation technologies, namely new micropropagation techniques, that will help save as many species as possible. This research focuses on gathering information regarding the *in vitro* behaviour of these species and on identifying an effective technology for rapid micro propagation, given their importance for medicinal or ornamental purposes. The objective of this study is the *ex situ* conservation of the species *Ocimum basilicum, Melissa officinalis* and *Origanum vulgare* by introducing them into *in vitro* culture, under controlled artificial conditions and studying their morphogenetic response to culture media with different compositions, in order to establish and identify a suitable micropropagation technique and isolating potentially valuable genotypes. Research highlights the importance of using the Murashige-Skoog culture medium and specific additives, as well as maintaining the cultures under a photoperiod of 16 hours of light and 8 hours of darkness, with a light intensity of 1500 lx and a temperature of 22°C ± 1°C as optimal conditions for the initiation, multiplication and preservation of cultures. Both growing media (M BA, M kin) are recommended for supporting the development of *Ocimum* and *Melissa* plantlets, enabling them to adapt quickly and effectively.

RO.328.

Title EN ***Phenotypic diversity of common bean germplasm (Phaseolus vulgaris* L.*), a potential crop for ensuring food security***

Authors *Diana Batîr Rusu, Margareta Naie, Constantin Lungoci*

Institution ***Plant Genetic Resources Bank "Mihai Cristea" Suceava Agricultural Research and Development Station Secuieni Neamț***
Ion Ionescu de la Brad" Iași, University of Life Sciences

Description

Bean crop is of great economic interest, being among the most used grain legumes in human nutrition. Also, it can use like organic crop, with great ecological plasticity, cultivated from the plains to high altitudes, also being a good precursor for other crops, leaving the soil rich in nitrogen. Therefore, we must give priority to the phenotypic characterization of local bean germplasm in order to provide breeders with valuable genetic sources, useful in creating of productive advanced cultivars, resistant to adverse environmental factors, to ensure food security.

The objective of this study is to evaluate variability of morpho-physiological and agronomic traits of some common bean landraces (*Phaseolus vulgaris* L.), well adapted to pedoclimatic conditions from different regions sites of the country, conditioned by the genetic factors of the species. All these local landraces are collected from local farmers, who prefer and grow them in their gardens due to the multiple uses in food and the adaptation to biotic and abiotic stress factors, in the context of current climate changes.

Morpho-physiological and agronomic traits are evaluated for 122 bean local varieties during the growing season 3 years in a row according to *Phaseolus vulgaris* descriptors edited by ECPGR. All the local bean varieties investigated showed high variability, representing potentially valuable genetic resources for breeding programs.

The results of this study represent the starting point from which the genetic diversity of our collection was assessed, thereby making it possible to optimize new strategies for planning future breeding programs to identify specific traits useful in the environment.

Regional Institute of Oncology Iasi, Romania

RO.329.	
Title EN	**Enhancing and Strengthening the Excellence in Interdisciplinary Biomedical Research at TRANSCEND (ESEI-BioMed)**
Authors	Brindusa DRAGOI, Eugen CARASEVICI, Radu ILIESCU, Rares-Ionut STIUFIUC
Institution	**Nanotechnology Laboratory, Regional Institute of Oncology, 2-4 General Henri Mathias Berthelot, 700483 Iasi, Romania**
Description	**-** Nanomedicine, which integrates nanomaterials and nanoparticles with medical science and operates at the nanoscale, offers promising solutions for cancer, whose incidence and mortality have increased in recent years, particularly among individuals under 65. It is a multidisciplinary and rapidly evolving field, with several nanopharmaceuticals already in clinics. ESEI-BioMed, implemented within TRANSCEND at the Regional Institute of Oncology Iasi (IRO) since 2021, aims to unlock research potential and establish a visible nanomedicine oncology hub within the European Research Area. It remains the only ERA-Chair project awarded to a university hospital or medical university in Romania, giving it a pioneering role. Its main outcomes include establishing of a NanoTechnology Laboratory (NTL) and a Technology Transfer Office. The research component focuses on development of (i) stimuli-responsive liposomes for drug delivery and imaging, (ii) magnetic nanoparticles for hyperthermia and Imaging, (iii) layered double hydroxides for photodynamic therapy and imaging, and (iv) Raman/SERS-based biomarker detection in biological fluids. Results have been disseminated through ISI-ranked publications, patent application, as well as conference presentations (invited, oral, flash, poster). The project also strengthens (inter-)national collaborations through memoranda of agreement, project consortia, and independent research partnerships. The awareness of the society on nanomedicine in oncology and its potential to improve diagnostic precision and therapy are achieved by media communication, workshops, round tables, newsletters,

open days, etc. Taken together, institutional reform, collaboration, and scientific output have contributed to positioning the NTL at IRO as an emerging contributor to European nanomedicine research.

Keywords: nanomedicine, drug delivery, contrast agents, liquid biopsy, cancer.

Acknowledgement. This work was supported by the H2020–ERA-Chair project (GA No. 952390/2020) and by the UEFISCDI through the project PN-III-P3-3.6-H2020-2020 (no 35/2021)

RO.330.

Title EN

Exploring pH-Sensitive Liposomes for Controlled Delivery of Anticancer Drugs

Authors

Răzvan GHIARASIM, Nicoleta-Catalina BASOC, Daniela-VLAD, Lilia ANDRONACHE, Dan LÎSÎI, Ecaterina MAZUR, Sergiu COJOCARI, Cristina CIOBANU, Brîndușa DRĂGOI1

Institution

Nanotechnology Laboratory, Regional Institute of Oncology, 2-4 General Henri Mathias Berthelot, 700483 Iasi, Romania

Description

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One of the criteria for the eradication of cancer cells is achieving sufficient cytoplasmic levels of anticancer drugs. The acidic pH of tumour endosomes can be exploited to enhance intracellular drug delivery. Thus, pH sensitivity in liposome design has been investigated lately to improve cellular uptake and pharmacokinetic properties. The aim of the project "Optimization of Process and Formulation Variables in the Design of pH-Sensitive Liposomes for Anticancer Drug Delivery" (OncoSensLip) is to explore relationships between formulation and process variables, pH responsiveness, and the broader applicability of such systems in oncological contexts where local pH variations are relevant. To achieve these objectives, a structured experimental plan is being used, including optimization of lipid composition using different phospholipids and investigation of preparation methods, such as thin-film hydration and microfluidics. Formulations will be characterized in terms of particle size, stability, encapsulation efficiency, drug loading capacity, pH-triggered

release, and in vitro biological activity, and evaluated on normal and tumour cell lines. These studies aim to generate insights into liposome design with strong potential for scalable production, thus addressing the need for innovation in cancer therapy.
Keywords: liposomes, pH sensitivity, microfluidics, thin film hydration, drug delivery, cancer.

Acknowledgement. This work was supported by the H2020 ERA-Chair project (GA No. 952390/2020) and by the UEFISCDI through the project PN-IV-PCB-RO-MD-2024-0363 (no 61PCBROMD/2025).

S.P.E.E.H. HIDROELECTRICA S.A.

RO.331.	
Title EN	**Device for Determining Optimal Preload of Bearings with Shape Memory Alloy Modules**
Authors	Andrei ZAMĂ[1], Viorel PALEU[2]
Institution	[1]**S.P.E.E.H. HIDROELECTRICA S.A. and** [2]**"Gheorghe Asachi" Technical University of Iasi**
Patent no.	Patent application No. A/ 00786/ 13.12. 2024.
Description EN	The Patent application describes a device for testing preloaded bearing assemblies using Shape Memory Alloys modules. The aim of the device is to determine and confirm the optimum preload required in order to ensure ideal operating parameters for bearings used in multiple applications. To determine the optimum bearing preload, an active preload method is employed, by the means of Shape Memory Alloys modules. The modules come in the form of disc springs, fabricated from an Fe-28 Mn-6 Si-5 Cr alloy. Applications: improving the rotational precision of machine tool spindles, automotive gearboxes & differentials, electric motor bearing assemblies, reducing thermal equilibrium time in CNC machining centers, actuators and robotics, aerospace industry etc.

AUMOVIO Autonomous Mobility Romania SRL

RO.332.	
Title EN	**SAFETY CONTROL METHOD AND SYSTEM**
Authors	VELICU IOANA-LAURA, BURCA CRISTIAN, BODEA DANIEL-CONSTANTIN
Institution	AUMOVIO Autonomous Mobility Romania SRL
Patent no.	EP4687128A1 / Patent application No. EP24465553A
Description EN	This invention concerns a safety control method and system for autonomous vehicles that reduces SOTIF-induced false positives by assessing the plausibility of other traffic participants' behavior using time-stamped mobility data. Consecutive datasets (e.g., position, velocity, acceleration with known standard deviations) are received at a predefined transmission frequency. The method first verifies the transmission frequency, then constructs a confidence interval for a current dataset and extends it using the second attribute and the known communication cycle. On the next cycle, it computes a subsequent confidence interval from the new dataset and compares the two intervals: overlap ⇒ plausible, no overlap ⇒ implausible event. This logic can be applied along 2D/3D Cartesian axes and generalized to different attribute combinations. A corresponding safety control module (memory, interfaces, processor) implements these steps in real time, enabling differentiation between plausible and implausible behaviors to prevent unnecessary evasive actions, improve safety and comfort, and support silent testing and broader use cases (R&D validation, traffic monitoring, security systems, UAVs, industrial automation, agriculture). Optional functions include state recognition and activation/control of vehicle functions upon implausibility detection. By formalizing plausibility via confidence interval overlap over successive cycles, the invention delivers a practical, lightweight mechanism to enhance the reliability and robustness of autonomous driving without relying on fault conditions, directly targeting SOTIF performance limitations.

RO.333.	
Title EN	**Steerable wheel motor with large steering angle**
Authors	Alexanndru Mihalache, Alexandru Maftei, Andrei Stanicel, Hans-Jorg Feigel, Dragos Luca
Institution	AUMOVIO Technologies Romania SRL
Patent no.	DE102023205697A1 / Patent application No. /DE102023205697.6A
Description EN	The present invention introduces a groundbreaking direct drive, steerable wheel motor enabling large steering angles for motor vehicles, addressing limitations of conventional wheel hub motors. Wheel motors integrate the drive system into the wheel or hub, providing high efficiency, simplified regenerative braking, and straightforward scalability to two- or four-wheel drive configurations. Despite their compactness, traditional designs often face challenges with bulky steering mechanisms, limited steering angles, asymmetrical operation, and integration complexity. This invention advances the concept by utilizing a steering actuator seamlessly integrated into the direct drive system. Unlike prior designs that position the actuator above the wheel or incorporate cumbersome gear modules, this solution minimizes axial and horizontal bulk, eliminating the need for traditional bulky control arms or trailing arms. By shedding mechanical redundancies such as steering rods and drive shafts, the mechanism achieves superior steering flexibility, offering symmetrical steering angles conducive to advanced maneuverability, including tight turns and crab movements. The design enhances universal applicability by optimizing structural compactness, simplifying attachment points to the vehicle body, and ensuring compatibility across diverse vehicle platforms. Additionally, it solves disc brake integration challenges, enabling optimal steering functionality without compromising braking performance. Ideal for modern automotive applications such as electric vehicles, this steerable wheel motor combines high steering capability, efficient power transmission, and reduced complexity. It provides unprecedented freedom in vehicle design, enabling innovative configurations and improved performance for next-generation mobility solutions.

DRUGON INTERNATIONAL SRL

RO.334.	
Title EN	Enhancement of cutting tools surfaces for dry/wet machining of wood by hard coatings deposition
Authors	C. P. Dragomir[1], E. Grigore[2], D. M. Vranceanu[1], F. Baiasu[2], M. Gherendi[2], M. Mocanu[2]
Institution	[1]DRUGON INTERNATIONAL SRL [2]National Institute for Laser, Plasma & Radiation Physics
Patent no.	95PED/2025-DURUZ – research project
Description EN	Dry machining of wood or wooden furniture is highly challenging due to high-speed operations and the composite-like nature of wood, which contains fibers and knots. These factors cause mechanical shocks and tool overheating, leading to surface damage and tool failure. This project aims to enhance the durability and performance of cutting tools used in the wood industry by developing a duplex surface treatment. The approach involves applying TaN and (Ta,Al)N thin film coatings (2–10 µm thick) on tools that have undergone plasma nitriding. These coatings will be deposited using HiPIMS (High Power Impulse Magnetron Sputtering). After optimizing the process, the treated tools will be tested under real working conditions, and results will be compared to those from uncoated tools to evaluate performance improvements.

AITEH SRL

RO.335.	
Title EN	AITEH BizInMotion: The Future Business Operating System in the Age of Decentralized AI
Authors	*OLARIU, Eduard Iuliu; BIȚU, Ștefania - Andreea*
Institution	***AITEH SRL***
Patent no.	-
Description EN	In the current landscape of enterprise digital transformation, traditional CRM and ERP architectures are encountering a critical bottleneck: the inherent inability of centralized, "one-size-fits-all" artificial intelligence to capture the idiosyncratic nuances of individual organizational realities. **BizInMotion** introduces a transformative paradigm shift by deploying a **Decentralized Business Operating System** grounded in contextual intelligence. The invention proposes an integrated operating layer that unifies data, workflows, and decision-making processes. At its core, the system utilizes a *Contextual Data Layer* and a proprietary *AI Autopilot*—a decision engine capable of precise "decision orchestration." Unlike standard models that rely on generic patterns, BizInMotion is organization-trained, ensuring that the computational intelligence is fundamentally aligned with specific strategic aspirations and human judgment. The academic and technological contribution of this project addresses the accelerating tension between rapid AI proliferation and the need for data sovereignty. By moving from a monolithic, externalized intelligence to a localized, organic architecture, BizInMotion fragments information silos and converts reactive processes into proactive, harmonized flows. Ultimately, BizInMotion posits that the future of business does not belong to a single universal intelligence, but to a distributed network of millions of contextual intelligences. This solution redefines operational efficiency by offering a sustainable strategic advantage through an architecture that augments, rather than replaces, human agency in the age of decentralized AI.

A BETTER LIFE SOLUTIONS

RO.336.	
Title EN	**iSENTINEL TIMER**
Authors	Mircea MANOLESCU
Institution	A BETTER LIFE SOLUTIONS
Patent no.	Patent application No. A.003732020
Description EN	iSentinel® TIMER is an advanced seismic anticipation and countdown solution created to turn a few critical seconds into meaningful protection. When an earthquake begins, the system identifies the first seismic signal and, after validating it locally, starts a clear visual countdown showing the remaining time before the destructive shaking reaches the protected site. This simple and powerful feature changes the way people and systems respond to seismic risk. Instead of receiving only a generic alert, users see a real-time countdown that helps them understand immediately that action must start now. At the same time, iSentinel® TIMER can automatically activate predefined protection measures from the very first second after confirmation of the seismic event. These actions may include shutting off gas, isolating electricity, protecting vulnerable equipment, unlocking doors, stopping sensitive processes, and launching warning messages or voice instructions. The value of the invention lies not only in warning, but in converting warning into action. It offers a practical bridge between seismic detection and real protection, reducing human delay at the exact moment when every second matters. For schools, office buildings, industrial facilities, logistics platforms, and other critical objectives, this means better protection of people, equipment, operations, and infrastructure. iSentinel® TIMER helps reduce foreseeable and controllable earthquake consequences, especially those related to non-structural damage, fire, explosions, and operational disruption. By combining intuitive communication with automatic response, it improves safety, strengthens resilience, and supports faster recovery after a major seismic event.

SYNC TECHNOLOGIES SRL

RO.337.	
Title EN	**ROQA AI — A Dual-Agent AI Platform for Enterprise RPA Quality Assurance and Operations**
Authors	**Mihai Cerbu, Sorin Chirita**
Institution	**ROQA AI**
Description EN	The present innovative solution introduces ROQA AI — a dual-agent AI platform purpose-built for UiPath Orchestrator environments, combining two complementary intelligent services: ROQA AriA, a conversational AI agent that provides natural-language access to the entire Orchestrator via Microsoft Teams, Slack, or Web API; and ROQA MonA, an intelligent monitoring solution that establishes data-driven performance baselines, detects anomalies in real time, and performs autonomous remedial actions such as restarts and targeted escalations. Both agents operate under read-only OAuth 2.0 scopes, with full credential isolation and per-response data provenance. Together, AriA and MonA transform RPA operations from reactive firefighting into proactive, intelligence-driven management — reducing downtime, standardizing code quality, and uncovering optimization opportunities that were previously obscured across tenants. The platform is self-service: users can connect an Orchestrator instance within minutes and begin deriving value without the need for consulting engagements or formal project planning.

CampTek.ai

RO.338.	
Title EN	**Eli — An AI Coworker for Collaborative Intelligence in Healthcare Revenue Cycle Management**
Authors	**Mihai Cerbu, Peter Camp, Joyce Zhang, Amy Wooldridge**
Institution	**CampTek.ai**
Description EN	The present innovative work introduces Eli, an AI coworker developed by CampTek.ai that integrates Robotic Process Automation, Machine Learning, and Generative AI into a unified collaborative system for Healthcare Revenue Cycle Management (RCM). Eli addresses prior authorization, claim denial management, claim status tracking, post-visit encounter adjustments, and HOPD coding, executing workflows while continuously learning from 835 claims data, payer plan updates, and real-world production outcomes. Rather than functioning as a siloed automation tool, Eli is designed as a true digital coworker: it captures and operationalizes organizational knowledge from both human expertise and data, integrates natively with major EHR platforms such as Epic, Cerner, MEDITECH, eClinicalWorks, and Siemens Healthineers, as well as payer ecosystems, and delivers its capabilities through agentic bots, dashboards, conversational interfaces, or direct API integrations. The result is a measurable recovery of lost top-line revenue, a reduction in clinician and administrative burden, and a robust, future-proof strategy for healthcare providers operating in an increasingly AI-driven payer landscape.

Pop Service Electronic HQ SRL

RO.339.	
Title EN	The use of bionanotechnologies and alternative systems in the development of innovative food supplements combined with plasma engine technology
Authors	Petre SĂVESCU, Adrian POP, Nicolae NĂCIOIU
Institution	POP SERVICE ELECTRONIC HQ SRL
Patent no.	Project PN-III-P1-1.2-PCCDI-2017-0566 (Contr. 9 PCCDI/2018-2021. Plicul cu Idei OSIM Nr.301450/17.03.2026
Description EN	The main stages of cellular respiration are described, the process by which macronutrients (carbohydrates, fats and proteins) are broken down to generate energy in the form of ATP. This process takes place mainly inside our cells, both in the cytosol and in the mitochondria. Mixed field loading of bio-membranes—used in Supercritical Extraction Systems with applications in the food industry (led to a 22% increase in yield) Valid results were recorded at lower pressures (200-450 bar) and temperatures of 30-32oC. Tests continue in several types of dynamic SFE systems, in which the extraction efficiency of the supercritical fluid is improved by a continuous agitation process and the influence of the plasmatic field of carbon dioxide (used as a supercritical fluid) combined with that of natural ion-exchange membranes. Main Metabolic Pathways: Nutrient Decomposition: Acetyl-CoA Formation (in mitochondria): TCA Cycle / Krebs Cycle (in mitochondria): Electron Transport Chain and Oxidative Phosphorylation (on the inner mitochondrial membrane): Energy Production: Use of the plasma field to protect food against microbial attack The field is generated by combined field generators (plasma, magnetic), activated using an electrolysis circuit which depending on the electrolyte in the bath and the voltage at the electrode terminals) produces nanostructured gas that liquefies at normal temperature. This fluid is placed at the end of the coils in a nano-cuprated tube with several right angles (to capitalize on the Garnier effect cumulatively). The systems generate and maintain a mixed field that contributes to the preservation of food products without the use of preservatives **.**

CORNELIUGROUP Association

RO.340.	
Title EN	**Architects of Innovation: Empowering Global Creativity**
Authors	Corneliu BIRTOK BANEASA, Erika KOLLMANN
Institution	**INVENTCOR Academy Deva, Romania**
Description EN	Educational program INVENTCOR Academy, under the aegis of the Association CORNELIUGROUP research-innovation, is an elite hub dedicated to young visionaries. We offer not only education, but a complete ecosystem of mentoring, prototyping and international representation. PILLARS: • EXPERIENCE: Over 18 years in the field of inventions and innovation. • ACHIEVEMENTS: Over 3000 international awards obtained on 3 continents. • MISSION: Transforming the creative potential of students into viable awarded technical solutions. INVENTCOR Academy focuses on tangible results: • Personalized Mentoring: Step-by-step guidance from concept to functional prototype. • Intellectual Property: Support in understanding the patenting process & protecting ideas. • Global Exposure: Access to the most prestigious invention salons in the world. • Networking: Direct connection between young inventors, academia and investors.

RO.341.	
Title EN	**GEARBOX FOR ELECTRIC CAR**
Authors	ROMEO CĂTĂLINOIU, SORIN AUREL RAȚIU, IMRE ZSOLT MIKLOS
Institution	**Coramex by Service Automobile SA, Politehnica University of Timisoara, Faculty of Engineering Hunedoara, Romania**
	RO134406 / 30.03.2023
Description EN	The invention is an application of Patent RO134406 dated 30.03.2023 and refers to a gearbox intended to ensure the transmission of electrically powered automobiles with the aim of reducing energy consumption and increasing energy autonomy. The gearbox is characterized by the fact that it continuously varies the value of the transmission ratio, by varying the revolutions of the two electric motors, which can work individually or in tandem. The gearbox is a mechanical reducer characterized by the fact that it provides assistance when pedaling through an electric motor, assistance that can be achieved in three modes: low, medium and high, self-adaptive depending on the value of the load torque that must be overcome.

Justin Capra Association

RO.342.	
Title EN	**Selenar Shelter "AJC"**
Authors	Velcea Marian, Grecu Vasile, Ionita Ctin, Livadariu Oana, Velcea Alexandru
Institution	**Association Justin CAPRA**
Description EN	ProJect **Selenar Shelter "AJC"** The Selenar Shelter is a project developed by the "Justin CAPRA Inventor's Association"(AJC). The Selenar Shelter "Justin Capra Inventor's Association" is a spatial structure made of frames and beams made of multi-laminated plywood boards and joined to form a honeycomb composition. The honeycomb thus created ensures thermal insulation, thermal energy accumulation, electromagnetic reflection, and aesthetic skin support. Geometric and functional optimizations offer maximum interior space for minimal consumption of materials and construction labor as well as minimal maintenance costs. The exterior geometric shape and specific structure ensure good aerodynamic and mechanical resistance, as well as reduced electromagnetic visibility. Connected conductive skins reduce the effect of exposure to electromagnetic pollution. The location of the entire construction above a basement or an underground shelter is recommended. It is intended to identify business partners (to provide assembly grouts or more contribution).

RO.343.	
Title EN	**Walipini Greenhouse "AJC"**
Authors	Velcea Marian, Grecu Vasile, Deacu Marian, Tutunaru Ctin-Romulus, Nicolae Valentina, Velcea Ion Alexandru
Institution	**Association Justin CAPRA**
Description EN	ProJect **Walipini Greenhouse "AJC"** The Walipini Greenhouse "AJC" is a Project developed by the Justin CAPRA Inventors Association (AJC) for family use. The Walipini Greenhouse is also known as a "semi-buried greenhouse", characterized by its orientation to the South - unlike the traditional orientation. It is an underground or semi-underground structure that uses the

thermal mass of the earth to provide natural heating and insulation, thus allowing the cultivation of plants throughout the year in cold climate areas. The term comes from the Aymara language (Bolivia) and translates as “place of warmth”, being originally designed for the mountainous areas of South America.The Sera Walipini “AJC” project defines a spatial structure made up of pillars, beams, frames, slabs and plates made of insulating or transparent cellular materials, which houses a solar energy capture system through versatile panels placed inside on the well-insulated North wall, which stores thermal energy in the thermal agent (water and glycol mixture) which it recirculates during the night both through the panels used as radiators and through the heating grids incorporated into the ground. The installation is managed by a climate controller powered by its own photovoltaic source. Geometric and functional optimizations offer maximum interior space for a minimum consumption of materials and construction labor as well as minimal maintenance costs. The external geometric shape and specific structure ensure good aerodynamic and mechanical resistance. A reflective interior curtain reduces energy losses through radiation.
It is intended to identify business partners to develop the Project.

RO.344.	
Title EN	**Scaner SU JOK 1K**
Authors	Velcea Marian, Scarlat Marlen, Visalom Gheorghe,Nicolae Florina-Valentina, Curta Ioan, Caracas Eugen, Ene Ciprian, Mandrea Lucian, Moldovan Ion Corneliu,Velcea Ion Alexandru, Hideg Catalin, Chetan Mihai, Plotog Ioan
Institution	**Association Justin CAPRA**
Description EN	Project **Scaner SU JOK 1K** The device allows for the instantaneous assessment of the relative energy levels on the 12 acupuncture meridians of a human subject, in order to quickly identify the health status of the energetic (etheric) body. The tests highlight the patient's response to the applied procedures, by comparing the values measured initially with those measured after their performance. They show the appropriateness of the applied treatment and identify possible energetic causes that cause

disturbances in the patient's homeostasis. The electronic device is based on the "Su-Jok" ("Palm-Sole") theory developed by academician Park Jae Woo, a modern theory of interpreting ancient acupuncture techniques through current scientific concepts. The device highlights the relative value (%) of an electrical quantity measured at specific points of each meridian (Voll) located on the first phalanx of the index and middle fingers, both on the front of the palm and on its back (on both hands) and interprets it statistically through the color in which it displays it both analogically and digitally. The accuracy of the measurements is 1% and the calibration of the device is automatic. The use is simple and involves going through all the acupuncture meridians, by choosing the specific contact point of each meridian and touching it with the specific mobile electrode, while the reference electrode remains fixed on the finger or arm. The measured values are memorized/noted and can be organized in a specific matrix for the interpretation of the Yn-Yang ratio and the circulation of Qi.

Asociatia Natura ca Profesor

RO.345.	
Title EN	***SYSTEM AND METHOD FOR UNDERWATER PROPULSION THROUGH ELASTIC-INERTIAL TRANSFORMATION***
Authors	*BOGDAN Adrian*
Institution	***Asociația Natura ca Profesor***
	CBI a 2024 00488/26-08-2024, WO2026049639
Description EN	The invention relates to a system and method for underwater propulsion providing the locomotion of a vehicle underwater or at its surface, consisting of a driving motor, a longitudinal assembly and a control and command unit, wherein the motor is secured to the vehicle and connected to the longitudinal assembly by means of an axle provided with a bearing, the longitudinal assembly being made up from an oscillating telescopic rod rigidly secured to 90 degrees at an end to the axle of the motor, this continuing with an elastic longitudinal element, made up from bending deformable elements, ending up with a blade having a deformable membrane secured to an extensible frame, the command and control unit being made up from several communication and logic operation modules

Asociația Echipa de Urgențe Timișoara

RO.346.	
Title EN	**Digital Youth Wellness**
Authors	Burbulea William, Muntean Theodor, Ayata Kutay, Mârza Adina, Șutoi Dumitru, Williams Carmen, Popa Daian, Purja Adrian, Cîndrea Alexandru, Mederle Ovidiu
Institution	Asociația Echipa de Urgențe Timișoara
Description EN	"Digital Youth Wellness" was an Erasmus+ Youth Exchange co-funded by the European Union. During the 8 days of the project, 36 participants (including group leaders) from Romania, Bulgaria, Czechia, Hungary, and North Macedonia came together to gain the knowledge, skills, and motivation to use digital tools and platforms more effectively while also maintaining a healthy relationship with technology. The project focused on improving digital literacy, understanding the responsible use of artificial intelligence, strengthening cybersafety awareness, and helping young people better navigate digital environments related to employment, entrepreneurship, and civic participation. Through non-formal education activities such as workshops, role-playing sessions, debates, and practical exercises, participants explored how digitalization influences modern society and how they can benefit from it in their personal and professional lives. Another key element of the project was promoting digital balance and well-being. Participants discussed the potential negative effects of excessive technology use on mental, physical, and social health and explored strategies to develop healthier digital habits. By the end of the exchange, participants had not only strengthened their digital competencies but also built intercultural connections and gained the confidence to promote responsible technology use within their local communities

ROSMAR H Inventor Center Association

RO.347.	
Title EN	**VEHICLE PROVIDED WITH A MOVEMENT SYSTEM AND THE METHOD OF MOVEMENT**
Authors	ADRIAN ROSCA
Institution	**ROSMARH INVENTOR CENTER ASSOCIATION** RO132244
Description EN	The invention relates to a vehicle provided with a movement system and a method of movement , so that the vehicle has the possibility of moving after it has initiali been stuck/aground on a covred surface , for example , with mud ,snow , ice , sand or in case has to climb or to get douwn from a surface with a leaning of more then 45°.ROSMAR H is a groundbreaking zero-emission vehicle backed by higly advanced compressed air technology and a patented moving system ,100% green vehicle , ROSMAR H GREEN POWER car will break the car acceleration world record of 5,5 g.This invention will have a major impact in saving human lives and a importantcontribution of innovation and enginieering for conserving our natural environmentthe , the new prototypecar with ZERO-EMMISION is in testing right now!

Technological High School of Targu Ocna

RO.348.	
Title EN	**Wheat flour bread with rosehip powder addition and its preparation method**
Authors	Nicoleta VARTOLOMEI, Maria TURTOI
Institution	Technological High School of Targu Ocna „Dunărea de Jos” Universitaty of Galați
Patent	RO133910A2
Description EN	The invention relates to bread made from wheat flour with the addition of rosehip powder and to the method of obtaining it. The product, according to the invention, is obtained from wheat flour type 550, yeast 1.8%, salt 1.5%, rosehip powder 0.5–5.0% and water depending on the hydration capacity of the flour, quantities of the ingredients being expressed in mass percentages compared to the amount of flour. The process, according to the invention, consists of mixing the ingredients, kneading and fermentation with re-kneading under known conditions, followed by successive operations of division, shaping, final leavening, baking, cooling, packaging and storage for delivery. The patent application is registered with no. A/00697/2018 with deposit date 19.09.2018 and regulatory national deposit with the number "a 2018 00697" and patent no (RO133910A2) date 27.02.2006.

RO.349.	
Title EN	**Waste sustainability in a new textile concept and 3D technology**
Authors	Andrei Pîrvu, Nicoleta Vartolomei, Simina Tănasă
Institution	**Technological High School of Targu Ocna**
Description EN	The main problem comes when the products leave the wardrobe and end up, most of the time, in the landfills. Sustainability in the fashion industry is the commitment to practices that minimize the negative impact on the environment and society. It means using recycled or sustainable materials, reducing production and waste, ethical working conditions and social responsibility, all for the benefit of future generations.”

Sustainable consumption does not, implicitly, imply giving up consumption, but rather implies a change in consumer behavior, it emphasizes the concerns regarding qualitative aspects at the expense of quantitative ones.
The aim of the research is the recycling of textile materials giving them a new life and their customization with the help of a 3D printer using a recycled pet filament with the motivation to adopt more circular practices all with the aim of reducing the impact on the environment.
This type of materials are in an overwhelming proportion, over 90%, reusable in the same form, or as raw material for other clothing elements. Through the 3D printing technique, they can be easily transformed into ideal elements for future clothing elements, depending on the nature of the material and its degree of use.

Theoretical High School “Spiru Haret” Moinești

RO.350.	
Title EN	Lumi — AI-powered wearable assistant for the visually impaired and people with reduced autonomy
Authors	Vrînceanu Rareș-Vladimir, Ciucă Dan-Alexandru,Vandra Eduard-Gabriel, Munteanu Pavel
Institution	**Theoretical High School “Spiru Haret” Moinești**
Description EN	Lumi is a low-cost, wearable AI companion that gives blind, visually impaired and elderly users instant, hands-free access to information about the world around them and to the digital tools on their phone. The device is built around a Raspberry Pi Zero 2W, equipped with a USB camera, microphone, speaker, vibration motor, fall detector and an optional fingerprint sensor for security. It pairs over Bluetooth Low Energy with a custom Android app, which routes voice commands to modern AI models (Claude, Gemini) for natural, conversational answers. The user simply speaks: "What is in front of me?", "Read this label", "How many steps did I do today?", "Where is my package?", "Translate what this person is saying", "Remind me to take my pills when I get home" — and Lumi listens, captures an image if needed, sends it to the AI, and speaks the answer back through the device. The Android app integrates with Health Connect, Open-Meteo weather, SMS-based package tracking, Google Maps/Waze navigation, geofence-based reminders, real-time two-way translation, contacts, calendar, WhatsApp, Gmail and over 25 other applications. The whole system can be assembled by a student for under 100 euro using off-the-shelf parts and 3D-printed enclosures, making advanced assistive technology — usually reserved for expensive medical devices — affordable and customizable for anyone who needs it.

National College ”Emil Racoviță

RO.351.	
Title EN	**Correlation of solar activity and ionospheric disturbances with cosmic radiation flux using an experimental device for predicting CMEs**
Authors	*Bogdan Bora*
Institution	*National College ”Emil Racoviță”*
Description EN	Monitoring the interaction between solar activity and cosmic rays typically relies on space-based instruments or large, professionally operated ground networks, limiting accessibility for small-scale experimental studies. In this work, we present a low cost approach to studying solar modulation of cosmic rays and its atmospheric signatures. A custom muon detector based on a plastic scintillator and silicon photomultiplier (SiPM), controlled by an Arduino board, was developed to determine ground level cosmic ray leves. In parallel, ionospheric Total Electron Content (TEC) was measured using a dual-frequency GNSS receiver. The muon flux was analyzed alongside solar activity using correlation, lag, and spectral methods, and directly compared with TEC variability. The results demonstrate a statistically significant anti-correlation between muon flux and solar activity, while TEC exhibits stronger short-term sensitivity. The zenithal angle of the device was changed in order filter out highly energetic muons and there was found a theresold on which solar modulation becomes weak for specific cosmic rays energy. Although the device is relatively inexpensive, the modeled data collected can predict a powerful solar storm, a CME. There were also found interactions between highly energetic muons and the atmosphere. The combined dataset enables an altitude comparison of solar forcing and demonstrates the research potential of configurable, student built devices.

Grigore Moisil
Computer Science High School Iasi, Romania

RO.352.	
Title EN	**ECODrone**
Authors	Vlad Sofronea, Tudor Moldovanu
Institution	**Liceul de informatica "Grigore Moisil" Iasi**
Description EN	The EcoGuard proposes development of an autonomous drone based on artificial intelligence, capable of detecting, classifying, localizing, and collecting waste in dangerous or inaccessible environments, where traditional cleaning methods are inefficient or unsafe. The software component is integrated into a 3D-designed drone equipped with a camera stabilization mechanism to maintain a ground-parallel perspective, with an active intake system for collecting detected waste. Flight control is achieved using PID-based stabilization algorithms, enabling precise positioning based on detection results. The system uses an architecture derived from the YOLOv8 (You Only Look Once) model, trained on a filtered and augmented dataset adapted for detecting small and difficult objects, such as cigarette filters or fragments of transparent materials. Within this project, we focused on improving performance of YOLO-based models in scenarios involving large distances between drone and detected object. Starting from limitations of existing architectures such as YOLOv4-tiny and YOLOv8s, we developed an improved version of model by introducing an additional detection head derived from the P2 layer of the backbone, enabling higher-resolution feature extraction. We also implemented context injection and backflow mechanisms, resulting in 13% increase in small object detection performance. Compared to baseline model, results show significant improvements across multiple object categories: glass: +16%, cigarette filters: +21%, metal: +7%, cardboard: +4%, unlabeled waste: +12%. To further improve classification accuracy, we developed a novel augmentation technique called FakeMix, which introduces artificial edges into images to help model distinguish between real object boundaries and artifacts, increasing reliability, especially for small or transparent objects.

RO.353.	
Title EN	**Modular hexapod robot with variable geometry, parametrically controlled for adaptive locomotion over rough terrain**
Authors	Cernăuțeanu Cosmin-Ștefan, Grecu Constantin Rareș
Institution	**Liceul Teoretic de Informatică ”Grigore Moisil” Iași**
Description EN	Researching and exploring spaces that are difficult for humans to access is a challenge without specialized and often very expensive equipment. To address this problem, we developed a robot capable of reaching such environments, able to explore and map them. Its arachnid-inspired shape provides increased mobility and adaptability to different types of terrain. For the development of the robot, we followed fundamental steps of the engineering and programming process: we analyzed similar projects (especially other hexapod robots), developed our own strategy, designed the robot in CAD (Computer-Aided Design), built and tested initial leg prototypes, constructed the first version using CNC-cut wood and 3D-printed parts, and developed a complex code structured around processing stages and a state diagram that coordinates the robot’s tasks. The robot is still under development, and at this stage it can move consistently using different gait patterns and overcome certain obstacles. During development, we improved the structure of the legs and the electrical circuit to maximize the robot’s potential. The next stage is to implement sensor data for automatic stabilization, develop an autonomous mode to cover longer distances, and further improve the electrical assembly.

RO.354.	
Title EN	**ChromaVer – Colorimetric Sensing for Real-Time Meat freshness assessment**
Authors	Salian Shaan Ștefan, Salian Surya Silviu
Institution	**Grigore Moisil Computer Science High School**
Description EN	Traditional “best-before” dates on packaged meat are often rough estimates that do not take real storage conditions into account which can increase the risk of consuming spoiled food, posing a potential public health risk. To address this problem, we developed ChromaVer, a system designed to monitor meat freshness in real time. As meat decomposes, bacteria produce volatile compounds, primarily ammonia. Ammonia is highly water-soluble and reacts with moisture to form a basic solution, resulting in a pH increase. Our system leveraged this pH change through ‘sensors’ infused with natural bio-indicators: anthocyanins (from red cabbage) and curcumin (from turmeric). As decomposition progressed, the sensor film changed color, offering an immediate and discernible visible warning that could be accurately analyzed using a computer vision algorithm. The software is written in Python, using the OpenCV library and it analyses images captured in real-time through a webcam. The results revealed a clear and consistent relationship between the color shift of the film and the actual level of spoilage. ChromaVer offers to enhance food safety through real-time freshness monitoring. Additionally, ChromaVer aims to develop lab-made bioplastics with built-in sensors as packaging materials. Thus it also supports environmental sustainability by relying on biodegradable materials instead of petroleum-based plastics. We used professional lab equipment to develop and test the bioplastic in the "Petru Poni" Institute of Macromolecular Chemistry, with the help offered by our chemistry teacher, Mrs. Popa Lăcrămioara, Dr. Tucaliuc Alexandra (Iași University of Life Sciences), Dr. Dinu Maria Valentina and Dr. Stanciu Cristina ("Petru Poni" Institute of Macromolecular Chemistry).

Liceul Teoretic ”Comandor Alexandru Cătuneanu” Lunca Cetățuii, Iași

RO.355.	
Title EN	**Eco-Mouse MIDI**
Authors	Claudia Bălteanu, David Cristian Iordan, Ionuț Petru Sârcu
Institution	Liceul Teoretic ”Comandor Alexandru Cătuneanu”
Description EN	This project is a hybrid hardware-software system that transforms physical movement into an audio signal. The students built a functional mouse using recycled materials, integrating an optical sensor and a Bluetooth module salvaged from decommissioned electronic components. How it works: Hardware: Motion is detected by the sensor and transmitted via Bluetooth to a custom-adapted speaker (recovered from an old toy). Software: An algorithm developed in Python 3.12 monitors the cursor's coordinates on the screen in real-time. Interactivity: When the user moves the mouse, the script automatically triggers the playback of the song "Color Violet." As soon as the movement stops, the music pauses. Conclusion: This is a practical experiment in applied physics and upcycling. It demonstrates data flow control through programming and the creative reuse of electronic waste (e-waste).

RO.356.	
Title EN	**APS^2 Comandorii**
Authors	Iordan David Cristian, Negru Matei Gabriel, Duțescu Cristian, Jalbă Adrian,
Institution	Liceul Teoretic ”Comandor Alexandru Cătuneanu”
Description EN	APS2 – Archaeological Positioning System is a prototype of an innovative modular measuring system that can be used in archaeology and field research, and can be attached to a magnetometer and GPR. The system helps archaeologists identify artifacts by using modern technology in research work. How it works: The project starts from a real problem in archaeology—the difficulty of carrying out precise and well-organized measurements in the field—and proposes a practical solution currently at the prototype stage: a mobile modular frame, designed and built by us, which can support and organize the use of geophysical instruments such as a magnetometer or GPR. Although we have not yet integrated these devices, we designed the structure so that it will allow their future attachment, aiming to achieve regular scanning paths, reduce human error, and ensure more coherent data collection. In practice, we created the physical foundation of a more complex system and clearly outlined its future development direction.

RO.357.	
Title EN	**Gonio-Smart**
Authors	Olaru Eduard-Constantin, Trifași Ianis-Gabriel, Iamandi Ioana Cătălina, Iordan David Cristian, Sârbu Ionuț, Coordinator prof. Sauciuc Lavinia
Institution	Liceul Teoretic ”Comandor Alexandru Cătuneanu”,
Description EN	It is an innovative measuring tool designed to make learning geometry easier through technology. The device measures angles in real time using a precision sensor and provides instant feedback in three ways: Digital: It displays the exact value on an OLED screen. Visual: It automatically classifies the type of angle (acute, right, obtuse) using colored LEDs. Audio: It emits specific sounds for each type of angle, making it accessible to students with visual impairments.

Vasile LUPU

RO.358.	
Title	SPECIAL EXTENSION CORD FOR OUTDOOR AND INDOOR SOCKET WITH SWITCH
Authors	LUPU VASILE
Patent no.	A/00207/16.04.2026
Description	The invention SPECIAL EXTENSION CORD FOR OUTDOOR AND INDOOR SOCKET WITH SWITCH will be used in the field of electricity where there is no socket. This special extension cord connects the socket with an indoor or outdoor socket equipped with a switch and the socket of a light bulb connected to the electrical circuit. By installing this extension cord, we have the possibility of using this socket at different distances from the socket connected to the electrical circuit.

Mihai Albert VLĂDESCU

RO.359.

Title	EcoBoost HHO: Turning Lost Energy into Power
Authors	Vlădescu Mihai Albert
Institution	Prahova County Center of Excellence
Description	The proposed system is an innovative plug-and-play solution for petrol and diesel vehicles, designed to reduce fuel consumption and increase energy efficiency by recovering lost energy. It integrates several technologies into a compact unit, easy to install, without major modifications to the car. The central element is a generator connected to the braking system, which produces electricity during deceleration. The energy is stored in a small capacity battery, optimized for fast cycling. This powers a module that extracts moisture from the air through corona discharge, transforming water vapor into liquid. The collected water undergoes electrolysis, being decomposed into hydrogen and oxygen (HHO). The gas is stored in a pressurized tank, located in the trunk, designed for safety and efficiency, without the need for a refrigeration system. The system includes sensors that constantly monitor pressure and operation. HHO gas is intelligently used when the engine has high consumption, such as when starting from a standstill or at low speeds, being injected into the intake manifold to improve combustion and reduce emissions. At constant speeds, the system uses the same generator to take up a minimum amount of mechanical energy, continuing to charge the battery and produce HHO. In this way, the system creates its own energy reserve, ready for optimal use. This solution transforms energy wasted during deceleration and water vapor collected from the atmosphere into green energy, providing a real advantage for superior dynamic efficiency and increased sustainability.

Maria Sarah VLĂDESCU

RO.360.

Title **Algorithmic cities: data-driven generative urbanism**

Authors Maria Sarah VLĂDESCU

Institution Ion Mincu University of Architecture and Urban Planning, Romania

Description Algorithmic cities represent a paradigm shift in urban design, in which digital technologies redefine the city as a dynamic, data-driven system rather than a fixed, one-time designed artifact. This article examines how algorithmic and computational models are transforming the urban design process, moving from static, plan-based methodologies to performance-oriented, generative workflows. It highlights the integration of parametric design, geographic information systems (GIS), and real-time simulation tools to generate and evaluate multiple urban development scenarios, focusing on their ability to optimize mobility flows, built form density, and urban microclimate at large scales. Drawing on case studies and methodological frameworks from recent research in AI-based spatial planning, the article argues that data-driven generative urbanism supports more adaptive, resilient, and sustainable urban configurations. To ground this discussion historically, the article contrasts the rigid, geometric order of Ildefons Cerdà's Eixample grid of Barcelona and Georges-Eugène Haussmann's top-down restructuring of Paris with contemporary feedback-based algorithmic urbanism. In doing so, it situates algorithmic cities within the broader epistemological transition from rational, comprehensive planning to evidence-based, adaptive urban governance.

Paradis International College

RO.361.	
Title	AR SANDBOX
Authors	Alex Bucataru, Amalia Hutanu, Eduard Grigoruta, Ilinca Olaru, Maria Parasca, Maria Alesia Pavel, Matei Stefan Sandu, Tudor Paicu Prof: Dragos Andrei Bobu, Monica Vîntu
Description	Our invention is an interactive Augmented Reality Sandbox system that transforms the study of geography into a dynamic and immersive experience. Developed by our team, the system uses a Kinect sensor to detect the depth and shape of a sand surface in real time. The collected data is processed by a custom 3D simulation program, which generates a topographic map projected directly onto the sand. As users reshape the surface, the system instantly updates contour lines, elevation colors, and even simulates natural phenomena such as water flow. This creates a living model of Earth's surface, where mountains, valleys, rivers, and basins can be formed and explored through direct interaction. The project bridges the gap between abstract scientific concepts and tangible understanding, making geography both visible and touchable. The main application of this invention is in education, particularly in geography classes, where it can be used to explain relief formation, topographic maps, and environmental processes in an intuitive way. It promotes experiential learning by allowing students to actively explore cause-and-effect relationships. Furthermore, the system enhances engagement by transforming learning into an interactive and captivating activity. It stimulates curiosity, creativity, and critical thinking, encouraging students to discover natural phenomena on their own. By combining science, technology, and hands-on exploration, our project reflects how a “drop of science” can reveal an entire universe of knowledge.

RO.362.

Title	**ExoNeuron**
Authors	Stefan Albu
Description	Exoneuron is a system that lets you control motors using a joystick, buttons, or voice commands. It uses an Arduino, two servo motors, and a voice recognition module. In **manual mode**, a joystick moves one motor and a button controls the other. In **voice mode**, saying “one”, “two”, or “both” moves the motors. The project shows how human input can control machines and is a basic example of how technology could help control movement in the future.

RO.363.

Title	**Synthesis and testing of soap from natural oils – Healer’s Pharmacy**
Authors	11th grade students – coordinating teachers: Iulia Moisii, Andreea Cozmei
Description	The aim of the project was to test different soap recipes using a series of plant-based oils in different proportions. The synthesis was achieved through a saponification reaction between sodium hydroxide and triglycerides to produce glycerol and fatty acid salts. Our formulations consisted of mixtures of oils (coconut, olive and almond oil), enhanced with vitamin E and rose floral water added. The rose water was distilled from rose petals in our laboratory. The soap is part of the Healer’s Pharmacy project together with the previously formulated perfume, both of them having the signature rose scent.

RO.364.

Title	**WARDA Robot**
Authors	Mechabyte Robotics Team
Description	We would like to present Team Mechabyte’s robot, a participant in the international FTC competition. Warda Robot effectively meets the challenges of this season, featuring a design that is simple yet highly efficient. It is composed of four main components: • intake (Build from 4 stages. It is equipped with

Gecko wheels, Baby Mechanum wheels and a surgical tubing. The order of components can be easily changed, allowing us to make experiments with it.)

- outake (Powered by two 6000 RPM motors with a 1:1 ratio. It includes two flywheels with a combined mass of 600 grams, helping the shooter return quickly to the optimum launch speed after each shot)
- transfer (This is the mechanism that we use to pass artifacts from the intake directly into the shooter. It is an extension of the intake and it includes a servo lock to stop artifacts, preventing accidental launches.)
- climb (Uses a rotating leg powered by two high-torque servos to lift the robot. It includes a platform that lowers, tilting the robot at a 15* angle. The second robot climbs onto the lowered platform, resulting in both robots being parked at the end of the match.)

RO.365.

Title **Recycled Cardboard Furniture**

Authors Veronica Irimescu

Description

Improved Joints and Alternative Materials

We started this project with a simple question: can we build functional furniture from recycled cardboard, and can we make it better than what already exists?

We researched several existing cardboard furniture designs available online — including flat-pack armchairs and shelving units that use slotted or push-fit assembly — and we identified two areas where we believed improvements could be made: the joining method and the choice of materials.

Most existing designs rely on basic slot-and-tab connections, which can loosen over time or fail under uneven loads. We developed a modified interlocking joint system that distributes stress more evenly across the connection points, making the assembled structure more stable without adding extra material or adhesive.

At the same time, we experimented with alternative materials that could partially or fully replace standard corrugated

cardboard. We tried layered recycled paper composites, reinforced honeycomb panels sourced from packaging waste, and hybrid constructions combining cardboard with reclaimed textile scraps for added flexibility in high-stress areas.

We built several working prototypes, each using a different combination of joint design and material mix. We plan to run comparative tests to evaluate load-bearing capacity, durability, ease of assembly, and overall comfort. Our goal is to find which combination performs best for practical everyday use while keeping the entire process sustainable and low-cost.

We don't claim this is a completely original concept — cardboard furniture exists. What we bring is hands-on experimentation with better joints and smarter material choices, backed by real prototyping and testing.

RO.366.

Title **Side Quest**

Authors Albu Andreia, Nedelcu Sabina

Description Side Quest is an innovative online community dedicated to supporting high school students at Paradis in their personal development. The platform promotes both formal and informal growth through engaging, creative, and challenging activities that extend beyond conventional education. Students can join by invitation and access a structured yet adaptable environment featuring ten thematic areas such as literature, community and government, art, health and wellness, and more, hosted on the Skool platform. These themes are designed to foster exploration, critical thinking, and self-discovery. SideQuest provides interactive features like a discussion and posting space for sharing ideas and experiences, a dedicated page for courses and activities, and an integrated online meeting tool. It also includes a scouting-inspired progression and rewards system, where students earn badges for participation that can be displayed on their Paradis blazer and that grant benefits such as priority in extracurricular activities. Each week, students complete a “side quest,” a small but impactful challenge that is meant to motivate and inspire. Throughout the year, they also undertake a major personal development project, setting a

goal and creating an action plan to start a band, participate in robotics competitions, or organise social initiatives. Side Quest encourages students to take initiative, be creative, and invest in their growth, shifting from passive learning to meaningful, real-world experiences.

RO.367.

Title **Stupina Paradis/ Pharmacy in Stupina**

Authors Zofotă Monica

Description

This year, Stupina Paradis launches an innovative project: "Pharmacy in the Apiary" – a natural alternative to classic pharmaceutical products, based on the gifts of bees and medicinal plants. Our concept combines the tradition of beekeeping with modern health needs, offering natural, safe and effective products.

Within the apiary, we produce a wide range of products: pure honey, natural wax, energizing jellies, therapeutic lollipops, jars with delicious combinations of honey and plants, as well as an ointment with healing properties. Each product is carefully created, without artificial additives, preserving the nutritional and curative benefits of the ingredients.

The "Pharmacy in the Apiary" project promotes a healthy and sustainable lifestyle, utilizing natural resources in a responsible way. The innovation consists in transforming beekeeping products into accessible solutions for prevention and care, addressed to all ages.

Through this initiative, we aim to bring the power of nature closer to people and demonstrate that health can be supported through simple, authentic and effective methods.

RO.368.

Title **Techno Wizards Smart Robot**

Authors Sebastian Rosca

Description

For the 2025-2026 First Lego League Challenge competition the Techno Wizards team developed and programmed an autonomous robot to complete game tasks. The code has built in error correction algorithms.The robot has been designed to be easy to operate and switch attachements. Our team has shown great progress over the past 2 years, most recently qualifying for the national competition.

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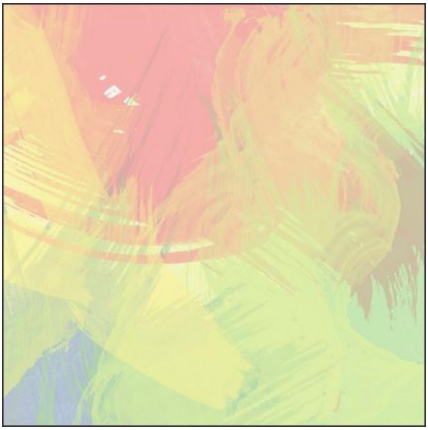

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editura pim

CERCETĂRI ȘTIINȚIFICE PRIN ELABORĂRI ELECTIVE
SCIENTIFIC INQUIRIES THROUGH ELECTIVE ELABORATIONS

Editors:
Ioan Gabriel SANDU
Ion SANDU

ISSN 2668-3229
ISSN-L 2668-3229

Technical editor:
Ioan Cristinel NEGRU

EUROINVENT INTERNATIONAL WORKSHOP
18th edition

Scientific, Technological and Innovative Research in Current European Context
Cercetarea științifică, tehnologică și de inovare în actualul context european

Volum editat sub egida
Academiei Oamenilor de Știinta din România

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Prin aceste manifestări se doreşte o participare activă, printr-o bună conlucrare şi dialog între inventatori, studenţi, specialişti din diverse domenii, artişti, mediul academic și cel industrial.

EUROINVENT inseamnă un eveniment complex alcătuit din: Salonul European de Invenţii şi Cercetare Ştiinţifică, Salonul de Carte şi Salonul de Artă, un rol important avându-l Workshop-ul organizat sub sigla „Cercetarea tehnico-științifică în contextul contemporan european”, unde se dezbat teme actuale de cercetare şi aspecte moderne ale celor trei tipuri de proprietate: intelectuală, industrială şi culturală, având în vedere printre altele, stimularea actului de creaţie şi protecţia dreptului de autor.

În ultimii șase ani acest workshop, avand genericul „**Cercetări științifice prin elaborări elective”,** s-a alăturat Conferinței Internaționale de Cercetări Inovative - componentă principală a EUROINVENT-ului, cunoscută sub titlul: International Conference for Innovative Research (ICIR).

Cu ocazia zilelor dedicate inventatorilor sau instituţiilor de cercetare și de învățământ din țările participante la aceaste manifestări, se vor prezenta sistemele actuale de transfer tehnologic, dinamica brevetării și alte aspecte privind ingineria creativității, respectiv rezultatele deosebite obţinute de către şcolile de inventică în formarea tinerilor.

Volumul de față cuprinde un număr de 20 lucrări elaborate de doctoranzi și masteranzi sub conducerea unor membri din comisiile de îndrumare a tezelor de doctorat și de dizertație, selectate de un grup de referenți, în acord cu direcțiile de cercetare din învățământul superior ieșean și cu evenimentele care vor fi marcate la a 18-a ediție a EUROINVENT.

Sub titlul „**Cercetarea românească în conext european**”, lucrările au fost grupate pe următoarele secțiuni: Știința Conservării Bunurilor de Patrimoniu Cultural și Natural, Științe Conexe, Inventică și Istoria Neamului Românesc. Au fost acceptate lucrări în limba română și engleză, cu o bibliografie recentă și selectivă.

Prof.univ.emerit dr. Ion SANDU,
Preşedinte de Onoare al Forumului Inventatorilor Români
Membru corespondent al Academiei Oamenilor de Știință din România

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International Conference on Innovative Research

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Planary Speaker	**Julia MIRZA-ROSCA** Professor Department of Mechanical Engineering, University of Las Palmas de Gran Canaria, SPAIN
Planary Speaker	**Iulian ANTONIAC** Professor Department of Materials Science and Physical Metallurgy, Faculty of Materials Science and Engineering, National University of Science and Technology POLITEHNICA Bucharest, ROMANIA
Keynote Speaker	**Norina Consuela FORNA** Professor Faculty of Medicine and Pharmacy, Grigore T. Popa University of Medicine and Pharmacy, Iasi, Romania
Keynote Speaker	**Cristina-Ileana COVALIU-MIERLA** Professor National University of Science and Technology POLITEHNICA Bucharest, Romania
Keynote Speaker	**Suriani MAT JUSOH** Associate Professor Dr. Eng. Head of Programme, Maritime Technology and Naval Architecture Faculty of Ocean Engineering Technology, Universiti Malaysia Teregganu, MALAYSIA
Invited Speaker	**Nermin DEMIRKOL** Associate Professor PhD Department of Ceramics, Faculty of Fine Arts, Kocaeli University, TURKIYE
Invited Speaker	**Anca Daniela RAICIU** Assoc. Prof. PhD Pharm Faculty of Pharmacy Titu Maiorescu University, Bucharest, ROMANIA

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