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MINISTERUL EDUCAȚIEI ȘI CERCETĂRII
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Proceedings of
The 17th Edition of

# EUROINVENT

## EUROPEAN EXHIBITION OF CREATIVITY AND INNOVATION

EURO INVENT 2025

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IFIA
Founded 1968
INTERNATIONAL FEDERATION
OF INVENTORS' ASSOCIATIONS

**Date: 20. March. 2025**
**Ref. No.: 2025-308**
**Subject: Message of IFIA President-**
**EUROINVENT 2025**

**Dear Innovators, Researchers, and Visionaries,**

It is with great enthusiasm that I extend my warmest congratulations to the **Romanian Inventors Forum (FIR)** and its esteemed partners for organizing yet another remarkable edition of **EUROINVENT**. Now in its **17th year**, this prestigious event continues to serve as a beacon of innovation, fostering collaboration and pushing the boundaries of creativity across Europe and beyond.

EUROINVENT is more than just an exhibition; it is a powerful platform where brilliant minds from diverse fields come together to exchange ideas, showcase groundbreaking technologies, and inspire the next generation of pioneers. The innovations presented here have the potential to transform industries, improve lives, and drive global progress.

The **International Federation of Inventors' Associations (IFIA)** is proud to support initiatives that champion creativity, scientific advancements, and entrepreneurship. We remain committed to fostering an ecosystem where inventors, researchers, and visionaries can collaborate and thrive.

I invite all forward-thinking individuals to join us at **EUROINVENT 2025**, taking place from **May 8th to 10th at the Palace of Culture, Iași, Romania**. This gathering will be an extraordinary opportunity to witness cutting-edge innovations, forge meaningful partnerships, and contribute to a future shaped by human ingenuity.

Let us celebrate innovation together and continue to push the frontiers of possibility. I look forward to seeing the remarkable contributions that will emerge from this year's event.

**With my best wishes for a successful EUROINVENT 2025!**

**Sincerely,**
**Alireza Rastegar**

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: 2025 European Exhibition of Creativity and Innovation (EUROINVENT 2025) in Iasi, Romania.

Throughout the last 17 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 **2009 to 2025.** 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 2025 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 2025** and capitalize all fruits of beneficial means in this excellent competition in Romania.

Sincerely Yours,

**Manli Hsieh**
*President*
**World Invention Intellectual Property Associations (WIIPA)**

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| | |
|---|---|
| 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 Iaşi, "Gheorghe Asachi" Technical University of Iaşi, and "Alexandru Ioan Cuza" University of Iaşi—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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## 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.

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World Invention Intellectual Property Associations

# WIIPA Family
# Create Your Minds
# Explore Your Life

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## 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 proprietății 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 şi 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 şi 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.


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** (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 – 2025

22 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

# PARTNER EVENTS













# PARTNER EVENTS











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2025 6/11 - 6/13
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# INVITATION

## 2025 Japan Design, Idea & Invention EXPO

Japan's creativity and design lead the fashion, and it is very important in Asia. Its invention is full of ingenuity and amazing. Japanese design and invention have always been regarded as a model by the public. The inventions have strong cultural characteristics. Many visuals make people can't help but say the feeling of "Japanese style".

**Date**

July 5 ~ July 6, 2025

**Venue**

Tokyo Haneda Garden
Convention Center


CONTACT

886-2-8772-3898
wiipa@wiipa.org.tw
www.wiipa.org.tw


World Invention Intellectual Property Associations

KUIA Korea University Invention Association

SEOUL, KOREA

KOREA WICO WORLD INVENTION CREATIVITY OLYMPIC

# WICO

## WORLD INVENTION CREATIVITY OLYMPIC

& conference

## 2025 세계발명창의올림픽 & 컨퍼런스

KOREA

2024 WICO Award Ceremony

Seoul National University of Education

**Grand Hall**

**July 17(Thu)~19(Sat), 2025**

- July 17 (Thu) - Booth Setup
- July 18 (Fri) - WICO Main Exhibition
- July 19 (Sat) - Awards Ceremony

KUIA 한국대학발명협회 Korea University Invention Association

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PATENT NEWS

LOHAS 시사뉴스


UNIVERSITI MALAYSIA PERLIS
UNIMAP
ICSTEM
INTERNATIONAL COMPETITION ON
SCIENCE
TECHNOLOGY
ENGINEERING
MATHEMATICS
2025
17-19 JULY
KUALA LUMPUR
ICSTEM2025, slated to occur on July 17th-19th, 2024, carries the primary goal of cultivating an Innovation Culture for Society 5.0. The event centers on this crucial theme, striving to disseminute ground breaking ideas within society. ICSTEM2025 aims to foster an innovation culture spanning all age groups with a special emphasis on channeling creative potential of young mind worldwide is part of this endover, the organizers of ICSTEM2025 will provide a platform for participant to exhibit their adeptness in presenting ideas using various methodologies.
Furthermore, all researchers aiming to publish their research or review papers in the field of material sciences, intended for inclusion in the Q3 Journal, are invited to the forthcoming event.
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• IR. MOHD NASIR MAT SAAD @NASIRSAAD@UNIMAP.EDU.MY
INTERNATIONAL PARTICIPANT
• PLEASE REFER RESPECTIVE REPRESENTATIVE


INNOVATION
15 – 16, August
2025
You see new changes in the world every day and all these changes are based on innovation. In line with our mission to promote a culture of innovation, World Invention Intellectual Property Associations is holding a new event called America Innovation Invention Exhibition.


THE 10TH ANNIVERSARY iCAN 2025
2025 INTERNATIONAL INVENTION INNOVATION COMPETITION IN CANADA
THE PREMIER EVENT OF CANADA FOR WORLDWIDE INVENTORS
International Invention Innovation Competition in Canada
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SPECIAL ONLINE EDITION - TORONTO, CANADA
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PRELIMINARIES REGISTRATION PERIOD
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11th - 14th September 2025
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# CROATIA

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***49 TH INTERNATIONAL INVENTION SHOW***
***21 TH INVENTION AND PROTOTYPE SHOW AND BUSINESS PLAN COMPETITION***

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***2nd oldest world's invention show***
***2nd largest european invention show***

*INOVA is an exhibition of inventions, new products and innovations of young people. A lot of entertainment features will include attractive prizing programs. Indeed, the organizers are preparing numerous medals which will be conferred on the basis of decisions by an international jury. Many international awards, Best Croatian and Best International Award are already announced ...*




HELD BY CROATIAN INVENTORS NETWORK AND WIIPA
*/WORLD INVENTION INTELLECTUAL PROPERTY ASSOCIATIONS/*

**FORUM AND TRADE SHOW FOR:**
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*Organizers will be delighted to be your hosts.*

CROATIAN INVENTORS NETWORK

**Contact:**
**ZAGREB INVENTORS ASSOCIATION**
Trg žrtava fašizma 14, HR-10000 Zagreb, Croatia
tel: +385 1 4612-517; fax +385 1 4662-680
info@savez-inovatora-zagreba.hr

ZAGREB INVENTORS ASSOCIATION


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iitexpo.co.uk


主辦單位
Organizer

miia 澳門創新發明協會
Macao Innovation and Invention Association

特別鳴謝：2024年以下的指導單位、協辦單位、電訊伙伴、支持單位、線上協辦單位、媒體支持單位和國際代表團
Special Acknowledgments:to 2024 Guidance Unit Organizers,Co-organizers,Telecom Partner, Supporters, Online Co-organizer, Media Partners and International Delegations.

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China Association of Inventions

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World Invention Intellectual Property Associations

HKFii
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# INEX INDIA

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**Margao, Goa, INDIA**

www.inex-india.com

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- INNOVATION YEAR BOOK 2025 LAUNCH
- INTERNATIONAL JURY AWARDS
- INEX HEI AWARDS
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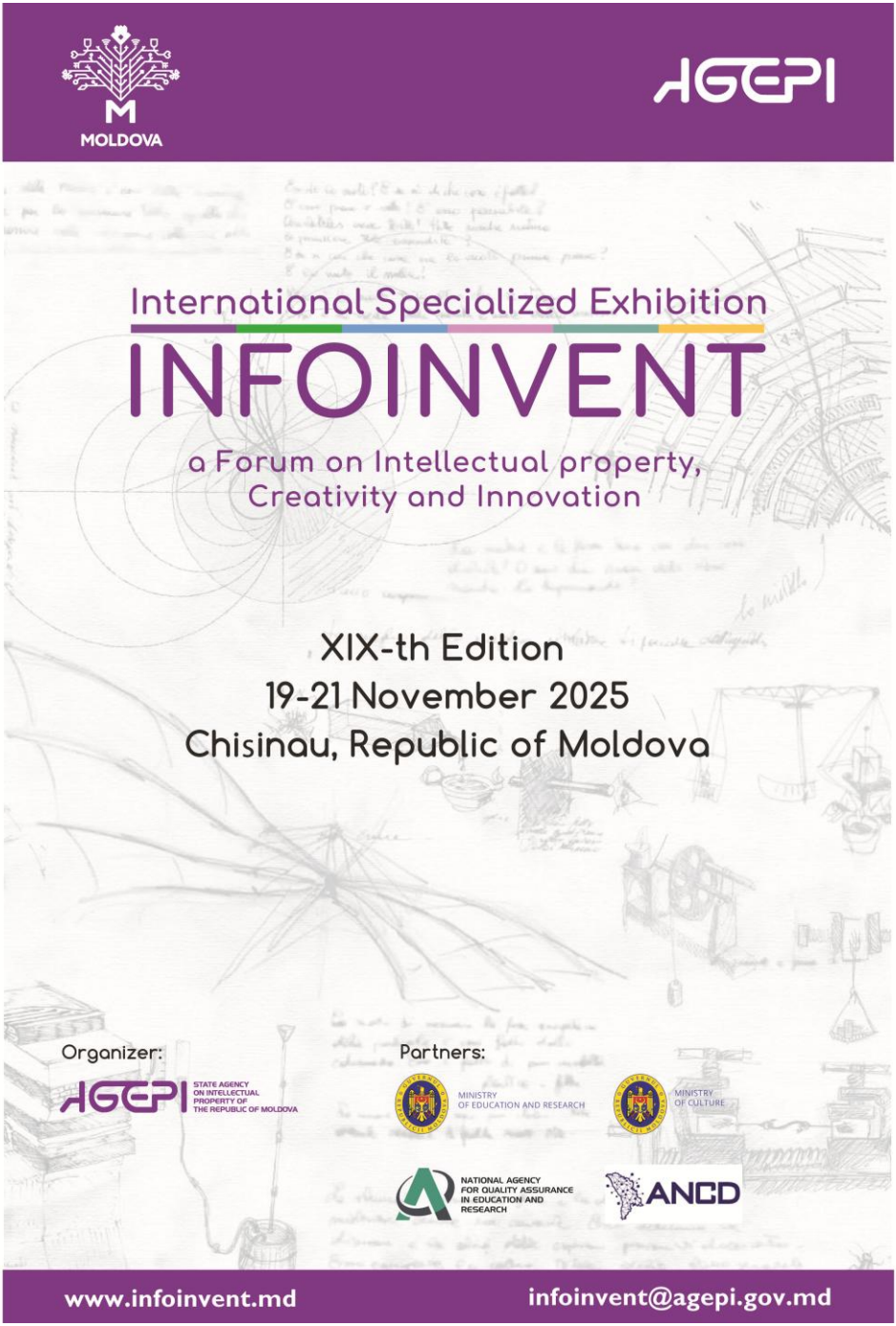
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XIX-th Edition
19-21 November 2025
Chisinau, Republic of Moldova
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# KIDE 2025
## 12/4 ~ 12/6

# Kaohsiung International Invention & Design EXPO

WIIPA

www.wiipa.org.tw

TIPA

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 Program, PNCDI IV – Program 5.7 Partnership for Innovation – Subprogram 5.7.4 Technology transfer in support of competitiveness – Technology Transfer Festival, North East Regional Program 2021-2027, ERA NET Program, POCIDIF (Operational Program for Smart Growth, Digitalization and Financial Instruments) 2021-2027 and other types of financing.

# 1OneHealth
# Biotech Entrepreneurship Bootcamp

September 2025

**Are you a researcher with a bold idea and the data to back it up? The OneHealth Biotech Bootcamp is your gateway to transforming early-stage research into operational biotech ventures.**

Join a hybrid program combining online learning and an in-person bootcamp in Timișoara, where selected teams will build prototypes, refine business models, and connect with top mentors, investors, and biotech leaders.

## Areas of Biotech Activities

The program is designed to support start-ups and innovators in the fields of Biotech

- Health, Medical, Diagnostics
- Food Biotechnology, Nutrition Science
- Aquaculture, Coastal and Marine Biotech
- Agriculture, Environmental Biotechnology
- Industrial applications, polymers, Building, Textile, Chemistry products
- Bioinformatics, Nanobiotechnology

**Find out more and join the Next Generation of Biotech Founders**

Applications open in May 2025 – scan the QR code to learn more and apply.

https://1health.ro/biotech-bootcamp-2025/

Event organized by Bio Mentor Hub

# **Dynamic brand:** A *contemporary* approach to *identity*

Dynamic brand is our methodology for designing identities capable of evolving over time, space, cultural and social contexts.

It stems from the idea that identity is never static, but a living system, enriched by diversity and relationship with others. It aims to create an authentic relationship between brand and people through the constant enhancement of the organization's values and vision.

With Dynamic brand, communication becomes integrated, investment optimized, design close to people. In 2022 we collected this method in a book published by Skira and now a reference point in academic and professional circles internationally. The book has been added to the recommended readings collection of World Design Organization.

Cappelli Identity Design is a multidisciplinary studio founded in 2010 by Emanuele Cappelli, specializing in brand identity and digital strategy. Based in Rome and Turin, it carries out multidisciplinary projects including brand identity, digital and interaction design, digital marketing and content curation for institutional and private clients. It is a member of AIGA, WDO, and listed in the World Brand Design Society Global Top 100.

Cappelli Identity Design

cappellidesign.com

Learn more about the Dynamic brand

2019, RUFA Contest


Archivi Olivetti

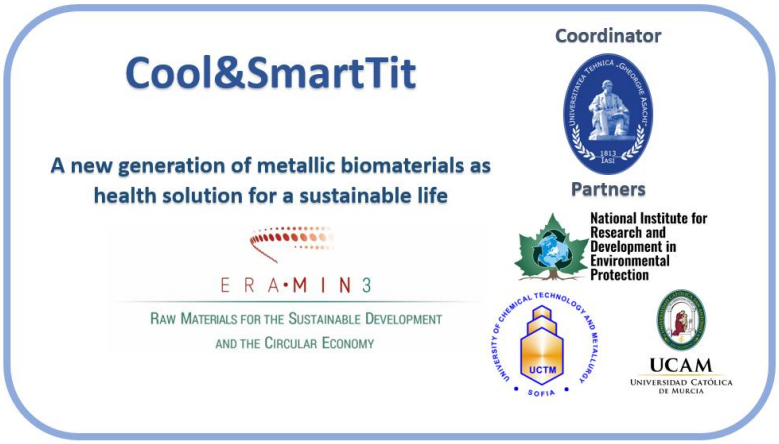
**Cool&SmarTit**

"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

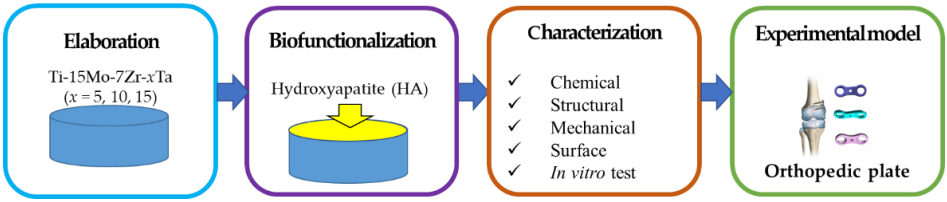
**Coordinator:** "Gheorghe Asachi" Technical University of Iasi, Faculty of Materials Science and Engineering

**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)

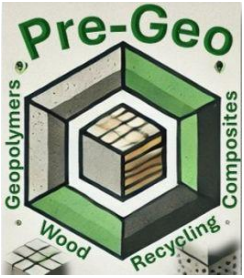
**Project period:** 1 October 2023 – 30 September 2026

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.




**Pre-Geo**

**Project title:** *"Innovative products based on Geopolymer composites with waste wood addition"*
**Project code**: GNaC 2023_271/2024;
**Website**: https://simtit.ro/arut271/
**Program**: National Research Grants – ARUT

**Project type**: Research projects to stimulate young researchers from ARUT Universities
**Funder**: Fondul pentru Finanţarea Cercetării Ştiinţifice Universitare, contract CNFIS-FDI-2024-0598 and "Gheorghe Asachi" Technical University from Iasi (TUIASI) own funds
**Duration of the project**: 01.07.2024 – 31.08.2025

The **overall objective** of the PreGeo project is to validate, under laboratory conditions, the technology to obtain a new class of geopolymer composites with wood waste addition, cured at room temperature. Moreover, in order to ensure the transition of this technology to the industrial level, the obtained materials will be used to obtain products for civil engineering applications.

Geopolymer composites with wood waste addition are an eco-friendly alternative to conventional Ordinary Portland Cement-based materials. However, the type and characteristics of raw materials (wood or mineral waste) significantly influence the final properties of geopolymer composites. Therefore, in order to obtain alkaline-activated geopolymers containing wood waste, the obtaining technology must be tailored according to the characteristics of the waste locally. In **Pre-Geo project**, mineral wastes (fly ash and ground granulated blast furnace slag) from different sources are used to obtain the matrix of the composite, while two types of wood waste (sawdust and wood chips) are used as reinforcing elements. Accordingly, the preparation method of these composite materials will be formulated and optimized, and in order to promote their industrial development, their possible use in civil engineering applications will be studied by obtaining and characterizing different types of products. Therefore, this eco-friendly manufacturing technology will enable the reuse of waste materials in order to develop innovative products.

**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

## Struers: The innovator of laboratory solutions for sample preparation

### Who are we?

Struers is a global leader in providing equipment and services for the processing and analysis of metal, ceramic, glass and composite materials.

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**Address:** Splaiul Independenței nr. 313
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**Phone number**+40311019548

**e-mail:** romania@struers.de


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# INTERNATIONAL EXHIBITORS

Belgium, Bosnia and Herzegovina, Bulgaria, Cambodia, Canada, China, Croatia, Germany, Hong-Kong, India, Indonesia, Iran, Iraq, Kazakhstan, Korea, Kosovo, Japan, Lebanon, Macau, Malaysia, Moldova, Morroco, Philippines, Poland, Portugal, Saudi Arabia, Spain, Sri Lanka, Taiwan, Thailand, Turkey, Tunisia, Ukraine, United States of America, Vietnam

# Belgium

**BE.1**

| | |
|---|---|
| **Title** | **Atabey Metavers based Tower** |
| **Authors** | Mehrdad Fojlaley, Abazar Karimi Panabandani |
| **Institution** | **Technofest Institute of Technology** |
| **Description EN** | Atabey Tower is a groundbreaking architectural and technological project that integrates cutting-edge advancements in artificial intelligence, the metaverse, and smart infrastructure. Designed as a vertical hub for innovation, this futuristic tower merges the physical and digital worlds to create a dynamic space for the future of work, communication, and collaboration.<br>Key Features:<br>Exhibition Areas: The tower includes immersive exhibition halls that blend physical displays with augmented and virtual reality, allowing global access and interaction from anywhere in the world. Ideal for tech expos, research showcases, and virtual product launches.<br>Metaverse-Based Offices: Atabey Tower offers customizable virtual offices for institutions, startups, and research organizations. These workspaces harness AI for smart scheduling, real-time translation, and advanced collaboration tools, redefining the concept of remote work.<br>Conference Salons: Equipped with holographic displays, virtual seating, and multilingual AI assistants, these salons host hybrid conferences that seamlessly connect participants across the globe through the metaverse.<br>Innovation Impact:<br>Atabey Tower represents a paradigm shift in how we interact with architectural space, bringing sustainability, digital integration, and interconnectivity into one vertical ecosystem. The project also contributes to green technology by minimizing physical travel through virtual engagement, and it supports global inclusion by offering accessible digital environments for all.<br>www.atabeytower.com.tr |

# Bosnia and Herzegovina

| | |
|---|---|
| **BG.1** | |
| **Title** | **Orientation Glasses For The Blind** |
| **Authors** | Authors: Ema Kazic, Latifa Prses;<br>Mentor: Admir Aksamovic |
| **Institution** | **Srednja elektrotehnicka skola Sarajevo** |
| **Description EN** | Nowadays, with the development of technology, an increasing imperative is placed on improving the lives of people with disabilities. This group also includes blind people, whose movement we're trying to improve, to improve their safety, and thus to improve their quality of life. We use three ultrasonic sensors and two buzzers, the ultrasonic sensors detect an obstacle, and the buzzer sends timely information to the system user. The implementation of such a device is really fast, and the device itself is easy to use at any time of the day. |

# Bulgaria

**BG.1**

| | |
|---|---|
| **Title** | **Advanced assessment of Titanium Alloys Using Biological Model Solutions** |
| **Authors** | Andriana SURLEVA*, Luydmila ANGELOVA, Dimka FACHIKOVA |
| **Institution** | University of Chemical Technology and Metallurgy Sofia, Bulgaria |
| **Description EN** | Titanium-based metallic biomaterials remain at the forefront of implant technologies for human body regeneration due to their favorable properties. Despite their widespread clinical use, continuous innovation is driving efforts to enhance their durability, stability, and biocompatibility. This study introduces a novel perspective on the characterization of advanced Ti-based alloys, focusing on the latest trends in evaluating their in vitro behavior. Emphasis is placed on recent advancements in simulating biological environments using classical and modified Simulated Body Fluid (SBF), Ringer's, Hank's, and Hartmann's solutions, as well as other bioactive model media.<br>A comparative analysis of current analytical techniques and experimental procedures is presented, highlighting their effectiveness, limitations, and potential for optimization. The chemical composition and interaction mechanisms of the most commonly used test media are systematically reviewed. This innovative review proposes a critical reinterpretation of the data obtained from model environments, emphasizing the importance of understanding the discrepancies between simulated fluids and real physiological conditions. Ultimately, the study underscores the value of chemically simulated environments as a cost-effective and time-efficient alternative for preliminary screening of biomaterial performance, reducing the reliance on extensive in vivo testing while maintaining scientific rigor. |

# Cambodia

*Norton University*

**KH.1.**

| | |
|---|---|
| **Title** | **Automatic Car Parking Management System** |
| **Authors** | Sek Socheat, Thon Rithyhong, Morn Soty, Sim Punleu, Hour Panha |
| **Institution** | **Department of Computer Studies, College of Science, Norton University** |
| **Patent** | N/A |
| **Description** | The Automatic Car Parking Management System leverages innovative technology powered by AI, IoT, and Computer Vision to revolutionize the parking management with real-time monitoring. |

**KH.2.**

| | |
|---|---|
| **Title** | **CamTour Recommender** |
| **Authors** | Sek Socheat, Heang Sokmeng, Neom Chhayya, Vuth Rachana, Luon Raksa |
| **Institution** | **Department of Computer Studies, College of Science, Norton University** |
| **Patent** | N/A |
| **Description** | The Camtour Recommender is an innovative platform designed to revolutionize how people plan and enjoy their travels. This system combines advanced recommendation algorithms [1], e-commerce integration, and chatbot assistance to create a seamless and personalized travel experience. Camtour Recommender aims to simplify the travel planning process by providing users with all the information and tools they need for a smooth and enjoying journey. |

**KH.3.**

| | |
|---|---|
| **Title** | **Digital Document Navigator AI System** |
| **Authors** | Sek Socheat, Phal Sothealen, Pen Sokrith, Sok Vitou, Somart Sopheak |
| **Institution** | **Department of Computer Studies, College of Science, Norton University** |
| **Patent** | N/A |

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|---|---|
| **Description** | The Digital Document Navigator AI System is an advanced web-based application for efficient document management. It uses an AI-driven learning mechanism at Norton University. It provides smart search, AI-generated summaries, and personalized recommendations for students and faculty. |

| **KH.4.** | |
|---|---|
| **Title** | **Learning Management System** |
| **Authors** | Sek Socheat, Keat Kong, Kong Sunlyheng, Leng Ratana, Meas Soksreymom |
| **Institution** | **Department of Computer Studies, College of Science, Norton University** |
| **Patent** | N/A |
| **Description** | Our learning mangement system enhances emloyee training with an efficient, structed, and engaging appraoch. It applies best UI/UX design and data mangaement to keep training resousrces well-organized and accessible. |

| **KH.5.** | |
|---|---|
| **Title** | **Solar Street Light Monitoring** |
| **Authors** | Chan Mithona, Poly Pheary, Hach Phanong, Srun Muoykieng, Dan Chantara, Om Soknet, Soeun Piseth |
| **Institution** | **Department of Electrical and Electronic Engineering, College of Science, Norton University** |
| **Patent** | N/A |
| **Description** | As the world moves towards sustainable energy solutions, solar-powered streetlights have become an essential component of smart cities or rural area. However, maintaining and monitoring these lights manually can be inefficient, costly, time-consuming, and a waste of labor. To address these challenges, we have developed a Solar Street Light Monitoring System that enables real-time tracking, remote control, and efficient management of solar street lights and easily finds the malfunctioning solar streetlights. |

| **KH.6.** | |
|---|---|
| **Title** | **Clogged Drainage Monitoring System** |
| **Authors** | Chan Mithona, Poly Pheary, Hach Phanong, Srun Muoykieng, Dan Chantara, Ratha Sophanith, Sambath Vibol |
| **Institution** | **Department of Electrical and Electronic Engineering, College of Science, Norton University** |

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|---|---|
| **Patent** | N/A |
| **Description** | Urban arainage systems are essential for preventing waterlogging, flooding, and maintaining sanitation. Howeverm blockages in drainage systems often go unnotices until they cause serious problems such as water stagnation, foul odors, and infratsture damage. Traditional manual inspections are inefficient, time-consuming, and costly. To address this issue, we have developed a Clogged Drainage Monitoring System, which utilizzes sensors and real-time data analysis to detect blockages early and alert to control center. This syste, ensures timely intervention, reducing the risks associated with clogged drainage. |

**KH.7.**

| | |
|---|---|
| **Title** | **Super Market Self Payment for General Grocery** |
| **Authors** | Chan Mithona, UL Dara, EL Eseor, Hach Phanong, Ratha Sophanith, Sambath Vibol |
| **Institution** | **Department of Electrical and Electronic Engineering, College of Science, Norton University** |
| **Patent** | N/A |
| **Description** | Most supermarkets in Cambodia often staff operated checkout kiask to process customer payments which lead to time consuming, long wait and inconvenicne to customers. Futhermore, payment methods in Cambodia are a mix of cash, card, and digital optionsm creating additional complexity. Therefore, our team created a project whcih is call Supermarket Self Payment for Gerneal Grocery to straemline checkouts and enhance convenine throug technology. |

**KH.8.**

| | |
|---|---|
| **Title** | **Auto Generate KhQR Payment for Petroleum** |
| **Authors** | Chan Mithona, UL Dara, EL Eseor, Hach Phanong, Ratha Sophanith, Sambath Vibol |
| **Institution** | **Department of Electrical and Electronic Engineering, College of Science, Norton University** |
| **Patent** | N/A |
| **Description** | In Cambodia, fuel payments at petrol stations often rely on manual processes, leading to delays, human errors, and operational inefficientsces. Additionally, the mix of cash and digital payment methods adds complexity. To address this, our team created project which called Auto Genearte KhQR |

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| | Paymenet for Petroleum, which automated KhQR code gerneation for seamless, secure, and cashless transactions, improving efficiency and customer conveniwnce. |

| **KH.9.** | |
|---|---|
| **Title** | **Vehicle Access Control System** |
| **Authors** | Chan Mithona, UL Dara, EL Eseor, Hach Phanong, Ratha Sophanith, Sambath Vibol |
| **Institution** | **Department of Electrical and Electronic Engineering, College of Science, Norton University** |
| **Patent** | N/A |
| **Description** | The Vehicles Access Control System is an advanced security solution designed exclusively for institutions in Cambodia to regulate vehicles entry and enhance security. This system integrated with ling-range RFID technology, touchscreen UI, and wireless communication via ESP-NOW to ensure efficient and seamless access management. By automating vehicle identification and access approval, the system minimizes human intervention, reduces unauthorized entry, and improves overall security. |

| **KH.10.** | |
|---|---|
| **Title** | **Sun Shading Device** |
| **Authors** | So Sokuntheary, Chuop Sopheak, Cheng Neahav, Mol Nyta, Ly Chandavin |
| **Institution** | **Department of Architecture and Urbanism, College of Science, Norton University** |
| **Patent** | N/A |
| **Description** | Currently, we can observe that the world's climate has significantly changed, with rising temperatures being one of the major effects. As a result, when selecting materials for architectural structures, we must carefully consider how to design them to protect them from direct sunlight hitting the building's surface. For this reason, many architects have incorporated sun shading devices to reduce the heat entering the building. However, it's also clear that most of these sun shading devices are primarily used to block heat and add aesthetic appeal to the building's exterior. Therefore, we've come up with the idea to inspire a sun shading design that is not only functional but also environmentally sustainable while enhancing the building's beauty. |

| KH.11. | |
|---|---|
| **Title** | **Khmer House Rohat Teuk** |
| **Authors** | So Sokuntheary, Chuop Sopheak, Mao Sothea |
| **Institution** | **Department of Architecture and Urbanism, College of Science, Norton University** |
| **Patent** | N/A |
| **Description** | Modern Khmer house, luxery appearance in Khmer form and style. In particular, Khmer house is an economial in both use and living. Every part of the Khmer houses to provide enough light and air, cool and refreshing. Rohat teuk is use ti gerneate electrivity to supply the entire household. As well as reduce pollution by using waater wheel to generate electrivity without using fuel. |

| KH.12. | |
|---|---|
| **Title** | **The Floret Bus-Stop** |
| **Authors** | So Sokuntheary, Chuop Sopheak, Cheav William, Seang Mong Vatanak, Chakk Lyhuor |
| **Institution** | **Department of Architecture and Urbanism, College of Science, Norton University** |
| **Patent** | N/A |
| **Description** | Nestled in the heart of Southeast Asia, Cambodia is a country where history, culture, and architectural splendor converge. Surrounded by Thailand, Laos, and Vietnam, it has long been a crossroads for diverse traditions and regional influences. The country's tropical monsoon climate, with its intense heat and humidity, has not only shaped its stunning landscapes but also its way of life. From the majestic legacy of the Khmer Empire to the enduring strength of its people, Cambodia offers a rich and vibrant backdrop for this project, seamlessly blending the wisdom of its past with the promise of modern growth. |

| KH.13. | |
|---|---|
| **Title** | **The Bamboo Classrooms and Renewable Energy** |
| **Authors** | So Sokuntheary, Chuop Sopheak, Norm Phearith, Hai Sokunsocheata, Ung Chisreng |
| **Institution** | **Department of Architecture and Urbanism, College of Science, Norton University** |
| **Patent** | N/A |
| **Description** | The Coconut School in Cambodia is an eco-conscieuous educational initiative founded by Ouk Vanday. It addresses |

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| | waste pollution and educational access in rural areas by constructing school facilities from upcycled materials like plastic bottles, cans, and tires. The school provides free education to underprivilleges chidren, focusing on English, computer skills, and environemental science. Students learn recylying and sustainability through hands-on practices, foresing enviroenemal repsosnsibility. Blending creativity, susutainability, and community empowerment, Coconut-school is a model of how education can inspire both social and ecological change. |

| | |
|---|---|
| **KH.14.** | |
| **Title** | **Rainwater Filtration System for Drinking Water of Coconut School (Sala Dong)** |
| **Authors** | So Sokuntheary, Chuop Sopheak, Norm Phearith, Hai Sokunsocheata, Vong Chakravuth |
| **Institution** | **Department of Architecture and Urbanism, College of Science, Norton University** |
| **Patent** | N/A |
| **Description** | The Coconut School, founded in 2013 by Ouk Vanday in Cambodia, provides free education to underprovilleged children while promoting environmental sustainability. The school uses recycled materials for construction and teaches waste managmeent and conservation. A key challenges in the region is the lack of clean water supply, and the school addresses this by installing water purification systems and educating students on hygience and sustainable water use. Offering lessons in English, math and life skills, the school has grown from 5 students to over 180, becoming a model for education, sustainability, and water access. |

# Canada

by

*Toronto International Society of Innovation & Advanced Skills (TISIAS)*

| **CA.1.** | |
|---|---|
| **Title** | **Self-Unfolding Satellite with Gravity** |
| **Authors** | Lembit Maimets |
| **Institution** | **University of Toronto, 5T6** |
| **Patent no.** | US Patent #5235788 |
| **Description** | 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. To allow form recovery in zero gravity environment, due to elastic properties of the toroid membrane, the structure unfolds and create the toroid enclosure without the need of human assistance. When making it spin around its axis, gravity offers earth-like work conditions for occupants. This avoids short-term disorientation and proprioceptive system disruptions to long-term bone decalcification and muscle atrophy. The concepts included in this structure allow long-lasting space voyages that presently designed space stations make difficult. This promises to become the next step in space exploration vehicles. |

# China

**CN.1.**

**Title** Cell Workstation

**Authors** Lingwen Zeng, Junjie Zhen, Zhihua Liang, Jiaxing Yao, Weifeng Tan, Si Zhang, Zhiyong Zhong

**Institution** Sino Cell Health Management Inc.

ZL 201110032862.9

If the 20th century was the era of drug therapy,so the 21st century is the era of cell therapy."

Cell therapy refers to the delivery of normal or enhanced living cells to the patient as drugs,or to replace diseased,damaged and degenerated cells in the body,or to remove abnormal and disease cells in the body,or to adjust the imbalance of pathological tissue,so as to achieve tissue regeneration and repair or disease treatment.

In the rapidly evolving world of biomedical innovation,the demand for safe,scalable,and cost-effective cell therapies has never been greater.

Yet,the industry faces critical challenges：

Unstable quality: the quality of manually cultured cells differ from batch to batch.

Contamination Risks: batch failures due to manual operations.

High Costs: GMP lab construction exceeds $1,500/m² in the developed countries.

Therefore,we require a revolutionary solution engineered to overcome these barriers and redefine cell culture technology.

Cell Workstation is our innovative answer!

What are the innovatives?

① B+A grade air quality : Guarantees high quality and safety with sterile,GMP-grade conditions.

② AI-Driven Culture Optimization: Achieves 99.8% batch consistency through automated,intelligent cell culture.

③ Real-Time Monitoring: Detects anomalies with over 99.8% accuracy,eliminating human errors.

④ Modular Design: Slashes capital expenditure by 90%,with rapid installation that saves time,space,and money.

The cell workstation can help hospitals,research institutions,and cell pharmaceutical companies in standardizing and normalizing cell preparation while reducing contamination risks and improving efficiency.

Who are we?

Sino Cell Health Management Inc. is a high-tech enterprise specializing in the research of automated cell culture equipment,stem cell and regenerative medicine,as well as the transformation of technological achievements for clinical applications.

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| **Description** | The company is driven by a professional team of researchers and management experts,led by the national stem cell chief scientist of China and supported by seasoned professionals and graduates with advanced degrees in stem cell science,regenerative medicine and preventive medicine.<br>Our core technologies are derived from collaborations with Harvard Medical School's Center for Innovation and Guangzhou Institutes of Biomedicine and Health,Chinese Academy of Sciences.<br>Partnering with top-tier hospitals and Global Cell Technology Association,we're advancing the future of cell therapy. |

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| **CN.2.** | |
| **Title** | Preparation and application of extracted sludge nutrients as active organic fertilizer |
| **Authors** | Yiqi Chen |
| **Institution** | Shanghai Qibao Dwight High School |
| | ZL2022 1 1151590.9 |
| **Description** | The biological treatment of various sewage (waste) water in China produces a large amount of biological residual sludge, which is rich in organic matter, and has certain potential as organic fertilizer for land use. The cultivation of microalgae in sludge can transform the harmful components in sludge into active fertilizer-effective biomass, which provides a green and sustainable new method for the transformation and reuse of sludge rich organic matter in poor soil and soil fertility. The focus of this study is to take the remaining biological sludge as the object, cultivate microalgae, realize the absorption and degradation of nitrogen, phosphorus nutrients and toxic organic substances in the sludge, and prepare organic fertilizer from the mixture of bacteria and algae, so as to verify its promotion effect on plant growth and development, and provide theoretical basis and technical guidance for the preparation of fungal and algae granule slow-release fertilizer for poor soil improvement in subsequent studies. |

**CN.3.**

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|---|---|
| **Title** | **A 3D printing technology for manufacturing high-precision silicon carbide photovoltaic wafer boats** |
| **Authors** | **Wei Liu** |
| **Institution** | Dongguan University of Technology |
| **Description** | Silicon carbide (SiC) has a small atomic radius, short bond length, and strong covalent bonding. Studying molding and sintering methods for large, high-precision, and complex SiC ceramic components is essential.<br>Due to its high refractive index (2.6 vs. 1.4–2.19 for other ceramics and resins), and its dark color that absorbs UV light, SiC presents challenges for photocuring 3D printing. To address this, Ding et al. oxidized the SiC surface to $SiO_2$, lowering the refractive index and enabling SLA printing of low-solid-content SiC green bodies. However, this approach compromises material properties, making the ceramics unsuitable for semiconductor use.<br>He et al. used polymer precursor stereolithography and polymer infiltration pyrolysis to fabricate 3D SiC ceramics, achieving 204.6 MPa flexural strength and 84.8% density. Ding et al. further advanced the field by creating a photosensitive SiC slurry (45 vol%, 3000 mPa·s viscosity) that enables 60 hours of stable SLA printing, producing complex SiC parts.<br>In conclusion, SLA 3D printing of SiC has shown promising results, but DLP still requires precursor-based approaches. Current SiC ceramics face issues like low density, poor strength, high impurities, and shrinkage, limiting their use in precision ceramic manufacturing. |

# Croatia

Represented by
**CROATIAN INVENTORS NETWORK**

**HR.1.**

| | |
|---|---|
| **Title** | **3D-Printed Elastic Lattice Structures** |
| **Authors** | MARKO MARICEVIC, TIBOR SKALA |
| **Institution** | **University of Zagreb Faculty of Graphic Arts** |
| **Description** | Elastic mesh structures, created through 3D printing, represent a revolution in product design and functionality. This innovative manufacturing approach enables the creation of variable thicknesses and densities, allowing for the adjustment of strength and flexibility according to specific needs. Adaptable mesh structures enhance comfort, while optimized load distribution extends the product's lifespan. In addition to aesthetic advantages, this production method allows for complex designs that are both functional and visually appealing. This technology presents an opportunity to improve production processes, offering solutions that are adaptable, functional, and sustainable.<br>- functionality customization: variable thickness allows for the adjustment of strength and flexibility in specific parts of the structure.<br>- weight reduction: mesh structures with variable thickness can reduce the overall weight of the product without compromising strength.<br>- increased comfort: variable thickness can improve comfort and adaptability, allowing for a better fit.<br>- aesthetic possibilities: variable thickness can create interesting visual effects and allow for more complex designs.<br>- improved ventilation and breathability: variable thickness can enable better ventilation and breathability, enhancing comfort.<br>- better load distribution: mesh structures can distribute load more effectively. |

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| **HR.2.** | |
| **Title** | **HYDROgel CELL for Diffusion Measurement (HYDROCELL)** |
| **Authors** | ANITA SALIC, ANA JURINJAK TUSEK, BRUNO ZELIC |
| **Institution** | **University of Zagreb Faculty of Chemical Engineering and Technology; University of Zagreb Faculty of food technology and biotechnology** |
| **Description** | Efficient diffusion of molecules through hydrogels is a key parameter for effective enzyme immobilization, especially in systems used in biotechnology. Molecule diffusion through the gel depends on the gel's structure, crosslinking density, and pore size. A higher concentration of the substance from which the gel is made and stronger crosslinking reduce the pore size and slow down diffusion, while lower concentrations increase diffusivity but reduce gel stability. Diffusivity also depends on conditions such as temperature, pH, and the presence of other substances.<br>The proposed innovation, Hydrocell, enables the study of diffusion kinetics of various molecules through the gel, with potential applications in various biotechnological industrial processes, including drug development, biosensor optimization, and assessing substance transport in controlled drug delivery systems. In addition to enabling precise measurements, the system is characterized by ease of use, customizable dimensions, and a wide range of applications.<br>This innovation, the Hydrocell system for measuring molecular diffusion through hydrogels, holds great significance for promoting sustainable development, supporting the circular economy, and contributing to the production of clean energy. Its potential lies in optimizing processes, improving material efficiency, and enabling environmentally friendly solutions for various applications. |

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| **HR.3.** | |
| **Title** | **Closed Water Cycle in textile industry: Innovative Reuse of Textile Wastewater for Industry and Irrigation** |
| **Authors** | IVA CURIC, DAVOR DOLAR |
| **Institution** | **University of Zagreb Faculty of Chemical Engineering and Technology** |

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|---|---|
| **Description** | This innovation offers a groundbreaking solution for water management in the textile industry by enabling the closure of the water cycle through multi-stage wastewater reuse. Using a hybrid system of ultrafiltration (UF), nanofiltration (NF), and reverse osmosis (RO), it maximizes water recovery: NF permeate is reused in dyeing, bleaching, and washing; RO permeate is used in boilers; and RO concentrate (thickened to 35–50%) is blended with tap water for irrigating salinity-tolerant crops.<br>The system achieves 95% water recovery, cutting potable water use by up to 20 times—from 0.06–0.40 $m^3$ to just 0.003–0.020 $m^3$ per kilogram of textile. For annual production of 10,000 tons of textiles, this reduces freshwater consumption from 600,000–4,000,000 $m^3$ to only 30,000–200,000 $m^3$. This enables zero wastewater discharge, significantly lowering environmental impact and operational costs, while promoting sustainable, circular production practices.<br>Commercial Potential:<br>As one of the largest water-consuming industries, textiles face increasing regulatory and cost pressures. This innovation helps companies drastically reduce reliance on external water sources and minimize wastewater treatment fees. Its scalability allows implementation across small, medium, and large facilities.<br><br>With sustainable production now key to global competitiveness, the system aligns with environmental goals and ESG standards, attracting investment and enabling international collaboration in green technology. Scalable and market-ready, it sets a new industry benchmark for resource efficiency and environmental responsibility. |

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| **HR.4.** | |
| **Title** | **Method for measuring dielectric losses in textile materials** |
| **Authors** | DUBRAVKO ROGALE, SNJEZANA FIRST ROGALE, ZELJKO KNEZIC |
| **Institution** | **University of Zagreb Faculty of Textile Technology** |
| **Description** | Parts of protective clothing made from synthetic polymer materials are joined using a high-tech method involving a high-frequency electromagnetic field, which ensures airtight |

and waterproof seams. The required energy and bonding time depend on numerous parameters, one of the most important being the dielectric loss factor of the material. Dielectric losses are known for pure and homogeneous materials (such as polyurethane, polyamide, polyester, etc.), but determining these losses becomes problematic when textile materials are layered with one type of material (e.g., polyurethane), while the base consists of another type (e.g., polyester). Additionally, the fabric or knitwear may have variable geometric structures with air gaps, along with the presence of dyes and other textile finishing agents.

In such cases, dielectric losses can be measured using the described measuring method, which consists of a variable frequency generator, a measuring bridge, a bridge balance indicator, a measuring capacitor containing the test material, and a computer that calculates dielectric losses based on the measured parameters (reactance and ohmic resistance) of the sample in the measuring capacitor.

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**HR.5.**

**Title** **AIR - Anonymous Identities Recognition using artificial intelligence (AI)**

**Authors** TOMISLAV BRONZIN

**Institution** **CITUS d.o.o.**

**Description**

AIR is an innovative solution that enables the recognition of anonymous identities based on multiple physical characteristics of a person, using artificial intelligence. By employing a stereoscopic camera and advanced image processing, it identifies biometric and kinesiological features in real time, from a distance, without the need for physical contact.

The artificial intelligence, through an innovative AI model, compares the captured data with previously recorded profiles of anonymous individuals and determines whether the person matches an existing anonymous identity or represents a new one.

The solution is fully compliant with personal data protection regulations (such as GDPR), enabling a non-invasive method for tracking, comparing, and recognizing completely unknown individuals. Since AIR relies on features such as posture or gait, it can identify the same person even if they are masked or have altered some aspects of their appearance.

The AIR solution is applicable across various industries and scenarios, such as in the field of security or loyalty programs in retail. Its target groups include companies, governments, and public institutions.

**HR.6.**

| | |
|---|---|
| **Title** | **Acoustic scale** |
| **Authors** | Authors: SIVAK SASA, ANDRIJA RADAS, MAKS BLAZEK<br>Mentor: GORAN ECIMOVIC |
| **Institution** | **First School of Technical Sciences Tesla** |
| **Description** | Weighing oneself using a personal scale is typically only possible for individuals with relatively good vision, as it relies on a digital display. Blind individuals are unable to independently measure their weight.<br>This personal scale has been enhanced with a system that provides acoustic output, making it primarily intended for blind or visually impaired users. Additionally, it features a Braille display, allowing use by blind individuals who also have hearing impairments.<br>Besides personal use, the device can be used in educational and rehabilitation centers.<br><br>**Instructions for use:**<br>Turn on the device at the base, wait for a second, step onto the scale sensor, remain still, and press the red button. After a few seconds, the speaker will announce the weight, and the Braille display on the front panel will show the weight value in Braille. |

**HR.7.**

| | |
|---|---|
| **Title** | **REMOTELY CONTROLLED UNDERWATER VEHICLE** |
| **Authors** | Author: MAGDALENA ANTOLKOVIC<br>Mentor: prof.dr.sc. ZELJKO SITUM |
| **Institution** | **University of Zagreb**<br>**Faculty of Mechanical Engineering and Naval Architecture** |
| **Description** | |

A remotely operated underwater vehicle (submarine) has been designed and built for use in underwater exploration or operations. Developing such a vehicle involves solving numerous engineering challenges related to securely sealing the interior and overcoming the difficulties of signal transmission through water. The vehicle's diving depth is controlled by ballast tanks that are filled or emptied with water, depending on whether the submarine needs to dive or surface.

The submarine is controlled using an Arduino microcontroller, and its propulsion is powered by electric motors supplied by a battery.

The remotely operated underwater vehicle allows exploration of areas too deep for humans to safely reach and can remain submerged much longer than human divers, extending the time available for research. The underwater environment is harsh and dangerous, and human diving depth is limited, making an underwater robot an essential tool for marine exploration.

The constructed prototype can serve as the foundation for a research vehicle that, with the addition of sonar, could scan the ocean floor or record underwater objects using a camera.

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**HR.8.**

**Title** **AUTOMATIC DRUM MACHINE**

**Authors** Author: IVAN DIEGO COSIC
Mentor: prof.dr.sc. ZELJKO SITUM

**Institution** **University of Zagreb**
**Faculty of Mechanical Engineering and Naval Architecture**

**Description**

The term "industrial music" refers to a musical genre that relies on harsh, mechanical, intriguing, or provocative sounds and themes. An automated mechanical drum machine can create simple rhythms and experimental music, developing a unique approach to generating music with ambient and mystical undertones using components of power electronics. By adjusting the speed of the drum strikes, a

wide variety of rhythms can be created for different music styles.
The basic set of the mechanical drum machine includes a 'kick' drum for deep tones that form the foundation of the rhythm, a 'snare' drum for higher tones that help shape the rhythmic feel, and cymbals that, depending on the structure, can produce medium-high or high-pitched sounds.
The term drum machine typically refers to digital software used to create rhythms in a song and the percussive sounds produced by instruments through striking, plucking, or vibrating, in the absence of a drummer and/or drums.
An automated drum machine generates drum patterns of various musical styles, complexity, and volume, which are controlled by the user.

**HR.9.**

**Title** **SMART TRAFFIC LIGHT**

**Authors** Author: EMANUEL CAJSA
Mentor: DANIJEL ESKERICIC

**Institution** **Electrotehnical school of Zagreb**

**Description**

The project consists of a fully functional model, or prototype, of a smart traffic light at an intersection. The model includes traffic lights for both vehicles and pedestrians, a speaker (buzzer), a 7-segment display (indicator) with 4 digits, and pedestrian buttons (keys). The speaker emits an audible signal to assist individuals with impaired vision. The button shortens the red light duration for pedestrians and the green light duration for vehicles. The 7-segment display counts down the transition from the green light for vehicles to the green light for pedestrians.
While driving, vehicle drivers receive information about the duration of the green and red lights on a large screen, significantly improving traffic safety and reducing the chances of running a red light. The button allows for quicker switching of the traffic light. It can be controlled via a smartphone with the Blynk app. The smartphone must be connected to a wireless network and have the free app installed. Email authorization is required for registration.
By physically pressing the button or using the phone to control it, people with hearing impairments can manage the

traffic light and, ultimately, safely cross. The speaker adjusts the countdown speed to provide information about the status change of the traffic light to individuals with both vision and hearing impairments. This model is fully adapted for blind and deaf individuals when crossing a traffic intersection.

**HR.10.**

**Title** **PEK SYSTEM – EARTHQUAKE EDUCATIONAL CONTAINER**

**Authors** VJEKOSLAV MAJETIC
**Institution** **DOK-ING d.o.o.**

**Description**

The earthquake educational container is an earthquake simulator in the form of a container, designed for educational purposes. It is intended for use in public spaces (city squares, school yards, etc.) and serves to raise public awareness about earthquakes. It has the technical capability to simulate earthquakes up to IX MCS, including IX MCS. It can provide participants with the experience of different types of earthquakes, from ground level to the 20th floor. It is built on a transport platform in the form of a container and is designed for transportation using a standard container trailer truck.

- Educational earthquake simulations up to 9th MCS scale
- Simulation of earthquake experience up to the 20th floor
- Container shape
- Transportable with a standard container trailer truck
- Ability to accommodate up to 4 users simultaneously
- Operated by a system with 2 operators
- Earthquake cabin powered by an electric motor hexapod
- Powered by the electrical grid or built-in generator
- Automatic switching between power sources

**HR.11.**

**Title** **DIY flipper**

**Authors** Author: LENARD KATUSIC
Mentor: SINISA TEVELLY
**Institution** **Technical School Zagreb**

**Description**

The DIY pinball project is built around an Arduino Nano microcontroller, which controls all components and allows player interaction. It includes three ultrasonic HC-SR04 sensors, an LCD screen, several micro switches, a bicycle bell creatively used as a scoring element, and a handmade wooden frame.

The ultrasonic sensors play a key role in scoring. They detect when the ball is very close to the sensor, interpreting it as a successful pass and awarding points: 100 for the first sensor, 200 for the second, and 300 for the third. The score is automatically updated on the LCD screen, with a small speaker playing a short melody for feedback. The system also features a mechanical target—a transparent container with a ball inside. If the ball is pushed strongly enough, it activates a micro switch, awarding 1000 points, representing the jackpot. This switch was repurposed from an old mobile phone, reflecting the DIY spirit.

Additionally, a bicycle bell is used to produce sound when hit by the ball, further enhancing the interactive gameplay. Two corner bumpers with elastic bands, made from wood and rubber bands, redirect the ball and contribute to a classic pinball-like feel.

At the bottom of the field, a micro switch detects when the ball passes between the paddles and exits the play area, signaling "Game Over" on the LCD. To restart, the player presses a button connected to the Arduino's RST pin, resetting the system.

The wooden frame is entirely handmade, with carefully measured and cut parts to prevent the ball from falling out during play. The paddles are mechanical, operated by a spring mechanism. The ball storage area is also designed to keep the ball safe during transport. The unfinished wooden design emphasizes creativity, recycling, and practical construction, reflecting the true DIY essence of the project.

**HR.12.**

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|---|---|
| **Title** | **Arduino voltage regulator with ammeter and voltmeter** |
| **Authors** | Author: LUKA KARLOVCEC |
| **Institution** | **STS Fausta Vrancica** |
| **Description** | Following a commercial power supply design, this project was intended to look and function as one. However, instead of regulation via a logic motherboard, it relies on the IRLZ44N MOSFET logic level. The component switch ensures that the entire range of input voltage supplied to the MOSFET is 100% available as output for the load.<br><br>The voltage regulator functions like any other, regulating the flow of voltage to the desired load, depending on the input source. Along with the pulse width modulation (PWM) carried out by the Attiny85 microcontroller, the board is equipped with two linear voltage regulators (LM317 and LP2981) to maintain a steady 5V input for internal components, including the LM358 operational amplifier. An I2C-controlled display is used for pre-sending information, along with a potentiometer to regulate the Attiny85 PWM cycle, ultimately controlling the voltage output. |

# Germany

**DE.1.**

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|---|---|
| **Title** | **Aquadea spray nozzles - for sustainable agriculture** |
| **Authors** | Werner Habermeier, Dr. Harald Herz |
| **Institution** | **Aquadea GmbH** |
| **Patent no.** | - |
| **Description EN** | Aquadea spray nozzles create natural vortex motion, energising water and enhancing oxygen binding – just like fresh spring water. The result? Healthier plants, stronger roots, and better yields.<br>Vitalised water improves irrigation by penetrating soil more efficiently and evenly, keeping it moist for longer. Plants absorb it more easily, leading to increased resistance against disease and stress.<br>Designed with sustainability in mind, Aquadea nozzles reduce water usage without compromising effectiveness – ideal for hot climates like Thailand. They also improve nutrient uptake, reducing fertiliser and glyphosate needs by up to 45%.<br>Perfect for organic farming, the nozzles leave no chemical residues and promote better soil health. The result is higher-quality, tastier produce.<br>Durable, easy to install, and compatible with existing irrigation systems, they withstand strong sunlight and salty water – a smart investment for rice fields, orchards, or vegetable crops.<br>**Tradition meets innovation** – Aquadea brings nature's wisdom and modern technology together, boosting the natural energy already in your soil and water.<br>Fast return on investment – approx. €100 per nozzle. |

**DE.2.**

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| **Title** | **Toxopheresis®: The Future of Immune Detoxification and Metabolic Reset** |
| **Authors** | Michael Husung, Herbert Hoehlein |
| **Institution** | **MedSelect GmbH** |
| **Patent no.** | - |
| **Description EN** | **Toxopheresis®** is a groundbreaking medical procedure designed to gently and effectively cleanse the blood of harmful substances. It removes toxins, inflammatory |

messengers, and misdirected autoantibodies—supporting immune and metabolic balance, especially in autoimmune and environmentally induced conditions.
Modern life exposes us to countless pollutants: PFAS from cookware, pesticides, microplastics, heavy metals, exhaust fumes, and more. These can overwhelm our natural detoxification systems, triggering chronic illness, inflammation, and immune dysfunction.
Toxopheresis® separates blood plasma from cells and purifies it through advanced techniques: adsorption, precipitation, and filtration. Pathogenic proteins and toxins are removed, and the cleaned plasma is reinfused—without needing a substitution solution or causing loss of vital elements.
This safe, well-tolerated process improves blood flow and helps restore immune regulation. It eliminates fat-soluble toxins (e.g., DDT, solvents, plasticizers), metals (lead, mercury, cadmium), inflammatory cytokines, and autoimmune antibodies—without chelating agents, reducing allergy risks.
**Benefits include:** reduced chronic viral and fungal loads, protection of the blood-brain barrier, enhanced energy production (ATP), and improved circulation. Toxopheresis® offers a powerful new approach to restoring health in a toxin-heavy world.
Fast return on investment – approx. €100 per nozzle.

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**DE.3.**

**Title** **Subsurface Reservoir Irrigation System: Year-Round Water Retention and Delivery for Sustainable Agriculture**

**Authors** Mitrovici Radu

**Patent no.** -

**Description EN**

The Subsurface Reservoir Irrigation System (SRIS) is a scalable, passive irrigation innovation designed to transform agriculture, horticulture, and permaculture. Unlike surface watering or traditional clay pot methods, SRIS uses durable underground reservoirs—constructed from reinforced plastic sheeting or industrial containers—to store rainwater, greywater, or runoff directly beneath crops.
Water is delivered through capillary action and controlled wicking, maintaining consistent soil moisture exactly where

plants need it—at the root zone. This minimizes evaporation, surface loss, and overwatering.

**Key benefits:**

- Long-term underground water retention
- Up to 80% reduction in irrigation needs
- Protection from evaporation and contamination
- Adaptable to diverse crops, field sizes, and climates
- Built with eco-friendly, corrosion-resistant materials

Ideal for small farms, greenhouses, reforestation, and drought-prone areas, SRIS supports climate-resilient, low-input farming. It reduces dependence on fossil-fuel-based pumping and ensures steady hydration, even in arid conditions.

By combining low-tech design with high efficiency, SRIS offers a sustainable solution for global food security, ecological land management, and regenerative agriculture.

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**DE.4.**

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| **Title** | **HabitHero: Voice-Powered Gamification for Kids with ADHD** |
| **Authors** | Sergiu Popovici |
| **Patent no.** | - |
| **Description EN** | HabitHero is a voice-powered game that helps kids with ADHD master daily routines without frustration. Instead of nagging reminders, children simply talk to their HabitHero friend to log tasks and unlock rewards through playful challenges.<br>Our secret? Turning chores into adventures! Brushing teeth becomes a "superhero power-up." Cleaning their room transforms into a "treasure hunt." A friendly animated coach guides them with encouragement, not lectures.<br>Developed with child psychologists, HabitHero uses:<br>- Voice commands (no typing needed)<br>- Instant rewards (celebrations, points, collectibles)<br>- Smart mood detection (suggests breaks when frustrated)<br>Parents get a simple dashboard to track progress and celebrate wins together. Early tests show 80% better habit completion compared to traditional methods.<br>By making routines fun instead of stressful, HabitHero builds confidence and independence - with zero nagging required. |

Why it stands out:
• Designed with ADHD kids, not just for them
• Voice-first approach removes barriers
• Clinically-proven techniques, playfully delivered
Perfect for homes, schools, and therapists - finally, a habit helper kids actually want to use!

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**DE.5.**

**Title** **RegenCity – Renewable Power in a Box**

**Authors** Costin Cozan

**Patent no.** -

**Description EN**

RegenCity is a compact, all-in-one renewable energy system designed to bring immediate energy independence to any home. Built into a 2x2x2 meter crate, it combines key components—pellet burner with storage and thermal tank, solar panels with battery storage, and a smart control module—into a single, modular unit.
It's fast to deploy, easy to maintain, and designed to scale. Whether for single homes, eco-developments, or disaster recovery zones, RegenCity makes clean energy access simple and immediate.
One crate. Full power. Ready to go.

# Hong Kong

**HK.1.**

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| **Title** | **Smart-hygiene Toilet Robot** |
| **Authors** | Siu Tung LUI and Corina Man Ngo CHENG |
| **Institution** | **Simply Mask Ltd** |
| **Patent no.** | Invention Patent UK (GB2612430) and Hong Kong Design IP Patent (2422794.6) |
| **Description** | The Smart-hygiene Toilet Robot eliminates 99.9% of aerosols generated during toilet flushing within seconds, compared to traditional exhaust fans that require over 30 minutes with low efficiency. It is cost-effective, comparable to traditional ventilation fans. It features UVC sterilization to sanitize the interior toilet bowl area and sensors for real-time air-quality monitoring, ensuring all pollutants remain below breathing zone, bringing bathroom hygiene into the new era. It is a already patented, design IP and ISO13485:2016 medical-grade device, backed by collaboration with scientist from the BeiHang University for Computational Fluid Dynamics (CFD) testing, also demonstrates 99% aerosol elimination. 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 initial commercialization stage. Corina's creative design features a charming pink cartoon cat, "Air Flush Miao Miao," making this essential pandemic solution accessible for everyday home. She also developed various models such as the “Longrange Puppy”, "IAQ Duck" and “Quiet Shark" for specific application. Positive patent valuations. |

# India

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| **IN.1.** | |
| **Title** | **AI Lecture Intelligence Platform** |
| **Authors** | Gouni Aashay Reddy, Raman Teja Venigalla, Devi Kavya Potluri |
| **Institution** | **Physitech Consultancy Services Private Limited** |
| **Description EN** | The AI Lecture Intelligence Platform is a cutting-edge educational technology innovation designed to transform traditional classroom experiences into intelligent, interactive, and highly personalized learning environments. Developed by PHYSITECH Consultancy Services, the platform leverages dual-camera capture and advanced AI processing to record and analyze classroom sessions in real time.<br>Its comprehensive services include a student learning portal, faculty insight dashboard, and ethical AI safeguards to ensure responsible data use. The platform automatically generates instant, searchable lecture notes, enabling students to revisit and review content efficiently. With personalized study paths and data-driven teaching tips, it supports differentiated instruction tailored to each learner's needs.<br>Furthermore, it ensures secure, compliant storage of educational data, promoting both accessibility and privacy. By bridging gaps between lecture delivery and student understanding, the AI Lecture Intelligence Platform not only enhances learning outcomes but also empowers educators with actionable insights—making it a transformative solution for modern education systems. |

# Indonesia

Represented by

***Indonesian Invention And Innovation Promotion Association (INNOPA)***

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| **ID.1.** | |
| **Title** | **SmartELY: Smartwatch with Smart Monitoring & Local Wisdom-Based Health Recommendations for Elderly Towards Society 5.0** |
| **Authors** | Risang Gading Bhamakerti, Athira Marwa Arrofifah, Elang Dilangit Biru Putro Nugroho, Athala Wiksa Pradipta, Selena Dahayu Larasati, Safira Putri Destinari, Sarah Larasati |
| **Institution** | **SMK Negeri 5 Surakarta, SMA Negeri 2 Surakarta, SMA Negeri 1 Surakarta, SMA Negeri 5 Surakarta, SMA Negeri 4 Surakarta** |
| **Patent** | EC00202520700 |
| **Description EN** | SmartELY is an innovative health monitoring smartwatch designed specifically for elderly users that integrates Society 5.0 principles with local wisdom-based health recommendations. This research addresses Indonesia's growing elderly population, currently at 33.6 million (11.75% of the population), and the increasing dependency ratio of 17.08%, which presents significant healthcare challenges. Following Health 5.0 principles, the system seamlessly combines human-centered design with advanced digital technologies to create personalized healthcare experiences. The smartwatch features real-time monitoring of vital signs (heart rate, SpO2, stress levels, sleep quality) while incorporating traditional Indonesian herbal medicine recommendations tailored to users' health conditions. This unique integration of modern technology with cultural healing practices represents a key aspect of Health 5.0, where healthcare is personalized, preventive, and culturally relevant. Using a qualitative descriptive approach with 50 elderly respondents aged 64-84 at Werdha Aisyah Nursing Home, the research demonstrated high user acceptance with 90% of participants expressing interest in the technology and a 90% System Usability Scale score. By preserving traditional health wisdom while embracing technological advancement, SmartELY exemplifies the Society 5.0 vision of human-centered innovation that improves quality of life, supports aging independence, and contributes to SDG Goals 3 (Good Health and Well-being) and 10 (Reduced Inequalities). |

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| **ID.2.** | |
| **Title** | **CASTOCIDIN: Hydrogel patch from Coralbush (Jatropha multifida L.) Latex Extract and White Turmeric (Curcuma mangga) Extract as an Antibacterial Agent Against Staphylococcus aureus in Diabetic Wound Healing** |
| **Authors** | Putu Ayu Krishna Jihvani, Komang Bukyan Jina Raksita |
| **Institution** | Faculty of Medicine and Health Sciences, Warmadewa University |
| **Description** | Castocidin is an innovation wound dressing designed to respond the rising prevalence of diabetic ulcers. Diabetic wounds are prone to Staphylococcus aureus infections, delaying healing and increasing complications. While antibiotics like clindamycin are effective, they contribute to resistance, necessitating alternative treatments. This experiment evaluates a hydrogel containing Coralbush (Jatropha multifida L.) latex extract (75%) and white turmeric (Curcuma mangga) extract (25%) with PVA/chitosan-based hydrogel against S. aureus compared to clindamycin 1% ointment. Using an experimental design, antibacterial activity was assessed via disk diffusion, with triplicate inhibition zone measurements analyzed by One-Way ANOVA and Tukey's HSD. The hydrogel showed an inhibition zone of 18.8 ± 0.3 mm, significantly smaller than clindamycin (21.5 ± 0.2 mm, $p = 0.005$). While demonstrating antibacterial potential, its efficacy remains lower than clindamycin, requiring further formulation improvements. However, it is effective as an antibacterial against Staphylococcus aureus, making it a potential alternative wound dressing for diabetic wounds in the future and helping reduce bacterial resistance. |

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| **ID.3.** | |
| **Title** | **VR COMPUTHINK** |
| **Authors** | Dias Aziz Pramudita, Adira Bintang Permana, Ratna Wardani, Bruri Triyono, Thomas Köhler |
| **Institution** | Technische Universität Dresden, Universitas Negeri Yogyakarta, Universitas Muhammadiyah Surakarta |
| **Description** | This invention introduces COMPUTHINK, a Virtual Reality (VR) game-based learning system designed to develop and enhance computational thinking skills among students. The system combines immersive VR technology with interactive learning modules that include quizzes, puzzles, and scenario-based challenges. Through an engaging 3D environment, learners are guided to practice core components of computational thinking such as decomposition, pattern recognition, abstraction, and algorithm design. COMPUTHINK not only fosters problem-solving and logical reasoning but also increases student motivation and engagement through gamified learning experiences. Designed to align with 21st-century digital literacy goals, the platform offers real-time feedback, adaptive learning pathways, and performance analytics. This invention provides an innovative educational tool that supports both individual and collaborative learning, bridging the gap between traditional instruction and immersive digital learning environments. |

# Iran

Represented by

***IR TOP INVENTORS***

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|---|---|
| **IR.1.** | |
| **Title** | **Smart home physiotherapy robot (PhysioBot)** |
| **Authors** | **Ali Safar, Mohammad Namdar, Morteza Faghanifam** |
| **Description EN** | A smart and portable robot that performs physiotherapy movements at home for patients with muscle injuries, stroke, joint injuries and the elderly. By connecting to the patient's body and performing smooth and standard movements at specific angles, this robot performs the physiotherapy process safely, accurately and at home. Equipped with mechanical arms with pressure sensor and protractor. Programming via app (type of movement, angle, number and duration of each movement). Heart rate and blood oxygen monitoring sensor during movements<br>Ability to adjust the level of difficulty and speed of movements according to the patient's condition. Sending daily reports to the treating physician via app. Alarm system in case of severe pain, pressure drop or movement outside the permitted range. Automatic + manual mode (remote control by physiotherapist)<br>Suitable for the elderly, stroke patients, sports injuries and people who cannot visit the clinic regularly. Savings on travel costs and physiotherapy sessions. Ability to be used in rehabilitation clinics and hospitals. Target market: Iran (with a large population of elderly and sick people) + neighboring countries. Ability to expand to versions for hands, feet, neck and back |

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| **IR.2.** | |
| **Title** | **Making a Pad (medicinally formulated) from the Effective Ingredients of Nettle and Abu Jahl Watermelon Medicinal Plants for Diabetic Patients** |
| **Authors** | Haniyeh Ghassabzadeh Alamdari, Maryam Hekmatnezhad, Sakineh Safaei Javid, Tooba Torabi Goodarzi |
| **Description EN** | This innovative diabeti□□ad is form□lated from t□o □o□erf□l traditional □ranian medi□inal □lants□nettle and Ab□Jahl □atermelon □□itr□ll□s □olo□ynthis□□ |

This innovative diabetic pad is formulated from two powerful traditional Iranian medicinal plants: nettle and Abu Jahl watermelon (Citrullus colocynthis). Developed as a modern, non-invasive solution, it offers a natural alternative to chemical medications for managing Type 1 and Type 2 diabetes - without the side effects or risk of hypoglycemia often seen with conventional drugs.
How It Works:
The pad uses a transdermal delivery system, gradually releasing active plant compounds through the skin. These compounds support blood sugar regulation through multiple scientifically proven mechanisms:
◦ Regenerating pancreatic beta cells and boosting insulin production; ◦ Reducing glucose absorption in the intestines; ◦ Enhancing insulin sensitivity in muscles, fat, and liver; ◦ Improving liver enzyme activity for better glucose metabolism; ◦ Protecting the pancreas, liver, and kidneys from oxidative damage and diabetic complications; ◦ Regulating key metabolic enzymes related to glucose and lipid balance
Clinical Application:
◦ Type 2 Diabetes: Improves insulin sensitivity, lowers fasting and post-meal blood glucose, and enhances peripheral glucose uptake; ◦ Type 1 Diabetes: Supports natural insulin production as a complement to insulin therapy.

**IR.3.**

**Title** **Clinical evaluation of polyphenol tablets from grape processing waste in enhancing the body's immune system**

**Authors** Bahram Hassani, Shahin Gavanji, Dayana Hassani
Institution World Academy of Medical Sciences

**Description EN**

Herbal medicine is rooted in traditions, and many cultures have relied on plants to promote health and prevent illness. The effectiveness of these herbs can often be attributed to their bioactive compounds, which interact with the body to strengthen the immune response. The polyphenolic compounds of Vitis vinifera waste have been recognized for their medicinal properties and have a wide range of

antimicrobial, anti-inflammatory, and immunomodulating effects. This study aimed to investigate the impact of polyphenolic tablets on inflammatory and immune factors. Initially, the microcapsules of polyphenolic compounds were produced and optimized. Then the DPPH and ABTS were evaluated. For the toxicological assessment of polyphenolic compounds, the 30 adult NMRI mice were randomly divided into four groups and received different doses. In the next step the polyphenolic tablets were produced and to choose the optimal composition of the tablet, the various parameters were evaluated. In our experiment, the clinical trial phase was conducted on 384 Participants of whom 295 were male (76.82%) and 89 were females (23.18%) and the inflammatory and immune factors were evaluated. Our research results indicate that the polyphenolic tablet has a reducing effect on IL-8, IL-6, TNF-α, and hs-CRP, subsequently leading to anti-inflammatory effects. The present study showed that polyphenolic compounds have anti-inflammatory potential and this potential benefit can be further examined in future research.

**IR.4.**

**Title**

**Diabetic Wound Healing Device Using Nano Titanium Plasma**

**Authors**

Mehrdad Fojlaley, Abdolrashid Beykizadeh

**Description EN**

Diabetes, or sugar disease, is a common and disabling condition that can cause serious problems for the body's organs. One of these problems is chronic and treatment-resistant ulcers that typically develop on the feet of these patients. This condition is called diabetic foot. Oxygen is a diatomic molecule that is inherently stable, and when we apply energy of 12 electron volts to the O2 molecule, it breaks the oxygen molecule and transforms it into negative oxygen ions. Since negative oxygen ions by themselves do not have an identity or definition in nature, they quickly react with surrounding microorganisms, oxidizing and eliminating them, and ultimately, besides re-disinfecting, they bond with each other again to convert back into oxygen. Following this rule, the range of oxygen is increased, leading to unimaginable tissue repair.

| IR.5. | |
|---|---|
| **Title** | **AI-Driven and Data-Guided Autonomous Urban Air Mobility for Smart Cities: A Sustainable Integration of Aviation Systems and Architectural Design** |
| **Authors** | Maneli Sotoudeh, Amitis Passandideh, Sanya Doustifam, Bahar Forouzan Far, Saghar Saeidi, Amin Heidari Pourafshar<br>Mentor: Alireza Jabarizadegan |
| **Description EN** | To develop a multidisciplinary framework that integrates AI-driven,<br>data-guided autonomous Urban Air Mobility into smart city infrastructures, emphasizing sustainability in aviation systems and architectural design.<br>To analyze the potential of AI and real-time data analytics in managing and optimizing UAM operations.To design sustainable UAM nodes and infrastructure embedded within the urban architectural context. To examine the synergy between autonomous aerial systems and smart city platforms (IoT, 5G, digital twins).<br>To address energy efficiency and environmental impact in urban air mobility systems.<br>To propose a model for adaptive, intelligent, and sustainable aerial transport architecture |

| IR.6. | |
|---|---|
| **Title** | **Integrated rotational robotic joint, consisting of motor, driver, controller and fractional speed reducer gearbox** |
| **Authors** | Alireza ABDOLKARIMI |
| **Description EN** | Robotic joints have different types and the most common type is revolt joint which can rotate around an axis and normally consists of motor, electronic components, encoders and in most cases mechanical brakes alongside gearboxes or speed reducers. The invented device is a type of reducer gearboxes which is mounted in a robotic joint and named Fractional gearbox with a very high conversion ratio and small size, and is used in mechatronics and robotics, especially robotic arms, CNC machines, animal or humanoid robots, etc. The reason for naming this model of gearboxes as Fractional gearboxes is the use of division, multiplication and subtraction operations and fractional |

numbers in their conversion ratio formula, unlike other gearboxes that use division or other simple mathematical operations.
Therefore, due to the wide range and the possibility of combining different types of gears with different teeth and modules and achieving different conversion ratios, a software has been developed and used in the design of the gearbox to find the most optimal gears to achieve the conversion ratio in desired size by examining the available gears in the market in tens of thousands of different modes.

| | |
|---|---|
| **IR.7.** | |
| **Title** | **Piezoresistive Skin Sensors Made with Graphene for Medical and Monitoring Applications** |
| **Authors** | Reza Ansari Khalkhali, Alireza Nouri Rodsari, Sajjad Amoupour Roudkoli, Pouya Raoof, Erfan Zare |
| **Description EN** | The newly developed piezoresistive sensors we have designed and fabricated represent a significant advancement in accurate medical measurements, revolutionizing patient monitoring. These sensors have proven highly effective in managing critical conditions such as brain injuries, visual impairments, and arterial pressure control in patients undergoing complex surgeries. Additionally, in advanced pulmonary, cardiac, and renal diseases, they serve as essential tools for precise health monitoring and improving clinical outcomes. These enhanced sensors also have the potential to save the lives of many patients in acute and unstable conditions and mark a major leap forward in the advancement of medical instrumentation technology in the field of healthcare and treatment. |

# Iraq

**IQ.1.**

| | |
|---|---|
| **Title** | **A New Technique for Estimating Phagocytic Activity of Cells** |
| **Authors** | Omar Sadik Shalal |
| **Institution** | Middle Technical University |
| **Patent** | - |
| **Description EN** | This innovative technique involves utilizing bacteria labeled with fluorescent nanoparticles as bait to evaluate the phagocytic activity of cells, including mononuclear and neutrophil cells. The procedure entails mixing labeled bacteria with a drop of blood on a glass slide, incubating the slide at 37°C for three hours, and examining it under a fluorescent microscope. Labeled bacteria appear as fluorescent entities inside or outside the cells. The phagocytic activity rate is calculated by counting the number of cells containing fluorescent bacteria, dividing it by the total cell count, and multiplying the result by 100%. This method boasts a low error margin (less than 0%), as it relies on fluorescence-based detection rather than traditional staining methods, overcoming issues of dye crystallization and incomplete bacterial staining. |

# Kazakhstan

**KZ.1.**

| | |
|---|---|
| **Title** | **Boosting EV Performance with Smart Shift: Adaptive Gear Unit for Next-Gen Transmission Efficiency** |
| **Authors** | Anton BASHIROV, Vitaliy SAVINKIN<br>Manash Kozybayev North Kazakhstan university |
| **Patent no.** | - |
| **Description** | This research explores a novel approach to electric vehicle (EV) transmission design, targeting enhanced energy efficiency and operational reliability. In response to the rapid expansion of the EV sector and the critical need to optimize powertrains, this study introduces an adaptive gear unit that minimizes energy losses during power and torque transmission from the electric motor to the drive wheels.<br>The objective is to develop a transmission system with a simplified architecture and refined kinematic parameters, capable of dynamically adjusting to varying driving conditions while maintaining high performance. A comparative analysis of current EV transmission technologies and torque transmission schemes is presented, justifying the conceptual and structural choices of the proposed solution.<br>Key focus is placed on evaluating transmission efficiency and its influence on output performance. The developed transmission integrates an adaptive gear unit capable of transmitting high levels of power and torque with minimal energy expenditure. The design and performance calculations were executed using advanced CAD tools such as KOMPAS-3D and simulation environments including MATLAB Simulink.<br>The practical innovation of this work lies in its applicability to mid-size serial electric vehicles, offering a scalable and efficient drivetrain solution. Beyond its industrial potential, the results contribute to academic programs in automotive engineering and mechatronics, supporting the next generation of electric mobility development. |

# Korea

by

*Toronto International Society of Innovation & Advanced Skills (TISIAS)*

| **KR.1.** | |
|---|---|
| **Title** | **PERSONAL USER-FRIENDLY CUSTOM NAVIGATION** |
| **Authors** | SIWOO LEE |
| **Institution** | **School of Mechanical Engineering, Korea University, Korea** |
| **Patent** | N/A |
| **Description EN** | The driver can select the route of his/her own preference (shortcuts, good road condition, reduced distance, less stagnation and traffic lights, etc.) and reduce the number of accidents caused by careless driving or bad driving habit through advantageous recommendations of route indicated by this customized navigation matched for the driver. For preference setting, the driver can select up to 3 user-rank settings, and 3 ranks are ranked from first priority to second and then third. In addition user settings, recommended routes can also be shared by mutual users of the navigation app helping to expand their own knowledge base of roads. The app also allows drivers to be aware of advanced information such as weather, road surface condition, school hours, etc. which allows the driver to fully focus on his/her driving only. |

# Kosovo

**KZ.1.**

**Title**

**Impact of roasting on the oxidative stability of walnut oil during thermal processing utilizing ATR-FTIR spectroscopy in conjunction with chemometrics**

**Authors**

Fatos Rexhepi, Ramize Leku

**Faculty of Food Technology, University "Isa Boletini" Mitrovica, Republic of Kosovo**

**Patent no.**

**Description**

The impact of roasting on the oxidative stability of walnut oil was examined by analyzing the alterations in the properties of oils derived from unroasted and roasted kernels during thermal treatment at 180 °C. Walnut kernels were roasted at 140°C for 20 minutes before cold pressing for oil extraction. The roasting of kernels enhanced the thermal stability of the oil, as the viscosity and density of the oil underwent rapid alterations during heating. The rate of rise in density and viscosity of the oil was much lower in roasted walnut oil compared to unroasted walnut oil during heating at 180 °C. The roasting of kernels markedly elevated the induction period of walnut oil from 1.12 to 2.89 days during storage.

The heating process resulted in reductions in the areas of the bands at 3007 and 722 $cm^{-1}$, as well as in the area ratios of 3007/2854 and 722/2854 $cm^{-1}$ in both oil samples, indicating differences in oxidative stability between roasted and unroasted samples. Moreover, heating resulted in elevated areas of the bands at 3475 and 1744 $cm^{-1}$, as well as increased ratios of 3475/2854 $cm^{-1}$ and 1744/2854 $cm^{-1}$, indicating the development of primary and secondary oxidation products in the heated oils derived from unroasted samples. All of these modifications, including PCA analysis, demonstrate that oil from roasted walnuts exhibits greater thermal stability than oil from unroasted walnut samples. This research demonstrated that oil oxidation may be efficiently and swiftly monitored using ATR-FTIR spectroscopy.

# Japan

**JP.1.**

| | |
|---|---|
| **Title** | FLOATABLE HOUSE |
| **Authors** | Shinnosuke Miura<br>Akano Miura |
| **Institution** | Toyosu Trading Co., Ltd. |
| **Description** | This invention is developed to support environmental protection and disaster resilience in Aomori City, Japan. It integrates a solar panel system, a buoyant raft foundation, and a submerged motor for controlled movement. The structure, referred to as the Floatable House, is designed to adapt to fluctuating water levels during floods.<br>As the water rises, the entire house floats upwards, reducing the risk of structural damage and protecting inhabitants and essential equipment. The solar panels provide sustainable energy, allowing off-grid operation even during power outages. The submerged motor assists in stabilizing the structure or repositioning it slightly as needed.<br>Additional features may include:<br>Battery storage for energy continuity<br>Water level sensors for early flood detection<br>Wireless communication modules for remote monitoring<br>Eco-friendly materials that minimize environmental impact<br>This system offers a promising solution for flood-prone areas, contributing to urban resilience and climate adaptation strategies. |

# 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**

**Development of Bioplastic Blue Light Filters Infused with Plant Extracts: An Eco-Friendly Innovation**

**Authors**

Chio Lok In Maxwell; Liu Chon Wa Marques; Wan Chi Fong

**Institution**

Yuet Wah College

**Patent**

Not Applied yet

**Description EN**

The increasing prevalence of electronic devices like smartphones has brought concerns regarding blue light exposure, which is linked to adverse health effects such as eye strain, retina damage, disrupted sleep cycles, and long-term conditions like depression and heart disease. Current solutions, such as commercially available blue light filters, mitigate these issues but contribute to environmental problems due to their non-biodegradable nature. This project introduces an innovative alternative: bioplastic blue light filters infused with plant pigments, combining functionality with sustainability.

Bioplastics were created using tapioca starch as the base material, with pigments extracted from food waste such as carrots and bell peppers. These plant-based extracts were incorporated into the bioplastic to enhance blue light absorption. Laboratory tests revealed that bioplastics containing red bell pepper and carrot pigments achieve blue light filtration rates of 10%–16%, comparable to traditional filters. Usability evaluations by 100 participants confirmed the materials' compatibility with touch screens and readability, with carrot-based bioplastics preferred for their superior user experience.

This eco-friendly solution leverages food scraps as raw materials, significantly reducing both production costs and environmental impact. By addressing the dual challenges of blue light exposure and plastic pollution, this project represents a practical and innovative breakthrough for health-conscious and sustainability-focused consumers.

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|---|---|
| **MC.2.** | |
| **Title** | **Potent in vivo protection against co-exposure with SOA and transition metal caused inflammatory response of zebrafish by Paeoniflorin** |
| **Authors** | Wong Man Cheng, Wong Hao Ian, Ng Ka Him |
| **Institution** | Yuet Wah College |
| **Patent** | Patent pending |
| **Description EN** | Particulate matter enters human bodies every day, leading to many health problems to irritation or even fatal conditions. One classification of particulate matter is secondary organic aerosol, which, in previous studies, had shown to have toxic properties when it is exposed to transitional metal ions found on human bodies. To alleviate this problem, we turned to traditional Chinese herbal medicine for answers. Paeonia lactiflora, an Asian flower whose various parts have been used as medicine since ancient times, have shown promising results as an anti-inflammatory, and in this study, we tested co-exposure of secondary organic aerosol and transitional metal ions with Paeonia lactiflora extract to investigate the possible relief Paeonia lactiflora could provide to this dilemma of particulate matter. |

# Malaysia

Represented by University Malaysia Perlis

| MY.1. | |
|---|---|
| **Title** | **Gas Sensor From Oil Palm Tree Waste – WASTE-TO-WEALTH** |
| **Authors** | Muhammad Mahyiddin Ramli, Shazlina Johari, Norizah Abd Karim, Ismariza Ismail, Mohd Fairus Ahmad, Norhsamsuri Ali, Nurul Huda Osman, Rafeezul Mohamed |
| **Institution** | **Universiti Malaysia Perlis** |
| **Patent no.** | **PI2022006029** |
| **Description EN** | According to Malaysian Palm Oil Council (MPOC), oil palm tree has accumulated about 4.49 million hectares of land in our country. However, it was estimated at around 75.61 million metric tons of oil palm tree waste is produced in the year of 2015 only. It is projected that in 2020, around 70 – 110 million metric tons per year will be produced. Current solution; 1) Open burning – which cause air pollution. 2) Energy conversion – only small amount of waste is used. Even that, it's not efficient. Second thing, In 2019, Malaysia is ranked 50th place of most polluted countries in the world, with a PM2.5 rating of 19.36 µg/m³. Up to date, we don't have smart integrated air quality monitoring system. Current solution are commercial sensors which are MOS and SE gas sensor – but not sensitive, high operating temperature and high-power consumption. |

| MY.2. | |
|---|---|
| **Title** | **Smart HEA Thin Film For Next-Gen Antennas** |
| **Authors** | Nur Izzati Muhammad Nadzri, Arnita Surieya Sangar, Nur Hidayah Ramli, Nurul Razliana Abdul Razak, Muhammad Firdaus Mohd Nazeri, Dewi Suriyani Che Halin, Nur Athirah Sidek |
| **Institution** | **Universiti Malaysia Perlis** |
| **Patent no.** | PI202200478 |
| **Description EN** | This invention focuses on a CoCrFeMnNi high-entropy alloy (HEA) thin film fabricated via RF magnetron sputtering at 300°C, followed by vacuum annealing at 500°C to enhance its structural and electrical properties for antenna applications.<br>Comprehensive material characterization was carried out to |

evaluate its performance. Grazing Incidence X-ray Diffraction (GIXRD) showed a clear transition from an amorphous to a crystalline phase after annealing, with new peaks indicating the formation of manganese oxide (MnO). Field Emission Scanning Electron Microscopy (FESEM) revealed that the as-deposited film (S300) had a refined and smooth surface, while the annealed film (300-A500) developed a coarser morphology due to MnO formation. Atomic Force Microscopy (AFM) confirmed surface uniformity in the as-deposited film, which is vital for reducing signal loss in antenna applications.

Electrical characterization showed promising results. Four-point probe measurements recorded a conductivity of $4.17 \times 10^5$ S/m, and Hall effect measurements indicated suitable carrier mobility and semiconductor-like behavior—supporting its capability for high-frequency use.

Based on these favorable structural and electrical properties, an antenna was designed using CST Microwave Studio Suite 2024. The simulation demonstrated a gain of 2.4 dBi, confirming the HEA thin film's potential in transmitting and receiving signals effectively.

Altogether, this study presents a smart, durable, and high-performing thin film material that supports the development of next-generation antennas for 6G communications, IoT systems, wearable electronics, and flexible wireless devices.

**MY.3.**

| | |
|---|---|
| **Title** | **From Dirt to Bright: Reinventing SS-$TiO_2$** |
| **Authors** | Dewi Suriyani Che Halin, Mohd Arif Anuar Mohd Salleh, Rozyanty Rahman, Ayu Wazira Azhari, Nur Izzati Muhammad Nadzri, Kamrosni Abdul Razak |
| **Institution** | Universiti Malaysia Perlis (UniMAP) |
| | PI2021004375/ MY-172024-A |
| **Description EN** | The Smart Surface of $TiO_2$ (SS-$TiO_2$) is a self-cleaning thin film developed as a surface cleaning for solar cell applications. The SS-$TiO_2$ is used to prevent dirt, debris or organic pollutants from contaminated onto glass wall, door, tiles or any surfaces. $TiO_2$ is one of semiconductor which is widely used as a photocatalyst in since $TiO_2$ can exhibit both photocatalytic and photo-induced superhydrophilicity properties. The $TiO_2$ is a favorable properties like non- |

toxicity, chemical inertness, and stability over a wide pH range under irradiation conditions. It is a strong bactericidal activity when exposed to irradiation close to UV light. This invention was focused on the reinventing SS-$TiO_2$ thin film doped with silver (Ag) and adding a small amount of polyethylene glycol (PEG).

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| **MY.4.** | |
| **Title** | **Self-Healing Eco-Friendly Hybrid Biocomposite for Underground Storage Tanks (USTs): Revolutionizing Fuel Storage** |
| **Authors** | Rozyanty Rahman, Nur Rusyidah Mustapa, Mohamad Syahmie Mohamad Rasidi, Luqman Musa, Mohammad Firdaus Abu Hashim, Dewi Suryani Che Halin |
| **Institution** | **Universiti Malaysia Perlis** |
| **Description EN** | Patent application No.: PI2021005964<br>This innovation introduces a groundbreaking self-healing, eco-friendly hybrid glass/kenaf fiber/fly ash biocomposite material specifically engineered for underground storage tanks (USTs). Traditional USTs are prone to corrosion, leaks, and environmental contamination, posing serious risks to soil and groundwater. This hybrid biocomposite addresses these challenges through a unique combination of polymer, glass fiber, kenaf natural fibers and fly ash infused with microcapsules containing healing agents. When cracks or damages occur, the microcapsules rupture, releasing the agents that react with environmental elements to autonomously seal the damage, thus extending the tank's lifespan and preventing leaks.<br><br>The eco-friendly nature of the material reduces reliance on petroleum-based resins and supports sustainability goals. Its high durability and resistance to chemical degradation make it ideal for harsh underground conditions. Additionally, the material is lightweight, reducing transportation and installation costs.<br><br>This self-healing hybrid biocomposite not only enhances safety and environmental protection but also reduces maintenance and replacement costs, making it a transformative solution for fuel storage industries worldwide. |

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| **MY.5.** | |
| **Title** | **From Waste to Wonder: Enhancing Foamed Concrete with Eggshell Powder** |
| **Authors** | Md Azree Othuman Mydin & Mohd Mustafa Al Bakri Abdullah |
| **Institution** | **Universiti Sains Malaysia & Universiti Malaysia Perlis** |
| **Description EN** | - This pioneering investigation presents a groundbreaking approach to sustainable construction by evaluating the use of eggshell powder (ESP) as a partial cement substitute in the production of lightweight foamed concrete (LWFC). With eggshells being a rich source of calcium carbonate, their calcination at 900 °C produces reactive calcium oxide which can effectively participate in cement hydration processes. The study capitalizes on this potential to create more eco-friendly concrete while addressing the growing issue of eggshell waste. Ten LWFC mixtures were developed with two target densities (600 and 1200 kg/m³), each incorporating ESP in proportions from 0% to 20%. A comprehensive evaluation of fresh, mechanical, transport, thermal, and microstructural properties was conducted. Results revealed that increasing ESP content reduced slump flow and setting time, while enhancing transport properties such as water absorption, sorptivity, and air permeability. Mechanically, the optimal performance was observed at 15% ESP replacement, with significant strength gains over the control mixes. At 28 days, compressive, flexural, and tensile strengths improved by up to 44.3%, 41.2%, and 41.7% for the 600 kg/m³ mix and even more up to 57.6% for the 1200 kg/m³ mix. SEM and pore dispersion analyses confirmed improved microstructure and greater formation of C-S-H compounds at the optimal replacement level. The findings highlight ESP as a promising, sustainable binder in LWFC production. Its application offers a dual benefit: reducing cement usage and repurposing agricultural waste paving the way for more durable, cost-effective, and environmentally responsible building materials. |

| MY.6. | |
|---|---|
| **Title** | **A Method to Improve Biogas Generation using Azadirachta indica-derived $Fe_3O_4$-NPs on the Anaerobic Digestion Environment, utilizing Zea mays L. and Bovine Manure** |
| **Authors** | Huwaida Ahmed Salem Bahashwan, Mohamad Anuar Kamaruddin, Rasyidah Alrozi and Norazian Mohammed Noor |
| **Institution** | **School of Industrial Technology, Universiti Sains Malaysia, 11800, Pulau Pinang, Malaysia**<br>**Chemical Engineering Studies, College of Engineering, UiTM Cawangan Pulau Pinang, Pulau Pinang, Malaysia**<br>**Faculty of Chemical Engineering Technology, Universiti Malaysia Perlis, Perlis, Malaysia** |
| **Description EN** | The impact of Azadirachta indica-derived green-synthesised iron oxide nanoparticles (IONPs) on the anaerobic digestion (AD) of cow manure and Zea mays L. straw is investigated in this work. For 40 days, reactors were run in mesophilic conditions with different IONPs concentrations (0, 10, 20, 40, and 80 mg/l). Along with the generation of biogas and methane, significant metrics such as pH, VFAs, TAC, SCOD, and $NH_3$-N were tracked. The findings demonstrated that microbial activity and biogas generation were improved by low concentrations of IONPs (10–20 mg/l), with 10 mg/l producing the greatest methane content (52.14%). On the other hand, because of potential nanoparticle toxicity, greater doses (≥40 mg/L) hindered methanogenesis performance. These results imply that, when used at the right concentrations, biosynthesized IONPs can efficiently increase methane generation, providing a long-term improvement for the treatment of lignocellulosic waste. (max 250 words) |

| MY.7. | |
|---|---|
| **Title** | **FRUITICLE PAPER** |
| **Authors** | Hadiff Bin Mohd Nor Hayat, Aufa Zafryl Bin Azizi, Muhammad Eiman Hazieq Bin Mohd Fadli, Muhammad Aqil Ar-Rayyan Bin Suhaimi, Adam Raiqal Bin Shahrul Affendi, Muhammad Raef Bin Khairol Azri, Akhill Hadiff Bin. Mohd Hazrin, Muhammad Syahier Rafieq Bin Mohd Sahak, Mukhlis Nazmi Bin Zulzaimi, Lisneza Binti Roseli |
| **Institution** | **HULU SELANGOR SCIENCE SCHOOL** |

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| **Patent no.** | **PENDING** |
| **Description** | FRUITICLE PAPER is an innovation product designed to reduce deforestation and waste while offering an eco-friendly alternative to traditional paper making. FRUITICLE PAPER aim to reuse the things that we usually throw away, specifically targeting peels from fruit, such as orange, bananas, mangosteen and other fruits. Utilising these biodegradable waste materials helps reduces the reliance on wood pulp an minimalizes landfill waste. By transforming these fruit waste into a valuable resource, this innovation not only reduce environmental impact but also offering a practical , colourful (base on the colour of the peel) and an eco-friendly alternative to traditional paper. |

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| **MY.8.** | |
| **Title** | **Breathing the Future: How the Climate Change Changes Malaysia's Air** |
| **Authors** | Norazian Mohamed Noor, Izzati Amani Mohd Jafri, Ahmad Zia Ul-Saufi, Norazrin Ramli, Mohamad Anuar Kamaruddin, Mohd Remy Rozainy Mohd Arif Zainol |
| **Institution** | **Universiti Malaysia Perlis** |
| **Patent no.** | - |
| **Description EN** | Breathing the Future: How Climate Change Changes Malaysia's Air addresses the urgent challenges posed by worsening air quality in Malaysia, driven by climate change phenomena such as rising temperatures, rampant deforestation, and recurrent haze events. This product delves into the health and environmental consequences of intensified air pollution—including respiratory illnesses, reduced life expectancy, and ecological harm—while highlighting the pressing issue of transboundary haze and its policy implications. By exploring innovative approaches and emphasizing the critical role of advanced modeling and predictive tools, this product seeks to bridge the gap between science and policy. It offers a forward-looking perspective on air pollution mitigation, aiming to inspire actionable, data-driven solutions for a cleaner, healthier Malaysia. |

# Malaysia

by

*Toronto International Society of Innovation & Advanced Skills (TISIAS)*

**MY.9.**

| | |
|---|---|
| **Title** | **TWO-STEP HYBRID POLYMER/NANOPARTICLES THIN FILM FABRICATION** |
| **Authors** | Dr. Fatin Hana Naning (Project Leader), Dr. Latifah Omar, Mr. Jimmy Anjang, Mr. Mohd Faisal bin Mohd Yassin |
| **Institution** | **Universiti Putra Malaysia Bintulu Campus, Malaysia & Universiti Pendidikan Sultan Idris, Perak, Malaysia.** |
| **Patent no.** | N/A |
| **Description EN** | Hybrid organic-inorganic nanocomposite materials have emerged as promising alternatives to silicon for next-generation optoelectronic applications, owing to their exceptional optical and electrical properties. The production of even plain thin films presents significant challenges, which are further compounded when additional steps and materials are required to synthesize and integrate nanomaterials into hybrid structures. This invention introduces a simplified method using modified Langmuir-Blodgett (LB) technique and gas exposure to directly nucleate nanoparticles within a polymer matrix. The approach enables the fabrication of large-area hybrid polymer/nanoparticle thin films in two-step step, significantly reducing material usage and processing time. The resulting films hold strong potential for use in photovoltaic devices, light-emitting diodes (LEDs), and gas sensors. |

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| **MY.10.** | |
| **Title** | **GP.A.T.H.S.: Gamified Positive Adolescent Training through Holistic Social Program** |
| **Authors** | Lei Mee Thien, Daniel T.L. Shek, Richelle Elisan Gerong, Chia Yean Lim |
| **Institution** | **School of Educational Studies, Universiti Sains Malaysia; National Higher Education Research Institute, Universiti Sains Malaysia; Department of Applied Social Sciences, Hong Kong Polytechnic University; School of Computer Sciences, Universiti Sains Malaysia** |
| **Patent no.** | N/A |
| **Description** | In 2025, the School of Educational Studies at Universiti Sains Malaysia collaborated with the Department of Applied Social Sciences from The Hong Kong Polytechnic University to launch the Positive Adolescent Training through Holistic Social (P.A.T.H.S.) Program. Aiming to promote holistic adolescent development among Malaysian Grade 7 and 8 students, both parties created an interactive learning tool called GP.A.T.H.S. (Gamifying Positive Adolescent Training through Holistic Social Program) to transform traditional printed teaching units into gamified learning experiences. In the current phase, the expert team has professionally designed 10 modules, including topics bonding, emotional competency, and prosocial norm. GP.A.T.H.S. will increase students' engagement through real-time feedback and active participation, enable personalised learning, and foster essential skills such as problem-solving and collaboration, ultimately helping students develop their personal growth through play. This initiative supports SDG 4 (Quality Education) and SDG 3 (Good Health and Well-being) by boosting mental health and resilience, as well as SDG 10 (Reduced Inequality) by providing equitable access to digital learning tools. By reducing reliance on physical resources, the project contributes to eco-friendly and sustainable educational practices, ensuring a lasting impact on both the students and the environment. |

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| **MY.11.** | |
| **Title** | **Community-based Early Flood Alert System (CEFAS)** |
| **Authors** | Ilakiyen Irraivan |
| **Institution** | **Sri KDU International School Klang** |
| **Patent no.** | N/A |
| **Description EN** | Flooding is a very serious issue throughout the world, including Malaysia. The costs and losses due to flooding in Malaysia in 2022 totaled RM622.4 Million. It affects various communities, especially poor and marginalized societies. This is due to:<br>• Lack of information about imminent flooding<br>• Flooding results in loss of lives<br>• Flooding results in economic losses<br><br>Therefore, this project aims to:<br>• Provide early alerts to residents on the impending flood<br>• Reduce casualties<br>• Mitigate economic losses<br>The novelties of this project are:<br>• It is a smartphone-based early flood alert system which operates 24/7<br>• It acts as a real-time source of information on surrounding rainfall and flooding<br>The benefits to be derived from this project are:<br>• Residents are notified about the potential flooding situation<br>• Residents can provide information to the system to enhance it<br>• Able to mitigate economic losses<br>CEFAS is able to provide flood predictions that are fairly accurate which will notify residents at any time of day, allowing them to be prepared for evacuation or flood mitigation. |


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# Moldova

## Technical University of Moldova

**MD.1.**

| | |
|---|---|
| **Title** | **DEVICE FOR UNIFORM AIR DISTRIBUTION IN A TUNNEL DRYER** |
| **Authors** | BALAN Mihail, ȚISLINSCAIA Natalia, STURZA Rodica, POPESCU Victor, BALAN Tatiana, ȘENILĂ Lacrimioara-Ramona, JIAN Mariana, MELENCIUC Mihail, VIȘANU Vitali, GÎDEI Igor, GUȚU Marin |
| **Institution** | **Technical University of Moldova** |
| **Patent no.** | Patent application no. 2627, from 14.02.2025 |
| **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. |

**MD.2.**

| | |
|---|---|
| **Title** | **PEACH DEHYDRATION PROCESS USING THE FORCED CONVECTION METHOD** |
| **Authors** | VIŞANU Vitali, ŢISLINSCAIA Natalia, POPESCU Victor, MELENCIUC Mihail, GÎDEI Igor, BALAN Tatiana, SANDU Andrei-Victor, BALAN Mihail. |
| **Institution** | **Technical University of Moldova** |
| **Patent no.** | Patent application no. 2640, from 21.03.2025 |
| **Description** | The invention relates to a process for dehydrating peaches by the forced convection method, which can be applied to food industry enterprises, in domestic conditions, in laboratories and research centers related to the drying process. Dehydration of peaches by the forced convection method is ensured by a well-studied and established process, which according to the invention consists of performing the following stages: stage I involves choosing peaches suitable for drying, varieties with a slightly adherent stone from the pulp, ripe, swept peaches are selected, with a firmness of around 1.0 kgf/cm2 and a moisture content of about 90%, the peaches are washed, organoleptically examined and cut using a slicer into spherical slices with an exact thickness of 3 mm; stage II involves portioning a predetermined amount of slices and arranging them on the perforated support in the drying chamber in a horizontal position in a single layer with a thickness of 3 mm, without overlaps; stage III involves dehydrating peaches by the forced convection method, as a thermal agent the air in the room is used with a temperature of 20 - 25°C, relative air humidity around 60%, normal atmospheric pressure, dehydration takes place at a temperature of 55 - 65 ± 0.5°C and an air speed of 1.0 - 2.0 m/s in the drying chamber and stage IV involves obtaining dehydrated peaches after a period of 250 - 300 min, the peaches are sufficiently dehydrated, the final humidity is a maximum of 20%. Peaches dehydrated in the following way can be stored for a long time of 25 - 30 days without being packaged or vacuumed. In this way, a high quality finished product is obtained with an attractive, natural color, typical of dehydrated fruits, with reduced duration and energy consumption of 6 – 8 kW. |

**MD.3.**

| | |
|---|---|
| **Title** | **Device for studying the process for densification of plant biomass in the form of briquettes** |
| **Authors** | DARADUDA Nicolae, MD; MARIAN Grigore, MD; NAZAR Boris, MD; GUDÎMA Andrei, MD; GHEORGHIȚA Andrei, MD; BANARI Alexandru, MD; GELU Ianuș, RO; ISTRATI Bogdan, RO |
| **Institution** | **Technical University of Moldova** |
| **Patent no.** | MD 1734 Y 2023.12.31 / Patent application No. 2023.01.10 |
| **Description** | The invention relates to biomass processing equipment, in particular to laboratory devices for studying the process for densification of plant biomass in the form of briquettes. The device, according to the invention, comprises a cylindrical punch (1) for pressing the biomass (10), driven by a hydraulic press (13), connected to a computer (11), and placed with the possibility of moving in a matrix, formed of the upper chamber (2) and lower removable chamber (9). The upper chamber (2) is equipped with a thermoelement (4) and a thermocouple (5), connected to a temperature control unit (12), and the lower part of the upper chamber (2) is connected to a support plate (7) and is equipped with a removable plug (14). The lower removable chamber (9) is equipped with a limiting ring (8) with a resistance strain gauge pressure sensor, connected to a computer (11), and comprises a transition guide cone, as well as a calibration element. Claims: 1 Fig.: 3 |

**MD.4.**

| | |
|---|---|
| **Title** | **Quail Raising Process** |
| **Authors** | Chiselița Oleg, Chiselița Natalia, Caraman Mariana |
| **Institution** | Technical University of Moldova, Institute of Microbiology and Biotechnology |
| **Patent no.** | MD No.10592, MD No.10589, from 2025.03.14. |
| **Description** | The invention relates to animal husbandry, in particular to the process of raising quails for increase productivity and meat quality by using the complex biologically active microbial preparation, obtained from yeast biomass from winemaking wastes and spirulina biomass, as the part of the daily ration of quails, in the ratio of 0.5% of the ration during the period of 1-44 days and 0.25% during the period |

of 45-60 days. The process ensures the viability of chicks of 98% in the experimental group compared to 83% in the control group, the decrease of the titer of conditionally pathogenic bacteria *E. coli* by 4.96%, the increase of the titer of beneficial microorganisms *Lactobacillus spp.* by 18.40%, *Bifidobacterium spp.* by 11.61% and *Bacillus spp.* by 4.56% in the gastrointestinal tract of the chicks, increasing the body mass of the chicks by 13.46% compared to the control, obtaining quail meat with the higher protein content by 3.92% and lower fat content by 3.02% compared to the control group and obtaining economic efficiency of 0.23€/ /quail. The process contributes to increasing the egg laying intensity of quails at the age of 60 days by 29.54%, increasing the weight, longitudinal and transverse diameter of eggs by 25.79%, 21.84% and 14.38% respectively, and obtaining of daily income of 0.03 €/head of laying quail from egg production.

The research was carried out within the project 24.80012.5107.SE „Diversification of feed aditives in poultry farming", funded by NARD.

**MD.5.**

**Title**

**TRIBOLOGICAL SUBASSEMBLY AND METHOD FOR EVALUATING ENERGY LOSSES IN GEARS**

**Authors** Viorel BOSTAN; Ion BOSTAN; Petru STOICEV; Gheorghe POȘTARU; Maxim VACULENCO; Alexandru BUGA; Ion BODNARIUC; Radu CIOBANU; Oleg CIOBANU.

**Institution** **Technical University of Moldova**

**Patent no.** Patent nr. 1801 Y of 2024.11.30

**Description**

The invention relates to the technique and methods of testing mechanical transmissions, including gear tooth materials.

The invention relates to the technique and methods of testing mechanical transmissions, including gear teeth materials.

In the tribological system and the proposed gear energy loss evaluation method, the energy loss in the gear is determined that the sum of the losses in the contacts of each pair of simultaneously conjugated teeth ki depending on the difference in the linear sliding speeds with friction, the load transmitted by the geometry contacts, gear tooth material

and lubrication conditions.

Also, the relative sliding with friction in the ki contacts between the simultaneously engaged teeth is represented by the external linear contact of two discs with different diameters, rotating at the same angular speed, loaded with a normal load equivalent to the load in the actual engagement of the teeth.

When transmitting motion, in the contact area of the gear with gears, various processes (mechanical, physical, chemical) occur that lead to energy and material losses. The intensity and consequences of the given processes depend on a number of factors (functional, constructive, kinematic) which, in the case of real transmissions, are difficult or impossible to estimate. For this reason, modeling is resorted to using standardized or internationally certified research facilities.

When modeling, the condition of geometric and kinematic similarity between the contact of the real gear and the model, represented by two cylindrical rollers, with relative convex-convex position, is imposed.

**MD.6.**

**Title** **VERTICAL AXIS WIND TURBINE WITH AERODYNAMIC PROTECTION AGAINST OVERLOADS**

**Authors** Viorel BOSTAN; Ion BOSTAN; Valeriu DULGHERU; Radu CIOBANU; Oleg CIOBANU; Valeriu ODAINÂI; Marin GUȚU; Ivan RABEI.

**Institution** **Technical University of Moldova**

**Patent no.** Patent nr. 1738 Y of 2024.08.31

**Description**

The invention relates to wind energy conversion systems, namely vertical axis wind turbines.

The vertical axis wind turbine includes the tower 1, on which is installed a rotating shaft 2 with blades of an aerodynamic profile 3 executed at an angle and flexibly mounted with the possibility of automatically changing the angle of attack α by pivoting, the blades 3 are joined to the rotating shaft 2 by means of radial bars 4 at the peripheral ends of which are mounted mechanical joints 5 and 6 axially spaced from each other, which have a common joint axis $O_1O_1$ concurrent with the axis $OO$ of the rotating shaft 2 and which in the section where the radial bars 4 are located

passes through a point with the projection on the chord of the blade profile 3 at the point $N_1$ located between the leading edge $B$ and the point $O_1$ of application of the aerodynamic forces of lift $F_L$ and resistance $F_D$ in compliance with the condition $BN_1<BO'$, so that at the maximum limit speed of the air currents the blade 3 under the action of the aerodynamic and centrifugal forces defined by the mass m of the inertial body 9 and its angular velocity $\omega$ to position the blade 3 under an angle of attack $\alpha_m$ different from the optimal one αopt, the forced increase of which $\alpha_m \neq \alpha_{opt}$, causes the increase in the aerodynamic resistance force $F_D$, which consequently by aerodynamic braking leads to the reduction of the angular velocity ω of the rotating shaft 2 and implicitly the centrifugal force $F_{CF}$ of the mass m of the inertial body 9, and under the action of the elastic force of the spring 8 the aerodynamic blade 3 by pivoting around the axis $O_1O_1$ of the mechanical joints 5 and 6 returns to the position with the optimal angle of attack $\alpha_{opt}$, thus the angular speed of the rotating shaft 2 and the rotor 7 of the electric generator 10 coaxially coupled with it returns to the value of the stationary mode of operation.

The proposed technical solutions ensure the process of mechanical and aerodynamic braking of the rotor through relatively simple constructive solutions and at the same time ensure the tower's security from overloads generated at high wind speeds.

**MD.7.**

**Title** **PRECESSIONAL GEAR TRANSMISSION**

**Authors** Viorel BOSTAN; Ion BOSTAN; Maxim VACULENCO; Dumitru VENGHER; Radu CIOBANU; Oleg CIOBANU Ion BODNARIUC; Iulian MALCOCI; Nicolae TRIFAN.

**Institution** **Technical University of Moldova**

**Patent no.** Patent nr. 1800 Y of 2024.11.30

**Description**

The invention relates to machine construction, in particular to precessional transmissions with gearing.

The precessional transmission, according to the invention, contains a housing (1) with a cover (7), in which are placed a satellite wheel (2) with two bevel gear crowns, a driving shaft with a crank (5), a driven shaft (6) and two central bevel gears, fixed (3), fixed with pretension at the junction of the housing (1) and the cover (7), and movable (4),

mounted on the flange of the driven shaft (6). The movable central wheel (4) and the driven shaft (6) are installed in the housing (1) in bearings (13) by means of an auxiliary bushing (8). The satellite wheel (2) is installed between two axial bearings (10) with washers (9), mounted in perpendicular planes on an inclined portion of the crankshaft (5). The planet wheel (2) is installed axially floating in a radial bearing (11), mounted on the inclined portion of the crankshaft (5). The crankshaft (5) is supported in a radial bearing (12) coaxially floating on the end of the driven shaft (6).

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**MD.8.**

**Title** **PRECESSIONAL GEAR TRANSMISSION**

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

**Institution** **Technical University of Moldova**

**Patent no.** **Patent SUA – US 11913523 B2, Date of Patent: Feb. 27, 2024.**

**Description**

The invention relates to the mechanical engineering, namely to mechanical transmissions.

The transmission comprises a body (1), a satellite wheel (2) with two bevel gear rings (3) and (4) driven by a crankshaft (5) in sphero-spatial motion around a fixed point, two central bevel wheels (6) and ( 7), one immobile 6 fixed in the body (1) and the other mobile (7) mounted on a driven shaft (8).

The teeth of the gear rings (3) and (4) of the satellite wheel (2) have a circular arc flank profile, and of the central bevel wheels (6) and (7) variable curvilinear, depending on the angles and , on the number of Z teeth and the ratio of the numbers of teeth of the mating wheels in the gears ($Z_1$-$Z_2$) and ($Z_3$-$Z_4$), as well as the radius r of the circular arc of the teeth profile of the gear rings (3) and (4). The configuration of the numerical values of the said parameters determines the geometry and the kinematics of the convex-concave contact of the teeth, the degree of frontal overlap, expressed by the number of simultaneously engaged pairs of teeth and defines the pressure angle between the mating flanks. The execution of the wheels with inclined teeth provides for the increase in the total contact line and the share of pure rolling

of the teeth in gear due to their sphero-spatial interaction. The tooth gear is multipair, the teeth flanks mate in contacts with convex-concave geometry with minimal difference of curvatures and with reduced relative sliding velocity, and the active flanks interact with each other with small angles of mutual pressure.

The technical result consists in increasing the load-bearing capacity and mechanical efficiency of the precessional gear by creating the multipair and convex-concave teeth contact with the minimum difference of curvatures of the flank profiles and with reduced relative frictional sliding between the flanks of the teeth, as well as in extending the kinematic possibilities and functionalities of the transmission.

For the essential extension of the functional and kinematic possibilities, the transmission further comprises a mobile intermediate central wheel with two bevel gear rings each engaged with a gear ring of two satellite wheels, placed laterally and mounted on spherical supports symmetrical to their precession centers, being consecutively coupled to two cranks.

**MD.9.**

**Title** **MICRO-HYDROPOWER PLANT WITH INDIVIDUAL BLADE ORIENTATION**

**Authors** Valeriu DULGHERU Iva RABEI; Marin GUȚU; Radu CIOBANU; Oleg CIOBANU.

**Institution** **Technical University of Moldova**

**Patent no.** Decision granting patent nr. 2540 of 2025.02.27

**Description**

The invention can be used in hydropower and relates to a micro-flow hydropower plant containing a low-power hydraulic turbine, intended for the production of electrical or mechanical energy in individual households, villages, for irrigation in areas near rivers, using the kinetic energy of flowing river water.

The micro-flow hydropower plant includes a platform (1) connected to the shore, on which the electric generator (2) and the multiplier (3) are installed, the driving shaft of which is rigidly connected to the main shaft (4) of the hydrodynamic rotor (5). The hydrodynamic rotor (5) includes blades with a hydrodynamic profile (6) installed on the axles (7) each fixed to the free end of the arms (8). The

upper end of the shaft (7) of each hydrodynamic profile blade (6) of the hydrodynamic rotor (5) is kinematically connected to the shaft of the reducer (9) and the electric motor (10), connected to a monitoring system (11) of the angular orientation of the hydrodynamic profile blades (6) relative to the water currents. The orientation of the blades relative to the water currents can also be achieved by a lever system or a cam system.

**MD.10.**

**Title** **HYBRID PROPULSION SYSTEM FOR A BOAT**

**Authors** Valeriu DULGHERU (MD); Cătălin DUMITRESCU (RO); Liliana DUMITRESCU (RO); Radu RĂDOI (RO); Corneliu CRISTESCU (RO); Ion CIOBANU (MD); Radu CIOBANU (MD); Oleg CIOBANU (MD).

**Institution** **Technical University of Moldova**

**Patent no.** Patent nr. 133039 RO of 2024.03.29

**Description**

The invention relates to electrically powered boats, namely, to boats powered by renewable energy.

Hybrid propulsion system for a boat, consisting of the boat body (1) installed on two floating bodies (2, 3), two wind turbines (4, 5) with vertical axis Darrieus or Savonius type, a solar photovoltaic system (6), a propeller propulsion mechanism (8) and an electrical energy storage system (7). The photovoltaic solar system (6) is fixedly installed on the roof of the boat in a horizontal position, the first wind turbine (4) with a vertical axis is installed on one side of the boat and has a right-hand blade inclination angle, the second wind turbine (5) with a vertical axis is installed on the opposite side of the boat and has a left-hand propeller inclination angle, the vertical shaft of the first turbine is connected through a bevel gear to the stator of an electric generator, and the vertical shaft of the second wind turbine is connected through a second bevel gear to the rotor of a first electric generator.

**MD.11.**

**Title** **WIND-SOLAR HYBRID MODULAR SYSTEM**

**Authors** Viorel BOSTAN; Ion BOSTAN; Valeriu DULGHERU; Radu CIOBANU; Oleg CIOBANU; Ivan RABEI; Marin GUȚU.

**Institution** **Technical University of Moldova**

**Patent no.** Patent nr. 1771 Y of 2024.08.31

**Description**

The invention relates to renewable energy conversion systems, in particular to wind-solar hybrid systems.

The modular hybrid wind-solar system includes a cube-shaped housing (1), on the upper face of which the support (2) is installed, on which the photovoltaic installation (3) is fixed. Inside the cube-shaped housing (1) is installed a vertical axis wind rotor (4) with inclined blades (5) installed with a variable angle of attack. The main axis (6) of the vertical axis wind rotor (4) is installed at the intersection of the diagonals of the upper and lower faces of the cube, the lower end of which is connected to an electric generator with permanent magnets (7). The modular hybrid wind-solar system operates in the following way: The photovoltaic installation (3) is fixedly installed on the support (2) in an angular position in the meridional and azimuthal plane optimal in terms of conversion efficiency. In another variant, the photovoltaic installation is installed on a rotating cylindrical support, which intermittently receives rotational movement from the main axis (6) of the vertical-axis wind turbine (4), ensuring orientation to the sun in the meridional and azimuthal planes, including taking into account the seasonal factor. The electrical energy generated by the photovoltaic installation (3) is transmitted to the battery or through an inverter in the network. The air currents, which act on the inclined blades (5), will drive the wind turbine (4) into rotational movement, which is transmitted through the main axis (6) to the permanent magnet electric generator (7). The electrical energy produced is transmitted through a controller in the network or through an inverter to the battery. In another variant, curved plates can be installed on the edges of the cube-shaped housing (1), which form a baffle, which directs part of the air currents from outside the housing (1) towards the inclined blades 5, increasing the conversion efficiency. Installing the curved plate on the top edge of the cube-shaped housing (1) directs air currents under the photovoltaic installation (3), ensuring cooling of the panels, thus contributing to increasing the conversion efficiency of the photovoltaic installation (3).

**MD.12.**

**Title** **BALL SCREW VARIATOR**

**Authors** Valeriu DULGHERU; Radu CIOBANU; Oleg CIOBANU; Stanislav SLOBODEANIUC.

**Institution** **Technical University of Moldova**

**Patent no.** Patent nr. 1765 Y of 2025.02.28

**Description**

The invention relates to the construction of machines, in particular, to transmissions with a variable transmission ratio.

The technical result of the invention consists of the following:

- The execution of the inner bush with a spherical outer surface, on which one (or two) closed sinusoidal grooves with an inclined axis $\gamma_1$ are executed with the possibility of varying the angle of inclination of the sinusoidal groove(s) ensures the relatively easy variation of the speed of the driven shaft, using gear elements;
- The implementation of two closed sinusoidal grooves with a phase shift of 180° on the spherical outer surface of the inner bushing, and on the inner spherical surface of the outer bushing two rows of longitudinal grooves inclined at an angle $\gamma_2$ and $\gamma_2$+90°, respectively, ensures increased bearing capacity and compensation of axial forces, which occur in the gear;
- The execution of the mechanism to vary the inclination of the intermediate bushing with gravity elements ensures the automatic variation of the speed of the driven shaft depending on the load.

# Moldova State University

**MD.13.**

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| **Title** | **APPLICATION OF 4-(2-(BIPHENYL-4-YL)-2-OXOETHYL)-1-((2-(2,4-DICHLOROPHENYL)-4-PROPYL-1,3-DIOXOLAN-2-YL)METHYL)-1H-1,2,4-TRIAZOL-4-YL BROMIDE AS AN ACTIVE COMPOUND AGAINST THE FUNGI *Fusarium avenaceum* and *Fusarium oxysporum*** |
| **Authors** | **Fliur MACAEV, Galina LUPAŞCU, Eugenia STANGACI, Serghei POGREBNOI, Natalia SUCMAN, Lucian LUPASCU, Svetlana GAVZER, Nicolae CRISTEA** |
| **Institution** | Moldova State University, Institute of Chemistry; Institute of Genetics, Physiology and Plant Protection |
| **Patent no.** | **MD 10568 / 2025.01.25; MD s 2024 0111/2023.09.28** |
| **Description** | The invention relates to chemistry and agriculture, and in particular to a quaternary derivative of 1,2,4-triazole and its application as an active compound against the fungi *F. avenaceum* and *F. oxysporum*.<br>The essence of the invention is that the application of a new compound from the class of 1,2,4 triazoles is claimed: 4-(2-(biphenyl-4-yl)-2-oxoethyl)-1-((2-(2,4-dichlorophenyl)-4-propyl-1,3-dioxolan-2-yl)methyl)-1H-1,2,4-triazol-4-yl bromide as an active compound against phytopathogenic fungi of the species *F. avenaceum* and *F. oxysporum* – some of the causative agents of root rot. The active concentrations vary in the range of 0,00125…0,01%.<br>Advantages of the invention consist in the fact that the application of the compound - 4-(2-(biphenyl-4-yl)-2-oxoethyl)-1-((2-(2,4-dichlorophenyl)-4-propyl-1,3-dioxolan-2-yl)methyl)-1H-1,2,4-triazol-4-ium bromide contributes to the increase of the fungitoxic activity for some of the causative agents of root rot - *F. avenaceum* and *F. oxysporum* in comparison to the closest prior art.<br>The technical result consists in the increase of the fungitoxic activity of the compound of the invention in relation to the closest prior art by 20…51% for the fungus *F. avenaceum* and by 19…50% for *F. oxysporum* in the |

concentration range 0.01….0.00125%, respectively, in the last days of cultivation of the fungi.

**MD.14.**

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| **Title** | **PROCESS FOR OBTAINING WATER-SOLUBLE ENOTANNINS WITH ENHANCED ANTIMICROBIAL PROPERTIES** |
| **Authors** | **Tudor LUPASCU, Gheorghe DUCA, Lucian LUPASCU** |
| **Institution** | Moldova State University, Institute of Chemistry |
| **Patent no.** | **7474 / 12.03.2025** |
| **Description** | The invention relates to chemistry and in particular to a process for obtaining water-soluble enotannins with enhanced antimicrobial properties. This process results in a product that can be used as an antibacterial and antifungal compound in human, veterinary medicine and in agriculture.<br>The essence of the invention is that the process for obtaining water-soluble enotannins with enhanced antimicrobial properties includes homogenization of enotannins with hydrogen peroxide with a concentration of 28…30% in a mass ratio of 1…(3…6), for 7…15 minutes at a temperature of 70…100ºC, oxidation with ozone in oxygen at an ozone concentration in oxygen of 5%, at a temperature of 0…3ºC for 30 minutes, followed by drying of the obtained product at a temperature of 40…60ºC to a constant mass.<br>The advantage of the invention is that following the elaboration of the process, a preparation is obtained that exhibits enhanced antimicrobial properties compared to the closest prior art.<br>The technical result of the invention is that the increase in antibacterial activity is 2...4 times depending on the investigated bacterial species, and the increase in antifungal activity is 2 times for the newly developed compound. |

**MD.15.**

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| **Title** | **TWO-DIMENSIONAL ZINC COORDINATION POLYMER WITH PHOTOLUMINESCENT PROPERTIES** |
| **Authors** | **Olga DANILESCU, Ion BULHAC, Maria COCU, Pavlina BOUROSH, Olga KULIKOVA, Daniel PODGORNII** |
| **Institution** | Moldova State University, Institute of Chemistry, Institute |

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| | of Applied Physics, Chisinau, Republic of Moldova |
| **Patent no.** | **MD 4909 / 24.12.31** |
| **Description** | The invention relates to coordination chemistry, in particular to the synthesis of a new two-dimensional coordination polymer of zinc(II) 2,6-diacetylpyridine-bis(isonicotinoyl hydrazonato)(2-)zinc(II) with the formula $[Zn_2(L)_2]_n$, $H_2L$ = 2,6-diacetylpyridine bis(isonicotinoylhydrazone), with photoluminescence properties. The claimed complex exhibits photoluminescent activity about 10 times more intense than the free ligand ($H_2L$), a fact established by evaluating the effect of the flourescent emission in the range 550-650 nm which can be observed even with the naked eye. $[Zn_2(L)_2]_n$ is proposed as a applicable material for obtaining green light sources. |

**MD.16.**

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| **Title** | **CLEANWATER – TECHNOLOGIES AND INTELLIGENT MONITORING SYSTEMS FOR WASTEWATER TREATMENT AND REAL-TIME ASSESSMENT OF WATER QUALITY** |
| **Authors** | **Raisa NASTAS, Tudor LUPAŞCU, Oleg PETUHOV, Nina ŢÎMBALIUC, Irina CEBAN, Nina BOLDURECU, Tatiana MITINA** |
| **Institution** | Institute of Chemistry, Moldova State University |
| **Patent no.** | **HORIZON-MSCA-2022-SE-01/101131382** |
| **Description** | The CLEANWATER project aims to develop innovative and environmentally friendly technologies for the treatment of contaminated water and the real-time monitoring of water quality. The project addresses key challenges related to the presence of hazardous pollutants, such as heavy metals, pharmaceutical residues, and pathogenic microorganisms, in industrial and agricultural wastewater.<br>CLEANWATER focuses on the synthesis and application of advanced materials—such as activated carbon, hybrid composites, and functionalized adsorbents—with high selectivity and efficiency in removing various classes of contaminants. These materials are integrated into prototype systems that combine adsorption, advanced oxidation processes, and eco-friendly separation technologies.<br>In parallel, the project develops intelligent monitoring systems capable of providing real-time data on water quality, enabling early detection of pollution events and |

process optimization. The approach is multidisciplinary and involves close collaboration between academic institutions, research centers, and small and medium-sized enterprises (SMEs) through the Horizon Europe MSCA Staff Exchange program.
By promoting international mobility and knowledge transfer, CLEANWATER strengthens research capacity, fosters innovation in water treatment technologies, and contributes to the sustainable management of water resources. The outcomes of the project are expected to support the development of scalable and low-impact solutions tailored to the needs of both developed and emerging regions.

**MD.17.**

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| **Title** | **A STIMULATOR OF THE TOTAL ANTIOXIDANT STATUS OF THE HEMOLYMPH OF BEES** |
| **Authors** | **Aurelian GULEA, Ion TODERAŞ, Olga GARBUZ, Victor ŢAPCOV, Vasilii GRAUR, Sebastien FLOQUET, Arcadie FUIOR, Diana CEBOTARI** |
| **Institution** | Scientific Research Laboratory "Advanced Materials for Biopharmaceuticals and Technics", Institute of Chemistry, Moldova State University / Université de Versailles Saint-Quentin-En-Yvelines |
| **Patent no.** | **WO 2022/018009 A1 / 2022.01.27**<br>**MD 4905 / 2024.10.31** |
| **Description** | The invention pertains to chemistry and apiculture, specifically to a biologically active cobalt coordination compound which stimulates the total antioxidant status of the hemolymphe of *Apis mellifera* bees and their larvae to enhance their resistance to diseases. Addition of this substance at the first feeding after wintering enhances the total antioxidant status of the bee's hemolymph and bee larval hemolymph by 5.4-7.9 times in comparison to control, and up to 5.3 times in comparison with prototype. |

**MD.18.**

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| **Title** | **NEW MOLECULAR INHIBITOR AS ANTICANCER AGENT** |
| **Authors** | **Aurelian GULEA, Doina CHIABURU-CHIOSA, Dorin ISTRATI, Victor ŢAPCOV, Donald POIRIER** |
| **Institution** | Scientific Research Laboratory "Advanced Materials for |

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| | Biopharmaceuticals and Technics", Institute of Chemistry, Moldova State University |
| **Patent no.** | **MD 4899 / 2024.08.31** |
| **Description** | The invention relates to chemistry and medicine, namely to a biologically active coordination compound from the class of thiocarbazidates of transition metals. It may find application in medicine for the prophylaxis and treatment of human liver cancer. The claimed compound inhibits the proliferation of liver cancer HepG2 cells 4 times more effectively than the prototype. The discovered properties of this substance are of interest for medical practice for enhancement of the arsenal of inhibitors of liver cancer cells. |

**MD.19.**

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| **Title** | **NEW INHIBITORS OF THE PROLIFERATION OF FUNGI OF THE SPECIES *Candida albicans*** |
| **Authors** | **Aurelian GULEA, Ianina GRAUR, Vasilii GRAUR, Irina USATAIA, Victor ŢAPCOV, Carolina LOZAN-TÎRŞU** |
| **Institution** | Scientific Research Laboratory "Advanced Materials for Biopharmaceuticals and Technics", Institute of Chemistry, Moldova State University |
| **Patent no.** | **MD 4886 / 2024.09.30; Request for patent MD a 2024 0021 / 2024.06.17** |
| **Description** | The invention relates to chemistry and medicine, namely to the biologically active synthetic compounds of the thiocarbamide derivatives. The described compounds possess fungiostatic and fungicidal activity within the limits of concentrations 0.004-0.031 µg/mL against fungi of the species *Candida albicans*, which exceeds 23-175 times the activity of the prototype. The present inventions expand the arsenal of fungal inhibitors of the *Candida albicans* species with high antifungal activity. |

**MD.20.**

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| **Title** | **Process for modifying cross-linked ionic polymers containing $R_4N^+$ grops with Cr(III) compounds** |
| **Authors** | **Vasile GUTSANU, Maria BOTNARU** |
| **Institution** | Moldova State University, Institute of Chemistry |
| **Patent no.** | **2624 / 05.02.2025** |
| **Description** | A method for modifying crosslinked ionogenic polymers |

containing $R_4N^+$ groups with Cr(III) compounds, comprising treating the polymer with a solution of $Cr_2(SO_4)_3$ or $KCr(SO_4)_2*12H_2O$ containing 0.75...0.85 mg Cr/ml, in which visible traces of $Cr(OH)_3$ sediment are constantly maintained by adding a NaOH solution and constant stirring at a temperature of 60 ± 0.1 oC for 6...7 hours. The composite is stable in drinking and mineral water. The composite has selective sorption properties with respect to some anions. After regeneration, the polymer can be reused to obtain the composite.

**MD.21.**

**Title** **NEW $F_1$ HETEROTIC HYBRID TOMATO INGSTAR**

**Authors** **Milania MAKOVEI, Galina LUPASCU, Anatolie GANEA**

**Institution** Moldova State University, Institute of Genetics, Physiology and Plant Protection

**Patent no.** **MD 453; MD v 0012 / 2022.04.13.**

**Description**

$F_1$ Heterotic hybrid tomato *INGSTAR*, with a plant of indeterminant type of growth ($sp^+$). The vegetation period from mass germination of seeds to the beginning of fruit ripening is 113-117 days. The height of the main shoot is 180...250cm. The height of the first inflorescence, above 9...10 leaves, the following, every 3 leaves. Leaves are large, green to intensely green in color. Inflorescence is simple, with 6...9 flowers. Flowers are yellow, fully opened, with 5...6 petals. The number of inflorescences on the main axis is 9...11. Fruits are round, slightly notched at the base, sometimes pointed, dark red, fleshy, with thick pericarp. Fruit mass 120-200 g. Fruits with high taste, dense, do not soften when stored, highly transportable. Fruits with a high dry matter content – 5.2...6.1% and sugar – 4.4...5.1%, as well as vitamin C – 27.7 mg/%. Sugar/acid index is 9.9. General yield – 24.7...32.9 kg/$m^2$, marketability yield – 92.2...95.9%.

**Advantages:** Powerful, highly productive plant with a well-developed root and vegetative system. With large, intensely red fruits. High flavor qualities (sugar/acid index - 9.9). Designed for fresh consumption, juice and other tomato products. Resistant to *Viral infections*, *Alternaria*, *Fusarium*, including *Meloidogyne incognita.* Characterized by good flowering and high fruiting in high-temperature

regimes**.**

**Recommendation:** It is intended for cultivation in film and high-tech industrial greenhouses in the Republic of Moldova. It is grown through seedlings with planting in the greenhouse according to the scheme of 4 plants/$m^2$.

**Application domain** – **Agriculture** (cultivated in associations of small and large farms), **Food industry** (for fresh consumption, production of juice and other tomato products).

**Homologated in Republic of Moldova – 2024.**

**MD.22.**

| | |
|---|---|
| **Title** | **HYBRID OF SWEET SORGHUM SAŞM 1** |
| **Authors** | **Gheorghe MORARU, Vasile PAVLENCO, Leonid VOLOŞCIUC, Vladimir TODERAŞ, Mihail BATCO** |
| **Institution** | MOLDOVA STATE UNIVERSITY, Institute of Genetics, Physiology and Plant Protection |
| **Patent no.** | **MD 396 / 2022.11.30** |
| **Description** | Sowing in strips favors the increase of biomass productivity, carbohydrate concentration and ensures the preservation of the crop in the field by minimizing the breaking and falling of plants in conditions of torrential rains and wind. The juice contains 13.5-16% carbohydrates, in favorable years up to 22%. The optimal plant density is 105-115 thousand/ha. The harvest for cultivation without irrigation is 90-120 t/ha and 20-30 t/ha of dry matter, with irrigation - 170-190 t/ha of biomass.<br><br>*Applications:Agriculture.* |

**MD.23.**

| | |
|---|---|
| **Title** | **HYBRID OF SWEET SORGHUM SAŞM 2** |
| **Authors** | **Gheorghe MORARU, Vasile PAVLENCO, Leonid VOLOŞCIUC, Vladimir TODERAŞ, Mihail BATCO** |
| **Institution** | MOLDOVA STATE UNIVERSITY, Institute of Genetics, Physiology and Plant Protection |
| **Patent no.** | **MD 398/ 2022.11.30** |
| **Description** | Sowing in strips favors the increase of biomass productivity, carbohydrate concentration and ensures the preservation of the crop in the field by minimizing the breaking and falling of plants in conditions of torrential rains and wind. The juice |

contains 14-16.5% carbohydrates, in favorable years it reaches up to 22%. The optimal plant density is 110-120 thousand/ha. The harvest for cultivation without irrigation is 75-110 t/ha and 18-27 t/ha of dry matter, with irrigation - 140-160 t/ha of biomass.
*Applications:Agriculture.*

**MD.24.**

| | |
|---|---|
| **Title** | **"SARMIS" - RHIZOGENIC INTERSPECIFIC VARIETY (*V. vinifera* L. x *M. rotundifolia* Michx.)** |
| **Authors** | **Eugeniu ALEXANDROV, Vasile BOTNARI, Boris GAINA** |
| **Institution** | Moldova State University, Institute of Genetics, Physiology and Plant Protection |
| **Patent no.** | **MD 436/2024.06.30** |
| **Description** | As a result of the development of the methodology for creating interspecific rhizogenic grapevine genotypes, using the species *Vitis vinifera* L. and *Muscadinia rotundifolia* Michx. Finally, rhizogenic interspecific grapevine genotypes were obtained and selected in BC3, with valuable characters, which allows to expand the grapevine cultivation area to the northern limit, on own roots and reduce the number of chemical treatments.<br><br>*Applications:Agriculture.* |

**MD.25.**

| | |
|---|---|
| **Title** | **A NEW WINTER COMMON WHEAT VARIETY (*Triticum aestivum L.*) – BIJUTERIA ZAMBRENILOR** |
| **Authors** | **Andrei GORE, Silvia ROTARI, Svetlana LEATAMBORG, Galina LUPASCU, Natalia JELEV, Nicolai PLATOVSCHII, Nina ZDIORUC** |
| **Institution** | Institute of Genetics, Physiology and Plant Protection, MSU |
| **Patent no.** | **MD v 2022 0019 / 2022.11.04** |
| **Description** | A variety of common winter wheat with high productivity, quality and resistance to adverse environmental factors and was obtained by the individual selection method from the Moldova 5 variety (spontaneous hybrid). The variety is part of the *Lutescens* variety. The height of the plants is 70–85 cm. The spike is white, medium length (9.0–10.5 cm), the grain is red, the weight of 1000 grains – 36-40 g, the number |

of grains in the spike varies from 40 to 60, contains 13.0–13.6% protein and 26–28% gluten. The variety is mid-early, the vegetation period – 270-275 days. It has good biochemical and baking qualities. The variety is productive and its potential of productivity reaches up 3.7-8.7 t/ha. It is more productivity than control variety Kuialnic with 0.2 – 0.7 t/ha. Tolerant to drought, wintering and the main fungal diseases (rust brown, root rot, septoriosis, fusariosis). The variety is included in the Catalog of Plant Varieties of the Republic of Moldova, year 2025.

**MD.26.**

**Title** **MONITORING OF CRITICAL INFRASTRUCTURES WITH THE APPLICATION OF LiDAR AND DRONE TECHNOLOGIES**

**Authors** **Veaceslav SPRINCEAN, Marianna SAVVA, Liviu DONTU, Roman BUIMESTRU, Florentin PALADI**

**Institution** Moldova State University

**Patent no.** **MEC 011210 and NATO SPS G6140**

**Description**

This research develops a UAV-based LiDAR system to improve the resilience evaluation of critical energy infrastructure. The strategy involves deploying advanced drones equipped with LiDAR for real-time surveillance and risk assessment of power grids and other essential energy assets. The gathered data facilitates the creation of high-resolution 3D models for structural evaluation, environmental risk analysis, and early hazard detection. A central feature of this approach is the enhancement of the eALERT monitoring system by integrating LiDAR technology, increasing accuracy in identifying vulnerabilities caused by biotic (e.g., vegetation overgrowth) and abiotic (e.g., extreme weather, structural wear) factors. The methodology encompasses preflight preparation, airspace evaluation, UAV operational safety measures, and real-time data processing to ensure precise and dependable inspections. The implementation focuses on building computational models for predictive maintenance and risk anticipation, enabling operators to proactively counter threats to energy infrastructure. Leveraging geospatial data, flight path optimization, and AI-driven anomaly detection, this research offers a scalable and effective solution for the energy infrastructure resilience assessment. The findings support enhanced energy security and the optimization of its sustainable development.

**MD.27.**

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| **Title** | **DIETARY SUPPLEMENT FOR THE PROPHYLAXIS OF HYPOTHYROIDISM IN CARBOHYDRATE METABOLISM DISORDERS IN RODENTS (*Rattus norvegicus*)** |
| **Authors** | **Iurie BACALOV, Aurelia CRIVOI, Elena CHIRIȚA, Adriana DRUȚA** |
| **Institution** | Moldova State University, Institute of Physiology and Sanocreatology, Scientific Research Laboratory *Human and Animal Ecophysiology* |
| **Patent no.** | **MD a 2025 0005 / 2025.01.28** |
| **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.28.**

| | |
|---|---|
| **Title** | **A NEW VARIETY OF ORNAMENTAL PLANTS: *Chrysanthemum indicum* L. 'GINGĂȘIE'** |
| **Authors** | **Ina VOINEAC, Vitalie MÎȚU, Olesea PUGACEOVA** |
| **Institution** | "Al. Ciubotaru" National Botanical Garden (Institute) of Moldova State University / Republic of Moldova |
| | **MD 443 / 2024.06.30** |
| **Description** | "Gingășie"- belongs to the small-flowered chrysanthemum group. The bush is hemispherical, 30 to 55 cm high, densely foliated. The leaves are bright green, slightly pubescent, small, 2-5 cm long and 1-3 cm wide. The leaf blade is cut by 1/3, the |

edge is slightly pointed, the upper leaflets have an almost whole blade. The stem is thin, green with a reddish tint. On one bush there are 5-9 flower-bearing shoots, which in the upper part branch out into even smaller ones, bearing a large number of inflorescences. The inflorescences are located along the entire perimeter of the crown. On each flowering shoot there are from 5 to 12 half-terry inflorescences, 3-5 cm in diameter. The ligulate flowers are arranged in 3 rows around a disk with tubular flowers. At the beginning of blooming they are lilac-pink with a terracotta tint, and by the end of flowering they are noticeably lighter. The lower row of petals is larger than the upper one. The petals are elongated, much bifurcated at the ends, and lighter on the inside. The center (ligulate flowers) is bright yellow with a greenish protrusion, clearly defined and has a diameter of 0.5-0.7 cm. The variety is early flowering, flowering begins in the first ten days of October and continues for 45-50 days, depending on the air temperature. It is recommended for group plantings, mixborders, cut flowers, and container culture.

**MD.29.**

| | |
|---|---|
| **Title** | **PROCESS FOR CORROSION PROTECTION OF STEEL IN WATER** |
| **Authors** | **Viorina GORINCHOY[1], Vladimir PARSHUTIN[2], Alexander COVALI[2], Vasile LOZAN[1]** |
| **Institution** | Moldova State University, Institute of Chemistry[1], Institute of Applied Physics[2] |
| **Patent no.** | **MD 1754 Z / 2024.12.31** |
| **Description** | The invention relates to the field of corrosion protection of metals in water and can be used for corrosion inhibition in closed steel pipeline systems. |

**MD.30.**

| | |
|---|---|
| **Title** | **BOOSTing decision making by enhancing the longevity of the knowledge assets as a source of reasoning** |
| **Authors** | Secrieru Iulian, Guțuleac Elena, Popcova Olga |
| **Institution** | **Vladimir Andrunachievici Institute of Mathematics and Computer Science, Moldova State University** |
| **Patent no.** | Project no. 24.80012.5007.24SE 'BOOSTing decision making: applying an Integrated Decision Intelligence approach to overcome the limitations and challenges of traditional scoring systems' |
| **Description** | The general scope of this research is to enhance the |

longevity of the existing informational tools (knowledge-based systems, decision support systems, knowledge/data warehouses) by increasing the duration or utility of a knowledge base, with a focus on improving its long-term usefulness, potentially through updates, optimizations, or reorganization.

Integrated Decision Intelligence (IDI) is aimed to improve decision-making efficiency by using advanced methods and technologies that would bridge the gap between traditional methodologies based on knowledge, skills and expert experience and the capabilities offered by data-driven analysis.

IDI approach can be used for previously created data assets to catalyse their valorisation as a source of reasoning (by developing methods/algorithms for the acquisition, storage, pre-processing and inference based on professional knowledge and data, as well as explanation of the generated conclusions).

Proposed IDI-based solutions allow:

i) to associate each important fact in the existing knowledge base (which implicitly represents an interpretation of a score) with a procedure of confirmation, adjustment or modification, based on data-driven decision making, launched automatically or on demand, but regularly;

ii) to associate the algorithms for determining the cut-off points, obtained by data-driven decision making, with a second opinion, which represent the professional experience of well-known experts in the domain (in the case when the scoring system explicitly represents the core of the knowledge base).

By incorporating proposed elements, the IDI approach enhances the longevity of the knowledge base by making it dynamic, self-improving, and scalable, ensuring it remains a valuable resource for a long time.

**MD.31.**

| | |
|---|---|
| **Title** | **From Leaves to Learning: An AR Journey into Home Plant Care** |
| **Authors** | Inga Titchiev, Olesea Caftanatov, Arcadie Fron |
| **Institution** | Vladimir Andrunachievici Institute of Mathematics and Computer Science, Moldova State University |
| **Patent no.** | - |

Plant care can be a frustrating experience for many, especially when lacking basic knowledge about the plant's identity and needs. This challenge, often caused by "plant blindness" [1], a tendency to overlook or misidentify plant species affects both novice and seasoned plant enthusiasts. Traditional identification methods, such as books or static images, offer limited engagement and utility. To address this, we propose an innovative mobile augmented reality (AR) application designed to identify home and decorative plants in real time and provide personalized, comprehensive care guidance.

**Description**

By integrating AR and image recognition technologies, the application allows users to simply point their smartphone at a plant to receive an instant overlay of relevant information. This includes the plant's name, optimal watering schedule, light and soil preferences, common issues, and even interactive 3D models or care videos. Unlike passive resources, this AR solution actively engages users through a hands-on, visual learning experience.

The application is developed using platforms such as Unity and Vuforia for its AR functionality. It aims to make plant care intuitive, enjoyable, and educational turning everyday plant ownership into a more successful and rewarding experience.

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

**MD.32.**

**Title**

**Use of chloro-{N-ethyl-N'-[phenyl(pyridin-2-yl)methylidene] carbamohydrazonethioato}copper as a growth factor inhibitor**

**Authors**

Gudumac Valentin, Pantea Valeriana, Ceban Emil, Andronache Lilia, Ţapcov Victor, Gulea Aurelian, Ghinda Sergiu

**Institution**

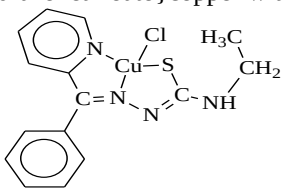
***Nicolae Testemitanu*** **State University of Medicine and Pharmacy of the Republic of Moldova**

**Patent no.** MD 4858 C1, BOPI 12/2023

**Description**

The invention relates to chemistry and medicine, in particular to the use of a biologically active copper coordination compound of the class of transition metal thiosemicarbazonates as a synthetic growth factor inhibitor. This complex can find application in medicine as a preparation, which, by inhibiting the excessive production of growth factors in the organism, prevents the development of cell and tissue injuries, related to excessive accumulation of connective tissue, inflammatory processes, neurodegenerative, renal, cardiovascular pathologies, atherosclerosis and carcinogenesis.

Summary of the invention consists in the use of chloro-{N-ethyl-N'-[phenyl(pyridin-2-l)methylidene] carbamohydrazonethioato}copper with the formula:




as an inhibitor of growth factors selected from the group consisting of (VEGF), (PDGF), (FGF- β) and (TGF- β).

The said compound expands the arsenal of growth factor inhibitors with high biological activity.

*Applications:* Bio-organic chemistry, medicine, pharmacology, pharmacy, medicine technology.

**MD.33.**

| | |
|---|---|
| **Title** | **Complex minimally invasive treatment of liver cancer** |
| **Authors** | Anghelici Gheorghe, Pisarenco Serghei, Crudu Oleg, Lupu Gheorghe, Zugrav Tatiana, Vasiliev Radu, Ceban Marina, Covaci Ana |
| **Institution** | ***Nicolae Testemitanu*** **State University of Medicine and Pharmacy of the Republic of Moldova** |
| **Patent no.** | MD 1778 Y, BOPI nr.09/2024 |
| **Description** | The invention provides a complex, minimally invasive method for the treatment of liver cancer in hepatology and oncological surgery combining local chemical ablation, transarterial chemoembolization and bipolar thermal ablation. The method comprises an initial laparoscopic intervention with tumor biopsy, followed by intratumoral injection of 96% ethyl alcohol in a volume of 10–30 ml, depending on tumor size. Simultaneously, transarterial chemoembolization is performed. A guidewire is introduced through the femoral artery and advanced through the iliac artery, aorta, celiac trunk, and common hepatic artery to the hepatic artery supplying the tumor. Over this guidewire, a catheter is inserted for vascular visualization using iopromide contrast agent. Upon localization of the tumor-feeding artery, an emulsion of hydrogel with polyvinyl alcohol microspheres (100–300 μm) and doxorubicin (75–150 mg) is injected, followed by 1–2 g of gelatin-based embolizing powder. After 7 days, a second laparoscopic procedure is conducted. Under video guidance, bipolar thermal ablation is applied using forceps operating at 100 W and 600 kHz, with 10-second active and 30-second pause cycles. Simultaneous aspiration of necrotic tissue is performed. A drainage tube is placed in the subhepatic space for five days post-ablation. Peritoneal lavage is performed four times using a solution of 4 g ceftriaxone in 500 ml saline and 640 U lidase in 500 ml saline. The lavage is administered as a jet with 24-hour exposure, enhancing postoperative recovery and minimizing inflammation.<br>Advantages of the method: it is a minimally invasive method; it is not necessary to perform traumatic interventions to remove the liver lobes; postoperative recovery is rapid; postoperative septic complications are very rare; life extension by 1-5 years. |

**MD.34.**

| | |
|---|---|
| **Title** | **Shunt with valve for normalization of intraocular pressure** |
| **Authors** | Bendelic Eugeniu, Alsaliem Sulaiman |
| **Institution** | ***Nicolae Testemitanu* State University of Medicine and Pharmacy of the Republic of Moldova** |
| **Patent no.** | *MD 1664 Z, BOPI nr. 08/2023* |
| **Description** | The invention relates to medical technology, in particular to a valved shunt used in ophthalmological microsurgery for the treatment of glaucoma, with the role of normalizing intraocular pressure.<br>The essence of this invention is that the device is made up of two perpendicularly intersecting tubes, forming a cruciform structure, with precise dimensions for each component. One of the tubes is provided with an opening and two overlapping leaflets, which allow the communication of the ocular fluid through a controlled mechanism. The leaflets are protected by a polymethylmethacrylate casing, equipped with tabs for fixation to the sclera. The shunt is made of medical silicone, ensuring safety and efficiency in the drainage of aqueous humor.<br>The problem that the invention solves is to create an effective device that ensures the drainage of fluid from the anterior chamber of the eye into the Shalim canal when the TI exceeds the norm by 2-3 units without opening the valve, and when the TI has high values – the valve opens and normalizes the TI.<br>The advantages of the invention are that the device ensures the drainage of ocular fluid into the Shalim canal, preventing excessive increases and decreases in intraocular pressure (IT). Its design allows for minimally invasive surgery, reducing damage to ocular tissues. |

**MD.35.**

| | |
|---|---|
| **Title** | **Complex treatment method of viral hepatitis D** |
| **Authors** | Bodrug Nicolae, MD; Botezatu Adriana, MD; Lungu Nicolae, MD; Genes Ciprian, RO; Ciurea Marius-Eugen, RO; Carauş Vladimir, MD; Ursu Cătălina, MD |
| **Institution** | ***Nicolae Testemitanu* State University of Medicine and Pharmacy of the Republic of Moldova** |

**Patent no.** **MD 1797 Y, BOPI 11/2024**

**Description**

Hepatitis D is a severe liver disease caused by the hepatitis D virus, which requires the presence of the hepatitis B virus to replicate. Dual infection leads to a more aggressive progression of the disease, with increased liver damage. The current treatment, based on pegylated interferon alpha (Peg-IFN-α) and antiviral drugs, is long-term (up to one year) and has multiple adverse effects, such as severe fatigue, weight loss, and psychological disorders, including depression.

The invention proposes an innovative and effective method for treating hepatitis D, combining systemic and local ozone therapy with the administration of a biologically active phytotherapeutic blend. This includes intravenous infusions with ozonated solution, major autohemotherapy, intestinal insufflations with ozone-oxygen, and the daily intake of ozonated water and phytotherapeutic capsules.

The advantages of this method are significant:

- Reduced treatment duration compared to Peg-IFN-α, which requires up to one year.
- Superior therapeutic efficacy due to the antioxidant, anti-inflammatory, and antiviral effects of ozone therapy and phytotherapeutic extracts.
- Rapid symptom relief, including reduced inflammation and improved liver function.
- Normalization of biochemical and structural parameters of the liver and spleen.
- Reduction of viral load and signs of hypersplenism.
- Shorter hospitalization periods and improved quality of life for patients.

This integrated method ensures a safer, faster, and better-tolerated treatment, offering a viable alternative to conventional therapies.

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**MD.36.**

**Title** **Method for determining the anti-inflammatory activity of biologically active substances**

**Authors** Ala Fulga, Olga Tagadiuc, Lilia Andronache

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

**Patent no.** *MD 1775 Y, BOPI 09.2024*

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| **Description** | The invention relates to medicine and biochemistry and can be used for the selection of biologically active compounds (BAC) with anti-inflammatory action, the assessment of the anti-inflammatory efficacy of new remedies by determining their antihyaluronidase activity (Anti-HA). The advantage of the method is that, when implementing the method for selecting anti-inflammatory compounds by determining their Anti-HA, the sensitivity, accuracy and reproducibility of the determinations are increased, and labor productivity increases. The use of cetylpyridinium chloride solution allows to increase the accuracy and reproducibility of the method in comparison with the prototype. This allows to more precisely detect changes in Anti-HA when testing different BAC. The problem solved by the invention consists in excluding the use of toxic substances, such as cetyltrimethylammonium bromide (CTAB) by substituting it with cetylpyridinium chloride, which is a non-toxic substance [Directive 67/548/EEC]. The technical result of the invention consists in the development of a non-toxic, environmentally friendly method, in increasing the accuracy and reproducibility of the method due to the exclusion of the use of toxic reagents such as CTAB by substituting it with cetylpyridinium chloride, which is a non-toxic substance. The use of the claimed method for evaluating the anti - inflammatory activity, extremely sensitive and precise, friendly to the environment is perfectly in the tendencies of personalized laboratory medicine based on the P4 principles (personalized, predictive, preventive, participatory), one of the most innovative fields of the contemporary era. |

**MD.37.**

| | |
|---|---|
| **Title** | **Multimodal prediction model for cancer therapy-related cardiac dysfunction in non-Hodgkin's lymphoma patients** |
| **Authors** | Daniela Bursacovschi, Valeriu Revenco, Maria Robu, Oleg Arnaut |
| **Institution** | ***Nicolae Testemitanu* State University of Medicine and Pharmacy of the Republic of Moldova** |
| **Patent no.** | OȘ 8078 from 26.12.2024 (Certificate of Copyright and Related Rights, AGEPI, Republic of Moldova) |
| **Description** | The prediction method helps in the early identification of |

the risk of cardiac dysfunction in patients with non-Hodgkin lymphoma (NHL) undergoing antitumor treatment.

The prospective observational cohort study was conducted at the IMSP Institute of Cardiology and the Oncology Institute in Chișinău, Republic of Moldova. To identify predictors of cardiotoxicity, cardiovascular, serological, and echocardiographic parameters were analyzed, obtained through Holter ECG 24h + MAATA 24h and cardiopulmonary testing. The particularities of NHL and oncological treatment were also considered. The prediction model, developed based on data from 120 patients, was evaluated using the binary confusion matrix and achieved an accuracy of 94.2%. The model's efficiency was evaluated through ROC curves, with an area of 0.95, indicating good discrimination of cardiotoxicity, while the analysis of precision and sensitivity showed an accuracy of 82.4% compared to random classification. SHAP analysis provided a deeper understanding of the contribution of each variable to the model.

The advantages of this model include the early detection of cardiotoxicity risk, treatment personalization, and optimized monitoring, thereby improving patient prognosis.

**MD.38.**

| | |
|---|---|
| **Title** | **Optimization of preclinical research of medicinal products with action on the auditory and vestibular system** |
| **Authors** | Parii Sergiu, Ungureanu Alina, Nicolai Eugeniu, Sochirca Adrian, Uncu Livia, Valica Vladimir |
| **Institution** | ***Nicolae Testemitanu*** **State University of Medicine and Pharmacy, Republic of Moldova** |
| **Patent no.** | 20.80012.8007.02SE. Project of National Agency for Research and Development 2024-2025 |
| **Description** | The presented project proposes streamlining preclinical research methods for medicinal products acting on the auditory and vestibular system in accordance with current requirements of experimental modeling and good laboratory practices. For all types of drugs and clinical trials in the drug development process, the use of non-clinical models and relevant animal species is essential to obtain predictive data |

for humans.
The expected result of the study is the development of a new methods and optimizing existing methods for experimental modeling of inner ear diseases and balance disorders. The novelty of the project involves measuring the effectiveness audiometric and vestibulometric preclinical researches of sensorineural hearing loss and vestibulopathy in rats.
The methodology includes preclinical research algorithm of the auditory and vestibular systems in rats that consists of two consecutive stages, namely: development of the protocol for functional examination in laboratory animals; establishing the type of substance for inducing and directing the course of sensorineural hearing loss (SNHL), experimental audiometric methods (otoacoustic emission, impedancemetry, Preyer reflex) for finding and monitoring SNHL; preclinical investigations of movement coordination for vestibular function.

A theoretical and practical basis has been developed for an interdisciplinary and systemic conceptual approach of preclinical studies on the development, pharmacological treatment of sensorineural hearing loss and vestibulopathy. The results were implemented in the practical activities of the National Institute for Research in Medicine and Health of the *Nicolae Testemitanu* State University of Medicine and Pharmacy.

**MD.39.**

| | |
|---|---|
| **Title** | **Identification and medico-legal assessment of soft tissue and osteo-articular trauma by musculoskeletal ultrasound** |
| **Authors** | Andrei Pădure, Maria Jeleznaia-Bondareva, Anatolii Bondarev |
| **Institution** | ***Nicolae Testemitanu* State University of Medicine and Pharmacy of the Republic of Moldova** |
| **Patent no.** | - |
| **Description** | Identification of soft tissue and osteo-articular injuries often requires additional imaging investigations, since not all lesions can be thoroughly diagnosed through clinical examination alone. Ultrasound is one of the most dynamic methods for imaging soft tissues, tendons, muscles, and nerves. It offers a non-invasive, inoffensive, informative, |

cost-effective, and fast alternative, facilitating repeated dynamic examinations. Notably, ultrasound outperforms CT and MRI in terms of speed, ability to conduct functional tests, and absence of contraindications. Despite being widely employed in clinical medicine, its use in forensic medicine remains extremely rare.

The main aim of our research project is to estimate the impact of musculoskeletal ultrasound in the identification and medico-legal assessment of soft tissue and osteo-articular injuries.

The project will focus on the following specific objectives:

1. Analysis of national and international medico-legal practices regarding the application of imaging methods for identifying soft tissue and osteo-articular traumas.
2. Assessment of diagnostic value and clinical utility of musculoskeletal ultrasound in blunt injuries.
3. Determination of ultrasound findings impact on the assessment of injury severity and the expert's conclusions.
4. Development of scientific basis for application of musculoskeletal ultrasound for forensic medical purposes.

We expect to prove the diagnostic efficacy and practical utility of musculoskeletal ultrasound in medico-legal examination of living people with blunt soft tissue and osteo-articular traumas, particularly when injuries are not clinically detectable. Consequently, it will provide evidence-based proof to improve the justice act and safeguard human rights.

| **MD.40.** | |
|---|---|
| **Title** | **Technological transfer of the software "Register of informational evidence of bio-specimens within the Biobank"** |
| **Authors** | Buta Galina, Puia Raisa, Todiraș Mihail, Tagadiuc Olga, Malcova Tatianaia, Romanciuc Grigore |
| **Institution** | ***Nicolae Testemitanu*** **State University of Medicine and Pharmacy of the Republic of Moldova** |
| **Patent no.** | The scientific work "Information architecture and systematization of bio-specimens within the Biobank", (Certificate of Copyright and Related Rights, AGEPI, Republic of Moldova, Seria OȘ no. 7541 from 16.05.2023; Innovator Certificates: no. 5999, no 6051 in the *Nicolae Testemițanu* University |

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| **Description** | In the period, September 2021-April 2023, within the project "Informational record of bio-specimens within the Biobank", of the „Nicolae Testemițanu" SUMPh of Moldova developed and implemented the "Register of informational record of bio-specimens within the Biobank" software, the registration at SAIP of the scientific work "Information architecture and systematization of bio-specimens within the Biobank", Seria OȘ nr.7541, din 16.05.2023. The software contributes to the effectiveness and efficiency of personalized medicine processes, to the qualitative management of information about research subjects and is a strategic tool of the competitive clinical management of health services.<br>Following the results obtained from the previous project, the technological transfer of the "Register of informational records of bio-specimens within the Biobank" software is currently being carried out in two medical entities: the MSIP the Oncological Institute and „ALFA Diagnostica" L.L.C., based on project 24.80015.8007.02TT, period 15.07.2024-31.12.2025.<br>The results of the project contribute to the qualification of human resources, by attracting and involving collaborators in research activities. The potential beneficiaries: scientific researchers, collaborators of scientific laboratories, teaching and scientific staff of the „Nicolae Testemițanu" University will benefit from a comprehensive informational support for the record of bio-specimens within of the State University of Medicine and Pharmacy Biobanks and will have possibilities to streamline the activity of research. |

**MD.41.**

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| **Title** | ***Psychophysiological characteristics of the health status of individuals with chronic hepatopathies*** |
| **Authors** | Berezovscaia Elena.<br>Supervisors: Furdui Teodor, Lupașco Iulianna |
| **Institution** | ***Nicolae Testemitanu*** **State University of Medicine and Pharmacy of the Republic of Moldova** |
| **Patent no.** | - |
| **Description** | This study aims to identify the psychophysiological characteristics of the health status of individuals with chronic hepatopathies and to assess the impact of liver pathology on their psychophysiological state. The research |

project has a multidisciplinary approach. In order to achieve the aim was necessary to form a control group of healthy people. The aspect of control group formation with recruitment of healthy subjects remains an important issue for researchers. For the health confirmation state of evaluated people who consider themselves to be practically healthy and/or to highlight various diseases or chronic pathologies was developed a special tool "Evaluation questionnaire of practically healthy people for the formation of the control group in scientific research".

For the first time in the Republic of Moldova, the psychophysiological status of 85 people was examined; before group formation they were evaluated by this non-invasive method, of whom identified 59 with chronic hepatopathies and 26 practically healthy people. The special designed above-mentioned tool was implemented in hepatology unit of Central Republican Hospital of Chisinau.

The scientific novelty of this tool results from the complex approach of investigating people who are considered to be practically healthy with their possible recruitment in the framework of scientific research or the discovery of various chronic pathologies that require investigation and/or timely monitoring. There are currently no similar questionnaires.

Application of the questionnaire, analysis and interpretation of data will have an impact on the eligible control group formation in scientific research and the possibility of establishing chronic hepatopathies in time.

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| **MD.42.** | |
| **Title** | **Determination of pathogenetic mechanisms in the niacin skin test for patients with high clinical risk of psychosis and schizophrenia in the Republic of Moldova** |
| **Authors** | Nastas Igor |
| **Institution** | ***Nicolae Testemitanu*** **State University of Medicine and Pharmacy of the Republic of Moldova** |
| **Patent no.** | - |
| **Description** | The concept of clinical high risk refers to those states in which symptoms cannot yet be attributed to schizophrenia or another mental disorder to enable intervention. The duration of these states can last 2-3 years before the appearance of clinically defined symptoms. Pathological processes at the |

level of membrane phospholipids are considered an essential factor in the pathophysiology of schizophrenia. Oxidative stress and decreased antioxidant activity play important roles in the development of these disorders. At the molecular level, reduced levels of arachidonic acid, increased activity of phospholipase A2 enzyme, and abnormal expression of niacin receptors in the walls of cutaneous capillaries are observed. The skin flushing reaction in response to niacin administration in patients with schizophrenia is considered to be influenced by prostaglandins. Both omega-3 and omega-6 play an important role, as they are part of the phospholipids of cell membranes. According to our average data calculations, the cutaneous niacin test can predict that in 78.5% of cases ($*(\mu)=0.7850$), patients with a positive test result will have schizophrenia, while in 71.09% of cases ($*(\mu)=0.7109$), subjects with a negative test result will not have schizophrenia. Additionally, the Omega-3 index is reduced in the red blood cells of patients with schizophrenia. The optimal levels of the Omega-3 index (the omega-3/omega-6 ratio) range from 1:1 to 1:4. Positive results for these tests allow for the timely initiation of treatment for individuals at risk of developing a psychotic disorder, thereby contributing to an improved disease progression.The innovation is part of the development process conducted within the postdoctoral research and the Authorship Certificate No. 8139 dated 12 February 2025 (certificate of copyright and related rights, AGEPI, Republic of Moldova).

**MD.43.**

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| **Title** | **Interdisciplinary diagnostic and treatment methods for congenital edentulism** |
| **Authors** | Solomon Oleg |
| **Institution** | ***Nicolae Testemitanu*** **State University of Medicine and Pharmacy of the Republic of Moldova** |
| **Patent no.** | - |
| **Description** | The postdoctoral project involves an interdisciplinary study of the diagnosis and treatment of congenital edentulism, which represents deviations from normal embryonic development and causes structural, functional or metabolic abnormalities associated with malformations and |

malocclusions.

The great diversity of syndromic forms has directed us towards a scientific research that provides for the complex interdisciplinary rehabilitation of the dento-maxillary apparatus with the development of a personalized clinical protocol and a predictive model. The advantages of the study consist in the precise paraclinical detection of dental follicles and the interdisciplinary treatment methodology for the possibility of rehabilitation of the functional and aesthetic anatomical structures of patients with congenital edentulous teeth. In the study, we identified the genes and protein that contributed to the development of congenital edentulism.

**MD.44.**

**Title** **Method for assessing the prognosis of severe evolution of community-acquired pneumonia in patients with heart failure**

**Authors** Cașcaval Virginia, Dumitraș Tatiana, Grib Livi, Matcovschi Sergiu, Fetco-Mereuta Diana

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

**Description**

The results of this research project PhD refer to the application in the clinical practice of internists and cardiologists of a calculation formula, which includes parameters from the clinical examination, laboratory and echocardiographic data, which will help identify patients at high risk of severe evolution of community-acquired pneumonia.

The in-hospital mortality rate due to community-acquired pneumonia varies, being on average 14%, and in patients with severe disease, it increases up to 50%. Long-term mortality has been shown to be strongly and independently associated with the severity of community-acquired pneumonia at admission, as well as with the presence of associated pathologies, including pre-existing heart failure.

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 community-acquired pneumonia severity in patients with chronic heart failure.

The formula we recommend for predicting severity of

community-acquired pneumonia in patients with chronic heart failure, includes the following parameters: presence of pleural effusion on chest X-rays examination, history of chronic heart failure, hematocrit value (%), and the constant value we adjusted for this formula (-2.511).
The advantages of the proposed method consist in early detection (with a probability of 87.0%) of patients with an increased risk of mortality, which dictates an early therapeutic management, with the aim of correcting possible complications and avoiding unfavorable evolution.
The innovation is part of the development process carried out within the doctoral research and the Innovator's certificate No. 6263 from 25.07.2024, „Nicolae Testemitanu" State University of Medicine and Pharmacy of the Republic of Moldova.

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| **MD.45.** | |
| **Title** | **Method for generating bioinformatics analysis reports and visualizing data obtained following viral deconvolution with the Freyja algorithm** |
| **Authors** | Colac Svetlana, Sitnic Victor, Iliev Albina-Mihaela, Apostol Mariana, Burduniuc Olga |
| **Institution** | **National Agency for Public Health;** ***Nicolae Testemitanu*** **State University of Medicine and Pharmacy of the Republic of Moldova** |
| **Patent no.** | - |
| **Description** | This innovation was conceived with the aim of creating a practical bioinformatics tool that allows the generation of reports and the visualization of information regarding the abundance of genetic lineages obtained with the Freyja algorithm following the analysis of SARS-CoV-2 RNA sequencing data from wastewater. In addition to individual clinical testing, wastewater analysis has emerged as a mass screening method, providing useful early warning data on the prevalence, dynamics, and genetic diversity of viruses at the community level. The Freyja bioinformatics tool, developed for the deconvolution of viral mixtures from sequencing data, has proven useful in the analysis of complex SARS-CoV-2 samples from wastewater. However, the interpretation, visualization, and reporting of data generated by Freyja often require advanced bioinformatics knowledge and can be time-consuming. Therefore, the |

development of a dedicated script for this purpose would significantly facilitate the preparation of reports for decision-makers regarding the results of SARS-CoV-2 wastewater sequencing. The advantages of the proposed method include an automated workflow for visualizing and reporting data on the abundance of genetic lineages obtained from SARS-CoV-2 virus genome sequencing from wastewater, thus significantly reducing the time required for interpreting the obtained data and preparing the results reports. Therefore, the generated reports can provide essential information for public health risk management, thereby contributing to the implementation of surveillance and control measures in the epidemic process of COVID-19 infection.

The innovation is part of the doctoral project, approved by the Consortium of the Doctoral School in Medical Sciences, applied within the NAPH and is confirmed based on Innovation Certificate No. 6315 dated 30.12.2024, „Nicolae Testemițanu" State University of Medicine and Pharmacy

**MD.46.**

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| **Title** | **Evaluating the impact of bottled water on public health: development of an assessment tool** |
| **Authors** | Maria Curteanu |
| **Institution** | ***Nicolae Testemitanu* State University of Medicine and Pharmacy of the Republic of Moldova** |
| **Patent no.** | - |
| **Description** | The PhD project explores how consumer preferences for bottled water are influenced by factors such as taste, smell, perceived quality, health, and convenience. The research assesses the impact of bottled water consumption on the health of the population in the Republic of Moldova, using a validated and ethically approved questionnaire.<br>This innovative study applies new methods to analyze consumer behavior and public health concerns. The questionnaire, approved by the Ethics Committee of the *Nicolae Testemițanu* State University of Medicine and Pharmacy, consists of 61 questions divided into four sections: bottled water consumption patterns, quality perception, health impact, and general demographic information.<br>The study provides valuable data on consumer habits and |

preferences, helping to shape recommendations for improving product quality standards and transparency in labeling and marketing. These findings will inform the development of public health policies aimed at promoting safe water consumption and increasing awareness about the health and environmental implications of bottled water.
This innovation is a key component of the author's ongoing doctoral research. The results are officially recognized through the Innovator's Certificate No. 6319, issued on January 21, 2025, by the *Nicolae Testemițanu* State University of Medicine and Pharmacy and implemented by the National Agency for Public Health. The project contributes to both health promotion and environmental sustainability in the Republic of Moldova.

**MD.47.**

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| **Title** | **Signs of pulmonary thromboembolism detected based on standardized diagnostic methods** |
| **Authors** | Ranga Doina, Caproș Natalia |
| **Institution** | ***Nicolae Testemitanu* State University of Medicine and Pharmacy of the Republic of Moldova** |
| **Patent no.** | - |
| **Description** | Field of study: internal medicine, pulmonology, cardiology.<br>The purpose of the study: Improvement of risk stratification and prognosis in patients with pulmonary thromboembolism (PTE) and development, improvement of the "Method for evaluating the severity of pulmonary embolism (PE) based on the increase in fibrinogen and CRP according to patient age".<br>The study of clinical and paraclinical parameters relevant for the stratification of patients with pulmonary thromboembolism (PTE). The aim is to predict pulmonary embolism (PE) based on the increase in D-dimers and improve the risk stratification and prognosis of patients with pulmonary thromboembolism (PTE) by integrating biomarkers such as fibrinogen and C-reactive protein (CRP) into diagnostic and clinical management algorithms, according to patient age. Patient investigation should be conducted based on the diagnosis associated with acute clinical decompensation. This will allow for more precise risk stratification and facilitate the making of appropriate |

therapeutic decisions. Additionally, we propose that associated cardiovascular conditions be addressed simultaneously, considering their constant interaction and bidirectional impact on patient prognosis.
The results of the study are implemented as conceptual support in the Clinical Department of Pulmonology of IMPS Holy Trinity Municipal Clinical Hospital, as well as in the study program at the Discipline of Clinical Synthesis of the "Nicolae Testemitanu" State University of Medicine and Pharmacy.

**MD.48.**

**Title** **Interactive model of simulation of tectonic earthquakes VEN-GP V.1.0**

**Authors** Valic Eugeniu, Valic Vladimir, Ciobanu Daniela, Bulgac Anatolie

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

**Patent no.**

**Description**

The innovation consists of an interactive tectonic earthquake simulation model. It is composed of a landscape represented by a model of a household consisting of a two-level building, lamp post with electric LED bulb, fenced yard placed on a mobile platform suspended on 4 springs.
The platform is connected to a system consisting of crank connected to a DC motor and reducer. This system is powered by a DC power supply (Li-Po 18650 12V batteries, connected in series).
The magnitude of the tectonic earthquakes is regulated by a DC controller with a potentiometer, being equated to the voltage in volts transmitted to the motor and reducer system. Its value is recorded by a voltmeter, whose display indicates the voltage transmitted to the system with motor and reducer.

Following the testing of this model during the seminars of the Department of Military and Disaster Medicine, the department's collaborators and students were impressed and motivated by the innovative approach in the instructional-didactic process of natural disasters, the convenience of its use and the adjustment of the magnitude of earthquakes with visualization in real time of its manifestations.

| MD.49. | |
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| **Title** | **RenalForm-StoneCare: Personalized treatment of lithiasis in kidney malformations** |
| **Authors** | Ceban Ilie, Ivanov Mihaela, Jinga Viorel, Ceban Emil |
| **Institution** | ***Nicolae Testemitanu*** **State University of Medicine and Pharmacy of the Republic of Moldova;**<br>**University of Medicine and Pharmacy „Carol Davila" Bucharest, Romania** |
| **Patent no.** | PhD research project in Medical Sciences |
| **Description** | Research refers to a common renal complication, that presents unique challenges when occurring in patients with congenital kidney abnormalities. Anatomical anomalies such as horseshoe kidney, ureteropelvic junction obstruction, and duplication complicate stone management due to altered urinary dynamics and access challenges.<br>The essence of the research lies in the possibility of investigation the relationship between congenital renal anomalies and stone formation and evaluation of surgical treatment options and outcomes. Effective management of urolithiasis in congenital kidney anomalies requires individualized treatment strategies.<br>The innovation is part of the development process carried out within the doctoral research supported by the author. |

| MD.50. | |
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| **Title** | Placenta processing device |
| **Authors** | JIAN Mariana, SAVCA Ion, BALAN Mihail, NACU Viorel, COBZAC Vitalie, MOSTOVEI Andrei, SOLOMON Oleg |
| **Institution** | Nicolae Testemitanu State University of Medicine and Pharmacy of the Republic of Moldova |
| **Patent no.** | Patent application No. MD 2625/2025 |
| **Description** | The invention relates to the medical technique, namely to a device for processing the placenta at the stage of blood removal in the process of extracting total collagen, which can be used in regenerative medicine and tissue engineering. The advantages of the device consist in creating a device that allows a wash effective of the placenta in the collagen extraction process, at the scheduled time and speed desired, avoiding the unexpected stoppage of the rotation of the |

material in the vessel, thus preventing distortion this one.
The result of the invention consists in processing the pieces of placenta and avoiding stopping
of the blood washing process, namely the elaborated device allows the exact control of
the number of rotations of the vessel in which the material is located and the processing time, thus it is avoided the long process of washing and denaturing the protein needed to extract it from the placenta. The device is convenient, mobile, practical, compact, portable and has a relatively low price for manufacturing.

**MD.51.**

**Title** **Specimen fixing rack device for testing at cytotoxicity**

**Authors** COBZAC Vitalie, JIAN Mariana, NACU Viorel, MARIȚOI Tatiana, MOSTOVEI Andrei, SOLOMON Oleg

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

**Patent no.** Patent application No. MD 2612/2024

**Description**

The invention relates to regenerative medicine and cell engineering. The problem that the invention solves is the creation of a device that allows the suspension of flat and large samples, in the nutrition medium, above the layer of adherent cells, thus avoiding the mechanical influence on them. The use of that device allows cytotoxicity tests to be performed on flat, heavy and large samples with high precision.

The result is that the said device can be used to neutralize any mechanical action of flat, heavy and large samples on the layer of adherent cells in the wells of cell culture plates in which cytotoxicity tests are performed, thus avoiding false negative results.

The advantages of the device are easy loading of the device shelf with flat, heavy and large samples, and thanks to the side wings that rest on the edges of the wells, there is no direct contact of the device and the required samples to be tested with the layer of adherent cells on the cell culture surface, however, the length of the wings can vary depending on the diameter of the plate wells, and the diameter of the cylinder can vary depending on the size of the sample and the plate wells.

| MD.52. | |
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| **Title** | Method of collagen obtaining from the umbilical cord |
| **Authors** | JIAN Mariana, COBZAC Vitalie, NACU Ana Maria, MOSTOVEI Andrei, NACU Viorel |
| **Institution** | Nicolae Testemitanu State University of Medicine and Pharmacy of the Republic of Moldova |
| **Patent no.** | Nr. MD 6201 /2024 |
| **Description** | The innovation relates to regenerative medicine, tissue engineering and oral maxillo facial surgery and represents a method of collagen extraction from the umbilical cord. The proposed method consists in using the surfactant TRITON X 100 which is effective in removing cellular components from the umbilical cord having a role in solubilization the membranes of the mesenchymal stem cells present in the umbilical cord and determining the removal of DNA with the obtaining of an extracellular matrix from which the collagen can later be extracted of high purity.<br>The advantage of the mentioned method consists in obtaining a collagen suspension of high purity by using the decellularization agent for the effective washing of the umbilical cord blood, the removal of mesenchymal stem cells and the obtaining of the extracellular matrix from which the non immunogenic collagen is subsequently extracted in the subsequent applications in engineering tissue. |

| MD.53. | |
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| **Title** | Urine and the impact of plastic pollution: microplastics as biomarkers of environmental exposure |
| **Authors** | Emil CEBAN, Viorel JINGA, Kamel EARAR |
| **Institution** | **1 "Nicolae Testemitanu" State University of Medicine and Pharmacy of the Republic of Moldova, Faculty of Dentistry, Chisinau, Republic of Moldova**<br>**2 Faculty of Medicine, Carol Davila University of Medicine and Pharmacy, Bucharest, Romania**<br>**3 "Dunarea de Jos" University of Galati, Faculty of Medicine and Pharmacy, Galati, Romania** |
| **Patent no.** | Research |
| **Description** | Microplastic pollution has emerged as a critical global public health challenge, with far-reaching effects on both ecosystems and human physiology. While microplastics have long been identified |

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| | in environmental matrices such as air, water, soil, and food, their recent discovery in human biological fluids—particularly urine—marks a pioneering development in exposure science.<br>This breakthrough introduces a novel, non-invasive pathway for assessing individual exposure to plastic particles, positioning urine as a powerful biomarker. Advanced Raman microspectroscopy techniques now enable the detection of microplastic fragments (4–15 μm) from common polymers like polyethylene, polypropylene, polyvinyl chloride, and vinyl acetate. These particles infiltrate the human body through ingestion, inhalation, or dermal absorption, cross biological barriers, and are ultimately excreted via the kidneys.<br>Urine's accessibility, non-invasive nature, and rapid responsiveness to physiological changes make it an ideal analytical matrix. Its use for microplastic detection not only enhances exposure assessment but also provides real-time insights into potential health risks such as endocrine disruption, chronic inflammation, and oxidative stress. This innovative approach redefines how we monitor environmental contaminants and sets the stage for transformative advances in epidemiological and ecotoxicological research. By leveraging urine as a diagnostic tool, we can accelerate the development of targeted strategies to mitigate plastic pollution's impact on human health. |

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| **MD.54.** | |
| **Title** | Development of biological dressings for skin wound regeneration through tissue engineering, |
| **Authors** | Macagonova Olga, Cociug Adrian, Nacu Viorel |
| **Institution** | **University of Medicine and Pharmacy „ Nicolae Testemițanu " / Laboratory of Tissue Engineering and Cell Culture** |
| **Patent no.** | research project 23.70105.8007.02T, |
| **Description** | This project is related to health and presents a study on the development of dressings from natural sources from porcine dermis and small intestine submucosa collagen sponge. The aim of the study is to explore the methods of development and integration of active biological dressings developed through tissue engineering and their role in the regeneration of skin defects. By using the sterilization, decellularization, enzymatic digestion, and dialysis we developed porous biomaterials. We analyzed the eligibility of tissues for in vivo use by performing the tests by SEM, staining with hematoxylin-eosin, quantification of DNA, cytocompatibility with MTT, staining with Calcein-Acetoxymethyl and DAPI-Rhodamine Phalloidin. |

Therefore, these tested biomaterials were the raw material for the development of combined biological dressings with therapeutic agents: 0.01% Povidone-iodine solution, gentamicin). In the preclinical study, Wistar rats were used, with skin defects surgically reproduced on the back. We followed the regenerative efficacy of the biological dressings. Biological dressings, revealed complete wound closure and complete restoration of the skin structure until day 21. Advantages: a biocompatible, self-degradable bio-dressing does not exert pressure on the wound, does not deform the wound edges and ensures undisturbed epithelialization. The scope of application of the project results is medicine through the use of the biomaterials in the form of implants, prostheses and transplants in surgery, traumatology and orthopedics, in an affected area of the body, where the skin has been damaged. Biomaterials can be used in dermatology, cosmetology; in pharmacology, toxicology, biology, chemistry for testing and producing drugs and various chemical substances.

**The Institute of Emergency Medicine**
Nicolae Testemitanu State University of Medicine
and Pharmacy of the Republic of Moldova

**MD.55.**

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| **Title** | ***ADVANCED INTEGRATED WEB-PLATFORM FOR REAL-TIME EVALUATION AND DECISION SUPPORT IN THE PROCESS OF PROVIDING SPECIALIZED MEDICAL CARE TO PATIENTS WITH ACUTE STROKE IN THE REPUBLIC OF MOLDOVA*** |
| **Authors** | **ZOTA Eremei, GOLUBEVA Natalia, GROPPA Stanislav, MANEA Diana, CRIVORUCICA Igor, CERNOBROV Dumitru, GLAVAN Felicia, ȚURCAN Ecaterina, VOITENCO Bogdan** |
| **Institution** | **The Institute of Emergency Medicine** |
| **Patent no.** | AGEPI MD Certificat SAIP seria OȘ Nr. 8053 din 20.11.2024 |
| **Description** | Stroke remains a leading cause of mortality and disability worldwide, with timely diagnosis and intervention essential to improve outcomes. Existing systems often lack integration at different stages of patient care, leading to delays in treatment and variability in decision-making. In addition, physicians need quick access to a comprehensive picture of a patient's medical history, objective examination data, and imaging results to make informed decisions within narrow therapeutic windows. Advanced integrated medical informational platform "STROKE ONSET TO OUTCOME" presents a physician's tool for multilateral stroke care, in the diagnosis, management of clinical stroke data in comprehensive Stroke Centers. The purpose of this software is to streamline and improve the management of stroke patients in stroke centers by providing an integrated platform for real-time data collection, analysis and decision making. This software is designed for use in comprehensive, multidisciplinary, Primary Stroke Centers but is applicable to any medical facility treating stroke patients. The platform integrates various stages of stroke patient care, from initial evaluation and diagnostic testing to treatment planning and execution.<br>This will allow clinicians to:<br>- Record and review patients' medical history and medications administered prior to hospitalization. |

- Record and evaluate real-time examination data such as glucose levels, blood pressure, and NIHSS stroke severity score.
- Simplify decision-making based on a structured plan for imaging interpretations and other tests. Instantly store and retrieve vital clinical data, ensuring that key information is not overlooked at critical moments.

The system promotes standardization of physician work, improving both the speed and accuracy of stroke care. It is designed to operate in high-pressure environments where time is of the essence, helping stroke centers provide patients with faster, evidence-based care and ultimately improve clinical outcomes.

**MD.56.**

**Title** ***THE REAL-TIME DECISIONS OPTIMIZATING METHOD TO PATIENTS WITH ACUTE STROKE THROUGH AN ADVANCED INTEGRATED PLATFORM IN STROKE CENTERS IN THE REPUBLIC OF MOLDOVA***

**Authors** **ZOTA Eremei, GOLUBEVA Natalia, GROPPA Stanislav, MANEA Diana, CRIVORUCICA Igor, CERNOBROV Dumitru, GLAVAN Felicia, ȚURCAN Ecaterina, VOITENCO Bogdan**

**Institution** **The Institute of Emergency Medicine**

**Patent no.** AGEPI MD Certificate SAIP seria OȘ Nr. 8054 din 20.11.2024

**Description**

Comprehensive stroke centers face significant challenges in managing large volumes of clinical data, interpreting complex diagnostic tests, and making timely decisions. Existing systems often lack integration across the different stages of patient care, leading to treatment delays and decision-making variability. In addition, physicians need rapid access to a comprehensive picture of a patient's medical history, objective examination data, and imaging results to make informed decisions within narrow therapeutic windows.

The "MED-Project AVC" software was developed to streamline and improve patient management in stroke centers, enabling real-time data collection, analysis, and decision-making.

The software aims to:

1. Consolidate comprehensive patient data, medical history, and objective examination results into a single platform.
2. Provide tools for rapid entry and access to critical, time-sensitive stroke information, such as time of onset, blood pressure, and stroke severity scores.
3. Facilitate the interpretation of brain CT scans and other instrumental data to guide decision-making processes.
4. Facilitate the creation of personalized diagnostic and treatment plans through structured decision-support protocols and algorithms.

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| **MD.57.** | |
| **Title** | **THE METHOD FOR ANALYZING THE COST EFFECTIVENESS AND QUALITY OF MEDICAL SERVICES IN GENERAL AND MONO SPECIALIZED HOSPITALS. FACTORS DETERMINING HEALTH POLICY IN ROMANIA AND THE REPUBLIC OF MOLDOVA** |
| **Authors** | **DOBRE Cristina-Elena, CIOCANU Mihail** |
| **Institution** | **The Institute of Emergency Medicine, The State University of Medicine & Pharmacology "Nicolae TESTEMIȚANU"** |
| **Patent no.** | AGEPI MD cycle of Certificates SAIP seria OȘ Nr. 8009, 8010, 8011 din 02.10.2024 |
| **Description** | The originality of this metod lies in the fact that the evolution of health policies has not been subjected, over the years, to specific assessments and analyses regarding the efficiency of application and economic feasibility, but these have undergone serial implementations of recommendations and legislative regulations. The few statistical analyses have focused mainly on selective criteria and unitary directions but not necessarily multifactorial and adapted to the socio-economic situation in Romania and the Republic of Moldova. Thus, a multidimensional and exhaustive analysis of all aspects related to the efficiency and quality of health services is carried out, on their entire compartmentalization.<br>We propose the evaluation of the activity and effectiveness of general and monospecialty hospitals based on measures developed within the specific health policies, respectively, the development and testing of an econometric model of efficient management, adapted to the socio-economic |

context, a tool that can be applied in practical and research activity, to improve health systems and policies both in Romania and in the Republic of Moldova.

**MD.58.**

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| **Title** | **METHOD FOR PREVENTING RECURRENCE OF PECTUS EXCAVATUM DEFORMITY IN CHILDREN AND ADOLESCENTS** |
| **Authors** | **KUSTUROVA Anna, MAXIM Igor, KUSTUROV Vladimir** |
| **Institution** | **The Institute of Emergency Medicine, The State University of Medicine & Pharmacology "Nicolae TESTEMIȚANU"** |
| **Patent no.** | AGEPI MD ***research cycles*** of patent pending s 2024 0110 din 2024.11.05 & Certificat SAIP seria OȘ Nr. 8082 din 27.01.2025 |
| **Description** | Thoracic deformity in the form of pectus excavatum, which constitutes more than 90% of all congenital thoracic deformities, is a severe pathology that leads to serious functional disorders of the respiratory and cardiovascular systems.<br>The given method involves the treatment of recurrences of thoracic deformity but does not provide conditions for their prevention. Prolonged corset therapy creates discomfort and leads to weakness of the back muscles, which is a predisposing factor in the occurrence of postural disorders. Sternotomy and chondrotomy during the operation present additional trauma, disrupt the growth zones of the rib cage and in the absence of a metal fixator can again cause a recurrence of pectus excavatum deformity.<br>The purpose of the proposed technical solution is to prevent recurrence of pectus excavatum deformity and to achieve a positive result by maintaining the sterno-costal segment in the correct position and maintaining the anatomical shape of the chest until the completion of the child's growth period.<br>The essence of the method is that, after the step-by-step correction of the pectus excavatum deformity of the chest to the correct physiological position, before removing the fixation device (Nuss plate or other), the correct shape of the rib cage is maintained until the end of the child's growth period by means of cross-intramedullary fixation of the |

sterno-costal segment.
The proposed technical result consists in maintaining the achieved correction of the sterno-costal complex throughout the entire period until the end of the patient's growth, without restricting and traumatizing the growth zones of the ribs and sternum, freeing the chest from the presence of foreign bodies (metal plate), which is a favorable condition for the organs in the thoracic cavity - the respiratory and cardiovascular systems.

**MD.59.**

**Title**

**ACUTE ISCHEMIC STROKE. QUICK GUIDE TO EMERGENCY MEASURES FOR THE GENERAL POPULATION. THE EFFECTIVENESS OF THE FAST ALGORITHM AT THE PREHOSPITAL STAGE IN THE REPUBLIC OF MOLDOVA**

**Authors**

**ZOTA Eremei, CRIVORUCICA Igor, GROPPA StanislaV, MANEA Diana, GLAVAN Felicia**

**Institution**

**The Institute of Emergency Medicine, The State University of Medicine & Pharmacology "Nicolae TESTEMIȚANU"**

**Patent no.**

AGEPI MD Certificat SAIP seria OȘ Nr. 8013 din 02.10.2024

**Description**

Stroke (CVA) is a major medical and social problem of humanity and the main cause of disability worldwide.

The specific treatment of acute ischemic stroke in the Republic of Moldova is currently the reperfusion procedure, performed by thrombolytic therapy and, since 2015, by endovascular treatment. "Time is brain", because millions of neurons are lost every minute from the onset of stroke, and the window of opportunity for saving ischemic tissue is the first 3 hours from the onset of stroke.

One of the reasons for delayed treatment is the lack of recognition of the symptoms of a stroke. The acronym FAST is a basic tool for the early recognition of the symptoms of a stroke. The FAST test was therefore designed as a tool to increase the recognition of acute stroke by the public, patients, primary care, but also the emergency medical care team. The acronym was created by the American Stroke Association and includes the main criteria for identifying and intervening in the event of a stroke:

• F – FACE – Ask the patient to show their teeth or smile. In a stroke patient, the FACE expression will be asymmetrical. As a

result, the corner of the mouth on the affected side will be lowered.

• A – HAND SLIP – Ask the patient to raise their hands up or stretch both hands forward. In a stroke patient, one hand will SLIP down compared to the other.

• S – SAY YOUR NAME – Ask the patient to SAY their name, age, address. The stroke patient will have unintelligible speech, will repeat some and the same words or will not be able to speak at all.

• T – TIME, to call 112- If you have determined at least one of these symptoms, it is TIME to call 112 and transport the patient to the Institute of Emergency Medicine.

**MD.60.**

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| **Title** | **STROKE MANAGEMNT ALGORITHM FOR THE GENERAL POPULATION AT THE PREHOSPITAL STAGE AND EMERGENCY MEDICINE DEPARTAMENT IN REPUBLIC OF MOLDOVA** |
| **Authors** | **ZOTA Eremei, CRIVORUCICA Igor, GROPPA Stanislav, MANEA Diana, GLAVAN Felicia** |
| **Institution** | **The Institute of Emergency Medicine, The State University of Medicine & Pharmacology "Nicolae TESTEMIȚANU"** |
| **Patent no.** | AGEPI MD Certificat SAIP seria OȘ Nr. 8012 din 02.10.2024 |
| **Description** | The management of stroke patients is a critical emergency that demands rapid and effective interventions to minimize complications and improve patient outcomes. Prompt recognition and swift access to diagnostic facilities and treatment can significantly increase survival rates and reduce the likelihood of disability. Early recognition of stroke symptoms and immediate notification of emergency services are crucial for improving the prognosis of acute stroke patients. The implementation of operational algorithms helps minimize "door-to-needle" time by accurately and swiftly identifying suitable patients, leading to improved recanalization rates and better clinical outcomes.<br>Avoiding delays should be the primary goal in the acute prehospital and in-hospital phase of stroke management. Time is an important predictor of clinical outcome and treatment effect in cerebral ischemia, so early recognizing the signs of a stroke and transporting the patient to the nearest stroke unit capable of performing acute stroke treatment is a priority. |

**MD.61.**

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| **Title** | ***THE OPTIMIZATION ALGORITHM FOR SECONDARY TRAUMATIC BRAIN INJURY MANAGEMENT. IDENTIFICATION OF RISK FACTORS AT THE PREHOSPITAL STAGE AND EMERGENCY MEDICINE DEPARTMENT IN THE REPUBLIC OF MOLDOVA*** |
| **Authors** | **MOCANU Natalia, ZAPUHLÎH Grigore, MANEA Diana, REZNEAC Larisa, CIOCANU Mihail** |
| **Institution** | **The Institute of Emergency Medicine, The State University of Medicine & Pharmacology "Nicolae TESTEMIȚANU"** |
| **Patent no.** | Certificat SAIP AGEPI MD ser.OȘ nr. 7822 din 18.03.2024 |
| **Description** | Secondary brain injury extends in the presence of secondary brain insult factors, referred to in English sources as secondary brain insults. These are systemic (known by the French acronym "ACSOS"): hypoxia, hypercapnia, hypocapnia, hyperglycaemia, hypotension, anaemia, hyponatraemia, hyperthermia; and intracranial: haemorrhage, ischaemia, oedema, intracranial hypertension, vasospasm, infection, epilepsy, hydrocephalus. Scientific evidence supports these claims, with researchers finding that the proportion of secondary brain injuries among patients who have suffered traumatic brain injury is 90 percent.<br>In our study, the correlation of several risk factors at prehospital stage (age, hypoxia, systolic blood pressure, hyperglycemia) with the severity of traumatic brain injury and mortality of traumatic brain injury patients was determined. The results of our study showed correlation between patients' age and mortality ($p = 0.033$, $r = 0.097$); systolic blood pressure ($p = 0.0001$, $r = -254$ in correlation with TBI severity, and $p = 0.002$, $r = -138$ in correlation with mortality rate); hypoxia ($p = 0.0001$, $r = ,264$) and hyperglycemia ($p = 0.0001$. $r = -.213$).<br>Injury scoring systems are also useful for risk stratification, particularly for physicians and emergency physicians, as they work with little clinical information in the field. Most research in the literature focuses on the accuracy of injury scoring systems and long-term outcomes. Therefore, the relationship between clinical criteria and short-term outcomes remains unclear. In practice, only short-term outcomes are specific to the triage of patients with TBI in both the prehospital and the DEM, and guidelines for triaging patients with TBI for specific |

lesions are virtually absent. Thus, evidence is needed to support a trauma patient scoring system based on 24-hour outcomes.

**MD.62.**

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|---|---|
| **Title** | ***THE METHOD OF CLINICAL-ENDOSCOPIC CORRELATIONS IN PATIENTS DIAGNOSED WITH COLONIC NEOFORMATIONS*** |
| **Authors** | **URSU Alexandr, DOLGHII Andrei, ROJNOVEANU Gheorghe** |
| **Institution** | **The Institute of Emergency Medicine, The State University of Medicine & Pharmacology "Nicolae TESTEMIȚANU"** |
| **Patent no.** | AGEPI MD patent pending s 2025 0035 din 2025.02.20 |
| **Description** | Colorectal cancer (RCC) is a public health problem with a significant impact on the morbidity and mortality of the population around the globe. In the Republic Of Moldova, RCC screening is carried out in 3 Stages: 1) identification, selection and referral of patients for colonoscopic screening; 2) colonoscopy itself with biopsy (if necessary) or miniinvasive endoscopic treatment (if necessary); 3) morphopathological examination of histological material, taken during colonoscopy. Subjective and objective clinical signs, indices of laboratory examination and results of imaging, endoscopic investigations in studied patients with different evolutionary forms, degree of activity and extension of NPC were studied. The patented method consists of 3 stages: 1. The detailed analysis of morphological, endoscopic, histological particularities and their correlation with the clinical evolution within the primary colon neoformations would allow the appreciation of differentiated and personalized tactics in their management. 2. Highlighting the molecular profile of RCC that can lead to a better understanding of tumor Genesis, framing patients in various risk groups to benefit from individualized, more aggressive or less aggressive treatment. 3. Determination and bioinformatic analysis of predictive genomic markers of RCC, which will contribute to early diagnosis of RCC, early initiation of treatment of these neoplasias, later to increase the survival rate of patients. Systematization of risk factors for malignant colonic neoformations. The applicative value consists in the implementation of screening programs that can ensure the regular follow-up of persons detected with positive tests or with increased risk factors, diagnostic examination and prompt treatment of cases. |

**MD.63.**

| | |
|---|---|
| **Title** | ***DIFFERENTIATED MEDICAL-SURGICAL TACTICS IN PRIMARY COLON NEOFORMATIONS*** |
| **Authors** | **URSU Alexandr, DOLGHII Andrei, ROJNOVEANU Gheorghe** |
| **Institution** | **The Institute of Emergency Medicine, The State University of Medicine & Pharmacology "Nicolae TESTEMIȚANU"** |
| **Patent no.** | AGEPI MD patent pending s 2025 0036 din 2025.02.20 |
| **Description** | The techniques and results of polyp excision during colonoscopy are intensely debated topics. These techniques have expanded in parallel with advances in endoscopic imaging and the diversity of endoscopic accessories. In the Institute of Emergency Medicine, two different treatment methods were used in patients: endoscopic – polypectomy (n=170/66.7%), endoscopic submucosal resection (n=5/1.9%) and resection procedures (n=79/31%) with/without application of primary anastomosis, one patient (0.4%) categorically refused surgical treatment.<br>We would like to mention that in the 170 patients who underwent polypectomy, a number of 243 polypoid formations of different sizes, histological type, degree of dysplasia were obtained: 140 solitary and 103 multiple, synchronous. In the presented study, very small polyps predominated in frequency in 128 (52.7%) and small in 84 (34.6%) cases, and large polyps represented 12.4% (n=31). All 128 (52.7%) of very small polyps and 63 (25.9%) of small polyps were excised by cold loop polypectomy. This technique is a safe method of resection, because the top of the loop captures the tissue as it closes, a few millimeters of normal mucosa around the polyp, followed by its en bloc capture, without the risk of damage to the polypoid tissue by electrocautery. Also, small polyps were mostly excised by this method, because the top of the loop does not cause lesions of the mucosa and blood vessels, compared to hot loop. Thus, the risk of bleeding and perforation decreases, and the safety profile of resection is superior. The loops used for cold polypectomy have a loop diameter of 10 mm and a rigid wire diameter of 0.3 mm, and the total procedure time was significantly shorter compared to the hot loop. |

# "Ion Creangă" State Pedagogical University of Chisinau

**MD.64.**

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|---|---|
| **Title** | **LangVet-IA: Interactive Digital TextBook 'French for Veterinarians and Animal Scientists'** |
| **Authors** | *Veleșcu Elena, Ludmila Canțîr (Armașu), Nicolae Balmuș* |
| **Institution** | ***"Ion Creangă" State Pedagogical University of Chisinau*** |
| **Patent no.** | Certificate of Copyright and Related Rights, AGEPI Moldova<br>***Nr. 2939,*** *registration date* ***06.02.2025*** |
| **Description** | LangVet-IA is an interactive digital textbook with editable content, created using MDIR Constructor 3.0 software. The basic version (17 content units) includes the following activities: video (17), audio (51 - created with AI tools), tests (true/false, multiple choice, fill-in-the-blanks, word association, the odd one out, crosswords, word ordering) - total (95). In the customized version of the textbook, the user can create and include/ add resources of their own design, created with the tools integrated into the textbook or with third-party tools, available online/offline. The resources included in the fields of the textbook are private (they are visible only in the teacher's manual). In the student version, users complete the learning tasks, having the option of checking the answers in real time. Additionally, the students can carry out their own learning activities (audio files, video, images, documents: Word, PowerPoint, Excel) which they can incorporate in their personalized coursebook.<br>This interactive digital textbook was developed within the Scientific Laboratory "Development of Digital Educational Resources" of "Ion Creangă" State Pedagogical University in Chisinau. The digital coursebook is based on the printed textbook by Elena Velescu, from Iasi University of Life Sciences. |

# National Agency for Public Health, Republic of Moldova

**MD.65.**

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| **Title** | **Method of testing blood in immunocompromised people for viral hepatitis E markers** |
| **Authors** | Sajin Octavian, Iziumov Nina, Paraschiv Angela, Țurcanu Adela, Holban Tiberiu, Blaj Valentina |
| **Institution** | **National Agency for Public Health** |
| **Patent no.** | S 2024 0087 dated 06.09.2024 |
| **Description** | The invention involves a method for diagnosing Hepatitis E virus (HEV) infection in immunocompromised individuals, including hemodialysis patients, using an optimized sequence of diagnostic steps. The method begins with testing for the presence of anti-HEV IgG and anti-HEV IgM markers in the blood using an enzyme-linked immunosorbent assay (ELISA). If the anti-HEV IgM is positive, a PCR test is then conducted to detect HEV RNA. If the PCR result is positive, the diagnosis of acute HEV infection is confirmed.<br>The novelty of the invention lies in modifying the sequence of immunoenzymatic reactions to improve testing efficiency and accuracy. The optimized procedure involves a sequence of reagent additions and incubations in specific wells, ensuring precise and effective detection of HEV markers. This protocol enhances the photometric measurement of optical densities, enabling faster and clearer evaluation of HEV infection in immunocompromised individuals.<br>procedure also includes detailed washing and enzyme conjugation steps, followed by colorimetric detection of the enzyme-substrate reaction, which provides a reliable result based on the optical density (OD) values. The interpretation of results is based on the ratio of serum OD to the cutoff OD, allowing for clear categorization into negative, gray zone, or positive results. If results are ambiguous, the test can be repeated after two weeks for confirmation. This method optimizes both the accuracy and speed of Hepatitis E diagnosis, particularly in vulnerable patient populations. |

| MD.66. | |
|---|---|
| **Title** | **Viral hepatitis E: from virus discovery to disease treatment** |
| **Authors** | Sajin Octavian, Iziumov Nina, Blaj Valentina, Guțu Veaceslav |
| **Institution** | **National Agency for Public Health** |
| **Patent no.** | Scientific Work No. 7947, 22.05.2024 |
| **Description** | Viral Hepatitis E: From Virus Discovery to Disease Treatment is an in-depth monograph that offers a thorough exploration of hepatitis E, a growing concern in global health. Authored by experts in the field, it examines the virus from its discovery to the current understanding of its impact on human health. The book delves into the virus's properties, its genetic diversity, and the mechanisms behind its transmission, identifying high-risk groups and modes of infection.<br>Key sections of the monograph include detailed discussions on the epidemiology, pathogenesis, and clinical manifestations of the disease. It covers acute and chronic forms of hepatitis E, liver failure, and extra-hepatic effects. The diagnostic processes, laboratory methods, and differential diagnosis are presented, along with current treatment options for managing the disease.<br>The monograph also emphasizes prevention, detailing both non-specific and specific measures to reduce transmission. It aims to enhance knowledge about the disease and offer practical guidance for medical professionals, researchers, and students. This work is a critical resource for advancing research and promoting better understanding and management of hepatitis E. |

| MD.67. | |
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| **Title** | 101 Questions and Answers About Endocrine Disruptors |
| **Authors** | Pînzaru Iurie, Bernic Vladmir, Miron Inga, Stîncă Kristina, Corețchi Roman |
| **Institution** | **National Agency for Public Health** |
| **Patent no.** | No. 2964 of 17.03.2025 |
| **Description** | It represents an innovative public education tool designed to raise awareness about endocrine disruptors and encourage the adoption of preventive behaviors among the population.<br>The goal of this work is to provide the public with an |

accessible, well-documented, and easy-to-understand guide on endocrine disruptors. Organized in the form of a set of 101 questions and answers, this material aims to address the most common questions related to chemicals that disrupt the endocrine system, explaining in simple terms the risks to which we are exposed daily and practical measures to reduce their impact on health. Proper information and the application of preventive strategies will not only contribute to protecting public health but will also reduce the burden that endocrine disruptors place on public health systems.
The practical value of the guide is undeniable, offering direct and effective solutions for protecting public health by preventing exposure to endocrine disruptors. Understanding the main sources of exposure to endocrine disruptors and how they function can help the public make healthier choices in daily life.

**MD.68.**

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| **Title** | Hygienic method for assessing the perception of working conditions and health status among workers in the garment industry |
| **Authors** | Elena, Bucata, Pînzaru Iurie, Raisa Deleu |
| **Institution** | **National Agency for Public Health** |
| **Patent no.** | No. 8018 of 05.11.2024 |
| **Description** | The method represents a valuable tool that offers a comprehensive approach that integrates the evaluation of knowledge, attitudes, and behaviors related to occupational health risks. It not only provides valuable insights into how workers perceive and respond to workplace hazards but also aids in designing more effective, tailored interventions to improve their overall health and safety. This approach supports the sustainable improvement of working conditions and fosters long-term occupational health and well-being among garment industry workers. The participatory nature of this method ensures that the evaluation is reflective of workers' experiences, promoting inclusivity and trust. By fostering a culture of awareness and prevention, the Hygienic Method helps create a safer, healthier, and more equitable working environment for all employees, particularly those in vulnerable groups. Over time, this approach can contribute to significant reductions in |

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| | occupational injuries and illnesses, improving both individual well-being and overall organizational performance.<br>The Hygienic Method could be used by employers, occupational health professionals, researchers, trade unions, government agencies, and NGOs to assess workers' perceptions of working conditions and health status in order to identify risks, promote a safer and healthier work environment and improve workplace safety and well-being the garment industry. |
| **MD.69.** | |
| **Title** | **Assessment of the impact of occupational exposure to ionizing radiation on the health of healthcare workers and radiological protection strategies** |
| **Authors** | Bogdan Marina, Corețchi Liuba |
| **Institution** | National Agency for Public Health |
| **Patent no.** | PhD Project |
| **Description** | Occupational exposure to ionizing radiation represents a significant health risk for medical personnel working in fields such as radiology, nuclear medicine and radiotherapy.<br>This study aims to assess the health risk to medical personnel occupationally exposed to ionizing radiation, by analyzing exposure factors, health effects and identifying effective measures to control and reduce radiological risk.<br>Research is being carried out using methods such as anonymous questionnaires administered to exposed medical personnel, analysis of medical records to identify exposure-related conditions and comparison of individual dosimetry to determine absorbed radiation levels. Radioactive background measurements is being also carried out at workplaces to assess safety conditions.<br>Based on the results obtained, measures to optimize radiological protection will be proposed, including improving the use of protective equipment, optimizing exposure times and training of personnel. This study will contribute to a better understanding of the impact of radiation on health and support the development of effective policies to protect exposed personnel. |

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| **MD.70.** | |
| **Title** | ***Quantification of health risk associated with radon exposure.*** |
| **Authors** | Ababii, Aurelia, Corețchi, Liuba, Rădulescu, Ileana, Ene Antoaneta, Stegarescu Vasile, Bahnarel Ion, Bogdan, Marina |
| **Institution** | National Agency for Public Health of the Ministry of Health of the Republic of Moldova; "Horia Hulubei" National Institute for R&D in Physics and Nuclear Engineering (IFIN-HH), Dunarea de Jos University of Galati |
| **Patent no.** | PhD project & bilateral Project RO MD |
| **Description** | Radon represents the most important source of natural radiation of the population, whose harmful effect has a cumulative character and synergism with other risk factors. In the Republic of Moldova, based on a study measuring the radon concentration in a sample of 1,100 homes using RADTRAK2 passive detectors, the population exposure doses to radon were calculated. Following the statistical processing of the collected data, the following results were obtained for a uniform distribution of the data, thus maximum values of 1160 Bq/$m^3$ are recorded for the Center area, 1260 Bq/$m^3$ for the North area and 950 Bq/$m^3$ for the area north. South. The average concentration of radon in the indoor air is 211.67 Bq/$m^3$; 240.55 Bq/$m^3$ and 285.57 Bq/$m^3$ for the Center, North and South. The share of homes that exceeded the reference level of radon (300 Bq/$m^3$) constituted 25.3% for the Center area, 31.06 - North and 38.58% - South. Studying the dependence of radon concentration on the abiotic factors of the environment of the existence of a close correlation link with the formation of the cluster with the large Euclidean distance, and the linkage distance constituting 4250 for the radon concentration and the maximum air temperature and the soil surface temperature. At the same time, the case-control study on the influence of radon on the occurrence of lung cancer revealed the following concentrations for the experimental group, the average value of the concentration of radon in the indoor air of 194.3 Bq/$m^3$, and the maximum value 857.2 Bq/$m^3$, value. The average recorded for the control lot is 165.2 Bq/$m^3$, and the maximum value 922.2 Bq/$m^3$. |

# National Institute of Applied Research in Agriculture and Veterinary Medicine

**MD.71.**

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| **Title** | **Process for Sulfitation of Wine Products** |
| **Authors** | TARAN Nicolae, MD; PRIDA Ivan, MD; MORARI Boris, MD; |
| **Institution** | Public Institution National Institute for Applied Research in Agriculture and Veterinary Medicine, Chișinău, Republic of Moldova |
| **Patent no.** | Patent application No. s 2023 0084 |
| **Description** | The invention relates to the wine industry, specifically to methods for sulfitation of wine products. Sulfitation is an essential technological process used at various stages of winemaking to ensure microbiological stability and oxidative protection. Existing methods primarily involve the use of liquefied sulfur dioxide, native sulfur combustion, or sulfurous acid salts (sulfites), each presenting specific limitations such as handling hazards, difficulties in precise dosing, or unwanted enrichment with potassium ions.<br>The proposed invention provides a simplified and cost-effective sulfitation method while maintaining the effectiveness of conventional approaches. The process includes the preparation of a sulfurous acid salt solution, its treatment with a strong acid cation-exchange resin in $H^+$-form, and the subsequent introduction of the treated solution into the wine product. The preferred sulfurous acid salts are potassium or sodium metabisulfite, dissolved in water or the wine product at concentrations of 2–5% by mass.<br>This method eliminates the need for hazardous liquefied sulfur dioxide handling while avoiding excessive potassium ion accumulation in wine, thus reducing the risk of tartaric precipitations. The approach ensures uniform sulfite distribution and maintains the sensory and physicochemical stability of the final product. The invention is suitable for all winemaking stages, including stabilization before bottling, and can be efficiently implemented in both artisanal and industrial production settings. |

**MD.72.**

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| **Title** | **Device for artificial insemination of sheep and goat** |
| **Authors** | DARIE Grigore, MD; Vacevschii Serghei, MD; BRADU Nina, MD; DJENJERA Irina, MD; OSIPCIUC Galina, MD: MAȘNER Oleg, MD |
| **Institution** | Public Institution National Institute for Applied Research in Agriculture and Veterinary Medicine, Chișinău, Republic of Moldova |
| **Patent no.** | MD 4715 C1/2021 |
| **Description** | The invention relates to animal husbandry, in particular to devices for artificial insemination of sheep and goats. The device, according to the invention, comprise a body of a length of 230…235 mm, made of stainless steel, assembled from a cannula for fixing the syringe with seminal material, a rod and a spiral tip, the outer diameter $d_1$ of which is 1.6 mm, connected by means of a sleeve with an outer diameter $d_2$ of 1.8 mm, at the same time, a lateral hole is made at the end of the spiral tip, the angle of inclination of the spiral tip is 24 ... 40˚, its length is 30 ... 32 mm, and the number of turns of the curved part of the tip is 1.5…1,7.<br>Applications: Animal husbandry |

**MD.73.**

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| **Title** | **Process for rearing replacement gilts** |
| **Authors** | ROTARI Sveatoslav, MD; MAȘNER Oleg, MD; DONICA Iov, MD; PETCU Igor, MD; CARAMAN Mariana, MD |
| **Institution** | Public Institution National Institute for Applied Research in Agriculture and Veterinary Medicine, Chișinău, Republic of Moldova |
| **Patent no.** | MD 1748 Z /2024 |
| **Description** | The invention relates to animal husbandry, namely to the rearing of replacement gilts on farms or complexes with a full production cycle. The process for rearing replacement gilts provides for the selection of gilts at the age of 25 days according to such parameters as external appearance, liveweight, uniformity, number and morphological condition of teats and their transfer to rearing in a separate specially equipped room, ensuring balanced feeding with a protein level of up to 17- 18% up to reaching a weight of 30 kg, from 30 kg to 70 kg feeding with combined feed with a protein level of no more than 14%. After reaching a weight |

of 70 kg, limited feeding is introduced to obtain a liveweight gain of no more than 800 g/day and a maintenance area of 1 m2 /head is ensured. The result of the invention consists in increasing fertility, the average number of live-born piglets and reducing the number of unproductive days per gilt.
Applications: Animal husbandry

**MD.74.**

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| **Title** | **Process for obtaining structured fruit snacks with a high content of bioactive polyphenolic compounds** |
| **Authors** | ȘLEAGUN Galina, MD; IUSAN Larisa, MD; CASTRAVEȚ Liudmila, MD; TOFAN Svetlana, MD; GOLUBI Roman, MD; CUPCEA Tatiana, MD; |
| **Institution** | Public Institution National Institute for Applied Research in Agriculture and Veterinary Medicine, Chișinău, Republic of Moldova |
| **Patent no.** | Patent application No.s 2024 0081 |
| **Description** | Process for obtaining structured fruit snacks with a high content of bioactive polyphenolic compounds includes the preliminary preparation of raw materials, the preparation of fresh fruit mass, consisting from grape, puree of other fruits and structure-forming agents taken in a ratio that ensures structuring of the product. The grapes are used as the main ingredient, and their preparation involves careful sorting, washing, crushing into particles, passing through a sieve, and pressing with subsequent collection of puree and squeezed juice. The grape pomace is dried until a maximum moisture of 8% is reached and then crushed. The fruit mass is prepared by mixing heated fruit puree, crushed pomace, and dietary fiber, holding for 15-30 minutes and activating. The resulting mass is combined with hydrated pectin and squeezed juice, and heated while slowly stirring. The ratio of the ingredients is set within the following limits (in % dry matter): prepared grapes 75–92, including crushed pomace 2.5–8.5, puree of other fruits 12–25, fiber 3–5 and pectin 0.8–3. Before forming, the dehydrated product is stored in the form of sheets at a temperature between 2–12 °C. |

# Academy of Economic Studies of Moldova

**MD.75.**

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| **Title** | **ERA TALENT _ EURAXESS Start up HUB – Accelerating Research-driven Entrepreneurship in Moldova** |
| **Authors** | Staver Liliana, Stratan Alexandru, Cociug Victoria, Belostecinic Grigore, Lopotenco Viorica, Dodu-Gugea Larisa, Mihailă Svetlana, Vîrțan Lidia, Roșcovan Nina, Gospodarenco Marin, Ohrband Gerhard, Cojocaru Adrian, Moraru Vitalie, Iațcheivici Vadim, Harea Dorina |
| **Institution** | Academy of Economic Studies of Moldova (ASEM) |
| **Patent no.** | Project no.: GA 101103476 |
| **Description** | EURAXESS Start Up HUB Moldova aims to enhance the transformation of doctoral research outcomes into viable start-ups with validated innovation components. Supported under the ERA Talent program, this HUB establishes a structured entrepreneurial ecosystem that supports doctoral researchers in launching innovative enterprises through dedicated mentorship, skills training, networking, and access to EU funding mechanisms.<br>The EURAXESS Start Up HUB supports innovation across multiple disciplines by providing doctoral students and researchers with entrepreneurial training, business incubation services, and assistance in accessing European research grants and investment capital. Potential applications include:<br>• **Business incubation and mentoring.** Expert-led guidance tailored specifically for researchers to transform scientific innovations into commercial ventures.<br>• **Capacity-building workshops**. Specialized training in entrepreneurship, intellectual property management, business modeling, and funding applications.<br>• **Networking and partnership development.** Facilitating international cooperation, market access, and industry-academia collaboration, enhancing Moldova's competitiveness within European innovation ecosystems. |

- **Investment readiness**. Preparing researchers and start-ups for interactions with venture capitalists and other funding sources, promoting sustainable economic development driven by scientific innovation.

The HUB actively contributes to the development of an innovation-driven economy in Moldova by bridging the gap between research and market, aligning closely with European strategies on sustainable growth and digitalization.

**MD.76.**

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| **Title** | **Enhancing exports of principal agri-food products to security resilience in the Republic of Moldova** |
| **Authors** | Stratan Alexandru, Lopotenco Viorica, Lucașenco Eugenia, Staver Liliana, Toacă Zinovia, Erhan Lica, Fală Victoria, Sacovici Vasilii |
| **Institution** | **Academy of Economic Studies of Moldova** |
| **Patent no.** | Project no. 23.70105.5107.07 |
| **Description** | Recent global crises, such as the COVID-19 pandemic and the war in Ukraine, have significantly impacted food security and the export potential of the Republic of Moldova's key agri-food products. These events underline the importance of studying the resilience of food security in the context of export capacity. Currently, there is no comprehensive research examining food security in correlation with the export potential of these products. This project aims to evaluate the export potential of Moldova's main agri-food products with the objective of strengthening food security resilience against internal and external risks. The methodology encompasses deductive, inductive, and abductive approaches, alongside complex methods that are both quantitative (statistical, bibliometric) and qualitative (analysis, synthesis). The research employs strategies such as constructing a composite **Food Security Resilience Index**, conducting case studies to identify factors that impact exports, and using phenomenological analysis to examine the interplay between exports and resilience. The relevance of this research lies in its timeliness and originality. In the Republic of Moldova, the issue of agri-food exports in relation to food security resilience has not |

been explored scientifically or methodologically. The project leverages previous research findings and provides a solid foundation for future studies in this field.

**Field of Research:** Social and Economic Science

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| **MD.77.** | |
| **Title** | **Protecting working conditions in the platform economy: Moldovan-Lithuanian social dialog** |
| **Authors** | Davulis Tomas, Gaspareniene Ligita, Remeikiene Rita, Paliukenas Arnas, Raistenskis Evaldas; Belostecinic Grigore, Dodu-Gugea Larisa, Mistrean Larisa, Zaporojan Veaceslav, Șavga Larisa, Nevmerjițchi Ilie; Staver Liliana; Dogaru Raisa; Vaculovschi Dorin, Plugaru Lilia; Bilba Mihai; Botosan Ludmila. |
| **Institution** | **Academy of Economic Studies of Moldova** |
| **Patent no.** | Project no. 101126470 – SOCPL-2022-IND-REL |
| **Description** | JWCPW (project code 101126470 - SOCPL-2022-IND-REL) is a collaborative European project focused on improving working conditions in the digital platform economy through social dialogue between the Republic of Moldova and Lithuania. The initiative responds to the challenges brought by the digital economy and gig economy, a phenomenon accelerated by the COVID-19 pandemic, which has created a new category of workers - gig workers - often in a regulatory gray zone between traditional employment and self-employment. These workers often face precarious work, lack of formal employment status, insufficient social protection and no right to collective bargaining, unlike traditional employees.<br>The JWCPW - Protecting working conditions in the platform economy: Moldovan-Lithuanian social dialogue - is an example of good practice in addressing an emerging issue (platform work) in an integrated way through research, policy and international cooperation. With its clear objectives, strong partnerships and results, the project makes a significant contribution to promoting justice and fairness in the digital labor market, while providing increased visibility for both the research community and the general public on the challenges and solutions in this area. |

**MD.78.**

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|---|---|
| **Title** | **Development of a digital agri-food atlas based on an integrated geo-spatial information system to increase the export potential of agricultural products** |
| **Authors** | Corneliu Guțu, Hristev Eugeniu, Hristev Elena |
| **Institution** | **Academy of Economic Studies of Moldova** |
| **Patent no.** | 23.70105.5107.01 |
| **Description** | The developed application combines the leading trends of information technologies on the ArcGis platform based on The Open Geospatial Consortium (OGC) Standards and offers new opportunities for the development of the agricultural sector and the export potential of agricultural products for the Republic of Moldova. Geographic Information Systems (GIS) technology is pivotal in developing suitability models for agriculture, particularly in Moldova, where diverse landscapes influence farming potential. By assessing key factors such as terrain slope, terrain aspect, carbon stocks, and land use/land cover, GIS can create comprehensive maps that guide crop selection for both annual and multiannual cultivation.<br>Terrain slope analysis identifies areas with optimal gradients for farming, as flatter landscapes reduce erosion risks and improve accessibility for machinery. The aspect of the terrain, or its orientation, influences sunlight exposure and temperature, which are crucial for determining the growth potential of various crops.<br>Assessing carbon stocks provides insight into soil health and fertility, as higher carbon levels typically indicate better nutrient availability for crops. Additionally, examining land use and land cover helps identify existing agricultural practices and potential areas for expansion or diversification, ensuring that new farming activities align with sustainable development goals.<br>By integrating these factors into a GIS-based suitability model, stakeholders can effectively delineate regions most suitable for specific crops. This approach not only enhances agricultural productivity and export potential in Moldova but also promotes environmentally sustainable practices, ultimately contributing to food security and economic resilience in the region. Such models empower farmers to make data-driven decisions, adapting their strategies to local conditions and improving overall farm viability. |

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| **MD.79.** | |
| **Title** | **Multidimensional measurement of social resilience for the Republic of Moldova: innovative approach** |
| **Authors** | Colesnicova Tatiana, Ciobanu Mihail, Heghea Ecaterina, Bejenaru Iulia, Garabajii Iulia, Rusu Svetlana |
| **Institution** | **National Institute for Economic Research, Academy of Economic Studies of Moldova** |
| **Patent no.** | - |
| **Description** | The Social Resilience Index (IRS) is a composite indicator designed to assess the capacity of the population in the Republic of Moldova to withstand and recover from economic and social shocks. This innovative tool evaluates resilience through five key components: economic stability, education capacity, social protection and welfare, food security and consumption and community safety. Each component contains standardized and weighted indicators to form a unified score that allows for comparison across districts and over time. The IRS provides a clear and evidence-based framework for decision-makers to identify vulnerable regions, evaluate policy impact, and support strategic planning. It also facilitates the alignment of national indicators with European standards of social inclusion and resilience. The methodology was applied to data from 2019 and 2023, revealing spatial differences in social resilience across the country. The visual maps demonstrate areas of improvement as well as regions needing targeted interventions.<br><br>The applications of this index are diverse. In the field of policy planning, it serves as a guide for directing public investment and development programs. Regarding crisis preparedness, the index helps identify socially vulnerable regions, allowing for quicker and more effective intervention. It also facilitates the monitoring of resilience trends over time, providing an objective basis for evaluating progress or setbacks. In the realm of research, the index supports socio-economic analysis and contributes to aligning national indicators with European standards. |

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| **MD.80.** | |
| **Title** | **Inclusive financial behavior among low-income social groups in the Republic of Moldova: specific challenges and needs** |
| **Authors** | Ungur Cristina, Pahomii Irina, Heghea Ecaterina, Gribincea Corina, Ciobanu Mihail, Bejenaru Iulia |
| **Institution** | **National Institute for Economic Research, Academy of Economic Studies of Moldova** |
| **Patent no.** | - |
| **Description** | Financial inclusion goes beyond mere access to bank accounts; it involves individuals' effective ability to use financial services in ways that improve their lives.<br>This study analyzes inclusive financial behavior among low-income social groups in the Republic of Moldova, aiming to identify specific needs, barriers to financial services, and opportunities to enhance financial inclusion. The research is justified by the persistence of economic vulnerability and financial exclusion, particularly in rural areas and among disadvantaged categories such as the elderly.<br>Motivated by the growing share of elderly people (17.4% currently, projected to reach 25% by 2040), the study emphasizes the need for public policies that address the financial vulnerabilities of this group. Using statistical data from 2019–2023 and qualitative field observations, the research identifies both opportunities and risks in integrating pensioners into the financial system.<br>The main objective is to propose actionable solutions to reduce financial access and behavior gaps—through financial education initiatives, adaptation of financial products to real-life needs, and the reinforcement of policy frameworks.<br>The practical relevance of the project lies in generating tools for analysis and intervention, which can support decision-makers, financial institutions, and non-governmental actors.<br>The results will contribute to the development of targeted programs that foster an inclusive and equitable financial environment, aligned with the Sustainable Development Goals and Moldova's national priorities in social cohesion and poverty reduction. |

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| **MD.81.** | |
| **Title** | **Study on the development of indicators for assessing energy** |
| **Authors** | Popa Nicolae, Țirigan Sergiu, Dumitru Stratan |
| **Institution** | **National Institute for Economic Research, AESM, Chisinau, Republic of Moldova** |
| **Patent no.** | - |
| **Description** | The purpose of this work is to analyze the potential for the development of the renewable energy sector and the consolidation of energy efficiency in the Republic of Moldova. Under the applied dimension, as a case study, the opportunities and barriers for the installation of photovoltaic panels in public institutions are evaluated and identified, considering the impact on the economic resilience of the institutions. It will allow the development of adjusted recommendations regarding the expansion of renewable energy projects in public buildings in the country. The study aims to formulate and validate measurable indicators that allow the assessment of the efficiency and sustainability of energy systems under stress or crisis conditions, considering the context of the Republic of Moldova. Academic and scientific objectives of the study:<br>Development of a comprehensive model that defines and structures the key concepts of energy resilience, including factors such as adaptability, recovery capacity and long-term sustainability of energy systems.<br>Establish a set of quantitative and qualitative indicators that allow measuring the performance of energy systems in the face of different types of shocks (e.g. climate change, economic crises, cyber attacks, natural disasters).<br>Establish tools and techniques to assess the capacity of energy systems to respond effectively to crises, taking into account economic, technical and social variables.<br>Provide research-based recommendations for government authorities and industry actors on the implementation of solutions to improve energy resilience, including through infrastructure development and the integration of renewable energy sources.<br>Publish and disseminate results to support the theoretical evolution of the field of energy resilience and to open new research directions in related fields, such as energy policy, risk econometrics or technological innovation.<br>Assess energy resilience in the global context, taking into account examples of good practices from different regions or |

countries, and develop an indicator system adaptable to different economic and geographical conditions.

**MD.82.**

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| **Title** | **Medium-term analysis and forecast model of the national economy of the Republic of Moldova.** |
| **Authors** | Toacă Zinovia |
| **Institution** | **National Institute for Economic Research, AESM, Chisinau, Republic of Moldova** |
| **Patent no.** | - |
| **Description** | The econometric model with simultaneous equations, transformed into a recursive form, is an essential tool for short- and medium-term macroeconomic forecasting, adapted to the specifics of the economy of the Republic of Moldova. This model includes a complex set of behavioral, balance and accounting equations, which reflect the interdependencies between the different sectors of the economy. The behavioral equations are estimated using statistical methods, such as the ordinary least squares (OLS) method and the two-stage method (2SLS). The recursive form of the model allows the use of these methods, thus ensuring a robust and accurate estimation of fundamental economic relationships. The model integrates critical variables, such as the impact of remittances, currency fluctuations, domestic and external inflation, as well as the dynamics of the global economy, providing a detailed perspective on how these factors influence the national economy. By simulating different economic scenarios, the model allows the authorities to anticipate possible effects on the main macroeconomic indicators, thus contributing to the formulation of well-founded economic policies and maintaining economic stability.<br>Continuous updating of the model as new economic data becomes available guarantees the relevance and accuracy of the forecasts, allowing for rapid adaptation to changes in the economic environment. The public presentation of economic forecasts based on this model facilitates the anticipation of economic and social processes, the identification of vulnerable areas and the orientation of the authorities' interventions to mitigate the negative effects and promote sustainable economic development. |

**MD.83.**

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| **Title** | **Measuring economic resilience indicators in the context of external shocks** |
| **Authors** | POPA Viorica, UNGUR Cristina, ȘARGU Lilia |
| **Institution** | **National Institute for Economic Research, AESM, Chisinau, Republic of Moldova** |
| **Patent no.** | - |
| **Description** | Purpose: Strategic diagnosis of the resilience of the national economy of the Republic of Moldova, assessing based on the methodology for measuring strategic indicators of economic resilience. Assess the capacity of the national economy to cope with and adapt to fluctuations and crises generated by external factors, such as global economic changes, international financial crises, fluctuations in natural resource prices or other external events that may affect the economy. Through this measurement, the aim is to identify vulnerable points and resilience factors that allow the economy to recover quickly from shocks and maintain stable development in the long term. The project focused on:<br>➢ Detailed assessment of strategic indicators of economic resilience, which reflect the capacity of the national economy to cope with and adapt to various internal and external economic shocks.<br>➢ Identification of the strengths and vulnerabilities of the national economy in the context of economic resilience, in order to understand how prepared the economy is to manage crises and maintain its long-term stability.<br>➢ Defining and developing economic resilience models, which represent strategic approaches that can be implemented in the national economy to increase its capacity to prevent, cope with and recover quickly from various crises.<br>➢ Formulating strategic recommendations to help authorities and decision-makers implement economic policies and measures that strengthen economic resilience and reduce the country's economic vulnerabilities.<br>Objective: Assessing the state of the national economy of the Republic of Moldova through the prism of economic resilience indicators and identifying strategic resilience models that can be implemented in the national economy to improve its capacity to cope with economic crises and other external or internal |

shocks. These strategic models should help consolidate economic stability and increase the long-term sustainability of the national economy.

**MD.84.**

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| **Title** | **Data map: The demographic profile of the Republic of Moldova for the year 2024 and the projection of the number and structure of the population in 2040.** |
| **Authors** | Gagauz O. (coordon.), Pahomii, I., Slav, M., Tabac, T., Ștîrba, V. |
| **Institution** | The Academy of Economic Studies of Moldova (ASEM), National Institute for Economic Research |
| **Patent no.** | - |
| **Description** | The data map is a comprehensive and innovative important visual synthesis of the main demographic trends in the Republic of Moldova, accompanied by medium-term projections. The map integrates key indicators on population structure, fertility, mortality and migration dynamics, as well as maps and graphs reflecting the impact of these processes at the national level of the Republic of Moldova and at the level of administrative-territorial units.<br>The poster highlights the advanced degree of demographic ageing, the natural and migratory decline of the population, as well as the pronounced regional disparities, while offering three scenarios of evolution until 2040. Its content is valuable for researchers, policy-makers and the general public, providing a solid basis for the formulation of sustainable demographic policies adapted to national realities.<br>The data map is distinguished by its methodological rigor, visual clarity and strategic relevance, being produced within the research sub-program "Demographic transition in the Republic of Moldova: particularities, socioeconomic implications and strengthening demographic resilience (2024-2027)" . |

**MD.85.**

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| **Title** | Scientific Results Obtained Within The Project 20.80012.7007.10SE ”Social Impact Analysis For The Return Guarantee System of Recyclable Packaging in The Republic of Moldova” |
| **Authors** | Perciun Rodica, Iordachi Victoria, Timofei Olga |
| **Institution** | National Institute for Economic Research, Academy of Economic Studies of Moldova |
| **Patent no.** | n/a |

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| **Description** | This research focuses on integrating the scientific and innovative outcomes of the Republic of Moldova into the European Research Area, while also aiming to assess the social impact of implementing the Deposit-Return System in the country. The analysis of the concept and operational mechanism of the deposit-return system for recyclable packaging, combined with the study of international practices—particularly those within the European Union and Romania—provides a solid foundation for the effective adaptation and implementation of such a system in the Republic of Moldova. These findings highlight the importance of aligning the national framework with European best practices to ensure a coherent transition toward a circular economy. The results were published in the Guide on Deposit-Return Systems for Recyclable Packaging. Survey ”Consumer Perceptions In The Implementation Of Deposit Return System”. The population plays a crucial role in the successful implementation and operation of the Deposit Return System. The research analyzes consumer perceptions and behaviors, focusing on their level of knowledge, attitudes, and intentions to use the system. To gain a detailed perspective, a survey was developed and conducted, targeting consumers to assess their awareness, expectations, and concerns regarding the DRS. The research methodology combines qualitative and quantitative methods, including an in-depth literature review. The results highlight the fundamental role of the population in optimizing the DRS and emphasize the need for information and education campaigns to encourage active participation and raise awareness of the benefits of the circular economy. |

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| **MD.86.** | |
| **Title** | **INVESTMENTS TO MODERNIZE THE WINE SECTOR** |
| **Authors** | Iatisin Tatiana; Timus Angela |
| **Institution** | **National Institute of Economic Research, Academy of Economic Studies of Moldova** |
| **Patent no.** | - |
| **Description** | The wine sector is a strategic pillar of the national economy, playing a key role in shaping the main economic indicators, attracting investment and maintaining jobs in various regions. Investments in the modernization of this sector, the technologization of production processes and the adoption of intensive and super-intensive forms of agriculture are undeniable necessities to ensure sustainable development. |

The aim of the research is the in-depth analysis of investment strategies and the impact of investments directed towards the modernization of the wine sector. Modernization has a decisive role to play, offering advantages such as reducing the time it takes to produce products, facilitating faster access to the market, increasing economic returns and prolonging the life of products. A strategic approach to investment is crucial for stimulating development, improving economic and financial performance and optimizing sector management.

The literature emphasizes the direct relationship between investments in modernization and technology and sustainable development. Research on the modernization of the wine sector has highlighted the need for a sustainable approach to investment, taking into account the long-term impact on resource use and the integration of an economic and ecological perspective, prioritizing environmental factors and climate change. Thus, the analysis of sustainable investment theories has led to the development of a new classification focusing on sustainable modernization investments in the wine sector, highlighting the benefits of implementing sustainable development programs.

**MD.87.**

**Title** **ELABORATION OF MODEL INVESTMENT PROJECTS FOR THE AGRICULTURAL SECTOR OF THE REPUBLIC OF MOLDOVA**

**Authors** TUREȚCHI Viorel, IATIȘIN Tatiana.

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

**Patent no.** -

**Description**

These investment projects are designed to support both experienced agricultural entrepreneurs and young individuals seeking to start or expand a business in the agricultural sector. They provide a well-structured strategic framework aimed at ensuring the sustainable growth of the agricultural industry through an integrated investment approach.

The projects include a detailed action plan focused on substantiating the rationality of investments, which involves assessing opportunities, risks, and economic profitability. This process entails the organized and efficient allocation of available resources—material, financial, human, and informational—to optimize investment management and enhance competitiveness in the agricultural sector.

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| | One of the primary objectives of these projects is to stimulate the development of small and medium-sized enterprises (SMEs) in agriculture by facilitating entrepreneurs' access to financial resources, modern technologies, and best practices. Additionally, these projects play a crucial role in attracting investments to rural areas, contributing to the modernization of agricultural infrastructure and the enhancement of productivity.<br>The implementation of these initiatives also aims to create new job opportunities in rural areas, providing employment prospects for the local population. This measure is essential in reducing labor migration to urban areas or abroad, thereby stabilizing and developing rural communities.<br>Furthermore, these projects support the sustainable development of rural areas by promoting efficient and environmentally friendly agricultural practices. By integrating technological innovations and eco-friendly solutions, they help optimize production processes while ensuring environmental protection.<br>Thus, these investment projects not only facilitate economic growth in the agricultural sector but also contribute to improving living conditions in rural areas, strengthening the local economy, and securing a more stable and prosperous future for agricultural entrepreneurs. |

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| **MD.88.** | |
| **Title** | Interactive Analytical Tool for Demographic Policy Design Based on GGS Moldova **From Data to Policy: Exploring the Generations and Gender Survey to Strengthen Demographic Policies in Moldova** |
| **Authors** | Grigoras Ecaterina, Tabac Tatiana, Maxim Slav, Stirba Vitalie |
| **Institution** | **Center for Demographic Research, NIER, AESM** |
| **Patent no.** | Project research: "Facilitating demographic policies through the exploration of data from the Generations and Gender Study" 24.80012.0807.11TC |
| **Description** | The study "From Data to Policy: Exploring the Generations and Gender Survey to Enhance Demographic Policies in Moldova" aims at strengthening the analytical-informational basis for developing, implementing, and monitoring policies related to population and development. The electronic database of the Generations and Gender program (GGP), which includes data for the Republic of Moldova, presents an opportunity for researching demographic processes, |

including from a comparative perspective. Under the auspices of the Ministry of Labor and Social Protection, it was initially intended to develop specific policies based on people's needs and consider current and future demographic trends. The study is elaborated in the project of young research, "Facilitating demographic policies through the exploration of data from the Generations and Gender Study", the purpose of which is to explore the data from the Generations and Gender Study (GGS), develop thematic research on fertility, migration, and population health, and substantiate specific policy measures. The study aims to identify changes in marital and reproductive behavior over time, conduct a comparative analysis of predictive factors of migration intentions, and determine gender and urban/rural differences in Self-Rated Health in Moldova. The main results are: Fertility patterns in Moldova show a clear shift toward smaller families and delayed childbearing, requiring supportive policies for reproductive planning and work–life balance.

Emigration is increasingly shaped by socio-economic pressures and life-stage factors, calling for improved local opportunities and targeted support for young populations.

Health inequalities, especially in times of crisis, emphasize the need for inclusive public health strategies that address both objective and perceived well-being.

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**MD.89.**

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| **Title** | Challenges and experiences in accessing assisted reproductive medicine in the Republic of Moldova |
| **Authors** | Inga Chistruga-Sînchevici, Mariana Crîșmaru. |
| **Institution** | National Institute for Economic Research, Academy of Economic Studies of Moldova |
| **Patent no.** | Poster created within the framework of the Research Project 24.80012.0807.16SE "Assisted reproductive medicine: potential in increasing birth rates" from the "Stimulating excellence in research" program run by the National Research and Development Agency. |
| **Description** | The poster presents the results of a qualitative study conducted in 2024 with experts and women who have undergone medically assisted reproductive treatments. Assisted reproductive medicine is becoming an increasingly prevalent reality. Despite this, the contribution of assisted |

reproductive medicine to increasing the birth rate remains small, though it holds the potential to become an essential tool. Annually, in the Republic of Moldova, approximately one hundred births are recorded among women who have successfully conceived through fertilization technologies, accounting for 0.4% of the birth rate.

The primary difficulties encountered in accessing assisted reproductive medicine in the Republic of Moldova include high costs, barriers related to access and transportation due to the concentration of services only in Chisinau, insufficient counseling services, lack of psychological support, and cultural barriers.

The main challenges in the provision of assisted reproductive medical services are the absence of protocols, national standards, and clear guidelines for assisted reproductive medicine; the implantation of a large number of embryos, which leads to multiple pregnancies and can have health implications for the mother and child; and the lack of anonymous donors of reproductive cells.

Confronted with these difficulties and challenges, couples and patients often resort to delaying access to assisted reproductive medicine services, leading to reduced chances of success. In this context, developing standardized protocols is necessary to ensure the quality and safety of treatments. An integrated approach to assisted reproductive medicine through financial support, comprehensive information dissemination, and improved access to psychological support programs is essential to maximize the chances of success and patient satisfaction.

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**MD.90.**

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| **Title** | **The SMEs' Competitiveness Index** |
| **Authors** | **Tatiana GUTIUM, Natalia VINOGRADOVA,** |
| **Institution** | **National Institute for Economic Research (NIER) of the Academy of Economic Studies of Moldova (ASEM)** |
| **Patent no.** | tbc |
| **Description** | The composite **SMEs' Competitiveness Index** is an innovative and practical tool that provides a clear, objective, and multidimensional assessment of SMEs' performance across regions. This index was developed as part of the task "Development of a complex tool for assessing enterprise competitiveness at regional and sectoral levels", which falls |

under Subprogram 030101 – "Strengthening the resilience, competitiveness, and sustainability of the economy of the Republic of Moldova in the context of the accession process to the European Union" (2024-2027), supported through institutional funding. It captures the multifactor nature of competitiveness, integrating SMEs performance and investment activities, market position, efficiency, and financial stability into a single composite score. The index offers a structured framework for comparing territories (districts and development regions), identifying disparities, and guiding targeted support for SME development and regional economic growth in the Republic of Moldova. It also can be adapted at the sectoral level for further in-depth research.

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**MD.91.**

**Title** **MODEL OF MODERNIZATION OF THE AGRICULTURAL SECTOR OF THE REPUBLIC OF MOLDOVA**

**Authors** Stratan Alexandru, Lucasenco Eugenia; Ceban Alexandru

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

**Patent no.** -

**Description**

The process of modernization of the agricultural sector in the Republic of Moldova should not be viewed only through the lens of its technologization, intensive processing of land to obtain increased harvests, structural transformations or excessive amplification of incomes, but is also based on various social, environmental and economic aspects, which prints a sectoral sustainability. For this purpose, the complex strategic model for the modernization of the Republic of Moldova's agriculture was developed based on the revitalization of a number of identified subsectors, increasing the competitiveness of agri-food products internationally, supporting agricultural producers through subsidies and other types of interventions, as well as aligning agricultural policies to the CAP provisions of the EU. The model is based on a series of applied analyzes and will contribute to the creation of an environment favorable to the transformation and modernization of the agricultural sector of the Republic of Moldova, taking into account the current realities and the challenges it faces. The OECD

agricultural policy evaluation methodology used in the development of the model can represent a useful quantitative and qualitative tool for decision-makers in the field, especially through its universality and the possibility of making comparisons with other countries. At the same time, the short-term subsidy (engine of modernization) efficiency evaluation questionnaire is also designed as a tool for monitoring agricultural policies and can be used in the progressive analysis of data on subsidies granted and their impact on the development of agricultural holdings, in particular, but also of the sector in general. The recommendations regarding the strategic directions of modernization can serve as a basis for recommendations for the central public bodies responsible for the development of public policies in the sector, but also for agricultural producers, producer associations, the academic environment, etc.

**MD.92.**

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| **Title** | **Methodology for Strengthening Organizational Commitment in Moldovan SMEs Using Psychosomatic Techniques** |
| **Authors** | Buga Lorina |
| **Institution** | Academy of Economic Studies of Moldova |
| **Patent no.** | doctoral research project |
| **Description** | The invention presents a targeted methodology to improve organizational commitment specifically within small and medium-sized enterprises (SMEs) in the Republic of Moldova, by integrating psychosomatic techniques. This innovative approach addresses the unique challenges faced by SMEs in turbulent socio-economic conditions characteristic of Moldova, aiming to enhance employee resilience, reduce workplace stress, and significantly boost organizational loyalty and productivity.<br>The methodology prioritizes the evaluation and enhancement of organizational commitment through a structured application of psychosomatic interventions, such as mindfulness practices, resilience coaching, and tailored corporate wellness initiatives. Empirical validation through comprehensive surveys, in-depth interviews, and case studies within Moldovan SMEs indicates measurable improvements in employee engagement, reduced |

absenteeism, and increased satisfaction and overall productivity.

Applications: This invention is particularly suited for:

- Moldovan SMEs navigating economic uncertainty and environmental turbulence;
- Strategic HR management aiming to foster long-term organizational commitment and employee retention;
- Organizational policies and practices addressing psychosocial workplace challenges;
- Training programs for SME leaders and HR managers focusing on employee engagement and psychosomatic well-being;
- Academic and practical research into effective organizational commitment strategies within transitional economies.

By providing an evidence-based framework adapted specifically to the Moldovan SME context, this methodology significantly enhances organizational stability, performance, and employee well-being, thereby addressing critical gaps in conventional commitment-building strategies.

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| **MD.93.** | |
| **Title** | **Innovative Intellectual Capital Valuation Model for Enhancing Corporate Sustainability** |
| **Authors** | Butnaru Ciobotar Alina, Bădicu Galina, Grosu Veronica |
| **Institution** | Academy of Economic Studies of Moldova / Stefan cel Mare University of Suceava, Romania |
| **Patent no.** | Doctoral research project |
| **Description** | The proposed model integrates multiple conceptual and sectoral perspectives to create a unified methodological approach for valuing intellectual capital (IC) in sustainable companies. Based on data from 70 companies listed on the Bucharest Stock Exchange, the model tests the RAEN paradigm (Rare, Authentic, Essential, Non-replaceable) and uses indicators from both ESG frameworks and non-financial performance indicators (NFPIs). It also explores interconnections between IC and other forms of capital.<br>The methodology incorporates Business Intelligence tools and visual interfaces to extract real-time qualitative and quantitative data from live sources, including surveys, |

reviews, and trend analyses. Machine learning algorithms and data analytics enable dynamic visualization, risk identification, and enhanced understanding of IC's impact on company performance and strategic planning aligned with sustainability goals.

Applications:

- Enables sector-specific strategies for enhancing IC efficiency and sustainability.
- Establishes a benchmark for IC valuation.
- Encourages innovation and employee education on sustainability practices.
- Guides performance strategies aligned with ESG taxonomies.
- Supports sustainability reporting under OMFP 85/2024 and EU Regulation 2024/1781.
- Lays the groundwork for accounting valuation rules for intangible assets, addressing current gaps in IAS 38 and IAS 36.
- Helps reduce costs and capitalize on intangible value creation.

This model responds to the growing need to link intangible asset valuation with sustainable development, offering a practical tool for both decision-makers and educators.

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**MD.94.**

**Title** **Integrating artificial intelligence and information technologies in internal audit: a holistic approach to risk management and compliance assurance**

**Authors** Cristina-Raluca Cernovschi, Svetlana Mihaila, Marius-Sorin Ciubotariu, Veronica Grosu

**Institution** **Academy of Economic Studies of Moldova / Stefan cel Mare University, Romania**

**Patent no.** Doctoral research project

**Description** Technological progress is increasingly making its mark in every business, and the effects are also being felt in internal audit, which requires a redefinition of traditional models. Although the literature addresses this topic, most research focuses on economically highly developed countries, while studies on emerging countries are limited and without a well-defined application. This research aims to determine the degree of acceptance of disruptive technologies in Romanian entities and the measure to which the

responsibilities of the internal audit function need to be reconfigured to adapt to the new technological requirements. The study adopts a questionnaire-based approach applied to internal auditors across Romania. The research instrument consists of three dimensions: the degree of acceptance of advanced technologies in the professional activity, the level of familiarity with the ethical implications of AI adoption and the current state of auditors' competences in the use of intelligent algorithms. **The results** allow for a ranking of the most commonly used types of artificial intelligence according to their level of difficulty. In addition, the audit stages where intelligent technologies are most frequently used and the procedures that have been automated so far are identified. **Based on the results, recommendations** will be made for restructuring internal audit teams to include technological competences, a guide for the responsible use of AI in auditing will be developed, and the basis will be laid for a reconfigured internal audit framework to integrate AI, which is scalable and adaptable to different industries and sizes of organizations in Romania.

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| **MD.95.** | |
| **Title** | **Assessing environmental practices as drivers of competitive advantage in Romanian and Moldovan companies** |
| **Authors** | Cojocaru (Bărbieru) Ana-Carolina, Mihaila Svetlana, Grosu Veronica |
| **Institution** | Academy of Economic Studies of Moldova/„Ștefan cel Mare” University of Suceava |
| **Patent no.** | Doctoral research project |
| **Description** | Nowadays, companies tend to improve their image and reputation, being increasingly aware of the positive impact these aspects have on overall performance and profitability. Thus, engaging in activities based on CSR principles becomes essential for building trust in businesses. In this context, we aimed to study the relationship between companies’ environmental practices and the perception of competitive advantage gained as a result, using an econometric approach based on data collected through a questionnaire applied to firms from Romania and the |

Republic of Moldova, with a sample of 303 respondents. By estimating a logistic regression model, the study analyzes the extent to which the number of environmental measures implemented, the company's size, age, and country of origin influence the likelihood of a company reporting a competitive advantage from its environmental protection efforts. The results show that the number of environmental practices implemented is a significant and positive predictor of the perceived competitive advantage, while the other factors have a smaller or statistically insignificant impact. The findings provide empirical evidence supporting the idea that sustainability engagement can offer strategic benefits to companies, regardless of their size or national context, emphasizing the importance of integrating environmental responsibility into business strategy.

**MD.96.**

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| **Title** | **Financial-accounting maturity score in IT entities: an innovative tool for assessing the quality of accounting information** |
| **Authors** | COJOCARU Victor, BĂDICU Galina, SOCOLIUC Marian |
| **Institution** | Academy of Economic Studies of Moldova / Stefan cel Mare University, Romania |
| **Patent no.** | Doctoral research project |
| **Description** | In the context of advancing digitalization and the growing role of the IT sector in the economy, this research proposes the development and application of an innovative tool for assessing financial-accounting maturity in IT entities. The model is based on six standardized indicators (scaled 0–1), capturing both financial performance and characteristics specific to knowledge-intensive industries: revenue and net profit per employee, personnel expense ratio, net margin, cash-to-assets ratio, and the visibility of intangible assets.<br>The motivation stems from current practice, where accounting information quality is often measured using firm size or net profit, without accounting for decision-making context or transparency. Yet, IT firms with similar revenues |

may differ significantly in efficiency and reporting coherence.

A sample of 20 IT entities from the Republic of Moldova was analyzed, with two hypotheses tested: ($H_{01}$) organizational size does not significantly influence accounting information quality; and ($H_{02}$) financial efficiency indicators are positively correlated with maturity. Kruskal-Wallis testing showed no significant differences between organizational categories ($H = 0.76$; $p = 0.684$), confirming $H_{01}$. Pearson correlations validated $H_{02}$, revealing strong associations between the score and efficiency indicators (e.g., profit per employee).

The results support the conclusion that financial-accounting maturity reflects the quality of internal decisions rather than firm size or resources. The proposed model offers a scalable, comparative framework for analyzing the quality of financial reporting in the IT sector, with potential application in other intellectual capital-driven industries.

**MD.97.**

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| **Title** | **Behavioral response model for shock advertising using neuromarketing insights: focused on generations Z and Y** |
| **Authors** | Gaugas Tatiana, Moldovan-Batrinac Viorelia |
| **Institution** | Academy of Economic Studies of Moldova |
| **Patent no.** | Doctoral research project |
| **Description** | The project introduces an innovative behavioral model to optimize shock advertising strategies targeting generations Z and Y. In today's advertising landscape, where content saturation is a significant challenge, the demand for emotionally impactful, attention-grabbing campaigns aimed at younger audiences has surged. This model responds to that demand, providing a scientifically grounded framework for brands seeking creative and effective advertising solutions. At the core of this innovation is the integration of neuromarketing techniques, specifically eye-tracking technology. This advanced methodology delivers real-time, objective data on consumers' visual attention, emotional arousal, and cognitive engagement when exposed to shock-based stimuli. The unique aspect of this study is the combination of eye-tracking with traditional behavioral |

methods, providing a nuanced understanding of consumer responses. Behavioral variables analyzed in the model were: shock level, intensity of emotions, interest levels, and action intentions after exposure to various shock advertising tactics. Applications

- -Gen Z displayed a more dynamic and explorative engagement with shock tactics.
- -Gen Y exhibited a more analytical and contemplative response to shock content, spending longer viewing times on moral violations and religious taboos.
- -Gen Z demonstrated neutrality towards nudity, while Gen Y showed stronger negative emotional responses.
- -Women showed more negative emotional reactions to shock tactics in advertising compared to men.

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

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**MD.98.**

**Title** **Methodology for Comparative Analysis, Including Computer Simulation, of the Efficiency Indicators of IT Investments**

**Authors** Ghetmancenco Svetlana, Bolun Ion
**Institution** Academy of Economic Studies of Moldova

**Patent no.** No

**Description**

The invention proposes a comprehensive methodology for the comparative evaluation of IT investment projects based on key financial efficiency indicators, adapted for both equal and different project durations. It integrates classic evaluation criteria—such as Net Present Value (NPV), Internal Rate of Return (IRR), and Profitability Index (PI)—with annualized equivalents like Equivalent Annual Net Present Value (EANPV) and Equivalent Annual Profitability Index (EAPI).

The methodology is built upon a structured model that incorporates computer simulation algorithms to generate and assess a wide range of project scenarios. These simulations are based on randomly generated or empirically derived parameters such as project duration, investment volume, discount rate, and cash flow volatility. The model enables

the analysis of consistency, ranking stability, and sensitivity of efficiency indicators under uncertainty.

Applications:

This invention is particularly valuable in:

- ✓ Strategic decision-making for IT investment portfolios;
- ✓ Feasibility studies for public or private digital infrastructure projects;
- ✓ Prioritization of informatics projects in public administration, education, and health;
- ✓ Academic research in project evaluation, finance, and operational research;
- ✓ Development of software tools for investment analysis and training purposes.

By supporting comparative analysis across projects with heterogeneous lifecycles, the methodology addresses a significant gap in conventional investment evaluation practices and allows for more rational and consistent decision-making under complex conditions.

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|---|---|
| **MD.99.** | |
| **Title** | **Using the EyeQuant model to evaluate university websites** |
| **Authors** | Jomir Eudochia, Belostecinic Grigore |
| **Institution** | Academy of Economic Studies of Moldova |
| **Patent no.** | Doctoral research project |
| **Description** | The invention refers to the possibility of using the EyeQuant model, based on predictive artificial intelligence and algorithms able to simulate the reactions of real users to various visual elements, in order to evaluate the attractiveness of university websites.<br>There are several methods that can be used to assess the quality of university websites, such as analyzing visitors' behavior by exposing them to images of the websites for a short period of time, using eye-tracking equipment (eye tracking), brain reaction to the interaction with the website (neuromarketing techniques) etc.<br>Research conducted on the first page of websites from |

19 universities in Moldova's higher education system has shown that, instead of involving human participants for each individual analysis, the computational neuroscientific model of human attention, EyeQuant, can be used.

This model offers over 90% predictive accuracy when compared with empirical studies.

The model allows for the evaluation of several indicators related to university websites: the level of design clutter; the extent to which the site conveys an optimal tone of enthusiasm that can attract and retain user attention; the visual impact on users (design perception); highlighting of design elements that capture visitor attention (attention distribution); and the sequence of attention fixation on various elements (texts, images, buttons, headings) during navigation.

The results can be used for periodic assessment or reassessment of a site's attractiveness, maintaining the current layout, or implementing redesign strategies, such as optimizing specific areas, reorganizing elements, or adding new content to meet user needs and enhance overall experience.

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**MD.100.**

| | |
|---|---|
| **Title** | **The role of foreign direct investment in stimulating growth in the context of economic globalization** |
| **Authors** | MACOVEI Anamaria-Geanina, PÂRŢACHI Ion, COSMULESE Gabriela |
| **Institution** | Academy of Economic Studies of Moldova |
| **Patent no.** | Doctoral research project |
| **Description** | The invention is based on a model that analyzes the impact of foreign direct investment (FDI) on sustainable economic development in a globalized context. The proposed approach is not limited to the simple quantification of capital flows, but also aims at identifying the qualitative impact of FDI on local economies, development / innovation processes and know-how transfer.<br>The model determined is an integrated regression, which correlates FDI intensity with the dynamics of global value chains (GVC), the technological level in the host industries |

and the ability of the authorities to convert investments into effective public policies. The technical support for the model is a modular database with micro and macroeconomic indicators specific to region, industry, policy strategy or tax regime. Econometric techniques it contains:

- network analysis, for understanding the integration of the analyzed firms into global production networks;
- multicriteria evaluation tools, used to measure the indirect effects of FDI.

Practical applications of the invention:

- informing national strategies to attract FDI in high value-added areas;
- impact analysis for the implementation of investment projects;
- creation of digital platforms for decision support to authorities/managers in defining economic policies/strategies;
- supporting academic and research institutions in investigating the relationship between FDI, sustainability and competitiveness in a global context.

By applying the model in the long term, it emerges as a tool for understanding and effectively managing the role of FDI in new economic realities such as the green transition, digitization and the reconfiguration GVC.

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**MD.101.**

| | |
|---|---|
| **Title** | **Functional model of budget-output integration for decision optimization in production entities** |
| **Authors** | MIHALIA Anastasia, BĂDICU Galina, GROSU Veronica |
| **Institution** | Academy of Economic Studies of Moldova / Stefan cel Mare University, Romania |
| **Patent no.** | Doctoral research project |
| **Description** | In the context of growing uncertainty and cost volatility, production entities often treat budgeting as a formal obligation, disconnected from actual performance and decision-making processes. This research proposes an integrated functional model that aligns budgeted and actual data by responsibility centers, aiming to support economic and financial decisions through measurable indicators. Supported by relevant literature and thematic mapping, the |

model addresses the need for a logical framework that links planning, execution, analysis, and decision.
Using real financial data from Republic of Moldova manufacturing entity (2021–2023), the study calculates budget variances (ΔCc), and operational efficiency (Ec = Qr/Rc), establishing their correlation with key profitability metrics: ROE (Return on Equity) and ROS (Return on Sales). These variables are synthesized into a single performance score using a weighted function, offering a quantifiable view of budgeting quality: Budgeting performance = f(Ec, ΔCc), where,
$f = \omega 1 \times ROE(Ec, \Delta Cc), + \omega 2 \times ROS(Ec, \Delta Cc), \omega 1 + \omega 2 = 1$

The model goes beyond the traditional budget–actual analysis, introducing operational efficiency as a decisive variable and enabling the distinction between unjustified and strategically relevant deviations. Its structure allows integration into digital control systems and supports real-time managerial decision-making. Statistically validated, the model demonstrates that efficient budget execution, when properly measured, directly influences financial performance. As such, it offers a scalable and practical approach for enhancing control and performance management in production settings.

**MD.102.**

| | |
|---|---|
| **Title** | Strategic alternatives and visionary model for resilient real estate market development in the Republic of Moldova amid regional geopolitical uncertainty |
| **Authors** | ROTARU Olesea, SAVCIUC Oxana |
| **Institution** | Academy of Economic Studies of Moldova |
| **Patent no.** | doctoral research project |
| **Description** | This study presents an innovative approach to stimulating the real estate market in the Republic of Moldova by integrating geopolitical risk analysis into development planning. It proposes an adaptive model tailored to potential scenarios resulting from the ongoing regional military conflict, offering both strategic alternatives and a visionary direction for sector growth. At the same time, the research facilitated the segmentation of property buyers.<br>The proposed methodology is comprehensive, |

combining quantitative and qualitative methods to model market evolution under geopolitical uncertainty. It uses classic scientific techniques - analysis, synthesis, systemic evaluation, literature review, comparison, induction and deduction - to ensure methodological soundness. Data collection included both primary and secondary sources, with insights from economic analysts and real estate professionals, enhancing the relevance and applicability of the findings.

Key applications of the study include:

- ✓ Segmentation of the real estate market in Republic of Moldova;
- ✓ Identification of emerging trends and formulation of strategies to stimulate real estate market growth;
- ✓ Design of adaptive development models for uncertain geopolitical environments.

By integrating traditional research tools with forward-looking scenario modelling, the study supports more resilient, evidence-based decision making. It provides a new paradigm for managing real estate dynamics in fragile and volatile regions, aligning policy and investment decisions with evolving risks and opportunities.

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**MD.103.**

| | |
|---|---|
| **Title** | **Accounting policies between professional reasoning and international harmonization: an innovative approach to the perception of professional accountants** |
| **Authors** | Tișcenco Vilena, Mihaila Svetlana, Bădicu Galina |
| **Institution** | Academy of Economic Studies of Moldova |
| **Patent no.** | Doctoral research project |
| **Description** | The invention presents a structured methodology, assessing how accounting professionals perceive the role and impact of accounting policies in their daily work. The approach is based on an empirical survey that collects qualitative and quantitative data from practitioners in Romania and the Republic of Moldova, providing a comparative perspective between two countries with distinct regulatory frameworks. By analyzing the responses, the research highlights the influence of national regulations, professional standards and economic conditions on the application of accounting policies. The study investigates: the importance of accounting policies in promoting transparency and |

comparability in financial reporting, their role in accurately representing an entity's financial position, and the practical difficulties faced by practitioners.
This allows researchers to correlate respondents' views with variables such as professional experience, economic sector, exposure to IFRS versus national standards and level of education. The data are processed and potential applications of this invention include: supporting accounting standard setting; informing professional bodies and regulators; improving accounting education; facilitating better alignment between theoretical models, etc.

This research contributes to bridging the gap between regulatory accounting frameworks and their operational impact, providing a valuable basis for future studies.

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**MD.104.**

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|---|---|
| **Title** | **Methodology of cost calculation in public higher education institutions in the Republic of Moldova** |
| **Authors** | Țurcanu Liliana , Grigoroi Lilia |
| **Institution** | Academy of Economic Studies of Moldova |
| **Patent no.** | doctoral research project |
| **Description** | The invention of an accurate and rigorous costing methodology is essential for the sustainable development of the higher education (HE) system in the Republic of Moldova (RM). In a period of profound transformation, characterised by ambitious structural reforms - from financial constraints to the need for international alignment - this innovation becomes a critical priority. It enables efficient resource management which are crucial for the sustainability of public HE.<br>Applications: the costing methodology is an essential pillar in the strategic transformation of HE in the RM, going far beyond a simple accounting exercise. It is becoming an indispensable tool for:<br>➢ Efficient management of scarce resources - Detailed knowledge of the costs of HE facilitates both the rationalisation of the allocation of scarce financial resources and their more judicious allocation to priority areas.<br>➢ Underpinning structural reforms - The HE in Moldova Project (HIPM) and the transition to performance-based |

funding require a sound basis for objective assessment and equitable allocation of resources.

- Strengthening accountable university autonomy - Greater institutional autonomy implies greater financial accountability. Knowledge of real costs is essential for effective and transparent financial management.
- Increasing relevance and competitiveness - Systematic cost analysis, linked to performance indicators, allows universities to prioritise investment in areas with maximum economic and social impact.

The implementation of this methodology is essential for the sustainable modernisation of the HE on system in the RM, supporting the efficient functioning of new funding and governance mechanisms, strengthening institutional autonomy and ensuring long-term sustainability.

# Junior Achievement Moldova

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| **MD.105.** | |
| **Title** | Sabri-lup Project Nr.2 |
| **Authors** | Lungu Sabrina |
| **Institution** | Junior Achievement Moldova<br>Seria AP Nr.8104 |
| **Description** | Sabri-lup new hosting pillow-duvet aims to treat migraines because it has a magnet inside, including the duvet can serve as a cover, the pillow is made in the shape of a wolf's head, it is my favorite animal, it is unique and copyrighted. |
| **MD.106.** | |
| **Title** | MOLD-LENN Project Nr.1 |
| **Authors** | Gonța Elena |
| **Institution** | Junior Achievement Moldova<br>In process |
| **Description** | MOLD-LENN this deep study project of our traditions and customs, aims to demonstrate the growth of the economy through hospitality and tourism. A new TOOM-Tourism is invented, timely, modern custom, invented term will assume the modern year 2025 in the activity of hosting and tourism regarding the growth of the state's economy of Moldova. |
| **MD.107.** | |
| **Title** | ady-dook Project Nr.1 |
| **Authors** | Miron Adelina |
| **Institution** | Junior Achievement Moldova<br>Seria AP nr.8108 |
| **Description** | ady-dook puppy outfit, the clothing is unique in its own way, it represents an outfit only for holidays, the purpose of this outfit is the unique special one with a hat and a bag. I have a purebred puppy that is always cared for and loved and I wanted a unique product so that it would not be copied. The outfit with the bag as the author is innovative. |

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| **MD.108.** | |
| **Title** | ALEXMEOW Project Nr.1 |
| **Authors** | Moroz Alexandru |
| **Institution** | Junior Achievement Moldova<br>Seria AP nr.8109 |
| **Description** | ALEXMEOW shoes for cats. The innovative product offers comfort to the owners so that the quadruped is clean and well-groomed during walks. The clip from which it is made is a water-resistant one, it is very easy to use, it is practical, it is fixed to the legs so that it does not fall off easily during walks. |

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| **MD.109.** | |
| **Title** | MAURA-PU Project Nr. 2 |
| **Authors** | Colun Maura |
| **Institution** | Junior Achievement Moldova<br>Seria AP nr.8106 |
| **Description** | MAURA-PU new project represents new coat duvet is a sleeping in the shape of a chick with wings in which we store sleeping pillows, the purpose of the innovative product is to create conditions for children at night when traveling with their parents. The product is of interest to both children and teenagers. |

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|---|---|
| **MD.110.** | |
| **Title** | KAPI-TANi Project Nr. 2 |
| **Authors** | Eșanu Tatiana |
| **Institution** | Junior Achievement Moldova<br>Seria AP nr.8103 |
| **Description** | KAPI-TANi my new children's pijamas based on storage and made of eco-friendly cloth, on the outside is with a pocket where the Capybara toy sits in the pocket, at the toy is attached a medicinal magnet that treats blood pressure and headaches. |

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| **MD.111.** | |
| **Title** | Epu-KAMi Project Nr.2 |
| **Authors** | Bordan Kamelia |
| **Institution** | Junior Achievement Moldova<br>Seria AP nr.8107 |
| **Description** | Epu-KAMi the innovative product, for bunnies made of |

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| | natural fabric. Our family has a tradition of raising white bunnies, our grandparents inherited this business. Innovative is the slim, comfortable tank top. |

| **MD.112.** | |
|---|---|
| **Title** | Spat-Lera Project Nr.2 |
| **Authors** | Gorincioi Laura |
| **Institution** | Junior Achievement Moldova |
| **Description** | In process<br>Spat-Lera is a new project that involves treating and relieving leg pain, including preventing and relieving the incipient condition of leg problems. The invented tool helps in practicing light sports for legs and applying new types of exercises. |

| **MD.113.** | |
|---|---|
| **Title** | INKspire Project Nr.1 |
| **Authors** | Dragoș Iustin Zloteanu |
| **Institution** | Junior Achievement Moldova |
| **Description** | In process<br>INKspire this new project is a character created for games, he is unique and cute, he has a special symbolism, the head signifies the circle of info infinity, the body means concentration. The eye dots are points of kindness, the black hands dots - the human negativity. My INKspire represents human changes that helps motivate myself and my school friends. |

| **MD.114.** | |
|---|---|
| **Title** | **FanaDorya Project Nr.2** |
| **Authors** | **Sinegur Andreea** |
| **Institution** | **Junior Achievement Moldova**<br>**SERIA AP NR.7775** |
| **Description** | FanaDorya my new collection of healthy toys project is intended for children that want personalized day-night toys that have a healing and calming effect. My healthy toys collection are very cute, original and represents children being. This project is a special one because every child is an important person in our society and my healthy toys are very important for them. |

**Olga Botnari (Fiodorov)**

**MD.115.**

| | |
|---|---|
| **Title** | **Process for obtaining the biodegradable packaging** |
| **Authors** | Olga Botnari (Fiodorov) |
| **Institution** | **Individual applicant** |
| | Filing no: s 2024 0097 |
| | **Process for obtaining a Biodegradable Packaging Based on Fruit- Derived Edible Films** |
| **Description** | This invention describes a technological process for producing a biodegradable packaging material made from fruit-based edible films with the addition of natural plasticizers, intended for use in the food and pharmaceutical industries. The process involves several stages: (i) preparation of the raw material by cutting the fruits into optimal sizes for processing; (ii) selective thermal treatment (blanching) of dense-structured fruits to inactivate enzymes and preserve sensory attributes; (iii) mechanical pulping of the fruits to obtain a homogeneous paste with fine particle size; (iv) homogenization of the composition and incorporation of a natural plasticizer (gelatin–chitosan, 0.5–3%) to enhance the mechanical strength and flexibility of the resulting film. The fruit paste is then cast in a uniform layer on a non-stick surface and subjected to a controlled drying process in a convection oven, with gradually increasing temperature (from 55°C to 70°C) until a residual moisture content of 6–12% is achieved. During this stage, natural polymerization reactions (involving pectin and uronic acids) occur, contributing to the gelation and stabilization of the film matrix. The resulting film has an average thickness of ~0.263 mm, a uniform and translucent appearance, specific fruit aroma, is water-soluble, and microbiologically stable. The packaging is then sealed and stored under controlled conditions (10–15°C, 40–60% relative humidity) to prevent degradation. This type of packaging offers a sustainable and eco-friendly alternative to conventional synthetic materials. |

# Morocco

| MA.1. | |
|---|---|
| **Title** | **Intelligent device for automatically changing the orientation of a photovoltaic pannel** |
| **Authors** | **Majid EL BOUAZZAOUI** |
| **Institution** | OFEED |
| **Patent** | PCT/WORLD 2018 |
| **Description** | The aim of the present invention is to provide a device for automatically and regularly removing specks of dust or grains of sand that may accumulate on the surface of a photovoltaic panel (A), in order to ensure long-term maximum performance while avoiding air pollution and the use of precious water resources. This is achieved by an intelligent system comprising: sensors (S) for detecting light intensity, atmospheric humidity, or the presence of rain; a microcontroller (U); and mechanical components (B, C, D) that automatically adjust the orientation of the photovoltaic panel (A) based on light levels, humidity, and weather conditions. The device is characterized by mechanical means (B, C, D) that enable the panel (A) to be oriented either toward the sun or toward the ground by controlling a motor-driven telescopic arm (D), which moves a mobile support (B) along rails (C) arranged in a semi-circle at the top of the device. |

# Philippines

by

*Toronto International Society of Innovation & Advanced Skills (TISIAS)*

**PH.1.**

| | |
|---|---|
| **Title** | **LIDART** |
| **Authors** | Iman Hadi Vincheh, Ma. Chat Donna V. Ofilas |
| **Institution** | **Farin Technologies OPC** |

**Description**

LIDART is an AI-powered 3D lidar system designed to enhance road safety and enable advanced vehicle autonomy. It is a versatile solution that can be installed on all types of vehicles, including cars, trucks, and motorcycles. The system comprises a radar unit equipped with an AI module and TOF (Time of Flight) sensor, as well as a graphical display unit, both connected via a secure wireless network. By detecting object types, distances, speeds, and trajectories in real time, LIDART provides precise monitoring of surrounding traffic and alerts users to potential collisions through intuitive visual notifications on the display. Its AI processing minimizes computational load on the vehicle's systems, and its programmable scanning capability allows 360° monitoring or front-sweep views. LIDART is cost-effective compared to conventional lidar systems, ensuring accessibility to everyday users while delivering advanced traffic detection and self-driving support. This innovation makes high precision lidar technology affordable, compact, and practical for modern road safety applications. The LIDART system is designed to revolutionize road safety technology and make it accessible for all vehicle users. Its potential impact includes:

- Reduced Traffic Accidents
- Increased Accessibility
- Improved Accuracy
- Enhanced Autonomous Driving
- User-Friendly
- Cost Efficiency

# Poland

Represented by **Eurobusiness**

**PL.1.**

**Title** **Reactor for Catalytic Pyrolysis and Gasification of Solid Fuels**

**Authors** Krzysztof Czajka, Janusz Skrzypa, Barbara Rogosz, Dominika Kufka, Anna Kisiela-Czajka,

**Institution** „Poltegor-Institute" Opencast Mining Institute
Wroclaw University of Science and Technology

**Patent no.** Patent application No. WIPO ST 10/C PL448440

A reactor designed for catalytic pyrolysis and gasification of solid fuels, including biomass, waste, polymers, and fossil fuels, enabling the execution of pyrolysis and gasification processes in modified gas atmospheres containing nitrogen, oxygen, carbon dioxide, and their mixtures. The reactor consists of a heat-resistant cylindrical body that is open at the top, with its inner lateral surface and bottom wall lined with thermal insulation. The body is sealed at the top with a cover, which has thermal insulation on its underside, extending into the reactor chamber. The cover also houses an outlet nozzle for pyrolytic gas.

**Description**

Inside the body, at a distance from its thermally insulated lateral wall, a cylindrical thermal insulation coating is positioned, forming a heating chamber. The bottom of this chamber contains ceramic rings and a container for solid fuel, whose lateral surface is made of a mesh structure that acts as a catalyst carrier.

The annular space formed between the thermal insulation coating and the thermally insulated lateral wall of the reactor body is entirely occupied by a heating system, consisting of electric heating elements mounted on a supporting frame. Around these heating elements, in the lower half of the reactor body, a carrier gas supply system is arranged in the form of a spiral, which is heated by the electric heaters.

# Poland

Represented by
***IBS Global***

**PL.2.**

| | |
|---|---|
| **Title** | **Wheelchair dynamometer** |
| **Authors** | Mateusz Kukla, Łukasz Warguła, Bartosz Wieczorek, Michał Kończak |
| **Institution** | **Poznań University of Technology** |
| **Patent** | Patent application: P.444414 |
| **Description** | Operating principle of the wheelchair dynamometer relies on the frictional interoperation between the wheelchair's wheels and rollers as part of a roller system. The rollers are mounted on bearing shafts that interoperate via flexible couplings with a torque gauge. It transfers the torque $M(t)$ and rotational speed $n(t)$ via the chain transmission to the main shaft. The main shaft features other mechanical transmissions intended for various simulation and measurement functions, the purpose of which exceeds the framework of this elaboration. The main shaft interoperates with the brake assembly, which is equipped with a brake, the purpose of which is to generate the resistance torque $M(t)$. The value of the drive torque that a wheelchair user must generate depends on the resistance of the dynamometer's mechanical system. The value of this resistance depends to some extent on the efficiency of its components, but mainly on the settings of the designed braking system. It is therefore possible to load the wheelchair's wheels with an adjustable value of the braking torque. This enables a simulation of various types of measurement scenarios with simultaneous measurement of motion parameters. |

**PL.3.**

| | |
|---|---|
| **Title** | **Enzybiotics – a breakthrough technology in the fight against antibiotic resistance** |
| **Authors** | Izabela Sabała, Elżbieta Jagielska |
| **Institution** | Mossakowski Medical Research Institute Polish Academy of Sciences |
| **Patent** | 1. PL243304B1 / WO2021075988A1<br>2. PL243303B1 / PCT/PL2020/050075<br>3. P.449074 / PCT/PL2024/050045<br>4. P.449072; PCT/PL2024/050046<br>5. P.449075<br>P.449073 |

| | |
|---|---|
| **Description** | Enzybiotics are a new group of biological antibacterial substances that lead to the immediate lysis of bacterial cells without damaging the natural microbiome. They also eliminate strains resistant to antibiotics, which is extremely important given the growing problem of antibiotic resistance. Unlike antibiotics, they demonstrate high species specificity, which, combined with their protein structure and rapid biodegradation, makes them safe for humans, animals, and the environment. New proteins are widely used not only in medicine but also in veterinary medicine, agriculture, food protection, and even the preservation of works of art:<br>• difficult-to-heal wounds, such as diabetic foot, pressure sores, or burns<br>• microbiological protection of fish in aquaculture<br>• dairy cattle disease mastitis - inflammation of the udder<br>• bio preservatives and agents for surface disinfection in the food industry<br>• biodeterioration of works of art<br>• fungal diseases of crops |

**PL.4.**

| | |
|---|---|
| **Title** | **A Set of Mechatronic Design Solutions For Control Modules Regulating The Airflow Delivered By A Rescue Fan Into A Building Through A Doorway** |
| **Authors** | Łukasz Warguła, Bartosz Wieczorek, Daniel Małozięć, Piotr Kaczmarzyk |
| **Institution** | Institute of Machine Design, Faculty of Mechanical Engineering, Poznan University of Technology, Scientific and Research Centre for Fire Protection, National Research Institute, |
| **Patent** | P.447682, P.447683, P.447681 |
| **Description** | Traditional positive pressure ventilation fans used in firefighting rescue operations typically rely on manual mechanical adjustment by the operator or lack such adjustment altogether. This leads to uncertainty regarding whether the device is correctly and effectively positioned. Improper setup reduces the efficiency of the rescue operation. The presented set of solutions is designed to enable autonomous control of the fan's position (P.447681) and to ensure precise alignment and effective delivery of clean air into the building to support the rescue effort (P.447682 or P.447683). |

# Poland

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

**PL.5.**

| | |
|---|---|
| **Title** | **Development of Technology and Launch of Production of Nickel-Plated Welding Wires with Increased Corrosion Resistance** |
| **Authors** | Sylwia Wencel, Waldemar Szczepaniak |
| **Institution** | **Czestochowa University of Technology**<br>**Metalurgia S.A. Radomsko** |
| **Patent** | Pat. P.440144 |
| **Description** | The project results provided the basis for their implementation in the business activities of the consortium member—Metalurgia S.A. Radomsko. This implementation is crucial for the steel construction sector, where welding wires are used in automatic and semi-automatic welding processes. Thanks to increased corrosion resistance and improved electrical conductivity, nickel-plated welding wires have significantly enhanced the quality and durability of welds, reducing the risk of technological defects and improving welding process stability. Metalurgia S.A., as part of the Czech consortium MORAVIA, introduced this technology to the international market, opening new opportunities for the export of Polish technological innovations. The product—nickel-plated welding wires with increased corrosion resistance—has the potential to dominate the market segment previously occupied by copper-coated and organically coated wires, representing a breakthrough in welding materials technology. |

**PL.6.**

| | |
|---|---|
| **Title** | **Development of an Innovative Technology and Launch of Production of a Wide Range of Wires and Fasteners Made from TRIP Steel** |
| **Authors** | Sylwia Wencel, Anna Radecka |
| **Institution** | **Czestochowa University of Technology**<br>**Metalurgia S.A. Radomsko** |
| **Patent** | Pat. P.439647, Pat.244409 |
| **Description** | The main objective of the project was the development of two innovative technologies: |

1. A two-stage heat treatment technology for TRIP wires, which serve as a semi-finished product for the production of fasteners. This process resulted in wires with a multiphase TRIP (Transformation Induced Plasticity) structure, characterized by high mechanical strength and appropriate plasticity, enabling their further processing in fastener manufacturing. The research involved determining the optimal heat treatment parameters, analyzing the retained austenite content, and conducting strength tests along with microstructural evaluations.
2. A plastic forming technology for fasteners made from TRIP-structured wires, eliminating the need for traditional heat treatment (quenching and tempering) as well as additional finishing operations such as straightening. The developed technology enables the production of screws and bolts with increased resistance to dynamic loads, meeting the requirements of property class 8.8, used in construction and steel structure industries.

**PL.7.**

| | |
|---|---|
| **Title** | **TUBE FLOWMETER FOR MEASURING LEAKS** |
| **Authors** | Tomasz Siuda |
| **Institution** | **OIL AND GAS INSTITUTE - NATIONAL RESEARCH INSTITUTE** |
| **Description** | Pat. P.437646<br>The innovation of the invention lies in the use of a pressurised tube coiled at a suitable radius which limits the d!mensions of the device and allows the measuring range of the flow of air or any'gas to be freely adjusted, both by the amount of pressure applied to the instrument and by changing the diameter or length of the tube itself. |

**PL.8.**

| | |
|---|---|
| **Title** | **PURE HYDROGEN BURNER FOR DOMESTIC GAS COOKERS** |
| **Authors** | Tomasz Siuda |
| **Institution** | **OIL AND GAS INSTITUTE - NATIONAL RESEARCH INSTITUTE** |
| **Patent** | Pat. P.437254 |
| **Description** | The essence of the invention is a burner of a suitable shape and a gas nozzle, which enable the combustion<br>of pure hydrogen while maintaining the thermal-performance parameters of the burner such as its efficiency |

(efficiency level at 5/%). The burner can be used for existing gas cookers as well as newly designed ones. It can also be present as a single burner in gas stool-type appliances or in the burner group of a typical gas cooker or gas hob.

**PL.9.**

| | |
|---|---|
| **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.10.**

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|---|---|
| **Title** | **GREASE FOR BEARINGS IN OFFSHORE WIND TURBINES AND METHOD OF MANUFACTURING OFFSHORE WIND-TURBINE BEARING GREASE** |
| **Authors** | Agnieszka Skibińska, Stefan Ptak, Dariusz Sacha, Magdalena Żółty, Iwona Rycaj, Małgorzata Maślanka, Kamil Pomykała, Iwona Kornecka, Piotr Szajnowski |
| **Institution** | **OIL AND GAS INSTITUTE - NATIONAL RESEARCH INSTITUTE** |
| **Patent** | Pat. P.450460 |
| **Description** | The present patent application is concerned with a lubricant for use in wind turbines. Its primary function is to ensure the reliable operation of wind turbines in a range of climatic conditions. The grease in question is characterised by a number properties, including, but not limited to, excellent mechanical stability and good extreme pressure transmission. This renders it suitable for utilisation in situations where high and long-term bearing loads are to be expected. |

**PL.11.**

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|---|---|
| **Title** | **OPENWORK WALL BLOCK** |
| **Authors** | Maciej Major, Izabela Adamczyk |
| **Institution** | **Czestochowa University of Technology, Faculty of Civil Engineering** |
| **Patent** | Pat. 235427 **Openwork wall hollow brick** |
| **Description** | The invention concerns a new solution of an openwork wall block made of a recycled concrete mix (the additives used are: polyethylene terephthalate in the form of PET flakes and SBR rubber granulate of various fractions), intended for use in construction, in particular for the construction of walls exposed to external dynamic impact, e.g. foundation walls of machines or external load-bearing walls of buildings located near railway tracks, trams or communication routes with high traffic of wheeled vehicles.<br>Advantages of the Developed Invention:<br>- It allows for the construction of walls that dampen external dynamic effects.<br>- It limits the impact of vibrations and their propagation inside the wall structure itself, both loadbearing, ground and foundation walls.<br>- It has an ecological aspect as a result of using waste for the production of hollow bricks. |

**PL.12.**

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|---|---|
| **Title** | **NEW TYPE OF STEEL FIBRE REINFORCEMENT FOR CEMENTITIOUS COMPOSITES** |
| **Authors** | Norbert Sczygiol, Mariusz Urbański, Paweł Helbrych |
| **Institution** | **Czestochowa University of Technology, Faculty of Civil Engineering** |
| **Patent** | Pat. 237440 **Dispersed reinforcement element** |
| **Description** | The invention concerns a new shape of steel fibre reinforcement designed for cement-based composites. It significantly improves mechanical and structural properties of fibre-reinforced concrete. The proposed solution addresses technological problems of currently used fibres, such as clustering (“hedgehog” effect), poor workability, or uneven distribution in the mix. This novel type of reinforcement consists of closed geometric shapes, which prevent tangling, |

improve uniform dispersion, and enhance the bond with the cement matrix. This novel type of reinforcement consists of closed geometric shapes, which prevent tangling, improve uniform dispersion, and enhance the bond with the cement matrix.) Advantages of the Developed Invention:

- Innovative closed-loop geometry improves fibre distribution in fresh concrete.
- Enhances both tensile and flexural strength of concrete.
- Suitable for structural applications and industrial production.
- Can be implemented in prefabrication, flooring, tunnel linings, and repair technologies.
- Reduces material waste and enhances sustainability by optimizing fibre efficiency.

Increases crack resistance and durability under dynamic and cyclic loading conditions

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| **PL.13.** | |
| **Title** | **CLA Composite Lightweight Aggregate – innovative material made from recycling of ash and plastic waste** |
| **Authors** | Przemyslaw Postawa, Piotr Gorak, Jaroslaw Kret |
| **Institution** | **Czestochowa University of Technology,**<br>**Faculty of Mechanical Engineering**<br>**Department of Technology and Automation** |
| **Patent** | Pat.236670 **Composite Light Aggregate** |
| **Description** | The subject of the invention is a new composite aggregate made from recycling of ashes and plastic waste. As a matrix in the created composite the waste of a post-consumer thermoplastic polymers could be used. The filler's role was fulfilled by fine-grained anthropogenic raw materials.<br>**Defined problems:**<br>• millions of tons of mineral and plastic waste, and no idea what to do with them<br>• no possibility of multiple recycling of plastic waste (max 5 times)<br>• problems with mineral waste management<br>**What problem the invention solves:**<br>• waste management of PET, PE, PP plastic,<br>• management of waste of combustion processes (fly ashes)<br>• the possibility of using waste heat from other processes for |

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| | their production,<br>• reduction of energy compared to current methods of producing lightweight aggregate by 60-70%<br>**Purpose and application areas:**<br>- architecture (concrete, light mortars, isulation)<br>- road engineering,<br>- chemical industry (fillers mortars and resins,<br>gardening (filtration layers) |
| **PL.14.** | |
| **Title** | **Phage preparation for rectal use** |
| **Authors** | Sławomir Letkiewicz, Ryszard Międzybrodzki, Andrzej Górski |
| **Institution** | 1 Bacteriophage Laboratory, Department of Phage Therapy, Ludwik Hirszfeld Institute of Immunology and Experimental Therapy of the Polish Academy of Sciences, Wroclaw, Poland<br>2 Phage Therapy Unit, Medical Center, Ludwik Hirszfeld Institute of Immunology and Experimental Therapy of the Polish Academy of Sciences, Wroclaw, Poland<br>3 Department of Clinical Immunology, Medical University of Warsaw, Poland<br>4 Collegium Medicum, Jan Długosz University in Częstochowa, 42-200 Częstochowa, Poland |
| **Patent** | Pat.214743B16 |
| **Description** | - Application possibilities:<br>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 |

# **Poland - Ukraine** (collaboration)

**PL.15.**

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|---|---|
| **Title** | **Revitalization and reconstruction of the tenement house at Tuwima 48 in Lodz and the traditional architecture of the city** |
| **Authors** | **Karol WYSZNACKI** |
| **Institution** | *Lodz University of Technology Institute of Architecture and Urban Planning, 116 Zeromskiego St., Lodz* |
| **Description** | The research is devoted to the problems of repurposing historical industrial facilities for new functions. The main issues of such measures and the necessary conditions for their feasibility are identified. The existing experience of preserving industrial facilities with a change of function is analyzed and how it can be used in the post-war reconstruction of Ukraine. The main requirements are the location in the centre of large cities with good transport accessibility and residential areas nearby. Examples are given of how new centres of public attraction with an artistic function arise on the site of industrial sites with the preservation of historical industrial buildings. |

**PL.16.**

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|---|---|
| **Title** | **Re-use of industrial heritage as an element in achieving urban resilience, adaptation complex of textile industry into a shopping centre, Lodz, Poland** |
| **Authors** | **Sylwia KRZYSZTOFIK** |
| **Institution** | *Lodz University of Technology, Institute of Architecture and Urban Planning* |
| **Description** | Lodz is the fourth most populous city in the country, located in central Poland, a former centre of the textile industry, which has a significant amount of valuable post-industrial heritage. This study presents an example of the adaptation of a complex of 19th century industrial buildings (the former Izrael Kalmanowicz Poznański cotton mill) for commercial functions. The research presents the history of the place and how a new function was implemented on the territory of a former factory with an area of 270,000 m2 and in former industrial buildings with an area of 9,000 m2. The methods of adaptation to the new function at different hierarchical levels are described – from the level of the city's master plan to individual industrial buildings and their details. The research presents archival cartographic materials in combination with the changes made and describes different approaches to preserving a historical building. The |

change is an example of a commercial investment that contributed to the popularization of post-industrial heritage and became an element of building a city brand, emphasizing its post-industrial identity. It is also an element of building a city's resilience that can transform and adapt to changing external conditions.

**PL.17.**

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|---|---|
| **Title** | **Exploring Innovative Methods for Assessing the Development Potential of Historic Architectural Structures: A Case Study of Small Medieval Towns in Subcarpathia** |
| **Authors** | **Anna Maria Martyka** |
| **Institution** | Department of Architecture and Cultural Heritage, Faculty of Civil and Environmental Engineering and Architecture, Poland |
| **Patent** | |
| **Description** | This research presents an integrated methodology for assessing the development potential of small historic towns with the aim of developing innovative tools to support the conservation and sustainable development of architectural heritage. The proposed research procedure involves a multi-stage process of historical space analysis, the first two stages of which have been tested on the example of medieval towns in the Subcarpathian region, whereas the third stage develops and complements the existing method.<br>The methodology developed not only provides valuable information on the development potential of historic cities but also offers new insights into the protection and adaptation of architecture in the face of contemporary conservation challenges. It enables systematic monitoring of change and evaluation of the effectiveness of conservation efforts, while providing a tool to support sustainable development planning. In addition, through the use of digital technologies, this methodology offers an interactive experience of reconstructing historic architecture. Its universal nature means that it can be successfully applied to architectural heritage research worldwide. |

**PL.18.**

| | |
|---|---|
| **Title** | **Revitalization of historic districts as a tool to enhance urban resilience of the city on the example of Lodz** |
| **Authors** | **Sylwia KRZYSZTOFIK, Aneta Anna TOMCZAK** |
| **Institution** | Lodz University of Technology, Institute of Architecture and Urban Planning |
| **Patent** | - |
| **Description** | Revitalization is a multifaceted process that must consider spatial, social, and economic conditions. An effective renewal |

initiative is long-term and requires the various social groups' collaboration, repair programs, and planning documents that incorporate diagnostic results, outline action directions, and establish principles for protection and the transformations' scope. It is also essential to have reliable operational tools integrating planning assumptions, budget, and action schedules, enabling the execution of revitalization projects and enhancing the urban life quality.

This article explores the revitalization process in Lodz, a post-industrial city situated in central Poland, which boasts the largest country's area with a valuable historic downtown, dating back to the 19th century. The Lodz Centre Area Revitalization Project stands as Poland's most extensive program in terms of area and budget. Covering a portion of the historic centre spanning 164 hectares, the project received over one billion euros in EU funding. The article details various activities undertaken, the methodologies of their implementation, and the extent of renovations conducted on selected culturally significant buildings. It highlights changes introduced in terms of spatial and functional aspects across multiple scales – district, street, and culturally significant structures. The program has been successfully implemented, with the final investments completed in 2024.

**PL.19.**

**Title** **Selected problems of cultural heritage protection in a small historic town based on the example of Głogów Małopolski**

**Authors** **Joanna Bartkiewicz, Somayeh Afshariazad**

**Institution** *1 Department of Architecture and Cultural Heritage, Faculty of Civil and Environmental Engineering and Architecture,*
*2 Faculty of Architecture, Cracow University of Technology*

**Description** The research deals with the protection and revalorization of a small historic town, using Głogów Małopolski as an example. Głogów is located in the Podkarpackie Voivodeship, in close proximity to Rzeszów. This town, with its rich history and pedigree in the Renaissance period, currently faces a number of problems in the field of cultural landscape protection and revalorization of the historic center.

The authors used research methods such as urban inventory, architectural inventory, photographic inventory, literature and archive research to analyze the historical urban layout of the center, its historic architecture, as well as current forms of conservation protection. On this basis, they diagnosed the biggest problems related to the protection and revalorization of the city's cultural heritage and presented proposals for their solution.

**PL.20.**

| | |
|---|---|
| **Title** | **Architectural Transformations of Multifamily Housing from 1960–1980 in Poland: Preservation of Detail and the Impact of Thermal Modernization** |
| **Authors** | **Dominika CENDA, Justyna KOBYLARCZYK** |
| **Institution** | *Department of Residential Environment Design, Faculty of Architecture, Cracow University of Technology* |
| **Description** | The research analyzes multifamily residential architecture from the period 1960–1980, which remains a dominant housing form in many Polish cities. The standardization of architectural solutions and the lack of individual features are now seen as reasons for the low visual appraisal of these buildings. Nevertheless, the uniqueness of some housing complexes was shaped by architectural detailing that introduced individuality into otherwise standardized structures. Due to thoughtful urban planning and proximity to green spaces, this type of development holds significant revitalization potential. Selected case studies illustrate changes in building forms and their surroundings after 1989, highlighting the impact of political and economic transformation. The analysis covered building scale, proportions in relation to the immediate context, facade design, construction solutions, and architectural details—including whether and how original detailing was preserved or transformed as a result of modernization processes. Special attention was given to thermal retrofitting, which significantly altered the visual character of many buildings. |

**PL.21.**

| | |
|---|---|
| **Title** | **Leisure Architecture of the 1960s and 1970s as an Example of Post-War Modernism** |
| **Authors** | **Barbara ROBAK, Justyna KOBYLARCZYK** |
| **Institution** | *Cracow University of Technology, Faculty of Architecture* |
| **Description** | The research presents an analysis of recreational centers from the 1960s and 1970s as examples of post-war modernism. Today, these facilities are regarded as a legacy of past eras, embedded in the panoramas of many health spa towns. They are characterized by typical design solutions, both in terms of form-shaping and their relationship with the surrounding environment.<br>Based on selected examples, an analysis was conducted on recreational buildings from the 1960s and 1970s, identifying characteristic elements of their architecture. Subsequently, the transformation processes of these structures were examined, |

defining the features and solutions that shape their regional character.
The study included an analysis of the form of the buildings, their scale, as well as their relationship with the immediate surroundings. Particular attention was paid to the design of building façades and the structural solutions employed.

**PL.22.**

**Title**

**Preliminary Design Studies Of The Sculptural Decor Of A Renaissance House At 23 Rynok Square In Lviv**

**Authors**

**Svitlana LINDA, Renata PRZEWŁOCKA-SIONEK, Oleksandra KULYNSKA**

**Institution**

*1Opole University of Technology*
*2Lviv Polytechnic National University*
*3Lodz University of Technology*
*4Chief architect of the ABMK design office,*

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**Description**

The Scholtz-Wolfowitz' house at 23 Rynok Square in Lviv is a characteristic monument of Renaissance architecture. The history of its construction is complex and has not yet been fully elucidated. Pre-project studies conducted in 2008, as well as a detailed literary and archival search, allowed us to clarify the periodization of the development of the building's sculptural decoration. Laboratory studies confirmed the stages of formation of the elements of the architectural decoration and polychromy of the tenement house, and their conclusions became the basis for forming the concept of restoration work. This article is devoted to the methodological aspects of pre-project analysis and the development of practical recommendations for the restoration of valuable Renaissance objects in Lviv.

# Portugal

**PT.1.**

| | |
|---|---|
| **Title** | **Comparison of a Numerical 3D Simulation of the Elastic Modulus of Porous Bioceramics with Different Representative Volume Element Sizes** |
| **Authors** | Duarte F. MACEDO, Mariana B. OLIVEIRA, Filipe OLIVEIRA, Abílio P. SILVA |
| **Institution** | Universidade da Beira Interior<br>University of Aveiro |
| **Description** | The numerical model used to predict elastic properties was validated experimentally through the Impulse Excitation Technique (IET). Numerical simulations of the elastic modulus showed a reduction in error relative to experimental values as RVE size increased (+9.8%, -3.6%, and -3.6%), demonstrating excellent agreement with experimental results for larger RVEs (<5% error). This approach provides a cost-effective and reproducible framework for reconstructing 3D microstructures, enabling accurate property prediction and optimization of β-TCP ceramics for biomedical applications. |

**PT.2.**

| | |
|---|---|
| **Title** | **Enhancing Fatigue Life in Hybrid Fiber Composites Through Graphene Reinforcement** |
| **Authors** | João PARENTE, Abílio SILVA, Paulo N.B. REIS |
| **Institution** | Universidade da Beira Interior<br>University of Coimbra |
| **Description** | Modern engineering requires lightweight yet durable materials resistant to fatigue. Advanced composite systems are being developed using hybrid fiber architecture and nanomaterials, such as graphene nanoplatelets (GNPs), offering benefits for aerospace, automotive, and wind energy sectors [1,2]. This research explored the impact of combining carbon and glass fibers with GNPs between 0 wt. % and 1 wt. % on epoxy composites' bending-fatigue performance. The results indicated that 0.75 wt% of GNPs maximized bending strength, stiffness, and ILSS. Among the evaluated configurations, the 1G/7C hybrid laminate demonstrated the most effective performance. Fatigue testing revealed that while pure carbon laminates had the highest fatigue strength, hybrid laminates offered superior damage tolerance and extended fatigue lives. The GNP reinforcement provided additional fatigue life improvements ranging from approximately 9% to 15%. Combining fiber hybridization with graphene-enhanced epoxy matrices presents a promising approach for developing next-generation composites that offer enhanced durability and fatigue resistance. |

# Saudi Arabia

*by Highly Innovative Unique Foundation,*

| SA.1. | |
|---|---|
| **Title** | **Firas Smart Health Watch For Kids** |
| **Authors** | ALI MAUDAH YAHYA MOJMAMY, MARYAM YAHYA MOHAMMAD OTAYF |
| **Institution** | Highly Innovative Unique Foundation (HiUF)<br>Kingdom of Saudi Arabia |
| **Patent no.** | Saudi Authority for Intellectual Property (Saip)<br>Patent application No. 49329771 |
| **Description** | Children often lack health awareness, leading to unhealthy habits such as low physical activity and poor nutrition. Additionally, parents worry about their children's safety and need innovative solutions to monitor their health and security. "Firas Smart Health Watch for Kids" is an intelligent device that uses artificial intelligence to provide personalized health advice through a virtual character named "Firas," along with advanced safety features to protect children and ensure their privacy. Firas Watch is<br>Safe silicone design with a colorful touch screen. AI system offers advice based on the child's daily data. 3D projector displaying "Firas" for engaging learning. Security features include GPS and data encryption. Interactive programs and rewards to encourage healthy habits. Sensors to monitor air quality and temperature. |

# Spain

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| **SP.1.** | |
| **Title** | **Biocompatibility Enhancement through Surface Modification of Metallic Biomaterials and Titanium Alloys** |
| **Authors** | Camilo Zamora-Ledezma |
| **Institution** | Universidad Alfonso X el Sabio (UAX), Madrid, Spain |
| **Description** | Metallic biomaterials, particularly titanium alloys, are crucial in biomedical applications due to their excellent mechanical properties and biocompatibility. However, their bioinert nature can limit tissue integration, making surface modification essential for enhancing biocompatibility. In this talk, it will be presented innovative strategies for enhancing the biocompatibility of metallic biomaterials, with a focus on titanium alloys. It will be discussed from the general biomaterials concepts, followed by the properties and applications of titanium alloys, and various surface modification techniques to improve their biological interaction. Finally, preliminar results on the use of Kokubo revisited methodology combined with NaOH treatments, and heat treatments, to enhance the biocompatibility of tailored medical grade Ti-alloys through apatite formation will be shown. These findings demonstrate the potential of these methods to improve osseointegration and tissue compatibility, offering promising advancements in biomedical implant technology. |

# Sri Lanka

**LK.1.**

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|---|---|
| **Title** | **80%Ene.Sav.Electronic Diagram for Domestic Lighting.** |
| **Authors** | WIjayapala Welgama 2. Anton korea Peiris |
| **Institution** | **WElgama Invention Innovation World** |
| **Patent** | 10630 (IPC) H 05 B 37102 |
| **Description** | The inventor drew attention towards ENERGY SAVING to overcome Energy Crisis in our country as well as other countries in the world like Asian and Africain countries .<br>It is an Mini Electeonic Cjrcuit to save Energy in domestic Lighting and boost the local Economy up to certain standard. The final product with 105 micro electronic componants including two high voltage transistors to achieve the target.. Bcz of the invention:<br>a. Relief for the local Energy Crisis.<br>b. In saving monthly cost of domestic electeicity bills.<br>& use saving money in order to up lift their living Consitions.<br>e. Motivate school leavers in Electronic fields.<br>f. Disabled workers could be employed in electronic field in giving them a chance to be recognized in the society.<br><br>g. The invention features;<br>a. LIGHT WEIGHT<br>B. SIMPLE PRODUCTION PROCESS.<br>C. Low cost and long durability.<br>D. High lumen power.<br>E, fixed in any B22 ,E 27 or E 12 hokders.<br>F. High demande in the world market. |

# Taiwan

Represented by **WIIPA**

**TW.1.**

| | |
|---|---|
| **Title** | **AI Intelligent Energy-Saving 5G Private Network Platform** |
| **Authors** | Hsu Yung-Chang, Chang Chun-Wei, Chi Yen-Cheng, Wang Jui-Tang, Chen Shih-Yeh<br>Institute for Information Industry (III)<br>National Taiwan University of Science and Technology, Department of Electronic and Computer Engineering |
| **Patent no.** | - |
| **Description** | To meet the growing demand for digital applications in 5G private networks, this project introduces an AI-enhanced 5G energy-saving platform. The platform centers on an open architecture, maximizing resource utilization. Through the application of AI technology, it effectively reduces network energy consumption and significantly lowers operational costs, driving energy-efficient transformation in vertical industries. |

**TW.2.**

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|---|---|
| **Title** | **Anti-fall Coaster** |
| **Authors** | Yuan Ching-Chien, Hsieh Hao-Pin |
| **Institution** | National Chutung Senior High School<br>Pacific American School |
| **Patent no.** | M647713 |
| **Description** | This design can be fitted to the bottom of a teacup to effectively lower its center of gravity, significantly enhancing stability and preventing the cup from tipping over during movement or vibrations. As a result, it helps avoid liquid spills. The product features an elegant appearance that seamlessly blends functionality with aesthetics, showcasing an innovative design concept. It enhances the overall user experience and demonstrates strong market potential and competitiveness. |

**TW.3.**

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|---|---|
| **Title** | **Applying Electrothermal Focused-Heat Sterilization in Short-Cycle Organic Leafy Vegetable Production** |
| **Authors** | Yeh Chung-Wei, Chiang Chih-Huang, Yeh Chen-Yu |

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|---|---|
| **Institution** | Air Force Institute Of Technology<br>Ping Tung County Her-Ping Elementary School |
| **Patent no.** | I817878 |
| **Description** | Electrothermal Focused-Heat Sterilization is an innovative solution developed for organic agriculture. By integrating electric heating with focused thermal energy delivery, this technology provides an efficient and energy-saving approach to substrate disinfection. It operates without chemical agents, ensuring a residue-free, eco-friendly process that fully complies with organic farming standards and food safety principles. Ideal for soilless short-cycle leafy vegetable production in greenhouses, this method helps suppress harmful pathogens, nematodes, and weed seeds while preserving substrate integrity and microbial biodiversity. The result is improved plant health, reduced disease risks, and higher crop quality.<br>The technology is protected under Taiwan ROC Invention Patent I817878, offering a forward-looking, sustainable disinfection solution for the future of organic farming. |

**TW.4.**

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|---|---|
| **Title** | **Automatic time-scheduled navigation system and method** |
| **Authors** | Hsieh Che Jen, Lee Chun-Te, Hu Yu-Chiang, Lui Ming-Chun, Hsieh Jui-Ling, Shih Hung Lin |
| **Institution** | Cheng Shiu University<br>Lichih Senior High School |
| **Patent no.** | I803936_ |
| **Description** | The method for automatically scheduling navigation according to time includes the following steps: performing a data collection step to collect the driving history data of the vehicle and store it in a driving history database, wherein the driving history data includes the vehicle's departure time, departure place and destination data. Perform data comparison to check whether the current time matches the departure time in the driving history database. If yes, then further check whether the current location of the vehicle matches the departure place in the driving history database. If yes, then perform navigation route A suggestion step is used to automatically generate a suggested route for the vehicle to travel from the current location to the locations at |

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| | the current time based on the navigation data and a data display step is performed to display the best suggested route in real time. |

**TW.5.**

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|---|---|
| **Title** | **Campus security management system** |
| **Authors** | Hsieh Che Jen, Lee Chun-Te, Hu Yu-Chiang, Lui Ming-Chun, Hsieh Jui-Ling, Shih Hung Lin |
| **Institution** | Cheng Shiu University<br>Lichih Senior High School |
| **Patent no.** | M662023_ |
| **Description** | The processor has a database for storing the identity data of the students corresponding to the above codes, wherein the processor receives the sensing signal transmitted by the sensor to determine whether the current state of the student is normal or abnormal. |

**TW.6.**

| | |
|---|---|
| **Title** | **Charging pile frame to prevent charging cable from falling off** |
| **Authors** | Lu Ssu-Hsuan, Kang Tsai-Hua, Chien Wei, Ying Ci-Fan, Lin Wei-Hsin |
| **Institution** | Lunghwa University of Science and Technology,<br>HungKuo Delin University of Technology,<br>Tatung university, Ningde Qianwei Industrial Technology Co., Ltd., Shih Hsin University |
| **Patent no.** | M659226 |
| **Description** | The invention provides a charging pile frame to prevent charging cable from falling off, including a charging pile. One end of the charging pile is provided with a base, and the feature is: the other end of the charging pile is provided with a charging plate, and the charging plate is A power output port is provided, and the charging plate is provided with a clamping charging device. The clamping charging device includes a moving mechanism and a clamping mechanism. Since the charging pile is equipped with a device to prevent the charging cable from falling off, the charging cable will not fall off during the charging process. It is not easy to fall off. Secondly, the device to prevent the charging cable from falling off can meet different types of charging cable connectors and can serve as a multi-purpose device. |

**TW.7.**

| | |
|---|---|
| **Title** | **Drone Lighting and Power Extension System** |
| **Authors** | Yeh Chung-Wei, Chiang Chih-Huang, Yeh Chen-Yu |
| **Institution** | Air Force Institute of Technology |
| **Patent no.** | I810715 |
| **Description** | This project introduces a drone-compatible lighting and aerial charging module system that integrates illumination, power extension, and modular design. It features rapid assembly/disassembly, cross-platform transferability, and instant deployment capabilities. The lighting module offers high-brightness, wide-angle coverage, while the gimbal mechanism allows dynamic angle adjustment during flight. The magnetic spherical charging connector enables quick, mid-air power docking and supports multi-drone rotation.<br>This system is ideal for disaster zones, border surveillance, aerial maintenance, and large-scale public events—solving the limitations of conventional lighting and recharging interruptions. It enhances mission continuity, operational safety, and overall efficiency.<br>Protected by Taiwan, R.O.C. Invention Patents I810715 and I816236. |

**TW.8.**

| | |
|---|---|
| **Title** | **Easy Wheeled Trolley** |
| **Authors** | Liu Jun-Lin, Liu Yi-Shuo, Liu Yi-Zhen |
| **Institution** | Lilin Elementary School, New Taipei City. |
| **Patent no.** | M665332 |
| **Description** | We utilize two metal rods, four agile wheels, and three bungee cords to make this versatile trolley. After disassembling the trolley, the metal rods can be repurposed into crutches, which are convenient, practical, and suitable for daily life and outdoor activities. |

**TW.9.**

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|---|---|
| **Title** | **Intelligent Bolt Locking Module System for Industrial Pipeline Flanges** |
| **Authors** | Fa-Shian Chang, Shang-Chi Su, Tai-Yuan Chang, Chuan-Tse Hsiang, Wen-Bin Lai |
| **Institution** | Cheng Shiu University & CTCI Corporation |
| **Patent no.** | I772169 |

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| **Description** | This invention is an Intelligent Bolt Locking Module System for Industrial Pipeline Flanges, integrating an industrial IoT system capable of automatic detection, recording, and transmission of work data. It ensures accurate and rapid documentation and analysis, significantly enhancing pipeline connection quality and construction safety.Traditionally, flange bolts are manually tightened one set at a time, often resulting in uneven flange contact, which leads to pipeline joint leakage. Such issues have caused numerous accidents, frequently resulting in severe casualties and financial losses. Therefore, the bolt-locking procedure for pipeline flanges is critically important.This invention features an automated multi-bolt synchronized locking module, designed for use in open-field environments. However, in tight spaces, the hydraulic wrench can be detached from the machine and manually operated, allowing for time-efficient construction, reduced errors, and real-time monitoring and recording, thereby improving overall engineering quality.Additionally, this system is equipped with cyber-physical integration technology, providing operators with real-time guidance on necessary actions, offering a competitive advantage in the global market. |

**TW.10.**

| | |
|---|---|
| **Title** | **Intelligent Recycling Device with Clothing Identification And Mobile Box** |
| **Authors** | Wen-Liang Chen, Cian-Yun Jun, Hui-En Tseng, En-Ci Zhang |
| **Institution** | Biozyme Biotechnology Corp. |
| **Patent no.** | I854714 / M647859 / D229135 |
| **Description** | As environmental awareness rises, resource recycling and reuse are becoming global priorities. However, current systems for used clothing recycling face numerous issues, severely impacting operational efficiency and user experience. These include low recognition of recycling bins, inadequate management mechanisms, and limited capacity, leading to inefficiencies, reduced public participation, and increased workload for recycling personnel. This invention proposes an intelligent recycling device with clothing identification and mobile box, aiming to integrate smart technologies and the Internet of Things (IoT) to comprehensively enhance the efficiency, convenience, and |

user experience of used clothes recycling.
This invention not only addresses the pain points of existing used clothes recycling systems but also has profound implications for environmental protection, resource reuse, and smart city development. It can also be extended to other recycling fields, demonstrating significant social value and potential for the circular economy.

**TW.11.**

**Title** **Lactobacillus fermentum GKF3 demonstrates the ability to reduce nicotine dependence and decrease nicotine accumulation in the body.**

**Authors** Chen Chin-Chu, Chen Yen-Lien , Lin Shin-Wei, Chen Yen-Po

**Institution** GRAPE KING BIO

**Patent no.** I837529

**Description**

Globally, approximately 7 million people die annually from tobacco-related harms, with the male smoking rate (35%) significantly higher than that of females (6%). Nicotine addiction triggers dependence by stimulating dopamine secretion. While existing smoking cessation therapies—such as nicotine replacement therapy (NRT), the antidepressant Bupropion, and non-invasive brain stimulation—modulate dopamine, they face limitations. Recent studies indicate that **psychobiotics** can influence host neurotransmission and behavior through the gut-brain axis. In this study, supplementation with **Lactobacillus fermentum GKF3** in healthy adult male smokers demonstrated:

1. **Significant reduction in urinary nicotine and its metabolite concentrations**, confirming GKF3's ability to decrease nicotine accumulation in the body.
2. **Lowered smoking frequency**, with proposed mechanisms linked to gut-brain axis modulation and dopamine activity regulation, directly alleviating withdrawal symptoms and smoking cravings.

As a psychobiotic, GKF3 offers a **non-invasive and safe adjunct strategy** for smoking cessation through bidirectional gut-brain interaction. This research not only supports the potential of microbiota in addiction intervention but also opens new avenues for global tobacco harm reduction.

**TW.12.**

**Title** **Lung capacity training device**

**Authors** Wen-Liang Chen, Ying-Liang Yao, Jia-Jhu Liou

**Institution** SHU-TE UNIVERSITY

**Patent no.** I854875 / M654449 / D233321

**Description**

Facing the growing challenges of air pollution and an aging population, the number of patients suffering from respiratory diseases continues to rise. In particular, young children and elderly individuals often experience health deterioration due to insufficient lung capacity. Traditional lung capacity training devices lack elements of fun and interactivity, leading to impatience during monotonous training sessions and subsequently reducing training effectiveness. Moreover, current devices are unable to provide precise data monitoring, making it difficult to assess the effectiveness of patients' training. Therefore, this invention integrates game-based interaction and data monitoring to create an innovative lung capacity training device, aiming to enhance the training experience and the efficiency of medical applications. Innovative Value:

- Real-time recording and visualization of training data facilitate the evaluation of users' lung capacity progress.
- Gamified design effectively increases children's motivation to train, promoting long-term adherence.
- Real-time transmission of medical data allows physicians to provide personalized treatment recommendations.
- Combining fun with practicality maximizes training outcomes.

This invention addresses the shortcomings of traditional devices and demonstrates high practicality and application potential. It not only effectively improves the health conditions of patients with respiratory diseases but also provides new directions for the development of intelligent medical training devices.

**TW.13.**

**Title** **Methods and compositions of Lactobacillus Plantarum GKM4 for improving sperm motility and quality.**

**Authors** Chen Chin-Chu, Chen Yen-Lien, Lin Shin-Wei, Chen Yen-Po

**Institution** GRAPE KING BIO

| | |
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| **Patent no.** | I846368 |
| **Description** | , This invention discloses methods and compositions utilizing Lactobacillus plantarum strain GKM4 for enhancing sperm quality and motility parameters. The GKM4 strain, isolated and purified from traditional fermentation sources, has been validated through comprehensive animal studies to significantly improve key sperm characteristics, including semen volume, sperm concentration, and motility. Notably, the strain maintains its efficacy under heat-stressed conditions, demonstrating thermal stability in its reproductive benefits. The composition is formulated as an oral preparation designed to enhance reproductive capacity in both animals and humans subjected to elevated temperature environments. Through the specific application of strain GKM4, this invention presents a novel, safe, and evidence-based approach for improving sperm quality, offering substantial applications across the reproductive health sector. |

**TW.14.**

| | |
|---|---|
| **Title** | **Methods to improve the stability of copper alloy films** |
| **Authors** | Tsung-Hsin Lin, Chia-Ling Lin, Chuan Ting Lee, Jing-Tan Wang, Bo-Hung Lee |
| **Institution** | Department of Semiconductor Engineering/ Lunghwa University of Science and Technology<br>Department of German Language and Culture / Fu Jen Catholic University |
| **Patent no.** | I796607 |
| **Description** | This invention provides a method for preparing copper–rhodium coatings. The method includes the following steps: (a) providing a vacuum sputtering system and a substrate; (b) introducing argon gas into the vacuum sputtering system to form a sputtering environment; (c) using copper and rhodium targets in the sputtering environment under a sputtering pressure of $1\times10^{-3}$ to $1\times10^{-2}$ torr and sputtering power of 150 to 200 W to perform a total sputtering step, thereby forming a coating on the substrate; and (d) annealing this coating to obtain the final copper–rhodium coating. The annealing temperature is between 340 and 700 °C, and the annealing time is greater than or equal to 1 h. Furthermore, depending on the total number of atoms in the copper–rhodium plating layer, the rhodium content ranges from 0.2 |

to 1.5 at%. Copper–rhodium plating layers prepared by the aforementioned method possess low resistivity and high stability.

**TW.15.**

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|---|---|
| **Title** | **Microcapsule structure with high concentration of superoxide dismutase that enhances detoxification and metabolism** |
| **Authors** | Cheng Huang, Yi Chung Lai |
| **Institution** | Biozyme Biotechnology Corp. |
| **Patent no.** | M606063 |
| **Description** | This creation provides a microcapsule structure with high concentration of superoxide dismutase that enhances detoxification and metabolism. It consists of a material layer, which is located in the innermost layer of the microcapsule structure; a formulation layer, which is a group made up of Lactobacillus plantarum and Saccharomycecerevisie, and it covers the material layer; a superoxide layer, which contains superoxide dismutase or superoxide dismutase-like enzyme, located in the outermost layer of the microcapsule structure. Through the coating of the superoxide layer, the microcapsule structure can achieve detoxification effects. In particular, there is a release gate embedded between the formulation layer and superoxide layer, and the superoxide dismutase (SOD) content exceeds 3000 units/ml. Experiments have showed that it can avoid genetic injuries and mutations. |

**TW.16.**

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| **Title** | **Mini Woodker** |
| **Authors** | Fu Shou-His, Chen Wen-Liang, Yang Jing-Qi<br>Nien Yu-Ling, Liu Yi-Zhao |
| **Institution** | Shu-Te University Graduate School & Department of Product Design |
| **Patent no.** | M666597_ |
| **Description** | The MINI WOODKER combines four tools: circular sawing, wire sawing, drilling and trimming, which can make 70% of woodworking products smoothly produced. The size of the main unit is only 35 cubic centimeters, which is convenient for users to work anytime, anywhere.<br>In addition, tenon and tenon jigs are also available, making it easy for novice carpenters to complete tenon joints and |

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| | make a variety of different shapes of furniture. In addition, a website platform is also provided for users to learn about timber knowledge and teaching, so that novices can quickly get started. |

| **TW.17.** | |
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| **Title** | **Modular Disaster Relief Aid** |
| **Authors** | Fa-Shian Chang, Shang-Chi Su, Jing-Zheyan, Jun-Xiang Wu, Po-Jui Chen |
| **Institution** | Cheng Shiu University<br>National Kaohsiung University of Science and Technology |
| **Patent no.** | M664208 |
| **Description** | This invention adopts a modular combination design, with the main structure comprising four major units: the mechanical system, control system, transmission system, and power system. To overcome uneven ground conditions and scenarios involving climbing and descending slopes during missions, the vehicle uses tracks for movement. It features an adjustable module that can retract the tracks when turning to reduce ground friction. Different modules can be installed according to mission requirements, with the main components including a carrier vehicle body, arm module, ground-penetrating radar and flag-planting module, demining plow module, and rope-throwing gun module.The control system primarily uses wireless communication for control and image signal transmission, with a transmission range of 300 to 500 meters. To prevent control difficulties due to wireless signal interference, the system also includes a 200-meter fiber optic cable for wired transmission. This setup allows for both wired and wireless communication, enhancing the efficiency of mission execution. |

| **TW.18.** | |
|---|---|
| **Title** | **Multifunction table tennis machine** |
| **Authors** | Chun-Hsiung Lee, Huang-Kuang Kung, Chen Bo-Xiang |
| **Institution** | Cheng Shiu University |
| **Patent no.** | I875629 |
| **Description** | The "Multi-function Table Tennis Machine" developed in this project has two innovations:<br>1. The self-developed crawler-type ball collecting module can achieve the effect of effective ball collecting.<br>2. Combine the ball collecting and ball serving functions, |

and recycle the ball bucket for collecting balls to the ball serving machine.
1. This product has the functions of receiving and serving the ball, so as to meet the needs of users for multiple uses with one device.
2. Different ball paths and multiple serving speeds can be created through motor speed differences, which can be suitable for different users and increase the diversity of ball practice.

**TW.19.**

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| **Title** | **Polysaccharide herbal fermentation exovesicle spherical structure** |
| **Authors** | Cheng Huang, Yi Chung Lai, Bo Ru Lai, Ping Cheng Chan |
| **Institution** | Biozyme Biotechnology Corp. |
| **Patent no.** | M660588 |
| **Description** | This invention provides a polysaccharide-rich herbal fermented exovesicle spherical structure, which includes a phospholipid layer and an ingredient core. The phospholipid layer which covers the outer surface of the ingredient core forms a spherical structure. The ingredient core includes vegetables and fruits fermented liquid, multiple β-Nicotinamide Mononucleotide(β-NMN) and multiple polysaccharide particles. This polysaccharide-rich herbal fermented exovesicle spherical structure has high both bioavailability and tolerability; and can pass through blood-brain barrier(BBB); it also has nerve protecting and repairing effects. |

**TW.20.**

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| **Title** | **Quick-Dry Portable Hanger** |
| **Authors** | Lien Pin-Hsi |
| **Institution** | Hsinchu International Academy |
| **Patent no.** | M666116 |
| **Description** | This hanger is equipped with a central support frame, which effectively expands clothing, enhances airflow, accelerates moisture evaporation, and improves drying efficiency. Its well-ventilated structure ensures quick drying. Additionally, it features a lightweight and space-saving design, making it easy to store and particularly suitable for travel. |

**TW.21.**

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|---|---|
| **Title** | **Smart three-dimensional parking control system and its control method** |
| **Authors** | Lu Ssu-Hsuan, Kang Tsai-Hua, Chien Wei, Ying Ci-Fan, Yang Fang-Yuan |
| **Institution** | Lunghwa University of Science and Technology, HungKuo Delin University of Technology, Tatung university, Ningde Qianwei Industrial Technology Co., Ltd., Shih Hsin University |
| **Patent no.** | I847332 |
| **Description** | The present invention provides a smart three-dimensional parking control system and its control method, which includes: a central transmission unit, which includes a transmission body, a plurality of positioning members provided on the transmission body and driven to rotate by the transmission body, and a central transmission unit that is provided on the transmission body and can be opposite to each other. A plurality of moving movable parts; a plurality of arms, one end of which is fixed on the movable part and extends radially outward from the transmission body, and the other end is provided with a vehicle-mounted plate; a traction unit is used to connect the vehicle-mounted plate and the vehicle parking position The vehicle is moved between; and the processing unit is connected to control the central transmission unit and the traction unit to perform the entry and exit operations of the vehicle. |

**TW.22.**

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| **Title** | **Tongue Motion Water Bottle** |
| **Authors** | Fu Shou-His, Li Pei Ling, Liao Chih Chin |
| **Institution** | Shu-Te University Graduate School & Department of Product Design |
| **Patent no.** | M662044_ |
| **Description** | The **Tongue Motion Water Bottle** features a sliding lid design, allowing the elderly to drink without tilting their heads, reducing the risk of choking and encouraging hydration. A hidden storage compartment at the base holds medication, enabling timely intake while on the go. The single-sided retractable handle enhances portability and ease of use. Incorporating Taiwan's 1950s window grille patterns, including begonia and cross motifs, along with a silicone anti-slip grip, it combines vintage aesthetics with functionality, making drinking both practical and elegant |

**TW.23.**

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| **Title** | **WORK PLAY HUB- multifunctional foldable side table** |
| **Authors** | Lin Chyun-Chau, Hsu Chien Wei, Liao Pei Ting, Tsai Kai Hsiang, Chen WEI QI |
| **Institution** | Shu-Te University. |
| **Patent no.** | M660058 |
| **Description** | This multifunctional foldable side table is designed for versatile use, seamlessly integrating with a sofa or sofa bed. When unfolded, it provides a stable workspace suitable for writing, reading, or using electronic devices. When not in use, it folds compactly and hangs on the sofa's side, optimizing space without compromising functionality.<br><br>The table consists of a sturdy working surface, a decorative panel, an armrest pad, a support structure, a pivot mechanism, a locking system, and a hanging fixture. The pivot and locking system ensure stability when in use, while the decorative panel and armrest pad enhance comfort and aesthetics. The hanging fixture allows for easy attachment and storage, keeping the space neat and organized.<br><br>Designed for convenience, the table can be effortlessly unfolded for immediate use and folded back into an armrest-like form when stored. This innovative design enhances the efficiency of living spaces, making sofa areas more adaptable and practical for modern lifestyles. |

**TW.24.**

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| **Title** | **Zonal smart lighting control system** |
| **Authors** | Chun-Te Lee, Huang-Kuang Kung, Huan-Mei Chu, Bonnie HM Chen, Jui-Ling Hsieh, Bing-Kai Liao |
| **Institution** | Cheng Shiu University |
| **Patent no.** | M617409 _ |
| **Description** | Most installed lighting systems are outdated and have poor energy efficiency. Therefore, there is an urgent need for smart LED lighting systems that are energy efficient, easy to install, and inexpensive. In this article, a leader-follower smart office lighting control system based on Internet of Things (IoT) technology is proposed to satisfy the goal of saving energy through the coordinated operation of a system counter and an infrared (IR) human movement sensor (passive infrared (PIR) sensor). When no one is present in the space, all indoor LED lights are turned to low-light |

mode. Otherwise, all indoor LED lights are turned to High-light Mode together. In addition to changing the brightness of LED lights in the same area at the same time to save energy, the parameters of the LED lights can be set directly through microcontrollers via the IoT and the internet. If a general 15 W T8 LED tube (noninduction light) is replaced with the proposed leader-follower office lighting system (assuming that the office is occupied for 10 hours a day and that the hourly low-light mode is 20 minutes), then the power-saving rate is as high as 28.13%.

**TW.25.**

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| **Title** | **Eco Pro** |
| **Authors** | CHLOE CHIH, BLAIR CHIH |
| **Institution** | Taiwan Math Science Circle (TWMC) |
| **Patent no.** | - |
| **Description** | *Eco Pro* is a cutting-edge sustainable solution designed to promote eco-friendly living through intelligent design, smart energy management, and environmental awareness. Built with a commitment to green innovation, *Eco Pro* enables users to reduce their carbon footprint while maximizing efficiency and convenience across daily life or industrial operations.<br>Whether applied as a smart device, a system integration platform, or a product suite, *Eco Pro* serves as a practical tool in the global movement toward sustainability and climate responsibility.<br>Innovation and Impact<br>Eco Pro is unique for its integration of sustainability, technology, and user-centric design. By blending smart analytics with everyday practicality, it transforms how individuals and organizations engage with energy and the environment. It promotes behavioral change while delivering measurable environmental benefits.<br>Whether deployed in a home, business, or public setting, Eco Pro encourages accountability, efficiency, and green transformation |

**TW.26.**

| | |
|---|---|
| **Title** | **Portable 3-in-1 Medical Diagnostic System** |
| **Authors** | WU, HSIANG-CHING, LIN ATHENA YAN JEN, HUNG CHUN CHEN |
| **Institution** | Taiwan Math Science Circle (TWMC) |
| **Patent no.** | - |
| **Description** | The Portable 3-in-1 Medical Diagnostic System is a compact, multifunctional device designed to perform rapid, accurate, and non-invasive medical assessments in various settings. This device combines three essential diagnostic tools—ECG (electrocardiogram), $SpO_2$ (blood oxygen saturation), and temperature monitoring—into a single portable unit, enabling frontline healthcare providers, remote clinics, and mobile responders to conduct primary health evaluations with ease and reliability.<br>Design and Functionality<br>Engineered with usability and accessibility in mind, the device features an ergonomic, lightweight design with an intuitive user interface. The system integrates: ECG Module: Records and analyzes cardiac activity using dry-contact electrodes and real-time signal processing. $SpO_2$ Sensor: Uses photoplethysmography (PPG) to measure blood oxygen saturation and pulse rate. Infrared Temperature Sensor: Provides contactless body temperature readings for infection control and speed. All measurements are displayed on a built-in touchscreen interface and can be transmitted wirelessly to mobile devices or cloud platforms for further analysis and patient record integration. The device operates on a rechargeable battery and includes USB-C and wireless charging support. |

**TW.27.**

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| **Title** | **Smart Wearable Fitness Device** |
| **Authors** | Wei-Jhen Chen |
| **Institution** | Taiwan Math Science Circle (TWMC) |
| **Patent no.** | - |
| **Description** | **Innovation and Impact**<br>What sets the *Smart Wearable Fitness Device* apart is its **integration of AI and fitness tracking**, allowing for deeper insights into health metrics and exercise performance. Through continuous monitoring, users can receive |

personalized health advice based on their real-time data, making it easier to stay on track with fitness goals.
This wearable is not only aimed at helping users track activity but also empowers them with data-driven feedback to improve workout efficiency, optimize recovery times, and maintain overall wellness.

**TW.28.**

| | |
|---|---|
| **Title** | **Versatile Mobile Green Energy Device** |
| **Authors** | Chen, Hsuan-Mu, Angelina Huang, Yu, Yu-Hsiang, Chu, Ting-Yi |
| **Institution** | Taiwan Math Science Circle (TWMC) |
| **Patent no.** | - |
| **Description** | The *Versatile Mobile Green Energy Device* is a next-generation portable power solution that integrates multiple renewable energy harvesting technologies into a single, compact, and user-friendly unit. It is designed for off-grid usage, disaster response, outdoor activities, and daily eco-conscious use. By allowing users to generate and store energy anytime, anywhere, this device represents a significant step toward decentralized, sustainable energy independence. |

# Thailand

*By ATIP*

**TH.1.**

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|---|---|
| **Title** | **Cordyceps: Nature's Super Energy Booster in a Chew** |
| **Authors** | Asst. Prof. Dr. Chutima Kongjaroon, Prem Kaewboonsong, Jidapa Yuthanet, Tanakron Dangchart and Ashita Kongjaroon |
| **Institution** | Maejo University |
| **Patent no.** | 22649 / Patent application No. 1903002907/2019 |
| **Description** | *Cordyceps spp.* mushrooms are well known in traditional Chinese medicine because of their medicinal properties, including boosting energy, enhancing respiratory function and supporting immune health. However, the natural resources of *C. sinensis* are limited and the difficulties in obtaining from culture media. *Cordyceps militaris*, an alternative source can be grown under *in vitro* culture conditions that can be overcome the limitation of *C. sinensis*. The qualitative and qualitative composition of bioactive compounds obtained from *in vitro C. militaris* does not differ from those of in fruiting of *C. sinensis*. A well-known bioactive compound found in Cordyceps is cordycepin which can be found in fruiting body and mycelial biomass. The application of gastronomic science conducted at 115±5˚C and 12±5 psi for 10 minutes given the bioactive compound solution contained approximately 3 times less than fruiting body with the value of 3.05 mg cordycepin per gram extract. The extract also possessed antioxidant properties of 52.47 % DPPH scavenging activity. Due to having antioxidation activity, the mycelial biomass was subjected to determine polyphenolic compound. The result showed that it contained 194.48 μg/g gallic acid, 201.94 μg/g isoquercetin, 286.69 μg/g, 45.28 μg/g rutin and 267.86 μg/g tannic acid. The extract was subjected to dehydrate via spray dryer given yellow phytochemical powder. This powder was incorporated with natural gum to produce health-promoting chewing gum. Thus, the feature of product would be *Cordyceps* chewing gum that also possess potential anti-cancer, anti-inflammatory, and significant antioxidant properties and able to combat fatigue and enhance energy levels. |

**TH.2.**

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|---|---|
| **Title** | **The Chrysanthemum Revolution: Innovative Extraction and Application** |
| **Authors** | Chutima Kongjaroon, Jidapa Yuthanet, Prem Kaewboonsong,Tanakron Dangchart and Ashita Kongjaroon |
| **Institution** | Maejo University |
| **Patent no.** | 21934 / Patent application No. 1903003100/2019 |
| **Description** | *Chrysanthemum indicum* is popularly known as ornamental beauty plant however, it also contains some valuable in chemical composition, especially a variety of bioactive compounds which contribute to medicinal properties. Phytochemical founded in chrysanthemum includes flavonoids, phenolic compounds, terpenoids and essential oils. These possess antioxidation activity, anti-inflammatory and anti-microbial properties which can be beneficial for various health condition.<br>Based on traditional Chinese medicine, dried chrysanthemum flower tea is supposed to have therapeutic properties including the treatment of hypertension, fever, headaches and inflammation. According to this information, dried chrysanthemum was subjected to determine isoflavone and polyphenolic compounds, the results show that isoflavone contained 21.34 μg/g genistein and 8.64 μg/g daidzein. Furthermore, it also contained polyphenolic compound including, 41.27 μg/g gallic acid, 74.56 μg/g isoquercetin, 40.11 μg/g quercetin, 30.77 μg/g rutin, 154.34 μg/g catechin and 66.32 μg/g tannin. Because of various phytochemical, among various extraction experiments conducted, the application of high pressure approximately 8-18 psi at 90-120°C for 8-12 minutes given the best extract which high value of antioxidant indicator. The results showed that the solution consisted of 215.43 mg GAE/g total phenolic compound and represented DPPH radical scavenging at 89.43 %. The delicate aroma of chrysanthemum flowers comes from 80.24% (wt) total volatile compounds. This extract can be used as a material for producing health-promoting beverages. However, the application of rotary evaporation was applied onto the extract to obtain concentrate phytochemical. The yellow paste was used as a functional ingredient to produce ice crecream with anti-inflammatory properties from chrysanthemum extract. |

| TH.3. | |
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| **Title** | **Innovative Cold Brew: Techniques and Taste Innovations** |
| **Authors** | Chutima Kongjaroon, Tanakron Dangchart, Jidapa Yuthanet, Prem Kaewboonsong and Ashita Kongjaroon |
| **Institution** | Maejo University |
| **Patent no.** | 23294 / Patent application No. 1903000939/2019 |
| **Description** | Cold brew coffee can be made by steeping ground coffee in water for 12 to 24 hours. A distinct chemical profile is obtained from the process of extracting aroma and flavor from the beans and more complex flavor profile is produced by the lengthy infusion process. Application of gastronomic sciences technique takes only 30 minute by speeding up the rate of aromas and flavors from coffee infusion to water. A 1:20 ratio of coffee to water for undiluted beverage is smaller proportion than 1:16 for traditional practice. This study aims to compare caffeine content, total phenolic content and DPPH scavenging activity between traditional and innovative cold brew methods. Caffeine content of 1:8 concentrate cold brew coffee and 1:20 dilute one by routine method was 1037.37±1.12 and 513.69±0.05 g/ml, respectively. However, 1:20 ratio by new approach consisted of 444.54±0.05 g/ml, and the highest of 805.77 mg/ml found in Robusta. For the blend, caffeine content increased when adding Robusta coffee. The antioxidant properties of Arabica extracted by traditional method indicated that total phenolic content and DPPH scavenging activity were directly proportional to coffee concentration with the highest value of 0.64□0.05 mg GAE/ml and 70.3%, respectively. There was no variation in total phenolic content of mixed bean approximately of 0.40-0.43 mg GAE/ml. DPPH inhibition of mixed bean in 40%, 30%, and 20% Robusta mixed were 76.68%, 79.33% and 80.93%. |

| TH.4. | |
|---|---|
| **Title** | Helios Pleurotus Essence from *Pleurotus sajor-caju* mushroom for dry skin |
| **Authors** | Supanat Sakkayawong, Saranya Laovitthayanggoon, Ubon Rerk-am |
| **Institution** | Supersayo Company Limited/ Thailand Institute of Scientific and Technological Research (TISTR) |

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| **Patent no.** | No. 2403000673 |
| **Description** | The essence contains *P. sajor-caju* mushroom oil extract, enriched with ergosterol, its derivatives, and short-chain fatty acids, which act as active ingredients for treating dry skin. This extract has demonstrated antioxidant, collagenase, and elastase inhibitory properties. At a concentration of 200 µg/mL, the extract stimulated collagen synthesis in WS-1 cells by 28.83 ± 4.42%, which is lower than the positive control (Vitamin C, 39.49 ± 0.99%) at the same concentration. Additionally, at a concentration of 200 µg/mL, the extract reduced melanin synthesis in B16-F10 cells by 18.67 ± 0.47%, which was not significantly different from the positive control (α-arbutin, 40 µg/mL, 11.51 ± 0.19%). The extract also reduced pro-inflammatory cytokines in RAW 264.7 cells by decreasing NO production and the secretion of TNF-α and IL-6 cytokines. These results suggest that the essence possesses properties that help reduce wrinkles and promote skin whitening in dry skin without irritation. |

**TH.5.**

| | |
|---|---|
| **Title** | Axtion gel Dietary Supplement Product |
| **Authors** | Kampanart Jirapakkakul, Rattanasiri jiwanon, Saowaluck Ruengsri, Thitisak Wongsawang, Oradee Vorahirun, Ubon Rerk-am |
| **Institution** | Lab D CO.,LTD/ *OD INNOVACOSMEX CO., LTD*/ Thailand Institute of Scientific and Technological Research (TISTR) |
| **Patent no.** | 2203000615 |
| **Description** | Axtion gel Dietary Supplement Product contains freeze-dried powder of Aloe vera as the active ingredient. The powder, rich in mucopolysaccharides, has demonstrated gastroprotective effects in experimental models. In a rat model, it significantly reduced the formation of acute gastric lesions induced by 80 mg/kg body weight of diclofenac sodium. Furthermore, it accelerated ulcer healing with efficacy comparable to that of the standard antisecretory agents (20 mg/kg body weight of omeprazole). In vitro studies further revealed that the<br>powder inhibited the secretion of two pro-inflammatory |

cytokines, specifically tumor necrosis factor alpha (TNF-alpha) and Interleukin-6 (IL-6), in human OE33 cells (an oesophageal adenocarcinoma cell line) stimulated with lipopolysaccharide (LPS). No symptom of toxicity was observed when an acute oral toxicity study of the powder was conducted over fourteen days. The result demonstrated no observable signs of toxicity at a single oral dose of up to 2000 mg/kg body weight, indicating a high safety margin for the compound.
(max 250 words)

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**TH.6.**

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| **Title** | **BETACAL PRO PLUS for Bone rejuvenation** |
| **Authors** | Akkapol Yokyingyong, Saranya Laovitthayanggoon, Thitisak Wongsawang, Oradee Vorahirun and Ubon Rerk-am |
| **Institution** | Hopeful CO., LTD./ OD INNOVACOSMEX CO., LTD./ Thailand Institute of Scientific and Technological Research (TISTR) |
| **Patent no.** | No. 2303001784 |
| **Description** | The dietary supplement product contains calcium in the form of calcium acetate, which is extracted from pearl shells using acetic acid to eliminated carbonate molecules, preventing kidney stones. The calcium acetate extract stimulated the preosteoblast cell line MC3T3-E1, with a concentration of 100 µg/mL, resulting in a value of 25.90±11.16%, which was similar to the positive control group (β-Estradiol, concentration of 0.1 µg/mL, with a value of 26.43±1.82%). The extract also reduced pro-inflammatory cytokines in RAW 264.7 cells by decreasing NO production, as well as the secretion of TNF-α and IL-6 cytokines. Furthermore, the product combines calcium acetate with calcium L-threonate to enhance the body's ability to absorb calcium for bone regeneration. This benefits the prevention of calcium loss and supports bone vitality. |

# Thailand

*By TISIAS*

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| **TH.7.** | |
| **Title** | **Prunus domestica gel which has anti-inflammatory effect reducing risk of developing skin cancer** |
| **Authors** | Mr.Panoppat Kengka, Miss Nannapas Thanawang, Miss Papichaya Nakpon, Miss Thitiputtra Semmanee |
| **Institution** | **Americana Chinese International School, Varee Chiangmai School and Chiang Mai University Demonstration School** |
| **Patent no.** | N/A |
| **Description** | Melanoma is a type of malignant skin cancer caused by abnormalities in melanocytes that produce melanin that determines skin color. UV light is an important medium that causes various changes to the cells and elements inside the skin. Herbal medicines and dietary supplements are commonly taken by patients with cancer, leading to concern over interactions with conventional medicines. Our study is interested to investigate the UV-B protection mechanism using fibroblast cell and active components between Ficus carica and Prunus domestica extracts. From the experiment, it was found that Prunus domestica extract has more anthocyanin, phenolic and flavonoid than Ficus carica. Moreover, Prunus domestica has more anti-oxidant effect and anti-inflammatory effect than Ficus carica. Both extracts are not toxic to cell. |

# Turkey

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| **TR.1.** | |
| **Title** | **Portable and interchangeable Machine** |
| **Authors** | Ronahi Sarıtaş ,Edanur Karaçavuşoğlu, Yiğit Soydan, Ertuğrul Çelik, Abdülkadir Arzum, Muhammed Enes Özhan, Süleyman Rıdvan Genç, Üveys Yeşilyurt, Yiğit Efe Tam, Yunus Aydemir, Samet Zorba |
| **Institution** | **Turkish Inventors Association** |
| **Patent** | - |
| **Description** | 3 NEMA stepper motors. 3 high torque NEMA stepper motors are used in the motion system of our CNC machine. These motors provide high precision and stability, providing a smoother and more reliable processing process. 2. Spindle System High Speed Spindle The spindle motor used in our CNC machine is high speed and has the capacity to perform effective processing on different materials. The interchangeable spindle head can be changed for different cutting and processing methods. It can be used in both wood and metal cutting processes, thus providing versatile use of the machine. 3. Control and Software Mach3 control card is used to provide computer-based precise control. Thanks to the user-friendly interface, the processing process is optimized and the margin of error is minimized. Used Software Languages: G-code is used as the basic command language that determines the movements and operations of CNC machines. 4. Portability and Modular Design Standard CNC machines are usually large and fixed systems, but our design is more portable and can be customized with different components thanks to its modular structure. (Replaceable head and portable) 5. Fast and Easy Installation Installation time can be installed in a shorter time compared to other CNC machines, thus making our machine more |

**TR.2.**

| | |
|---|---|
| **Title** | **İndustrial Robot arm System** |
| **Authors** | Yusuf izgi , Berjin Sarıtaş, Taha Demir, Ahmet Emin Öngel, Muhammed Ali Öngel, Eyüp Girgin, Miraç Haktan Ekinci, Muhammed Enes Girgin ,Resul Tanış, Musab Coşar, Yasin Tunç |
| **Institution** | **Turkish Inventors Association** |
| **Patent** | |
| **Description** | This project focuses on the design and implementation of an industrial robot arm. The robot arm was developed to perform tasks such as automatic transportation, assembly, packaging, and sorting in the industrial field. It is programmed using Python and Arduino programming languages. The robot arm automatically performs a specific task through various motors and sensors<br>1. Motors 4 NEMA 17 Stepper Motors Linear and angular movements are obtained by providing the main movements of the robot arm. These motors ensure precise movement of the robot arm. 2 MG 998 Servo Motors precisely control the joint movements of the robot arm. These motors enable small and fast movements of the robot arm. 1 SG 90 Servo Motor performs small adjustments and precise movements of the robot arm.<br>2. Software Language Python is used to write the motion control algorithms of the Python robot arm and manage additional operations such as image processing. Python coordinates the motors and sensors and ensures the smooth operation of the robot arm. Arduino is used for motor control and sensor management. Arduino is the main unit that controls physical movements.<br>3.Image Processing The robot arm can analyze the objects around it using a webcam or a suitable camera. Image processing software can process the images received and separate objects according to features such as color, shape and size. This process allows the robot arm to pick up and place the correct object.<br>4.Area of Use This robot arm has a wide range of uses in the field of industrial automation.<br>5.Features Packaging and Sorting The robot arm can be used to pick up, sort and package products on the production line. The robot arm can be used for assembly and assembly of small parts. The robot arm can be used |

efficiently for transporting heavy and small parts. Image-based processingThe robot arm can separate colored objects with image processing and perform quality control. The robot arm is programmed to perform tasks given by the user. The system scans its surroundings through a camera and recognizes objects with the image processing algorithm. The recognized objects are moved to the target shelves or areas by the robot arm. The robot arm works actively until the process is completed by following the programmed task set. At the end of the work, the robot arm stops and becomes ready for the next task.

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**TR.3.**

**Title**

**Advanced nano TiO2 cold plasma technology for efficient industrial emission gas treatment**

**Authors**

**Mehrdad Fojlaley, Türker Necati Yeniçeri, Faik Baykuş**

**Institution**

MSST SAVUNMA SANYİ LTD.CO

**Patent**

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**Description**

The innovative device we have developed converts harmful carbon-based components in exhaust gases into harmless by-products such as CO2 and H2O.
This conversion takes place through non-thermal oxygen plasma and the photocatalytic action of TiO2 nanoparticles.
Reduces carbon emissions caused by transportation, heavy machines and generators by up to 90%.
Nano-TiO2 plasma technology combines photocatalysis with plasma-induced oxidation to decompose pollutants. The process includes:
- Generation of Plasma: A non-thermal plasma discharge is created, producing high-energy electrons and reactive oxygen species.
- Activation of TiO2 Nanoparticles: TiO2 nanoparticles absorb UV and plasma-generated energy, leading to the formation of electron-hole pairs.
- Decomposition of Pollutants: Oxidation reactions break down toxic gases into harmless byproducts such as CO2 and H2O.

| TR.4. | |
|---|---|
| **Title** | **SDL-Basket** |
| **Authors** | Rose Aksoy |
| **Institution** | **TUMMIAD** |
| **Patent** | Prototype |
| **Description** | Smart Digital Laundry Basket: Preven ng Overload, Protec ng Your Washing Machine In today's homes, washing machines are essen al appliances. However, uninten onal misuse—especially overloading—can significantly reduce the machine's lifespan and efficiency. Many users unknowingly exceed the opmal load capacity, causing long-term damage to the motor and internal components. Our industrial project design, the Smart Digital Laundry Basket, offers an innova ve solu on to this problem. It precisely measures the weight of laundry before it enters the washing machine, displaying real- me data on a digital panel. This helps users stay within the safe minimum and maximum load limits, ensuring be er protec on and performance for their washing machines. e interface.<br><br>Key Features:<br>- High-Precision Digital Weighing System Accurately calculates the weight of clothes before washing.<br>- Magne c Odor Suppression Technology Neutralizes unpleasant smells from dirty laundry using an integrated magne c system.<br>- Visual and Audible Load Alerts No fies users when the laundry load is below or exceeds recommended thresholds.<br>- Customizable Designs Available in a variety of styles and finishes to match different home interiors.<br>- Easy-to-Clean Control Panel Designed with hygiene in mind; features a sleek and washable interface. |

# Tunisia

**TR.1.**

**Title**

**The effect of Ni, Cu and Cs ions incorporation on the physico-chemical characterizations of geopolymers**

**Authors**

Mouna Sellami[1], Ali ben Ahmed[1], Andrei Victor Sandu[2], Mohamed Toumi[1]

**Institution**

[1]Faculty of sciences of Sfax-Tunisia

[2]Faculty of Materials science and Engineering of Iasi-Romania

**Patent**

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**Description**

This study investigates the structural and optical properties of acid-based geopolymers doped with nickel (Ni), copper (Cu), and cesium (Ce) ions. The geopolymers were synthesized via the phosphoric acid activation of metakaolin and characterized using X-ray diffraction (XRD), Raman spectroscopy, infrared (IR) spectroscopy, and ultraviolet-visible (UV-Vis) spectroscopy. Phase identification of samples sintered at 1000°C revealed an amorphous phase, evidenced by a broad hump in XRD patterns.

The structural analysis of Ni-doped geopolymers identified crystalline phases of tridymite ($SiO_2$), aluminum phosphate ($AlPO_4$), and nickel orthosilicate ($Ni_2SiO_4$). In Ni-Cu-doped systems, cristobalite ($SiO_2$) and $AlPO_4$ phases were observed, while Ni-Cu-Ce-doped geopolymers exhibited tridymite ($SiO_2$), $AlSi_2P_3O_{12}$, and cesium dihydrogen phosphate ($CsH_2PO_3$). Vibrational spectroscopy (Raman and IR) corroborated the structural findings, and UV-Vis analysis provided insights into the optical properties and band gap behavior of the synthesized materials.

This work highlights the influence of transition and alkali metal dopants on the crystallization and optical characteristics of acid-based geopolymers, offering potential implications for tailored material design.

# **Ukraine – Poland** (international collaboration)

**UA.1.**

| | |
|---|---|
| **Title** | **Problems of repurposing the monuments of residential architecture for cultural and artistic function** |
| **Authors** | **Yulia IVASHKO, Marek PABICH, Volodymyr TOPORKOV, Oleksandr KRAVCHUK, Przemysław BIGAJ** |
| **Institution** | *1Kyiv National University of Construction and Architecture, 31 Povitrianykh Syl Avenue, Kyiv, 03037, Ukraine*<br>*2 Lodz University of Technology, Institute of Architecture and Urban Planning, 116 Żeromskiego Street, 90-924 Lodz, Poland*<br>*3 National University "Yuri Kondratyuk Poltava Polytechnic", 24 Vitaliia Hrytsaienka Avenue, 36011, Poltava, Ukraine*<br>*4Cracow University of Technology, Faculty of Architecture, 24 Warszawska Street, 31-155, Cracow, Poland* |
| **Description** | The study examines the main problems in repurposing monuments of residential architecture for cultural and artistic purposes: the economic feasibility of repurposing, the negative impact of groundwater and underground communications on the foundations and footings state, the state of the historical object structures, the fine-grained planning scheme that imposes restrictions on changing the purpose of the object for a new function, the emergency state of internal building networks. The main possible directions of such repurposing are identified: a chamber theatre, a thematic museum, a museum of a prominent person, a museum in an open-air museum. Examples of repurposing part of the premises of the former Rodzianko's apartment building at 14-b Yaroslaviv Val Street for a theatrical function and a list of restoration measures carried out are given. The repurposing of the former house of architect Hilary Majewski at 11 Włókiennicza Street in Lodz for a new function is analyzed.<br>The examples of Kyiv museums – the Bohdan and Varvara Khanenko National Museum of Art (formerly the Kyiv Museum of Western and Eastern Art) and the National Museum "Kyiv Picture Gallery" (formerly the Kyiv National Museum of Russian Art) – highlight the peculiarities of the change in traditional museum functions in wartime. |

**UA.2.**

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|---|---|
| **Title** | **Repurposing the monuments of industrial architecture into modern public spaces of Art direction** |
| **Authors** | **Oleksandr IVASHKO, Andrii DMYTRENKO, Tomasz KOZŁOWSKI, Yuliia KHARABORSKA** |
| **Institution** | *1Kyiv National University of Construction and Architecture, 31 Povitrianykh Syl Avenue, Kyiv, 03037, Ukraine*<br>*2 National University "Yuri Kondratyuk Poltava Polytechnic", 24 Vitaliia Hrytsaienka Avenue, 36011, Poltava, Ukraine*<br>*3 Cracow University of Technology, Faculty of Architecture, 24 Warszawska Street, 31–155 Cracow, Poland* |
| **Description** | The research is devoted to the problems of repurposing historical industrial facilities for new functions. The existing experience of preserving industrial facilities with a change of function is analyzed and how it can be used in the post-war reconstruction of Ukraine. The main requirements are the location in the centre of large cities with good transport accessibility and residential areas nearby. Examples are given of how new centres of public attraction with an artistic function arise on the site of industrial sites with the preservation of historical industrial buildings.<br>For Ukraine, the equipment of air raid shelters for the population during a large-scale invasion has become relevant. However, it can be predicted that in any variant of the end of the Russian-Ukrainian war (or its hot phase), such a need will persist for the foreseeable future. Considering that in the Soviet period, all significant industrial enterprises were equipped with bomb shelters, after revitalization the former industrial enterprise will become not only a place of concentration of public activity, but also a place that provides shelter for employees and visitors of institutions located in revitalized former |

**UA.3**

| | |
|---|---|
| **Title** | **Restoration of architectural objects' stucco décor: Ukrainian experience** |
| **Authors** | **Mykola ORLENKO1, Oleksandr IVASHKO2,□, Pavlo BILOUS2, Anatolii VAKOLYUK1, Serhii BELINSKYI3, Grzegorz TWARDOWSKI4** |
| **Institution** | *1 Ukrrestavratsiia Corporation, 6 Boryspilska Street, Kyiv, 02099, Ukraine*<br>*2Kyiv National University of Construction and Architecture, 31* |

*Povitrianykh Syl Avenue, Kyiv, 03037, Ukraine*
*3 Knights of the Winter Campaign 28th Separate Mechanized Brigade, Armed Forces of Ukraine*
*4Cracow University of Technology, Faculty of Architecture, 24 Warszawska Street, Cracow, 31-155, Poland*

**Description**

The research is devoted to the restoration of stucco decor on facades and in the interiors of architectural objects. The stylistic features of stucco decor of the second half of the 19th and early 20th centuries are analyzed. The procedure for work is described, which begins with the examination and cleaning of parts from whitewash, dirt, and paint. A separate technology for removing glue and lime, paint and oil layers has been developed. After cleaning, the lost stucco fragment is "plastered" using gypsum mortar, from which the restored fragments are modeled. To restore plaster parts of a complex profile, such parts are first made in a soft material, and then a mold is removed from this model, according to which the plaster addition is cast. For the mold, you can use gypsum or formoplast (synthetic elastic material). The part cast in the mold is attached by gluing to the base using thermoplastics dissolved in organic solvents or water-alcohol solutions of PVA dispersion. If the gypsum part is large, it is attached to the base with nails. During the manufacturing process, the gypsum stucco decor is subject to protective and decorative treatment, which consists of three stages: priming, patination, waxing.

**UA.4.**

**Title**

**Research work in developing design solutions on the example of soil reinforcement under the foundations of supports of stairs to the Magdeburg law monument in Kyiv**

**Authors**

**Oleksandr MOLODID, Volodymyr SKOCHKO, Olena MURASOVA, Ivan REZNICHENKO, Olena MOLODID, Yevheniia NOVAK, Marek POCZĄTKO**

**Institution**

*1 Kyiv National University of Construction and Architecture,*
*2 State Enterprise "State Research Institute of Building Constructions", e*
*3 LLC "SPT Ukraine"*
*4 Yuriy Fedkovych Chernivtsi National University,*
*5 Cracow University of Technology,*

**Description**

The stairs leading to the oldest existing monument in Kyiv – the Magdeburg Law Monument – stretch along the slope of Khreshchatyi Yar. The last reconstruction was carried out in

2013. In 2019, as part of scientific and technical support work for the construction of a pedestrian and bicycle bridge crossing between the parks "Khreshchatyi" and "Volodymyrska Hirka", research work was carried out aimed at securing the soil base under the columns' foundations of the stairs to the Magdeburg Law Monument. Developed scientifically based structural and technological solutions for securing the foundations under the foundations of the staircase columns, which began to shift along the slope during the construction of temporary supports of the pedestrian and bicycle bridge crossing next to them. During experimental studies, the effectiveness of the method of securing soils with polyurethane materials was tested and proven. Design solutions were developed that provide for the injection of polyurethane material through two separate tubes at two elevation levels from the base of the foundation.

**UA.5.**

**Title** **Polychrome sculpture in the interiors of Dunhuang sanctuaries, its periodization abd artistic-picture features**

**Authors** Shiru WANG, Yuelin WU, Ivan CHORNOMORDENKO, Svitlana RUBTSOVA, Bianca BOROS, Tomasz KROTOWSKI

**Institution** 1 Kyiv National University of Construction and Architecture,
2 "George Enescu" National University of Arts of Iasi, Faculty of Visual Arts and Design,
3 Lodz University of Technology Institute of Architecture and Urban Planning

**Description** Ritual sculpture of Dunhuang is diverse in size (from 30 m to 10 cm). In total, there are more than 3,000 sculptures in the sanctuaries. These are three-dimensional sculptures (most of them), high reliefs, bas-reliefs. To create sculptures from clay, a wooden frame was used, fastened with reeds, with clay coating, grinding, tinting, and painting. Among them are single sculptures, groups/several groups of sculptures, metric rows of identical sculptures. Three periods of sculpture of Dunhuang sanctuaries are distinguished – the period of development (about 180 years), the period of flourishing (about 300 years), the period of decline (about 460 years).

**UA.6.**

**Title** **Wall painting as characteristic décor of Ukrainian churches: experience of the Ukrainian restoration school**

**Authors** **Oleg SLEPTSOV, Mykola ORLENKO, Pavlo BILOUS, Tomasz KROTOWSKI**

**Institution** *1Kyiv National University of Construction and Architecture,*

| | |
|---|---|
| **Description** | *2 Ukrrestavratsiia Corporation,*<br>*3 Lodz University of Technology Institute of Architecture and Urban Planning*<br>The research is devoted to the study of Ukrainian wall painting, which is an integral part of the church interiors (and sometimes facades and monastery walls) since the times of Kyivan Rus. Traditionally, Kyivan Rus fresco and mosaic, Baroque oil wall painting and Baroque carved iconostasis are considered to be the features of decoration that determine the national identity of Ukrainian Orthodox churches. The genesis of the development of the Ukrainian school of Orthodox church construction was repeatedly interrupted, and its revival on new principles began only after the independence of Ukraine. In modern and restored churches of Ukraine, those elements that are expressions of national identity are actively used, which is proven by the examples of modern churches of Cherkasy region, studied by the authors. The study of the execution techniques and restoration technologies of wall paintings of the Kyivan Rus and Baroque periods has proven the high level of skill of ancient masters. These wall paintings are the basis for the modern decoration of Ukrainian churches. |

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|---|---|
| **UA.7.** | |
| **Title** | **Regeneration problems of the Odesa historical environment in the conditions of post-war reconstruction** |
| **Authors** | **Oleksandr KULIKOV, Tomasz KROTOWSKI** |
| **Institution** | [1]Kyiv National University of Construction and Architecture,<br>[2]Lodz University of Technology Institute of Architecture and Urban Planning, |
| **Description** | It can be predicted that the post-war reconstruction of the historical heritage of Odesa will concern the restoration of individual objects and during the post-war reconstruction of the historical centre of Odesa with objects of different legal status, the following measures will be applied:<br>– restoration based on conservation (for unique objects with the appropriate status, in which authenticity must be maintained);<br>– revitalization, i.e. changing the original function of the object in case of its unprofitability to a new one, which will ensure the economic feasibility of the object while simultaneously preserving the character of the environment;<br>– revalorization, i.e. increasing the level or restoring the properties of the environment, both architectural and aesthetic and artistic, by combining restoration measures for relatively significant objects, if necessary, reproducing lost fragments of |

buildings or individual objects, removing unaesthetic additions, etc.;
– regeneration, i.e. preservation with restoration and improvement of the planning structure of the historical centre.

**UA.8.**

**Title**

**Restoration of Ceilings In Buildings Damaged As A Result Of Over-Design Impacts, While Preserving The Established Urban Environment**

**Authors**

**Oleksandr MOLODID, Ivan MUSIIAKA, Sergey BOGDAN, Yehor YASHCHENKO, Małgorzta HRYNIEWICZ, Ruslana PLOKHUTA, Yevheniia NOVAK**

**Institution**

*1 Kyiv National University of Construction and Architecture,*
*2 LLC "Mapei Ukraine",*
*3 National Transport University,*
*4 Cracow University of Technology,*
*5 Chernivtsi National University*

**Description**

This research deals with the issue of restoration and modernisation of buildings that have been damaged, inter alia, as a result of warfare. These facilities largely have cultural values and the need to revitalise them is a priority for society. Consequently, it is important to conduct research into the methods of repairing built structures and the results of their implementation.The article considers the issues of restoring inter-floor ceilings damaged due to off-design impacts. These ceilings are most often made of reinforced concrete hollow-core slabs. Existing repair methods do not solve the issue of restoring the structural integrity and geometric parameters of these slabs while at the same time leading to undesirable changes in the spatial and geometric parameters of the building interior. Therefore, finding a way to restore the operational suitability of damaged reinforced concrete hollow-core slabs is an urgent task. The hypothesis of solving the restoring problem of damaged hollow core reinforced concrete slabs by installing reinforcing cages inside the slab voids with the formwork installation inside the voids (damaged areas) and filling the voids with high-fluidity concrete was tested. Experimental studies were conducted to substantiate the possibility of using this method. Based on the data obtained during the experiments, a damaged floor slab was brought into operational condition at one of the construction sites.After operability restoration, this slab has been successfully operated for more than two years, which indicates the correctness of the selected design and technological solutions and the possibility of using this technology to restore the operability of damaged reinforced concrete slabs

# United Kingdom

| UK.1. | |
|---|---|
| **Title** | **The Generator for Producing Piston Continuous Motion Inside the Vertical Cylinder by the Gravitational Force And Magnetic Field** |
| **Authors** | Saeid Abazari, Mohammad Javad Nourian Fard |
| **Institution** | ***UK Blue Efficiency Limited.*** |
| **Patent no.** | *WO2025022149* , WO/2025/022149 |
| **Description** | This system has a long cylinder that is mounted on the chassis and body. A piston moves inside the cylinder, which has blades on both sides. These blades have a rack on one side that is embedded to entangled with the gears. At the top and bottom of the cylinder, there are two gears, and every time the piston moves and reaches the top or bottom of the cylinder, the rack of the piston blade approaches the gear and induces them to move |

# United States of America

***By TISIAS***

**US.1.**

| | |
|---|---|
| **Title** | **Under-$50 Smartphone-Based DIY Fluorometer for Detecting Micro- and Nanoplastics in Beverages** |
| **Authors** | Marvin Hicke |
| **Institution** | **Webb School of Knoxville** |
| **Patent no.** | N/A |
| **Description** | We developed an innovative, smartphone-based DIY fluorometer for under $50, designed to detect micro- and nanoplastics in beverages. The system combines a custom-built microscope attachment equipped with LED lighting and a smartphone camera to photograph samples stained with fluorescent dyes. These dyes bind to plastic particles and emit fluorescence under specific lighting conditions, allowing visualization of even small plastic fragments. The captured images are then analyzed using a custom Python-based image processing program that quantifies fluorescence intensity and correlates it with plastic content. Additionally, pH levels are used as a tuning mechanism to adjust the sensitivity of the readings, making the system adaptable for different testing environments. This low-cost, portable setup offers a highly accessible alternative to expensive million-dollar lab equipment operated by highly trained technicians, empowering individuals, schools, and even policymakers to test beverages for plastic contamination with ease. Its affordability, userfriendliness, and adaptability make it a powerful tool for raising awareness and promoting action around the growing issue of plastic pollution. |
| Class no. | |

# Vietnam

*By SANVIC*

**VN.1.**

| | |
|---|---|
| **Title** | **INSIDE OUT - An Innovative AI-Based Application to Enhance Communication and Interaction for Autistic Children in Vietnam** |
| **Authors** | Nguyen Thi Sinh, Nguyen Ha An. |
| **Institution** | Brighten Vietnam Co., Hanoi, Vietnam<br>Tay Mo 3 Primary School, Hanoi, Vietnam |
| **Patent** | Patent pending |
| **Description** | Autism spectrum disorders (ASD) are increasingly recognized as a significant public health concern in Vietnam. A comprehensive study conducted in 2017-2018 across seven provinces revealed that approximately 0.758% of children aged 18 to 30 months are affected by ASD, equating to about 1 in 132 children. Notably, ASD prevalence is higher among boys and in urban settings, highlighting the urgent need for tailored interventions.<br>In response to this pressing issue, I have developed **INSIDE OUT**, an innovative artificial intelligence-based application specifically designed to empower Vietnamese autistic children to better understand their emotions, enhance their communication abilities, and engage more effectively with the world around them.<br>**INSIDE OUT** leverages advanced technology to deliver interactive and personalized learning experiences. The application tailors interactive lessons, adaptive questioning strategies, and engaging emotion-based games utilizing colors, shapes, and sounds by carefully gathering and analyzing individual behavioral traits and preferences. Additionally, the integrated "DeepSeeK" module provides short, personalized videos and guided questions that align with each child's unique interests and personality, fostering greater comfort, engagement, and confidence in interaction.<br>Furthermore, **INSIDE OUT** supports caregivers by systematically compiling data on children's habits, behaviors, emotional changes, and communication patterns. The application analyzes children's verbal interactions through intentional and purposeful inquiries, decoding their intended |

meanings, and conveying these insights clearly to parents and teachers. By bridging the communication gap, our solution significantly simplifies the parenting and educational process, enabling a deeper understanding of each child's needs and facilitating meaningful developmental progress.

**INSIDE OUT** represents a compassionate and innovative approach to transforming how Vietnamese autistic children connect, communicate, and thrive—empowering them from the inside out.

# Vietnam

*By TISIAS*

**VN.1.**

| | |
|---|---|
| **Title** | **Extraction of bioactive compounds with pharmaceutical potential from Food by product Clausena indica seeds.** |
| **Authors** | Dao Manh Tuan, Lu Khoi Nguyen, Tran Ngoc Thai, Nguyen Long Nhat, Nguyen Tuan Kiet, Nguyen Thi Thanh Thuy (Supervising Teacher) |
| **Institution** | **Times School Khai Son Secondary School; Vinschool Imperia Primary, Secondary and High School** |
| **Patent** | N/A |
| **Description** | This study valorizes Clausena indica seeds—a food by-product—through extraction, isolation, and pharmacological evaluation of bioactive compounds. Sequential extraction with solvents of increasing polarity yielded a total extract rate of 9.18%, with water extract giving the highest yield (5.98%) and hexane the lowest (0.53%). Antioxidant activity was weak across all fractions ($EC_{50}$ > 243 μg/mL), with EHM-E showing the best response ($EC_{50}$ = 243.53 ± 5.91 μg/mL). In contrast, anti-inflammatory activity was significant in all fractions, ranging from $IC_{50}$ = 1.83 to 12.38 μg/mL. The dichloromethane fraction (EHM-D) exhibited the highest potency ($IC_{50}$ = 1.83 ± 0.21 μg/mL), indicating strong NO inhibition. From 600 g of dried seeds, 2.00 g of high-purity myristicin (>95%) was isolated from the n-hexane fraction. Structural elucidation was performed via NMR spectroscopy. Myristicin demonstrated both anti-inflammatory and anticancer potential, along with high commercial value (~$125/50 mg). The findings support C. indica seeds as a sustainable phytochemical source for pharmaceutical applications. |

# International

by

*AI-JAM US*

| | |
|---|---|
| **INV.1.** | |
| **Title** | **Machine Learning Prediction Models over Traditional Technical Analysis Methods in Financial Markets** |
| **Authors** | **Yuchang Lee** |
| **Institution** | **Wilbraham and Monson academy** |
| **INV.2.** | |
| **Title** | **Identification of Novel Metastasis-Enriched Gene Deletions in Lung Adenocarcinoma through Comparative Genomic Analysis** |
| **Authors** | **Woojin Lee** |
| **Institution** | **Thornhill Secondary School** |
| **INV.3.** | |
| **Title** | **A Smart IoT-Enabled System for Bird Cages: An Innovative Approach to Monitoring and Managing Bird Environments through Arduino sensor system** |
| **Authors** | **Minseo Choi** |
| **Institution** | **Saint Johnsbury academy jeju** |
| **INV.4.** | |
| **Title** | **The Importance of Whale Protection for Earth's Ecosystem Conservation and Book Review on Whale-Related Literature** |
| **Authors** | **Joo Yoon Park** |
| **Institution** | **St. Johnsbury Academy Jeju** |
| **INV.5.** | |
| **Title** | **Bear repellent spray mounted on smartphone case** |
| **Authors** | Korben Hunter Chung |
| **Institution** | **The Fessenden school** |
| **INV.6.** | |
| **Title** | **Smart House Design by Data Tracking and Environmental sensors** |
| **Authors** | **Miria Chung** |
| **Institution** | **Taipei American school** |

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|---|---|
| **INV.7** | |
| **Title** | **Classification of reptiles to prevent extinction through the use of AI detection tool** |
| **Authors** | Jolienne Chung |
| **Institution** | **The Loomis Chaffee** |

| | |
|---|---|
| **INV.8.** | |
| **Title** | **Smart Shoes for Inhibition of Harmful Bacterial Growth Using IoT Sensors, Nano Silver and Copper Photocatalytic Compounds** |
| **Authors** | **Sunhye Koo** |
| **Institution** | **Your Company/Institute/University** |

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|---|---|
| **INV.9.** | |
| **Title** | **Wheelchair-Accessible Pathway Detection and Visualization** |
| **Authors** | **Yaejoon Jung** |
| **Description** | **Phillips Academy Andover, MA, USA** |

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|---|---|
| **INV.10.** | |
| **Title** | **Research on Wireless Power Transmission Frequency Characteristics and Design Applications as LED Dancing Spinning Top** |
| **Authors** | Seohee Han |
| **Institution** | **North London Collegiate School Jeju** |

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|---|---|
| **INV.11.** | |
| **Title** | **Colloidal Oatmeal as a Barrier-Restoring Botanical** |
| **Authors** | Seung Cheol Kang |
| **Institution** | **CATS Academy Boston** |

| | |
|---|---|
| **INV.12.** | |
| **Title** | **Powering Regeneration: TFAM Gene Therapy as a Catalyst for Skin Cell Repair** |
| **Authors** | Yeowon Hong |
| **Institution** | **Stony Brook School** |

| | |
|---|---|
| **INV.13.** | |
| **Title** | **Agarose-Enhanced PDMS Microgravity-On-a-Chip Platform: Advancing 3D Mechanobiology Under Simulated Space Conditions** |
| **Authors** | Lillian Koschnitzke |
| **Institution** | **The Thacher School** |

| | |
|---|---|
| **INV.14.** | |
| **Title** | **Evolvement of NGO's Information Outreach Projects Based on North Korea's Information Access Conditions** |
| **Authors** | **Jaehoon Song** |
| **Institution** | **NLCS Jeju** |

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|---|---|
| **INV.15.** | |
| **Title** | **AI and medication support to target high-risk patients for suicide prevention** |
| **Authors** | Yoonhyuk Cho, Junmo Joshua Son, Eunice Suhjin Jang, Jenna Saeyoon Choi |
| **Institution** | KIS, St. Andrew's College, BIS |

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|---|---|
| **INV.16.** | |
| **Title** | **Noise-Induced Dysregulation of Thyrotropin-Releasing Hormone (TRH) Production in Hypothalamic Cells: A Potential Biomarker for ADHD** |
| **Authors** | Bryan Cho |
| **Institution** | Phillips Exeter Academy |

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| **INV.17.** | |
| **Title** | **The Earthship: The World's Most Sustainable Housing Model** |
| **Authors** | **Seunghwi Park** |
| **Institution** | Seoul Scholars International |

# NATIONAL EXHIBITORS

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## THE NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY POLITEHNICA BUCHAREST

**RO.1.**

| | |
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| **Title EN** | **Method and system for anonymously collecting position and mobility information in public passenger transport, based on Bluetooth and Artificial Intelligence** |
| **Authors** | Minea Marius, Dumitrescu Cătălin, Chiva Ionuț-Cosmin, Minea Viviana - Laetitia, Semenescu Augustin |
| **Institution** | **National University of Science and Technology POLITEHNICA Bucharest, ROMANIA** |
| **Patent no.** | RO 134415 – B1 |
| **Description EN** | The invention relates to a method and system for the anonymous collection of position and mobility information in public passenger transport, based on Bluetooth and Artificial Intelligence, for improving public transport management systems by supplementing the information required by them, providing a simple method of collecting. anonymously (without the possibility of associating the persons with the detected devices) the data on the flows of passengers transported or waiting in the passenger stations, information regarding the position of the public transport vehicles on the route, as well as the density of the private traffic of vehicles on the route of the means of public transport. |

**RO.2.**

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| **Title EN** | **Medical Device and Method of Making Same** |
| **Authors** | Ruxandra Vidu, Augustin Semenescu, Ileana Mariana Mates, Cristian Dragos Vidu |
| **Institution** | **National University of Science and Technology POLITEHNICA Bucharest, ROMANIA** |
| **Patent no.** | US 11,799,465 - B1 |
| **Description EN** | The present invention describes a biocompatible medical device that includes two supported meshes for providing mechanical strength and osseointegration properties of implant, and a multilayer porous material in between them loaded with antibacterial compound to promote controlled release of pharmaceutical agents at the site of surgical intervention. The composition gradient in the multilayer porous material is attained by loading successive layers of porous material with different amounts of bioactive materials |

and then stacking them to create a gradient of composition across the porous material. The present invention describes method(s) to place and fasten the medical device to the bone structure.

**RO.3.**

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| **Title EN** | **Occupational health and safety study for the working environment of an industrial equipment distribution operator** |
| **Authors** | Chivu Oana-Roxana, Borda Claudia, Gheorghe Marilena, Semenescu Augustin |
| **Institution** | **National University of Science and Technology POLITEHNICA Bucharest, ROMANIA** |
| **Patent no.** | RO -Research project |
| **Description EN** | SC AC BONT TOOLS SRL from Timișoara has been operating in the industrial and technical equipment distribution sector for many years, covering a wide range of products and services. The company has adequate preventive measures in place, such as clear internal procedures, individual and collective protective equipment, regular employee training, and an efficient system for monitoring the implementation of Occupational Health and Safety measures. These measures' evaluation highlights strengths and areas that require further improvement to prevent risks.<br>The improvement proposals include updating the technological equipment used, developing new training programs adapted to the needs of employees, ergonomic optimization of workspaces, and implementing an integrated and proactive risk management system. These recommendations aim to minimize risks and create a safer and more efficient working environment.<br>Following the analysis carried out, the urgent implementation of the proposals formulated is recommended, in parallel with the continuous monitoring and adjustment of the measures adopted. A proactive approach will lead to improved working conditions and, implicitly, increased employee productivity and satisfaction. |

| **RO.4.** | |
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| **Title EN** | Smart nerve Grafts based on Graphene-related composite materials with electric-triggering capability for central and peripheral nervous system regeneration [**SMART2GRAPH**] |
| **Authors** | Cristian-Sorin Hariga, Viorel Jinga, Ayse Ceren Calikoglu Koyuncu, Oguzhan Gunduz, Cem Bulent Ustundag, Zehra Betül Ahi, Erwann Guénin, Christophe Eagle, Denisa Ficai, Anton Ficai |
| **Institution** | **National University of Science and Technology POLITEHNICA Bucharest** |
| **Patent no.** | **28 din 01/03/2024** (ERANET-FLAG-ERA-Smart2Graph-1) |
| **Description EN** | The gold standard procedure for treatment after a severe nerve injury is to use nerve autograft but several drawbacks are raised. In recent years, advances have been made on the development of artificial nerve guides to replace the autograft, but no graft has been able to consistently demonstrate adequate superiority. Moreover, in complex surgical reconstruction, the repaired nerve is sometimes hard to reach (due to a bone canal for example) or morphologically complex in the mean of multiple bifurcations (the repair of the brachial plexus for example). Recent years have seen the rise in silk-based materials as silk fibroin has been demonstrated to be a versatile natural polymer. Furthermore, silk fibroin is a natural, biocompatible, and biodegradable material that is readily chemically and biochemically. The Smart2Graph project introduces an adaptable foundation design of a more effective synthetic nerve guidance conduit for peripheral or central nerve repair. |

| **RO.5.** | |
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| **Title EN** | Nanostructured bone grafts with predetermined properties [**COLLNANOBONE**] |
| **Authors** | Ficai Anton, Viorel Nacu, Ovidiu Cristian Oprea, Angela Spoiala, Ludmila Motelica, Doina Fosa, Mariana Jian, Elena Pavlovschi |
| **Institution** | **National University of Science and Technology POLITEHNICA Bucharest** |
| **Patent no.** | **29 ROMD din 20/05/2024** (PN-IV-P8-8.3-ROMD-2023-0347) |

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| **Description EN** | The project is especially focused on developing new synergies between Romania and Moldova by joining the force of two representative universities in developing high-quality research in one of the most challenging topics of tissue engineering, meaning hard tissue engineering. The importance of the topic is based on the very high need for bone-related materials (49% of the total market of grafting materials being represented by bone grafts) and, unfortunately, there are some diseases (osteosarcoma, infections, cancer) along with accidents that make necessary to develop more and more complex systems. Based on the existent, complementary experience of the UNSTPB (in the field of developing and morpho-structural, thermal characterization of these materials) and USMF (especially collagen extraction, in vitro and in vivo evaluation), the consortium will be able to develop complex and complete research. The materials will be designed with incremental complexity depending on the medical needs, from pure regenerative to enhanced regenerative (such for instance in the case of elderly people/people with osteoporosis) and up to complex drug delivery systems for the treatment of bone infections or cancer. The project is also assuring a joint PhD and exchange between the two partners. |

**RO.6.**

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| **Title EN** | **Innovative composition for biodegradable, antimicrobial packaging, based on cellulose derivatives, zinc oxide nanoparticles and mesoporous silica loaded with essential oils** |
| **Authors** | Oprea Ovidiu-Cristian, Motelica Ludmila, Ficai Anton, Ficai Denisa, Andronescu Ecaterina |
| **Institution** | **National University of Science and Technology POLITEHNICA Bucharest** |
| **Patent no.** | **A/00336 / 18.06.2024** |
| **Description EN** | Biodegradable packaging based on cellulose derivatives, with ZnO nanoparticles and MCM-41 mesoporous silica particles loaded with essential oils with antimicrobial activity, is designed by rationally combining several components with complementary and synergistic roles. Both ZnO nanoparticles, the compounds in the essential oil and citric acid used as a crosslinking agent for cellulose derivatives, have proven antimicrobial activity on pathogenic |

bacteria or molds. Their combination will lead to increased efficiency of the packaging film, with improved light and gas barrier properties. ZnO nanoparticles covalently bind to the structure of the cellulose derivatives and remain trapped in the polymer matrix, ensuring permanent antimicrobial activity. The encapsulation of essential oils in mesoporous silica ensures a sufficient reserve of essential oil, but also a slow release, practically the composite films thus obtained retaining their antimicrobial activity for more than 3 months.

**RO.7.**

**Title EN** **SOLENOID COLUMN**

**Authors** CRISTIAN PREDESCU, ECATERINA MATEI, ANDRA MIHAELA PREDESCU, ANDREI CONSTANTIN BERBECARU, RUXANDRA VIDU, MIRELA GABRIELA SOHACIU.

**Institution** NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY POLITEHNICA BUCHAREST

**Patent no.** US9469555-B2 /2016

**Description EN**

The present invention, **Pub.App.No.US US9469555-B2/2016** relates to magnetic nano-particles and apparatus with multiple solenoid columns, using magnetic nano-particles for selective removal of heavy ions, biological, cations, anions or other elements of interest from liquids, and recovery of nanoparticles to be reused in the wastewater purification.

Magnetic nanoparticles are held in contact with a liquid for a sufficient period of time to form a complex or conjugate with the target. After the magnetic nanoparticles adsorbed the target, the liquid containing nanoparticles is subjected to an external magnetic field that causes the loaded nanoparticles to segregate. The magnetic separation of nanoparticles leaves a portion of liquid purified and free of target-loaded nanoparticles. The magnetic nano-particles are then washed and regenerated using process conditions that release the target from nanoparticles. The regenerated magnetic nanoparticles are then re-introduced in the system and re-used in the water treatment process. Then, the purify-cation cycle is restarted, ensuring a continuous water treatment process.

**RO.8.**

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| **Title EN** | Composition and Procedure for Making Alginate-Based Microspheres and Titanium Oxide ($TiO_2$) Nanoparticles with Applications in Environmental Protection |
| **Authors** | Predescu Cristian, Matei Ecaterina, Râpă Maria, Predescu Andra Mihaela, Popa Elisabeta Elena, Berbecaru Andrei Constantin, Șăulean Anca - Andreea, Deak Gyorgy, Dumitrescu Florina - Diana, Moncea Mihaela - Andreea |
| **Institution** | **NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY POLITEHNICA BUCHAREST** |
| **Patent no.** | RO135381-A2/2021 |
| **Description EN** | The invention refers to a process for obtaining microspheres based on sodium alginate, polyphenols and $TiO_2$ nanoparticles with antioxidant, antifungal activity and capacity to retain heavy metals from waste water. The process, according to the invention, consists in the preparation of the following solutions: polyphenol extract from rose petals, 2% sodium alginate solution by dissolving the polysaccharide in the polyphenol extract by mechanical stirring, and $TiO_2$ nanoparticles from titanium tetraisopropoxide, acetic acid concentrated and solution of polyvinyl pyrrolidone dissolved in ethyl alcohol, by electrospinning followed by calcination, adding of nanoparticles to the alginate solution, extruding the solution into a vessel containing calcium chloride solution as a crosslinking agent, resulting microspheres that exhibit antifungal properties against Aspergillus niger, as well as retention capacity of $Cu^{2+}$ from contaminated waters. Environment – Pollution control |

**RO.9.**

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| **Title EN** | **PROTECTIVE TUBE FOR CONTINUOUS CASTING OF HIGH PURITY STEEL** |
| **Authors** | PREDESCU CRISTIAN, ZAMAN FLORIN, SOHACIU MIRELA-GABRIELA, BERBECARU ANDREI CONSTANTIN, COMAN GEORGE, PANTILIMON MIRCEA CRISTIAN, SZEKELY ZOLTAN GHEORGHE, |
| **Institution** | NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY POLITEHNICA BUCHAREST |
| **Patent no.** | RO 133961 B1/2024/ Patent application No. 00735/2018 |
| **Description** | Protection tube is provided between a feeder and a |

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| **EN** | crystallizer upon continuous casting of steel with high inclusionary purity and has a specific geometry meant to collect non-metallic inclusions in the liquid steel in specially provided spaces. The protection tube comprises a cylinder with an exterior diameter of 300 mm, an interior diameter of 100 mm and a total height of 1000 mm, which has, at the upper side, a non-profiled cylinder-shaped area with a height of 100 mm, in the middle part, a working area with a height of 500-800 mm, profiled at the interior with two spiral channels of square cross-section, with the side of 20-30 mm, which are symmetrically placed and with a pitch of 100 mm and an evacuation area with a height of 200 mm, with closed bottom having a thickness of 70 mm and two lateral circular evacuation orifices with a diameter of 50 mm, placed symmetrically at an angle of 30 degrees relating to the horizontal.<br>USE - The protection tube is useful for continuous casting of steel with high inclusionary purity. |

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| **RO.10.** | |
| **Title EN** | Collagen Nanofibers from Fish Scale for Making Non-active Dressings for Treating Wounds |
| **Authors** | Gaidau Carmen Cornelia, Rapa Maria, Stanca Maria, Predescu Cristian, Alexe Cosmin-Andrei |
| **Institution** | National University of Science and Technology POLITEHNICA Bucharest, RO |
| **Patent no.** | Patent application No. RO137330-B1/2024 |
| **Description EN** | The nanofibers are prepared by using an amount of collagen ranging between 1-50 gram which is dissolved in acetic acid solution by mechanical stirring for 30 minutes, where the solution is introduced into a dosing syringe of an electrospinning machine and flow rate is adjusted to 1-2 milliliter per hour with a specified voltage ranging between 22.19-23.24 kv, at a distance of 13 centimeter, a temperature ranging between 26-26.5°C, and 10% RH to deposit a matrix of collagen nanofibers with dimensions of 176.9 nm and 110 nm, respectively. The process for obtaining collagen according to the invention begins with grinding fish scales, washing them twice with 5% NaCl for 30 min to remove proteins, lipids, carbohydrates and soluble salts that generate the specific odor, degreasing by stirring with a 10% N - butanol solution for 30 min, three times successively, with |

intermediate washings with distilled water until a neutral pH, followed by one of the treatment variants with 15% w/v EDTA, for 16 hours, rinsing with distilled water and neutralizing with 0.2% v/v acetic acid to remove salts, and in another variant, without this treatment, and heating in distilled water for 12 hours, at 60°C, when a collagen dispersion in the form of gelatin is obtained, which can be dried in the form of a thin film.

**RO.11.**

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| **Title EN** | **Nanostructured surface coated with doped hydroxyapatite to enhance the bioactivity of titanium** |
| **Authors** | Diana M. Vranceanu, Elena Ungureanu, **Cosmin M. Cotrut** |
| **Institution** | National University of Science and Technology POLITEHNICA Bucharest |
| **Patent no.** | Patent application No. A/00714/2021 |
| **Description EN** | The invention refers to a biocompatible material obtained by electrochemical techniques in the form of a nanostructured surface with titanium dioxide nanotubes with an internal diameter of the nanotubes between 70 and 75 nm, a high degree of wettability highlighted by a contact angle between 15° and 20°, a roughness ranging between 130 nm and 160 nm, and coated with hydroxyapatite films doped with Zn or Mg in amounts of 0.50 (± 0.05) at.% Mg or 0.80 (± 0.02) at.% Zn, with a Ca/P ratio between 1.55 to 1.57, a crystallinity between 44% to 47%, and having superior bioactivity abilities at 37°C, such as biomineralization in SBF on day 21 and good degradation in PBS on day 21.<br><br>Presentation link: http://www.3b-coated.eu |

**RO.12.**

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| **Title EN** | **High Entropy Alloys Hf-Mo-Ta-W with Nb or Ni to Obtain Penetrators with High Kinetic Energy and Consolidation Method** |
| **Authors** | **Victor GEANTĂ, Ionelia VOICULESCU, Dumitru MITRICĂ, Adrian ROTARIU** |
| **Institution** | National University for Science and Technology POLITEHNICA Bucharest, National Institute for Research and Development for Non-Ferrous and Rare Metals, "Ferdinand I" Military Technical Academy |

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| **Patent no.** | **Patent No. 134976/29.11.2024** |
| **Description EN** | 1. **High entropy metallic alloy from the HfMoMTaW systems** for the manufacture of high kinetic energy penetrators, containing the elements Hf, Mo, M, Ta, W, where M represents a precipitate-forming element selected from Ni or Nb, characterized in that it contains the chemical elements in the composition in the following percentages of Hf = 24.5 - 26%; Mo = 12 - 14%; M = 6 - 8%; Ta = 26 - 28%; W = 27 – 29% and has a density of 13.5 – 14.5 g/cm3, a melting temperature of 2500 – 2700ºC and average microhardness values in the cast state of 550 – 650 HV0.5, and after applying a homogenization heat treatment for consolidation it has an associated hardness - HV 76070.<br>2. **Method for consolidation** of a high-entropy metal alloy HfMoMTaW with M=Ni or Nb, achieved by a hardening heat treatment with homogenization heating up to 900ºC, obtained in a CIV installation in an argon protective atmosphere, through a preliminary stage of aluminum foil and packaging in kaolin paste, followed by cooling for quenching and quenching at 2 hours. |

**RO.13.**

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| **Title EN** | **Heat treatment applied to pipes made of austenitic stainless steel X2CrNi19-11, to ensure increased stability of resistance to intercrystalline corrosion and the optimal complex of mechanical characteristics required in their operation** |
| **Authors** | Mihai Ovidiu Cojocaru, Mihai Branzei |
| **Institution** | **National University of Science and Technology POLITEHNICA Bucharest** |
| **Patent no.** | Patent application No. A 2024/00748-27 Nov 2024 |
| **Description EN** | The heat treatment process proposed as a replacement for the solution hardening heat treatment applied to X2CrNi19-11 austenitic stainless steel pipes (when this processing variant is not required by the standards of use of this product category), represents a phase recrystallization/stabilization annealing carried out at much lower temperatures compared to those required by solution hardening, strictly correlated with the degree of cold deformation carried out in the operation prior to annealing. The correlation between the parameters of cold plastic deformation and the thermal and temporal parameters of annealing needs to be extremely |

rigorously controlled, because in the case of X2CrNi19-11 steel grade, the hardening phase is represented by intermetallic compounds, which show a tendency for intergranular separation, and therefore, for amplifying the susceptibility to the intergranular corrosion initiation phenomenon. For degrees of cold plastic deformation between 50 and 70 percent, the annealing temperature is required in the range of 800÷700 $^{o}$C, the holding time is 8÷6 h, higher values corresponding to lower degrees of deformation. In this way, mechanical characteristics generally superior to those provided by solution hardening treatment and an appropriate level of resistance to intercrystalline corrosion are obtained.

**RO.14.**

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| **Title EN** | **Technology for treatment of wastewater containing lead ions using Iris pseudacorus plant** |
| **Authors** | Cristina-Ileana Covaliu-Mierlă, Alexandru Becheru, Sorin Stefan Biriș, Gigel Paraschiv |
| **Institution** | National University of Science and Technology POLITEHNICA Bucharest |
| **Patent no.** | Innovation in Phd thesis |
| **Description EN** | The innovation consists in creating a high efficiency technology in which wastewater containing lead ($Pb^{2+}$) ions is treated using Iris pseudacorus plant. Macrophyte stems were harvested and transferred into polluted environments of 1, 2 and 3 mg/L Pb concentrations. During the 21 days of experiment, Iris pseudacorus showed a high rate of Pb removal efficiency with a peak of 91.74% being achieved, suggesting that these macrophytes have a great capacity to tolerate and accumulate heavy metals and can be used in the treatment of water polluted with $Pb^{2+}$ ions. The wastewater Pb removal efficiency for the one stem, two stem and four stem samples respectively) reached 85.71% for the one stem sample, 91.74% for the two stem sample and 91.07% for the four stem sample. Iris pseudacorus underwent substantial modifications in regards to its aspect and structure during the 21 day period of the experiment. The short, outer leaves displayed signs of necrosis while the long ones suffered fractures and showed chlorosis only in the extremities, whereas at the same time, the plants developed rhizomes and |

shoots. Although parts of the plant manifested signs of withering according to visual observations, Iris pseudacorus presented 100% signs of survival.

**RO.15.**

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| **Title EN** | **Harnessing the potential of sunflower (Helianthus annuus) Seeds: A Novel Approach for Phytoremediation of Waters Polluted with Copper** |
| **Authors** | Alexandru Becheru, Cristina-Ileana Covaliu-Mierlă, Gigel Paraschiv |
| **Institution** | National University of Science and Technology POLITEHNICA Bucharest |
| **Patent no.** | Innovation in Phd thesis |
| **Description EN** | This study contains novel insights into the phytoremediation capabilities of Helianthus annuus as an ecofriendly alternative, for heavy metals absorption and immobilization from wastewater. The novelty consists in evaluating the potential of sunflower (Helianthus annuus) seedlings for copper phytoremediation in hydroponic conditions. Sunflower sprouts were exposed to varying concentrations of $Cu^{2+}$ (0.63 mg/L, 1.02 mg/L, and 1.86 mg/L) over a 72-hour period. Copper removal efficiency and plant health indicators, including stem length and root development, were monitored. Results demonstrate that sunflower seedlings efficiently removed copper at mild to moderate concentrations, achieving over 96% removal within three days. However, at higher concentrations, removal efficiency declined to approximately 35%, indicating potential phytotoxic effects. Morphological analysis further revealed stunted growth, root discoloration, and leaf chlorosis at elevated $Cu^{2+}$ levels. These findings highlight the suitability of sunflower sprouts for copper remediation in low to moderate contamination scenarios while emphasizing their limitations under excessive metal stress. |

| RO.16. | |
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| **Title EN** | **Technology using algae for removal of manganese and copper ions from wastewater** |
| **Authors** | Loredana Diaconu, Corina Stoian, Sorin Ionescu, Cristina-Ileana Covaliu-Mierlă, Gigel Paraschiv |
| **Institution** | National University of Science and Technology POLITEHNICA Bucharest |
| **Patent no.** | Innovation in Phd thesis |
| **Description EN** | The innovation consists in demonstration of functionalization of a technology in which wastewater containing manganese and copper ions is treated using Sargassum fusiform in native, coarse and ground form. Efficiencies of wastewater treatment technology were 80, 90 and 92% for the removal of copper ions and 60 % for the removal of manganese ions. The results obtained are closely linked to the metabolic bioaccumulation mechanism exhibited by algae. The living cells of algae have a crucial role in controlling the internalization of metals. Because of a metal homeostasis system, the concentration of internalized metal may be regulated. |

# Technical University of Cluj-Napoca, România

| RO.17. | |
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| **Title EN** | **Innovative use of sheep wool and polyurethane foam for obtaining materials with sound-absorbing properties** |
| **Authors** | Nemeş Ovidiu, Borlea (Mureşan) Simona Ioana, Tiuc Ancuţa-Elena, Deak Gyorgy |
| **Institution** | **Technical University of Cluj-Napoca** |
| **Patent no.** | Patent OSIM no.: RO136050- B1/30.05.2024 |
| **Description EN** | The aim of this work was to obtain materials with sound-absorbing properties using sheep wool and rigid bicomponent polyurethane foam. Were obtained four materials composed of three layers, a layer of sheep wool previously processed by hot pressing at 80°C and 5 MPa, with final thicknesses of 2, 4, 6 and 12 mm; a layer of rigid bi-component polyurethane foam, with a thickness of 8....37 mm and a transition layer, 1...20 mm thick, resulting from the migration of polyurethane foam during the multilayer panel manufacturing process into the wool layer and/or the migration of wool into the polyurethane foam layer. Wool and polyurethane foam are the combination of sound insulation and sound absorption - wool absorbs sound and reduces it, and due to the rigid structure of polyurethane foam (closed pore structure), it does not allow sound to travel further, resulting in sound insulation. The obtained materials have very good sound absorption properties with acoustic absorption coefficient values over 0.7 for the frequency range 800 ÷ 3150 Hz; the results prove that the sheep wool has a comparable sound absorption performance to that of mineral wool. |

| RO.18. | |
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| **Title EN** | **Prohep-lct- parallel robot for laparoscopic treatment of hepatic tumors** |
| **Authors** | Plitea Nicolae, Pîslă Doina Liana, Vaida Liviu Călin, Gherman Bogdan George, Tucan Paul George Mihai |
| **Institution** | **Technical University of Cluj-Napoca** |
| **Patent no.** | Patent OSIM no.: RO134189- B1/30.10.2024 |
| **Description EN** | The invention relates to a parallel robot for laparoscopic treatment of unresectable liver tumors. According to the invention, the robot consists of two robotic modules: the intra-operatory ultrasound (I-US) guiding module is designed for guiding a hepatic ultrasound probe in the |

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| | operating field; the needle guiding module is designed for guiding and inserting brachytherapy needles in hepatic tumors (which are localized using I-US). Each robotic module has five degrees of freedom and are placed on a common frame which is fixed on the patient's bed. Furthermore, both parallel robotic modules consist of two parallel mechanisms, one with three degrees of freedom and is used for positioning an automated medical instrument (to manipulate a hepatic ultrasound probe, or for brachytherapy needle insertion), and the second mechanism with two degrees of freedom for the automated instrument orientation. |
| **RO.19.** | |
| **Title EN** | **Automated medical instrument for inserting multiple needles on linear and parallel trajectories in interstitial brachytherapy cancer treatment** |
| **Authors** | Gherman Bogdan George, Bîrlescu Iosif, Burz Alin, Pîslă Doina Liana |
| **Institution** | **Technical University of Cluj-Napoca** |
| **Patent no.** | Patent OSIM no.: RO134941- B1/ 30.10.2024 |
| **Description EN** | The present innovation is a medical robotic instrument designed to insert percutaneously multiple needles on a straight trajectory in brachytherapy procedures for liver cancer treatment. The instrument has 3 degrees of freedom, having a serial kinematic chain of type PPP and a specially designed gripper. It uses Gantry architecture to position the brachytherapy needle in the XOY plane. The brachytherapy procedure usually requires the precise placement of up to 6 brachytherapy straight needles inside the tumor in a matrix form, at a distance of 10mm from each other (both on OX and OY axes). The needles are taken from the needles rack, which is attached to the robotic instrument, one by one using the needle gripper. The first needle is placed in the middle of the tumor, followed by the others, using the pre-planned trajectories. |
| **RO.20.** | |
| **Title EN** | **Process of manufacturing customized multi-structure medical implants by additive manufacturing technologies** |
| **Authors** | Leordean Vasile Dănuț, Radu Sever-Adrian, Cosma Sorin-Cosmin, Cuc Stanca, Vilău Cristian, Rusu Mircea-Aurelian-Antoniu |

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| **Institution** | **Technical University of Cluj-Napoca** |
| **Patent no.** | Patent OSIM no.: RO132908- B1/28.02.2024 |
| **Description EN** | The invention is related to the development of a process (technology) for manufacturing customized implants, made of biocomposite material, reinforced with metallic structures made by SLM. The obtained implants of the multi-structure type (metal / biocomposite) are individualized for a patient and can prosthesis any area of the human bone system. It is based on CT data from which to extract the 3D model of the affected area. The final shape and the resistance structure (metal reinforcement) of the future implant it will result by using the CAD + FEA programs. The manufacture consists of two stages. The first uses two AM technologies - using SLM the metal reinforcement is made and, by SLS and Vacuum Casting is manufactured the silicone rubber mould that will form the final implant. In the second stage - the reinforcement is inserted into the silicone mould and by means of casting/injection (depending on the material recipe) the final customised implant is made. |

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| **RO.21.** | |
| **Title EN** | **Mono-block body for low-mass vehicles** |
| **Authors** | Bere Petru Paul; Neamţu Călin Gheorghe Dan; Dudescu Cristian; Krolczyk Grzegorz |
| **Institution** | **Technical University of Cluj-Napoca** |
| **Patent no.** | Patent OSIM no.: RO133971- B1/ 30.12.2024 |
| **Description EN** | The invention relates to a monoblock body for motor vehicles and to a sandwich-type fiber-reinforced composite material for making the body, the composite structure exhibiting high mechanical resistance and low mass. According to the invention, the body is made of a sandwich-type composite structure consisting of a honeycomb-like aluminium core placed between an exterior layer and an interior layer made of a glass-fiber-, carbon-fiber- or Kevlar-reinforced composite material, the body consisting of two cones, a front one and a back one, for impact, continued with a floor provided, on the edges, with two sills made of composite material, onto which four pillars supporting the ceiling, are connected, on the edge they having a resistance structure, with a reinforcing element placed inside the door with the role of protecting the passengers in case of lateral impact, all the mentioned elements being obtained in a mould with multiple separation planes inter-connected |

during the process of composite lamination, the operation being performed simultaneously, to finally result in a complete monoblock body.

| RO.22. | |
|---|---|
| **Title EN** | **Sheep wool based modular panel and the method used for obtaining it** |
| **Authors** | Dénes Tünde-Orsolya, Tămaș-Gavrea Daniela-Roxana, Iștoan Raluca, Tiuc Ancuţa Elena, Manea Daniela Lucia, Vasile Ovidiu |
| **Institution** | **Technical University of Cluj-Napoca** |
| **Patent no.** | Patent OSIM no.: RO135991- B1/30.05.2024 |
| **Description EN** | The invention relates to a modular panel based on sheep wool fibers, and the method of obtaining it, in order to meet the requirements of quality in construction regarding noise protection and the sustainable use of natural resources. Each module consists of a triple layered panel, having a composition similar to that of sandwich panels. The structure of the layered panel is made of two outer layers of hydrated lime-based plates, which delimit a mattress made of sheep wool fibers placed between them.<br>The weighted sound reduction index of the modular panel is Rw (C;Ctr) = 38 (-2, -8) dB.<br>The layered panels have high sound absorption coefficient values at low frequencies. The maximum value is 0.90 at the frequency of 524 Hz.<br>The coefficient of thermal conductivity of the layered panels is 0.077 W/mK. |

| RO.23. | |
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| **Title EN** | **Sofa side made by thermoforming process and its accomplishing process** |
| **Authors** | Ciupan Cornel, Filip Ioan, Cionca Ioan, Ciupan Emilia |
| **Institution** | **Technical University of Cluj-Napoca** |
| **Patent no.** | Patent OSIM no.: RO133392 -B1/29.03.2024 |
| **Description EN** | The invention relates to the structure of a sofa side made of composite material based on natural fibers (hemp 50-60%) mixed with polypropylene (40-50%).<br>The material is obtained by interweaving. The sofa side has the shape of a box and is made up of an inner shell, an outer shell and a rib that is mounted between the two shells. It replaces a classic side made mainly of wood which was |

made up of 21 pieces. The process presents the phases and parameters of thermoforming of the three components and the way of assembling them. The thermoforming process consists of the following phases: tailoring, heating to 210-220ºC, transfer to the core mold and calibration by pressing with the cavity mold. After cooling, the piece is extracted from the mold and it is finished on the contour.

| **RO.24.** | |
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| **Title EN** | **Ecological road concrete based on cement, glass powder and aggregates from recycled concrete waste for applications in the field of constructions "BcR_G"** |
| **Authors** | Corbu Ofelia-Cornelia; Puskas Attila |
| **Institution** | **Technical University of Cluj-Napoca** |
| **Patent no.** | Patent OSIM no.: RO137345- B1/30.07.2024 |
| **Description EN** | The road concrete of the invention is an environmentally friendly concrete composed of natural aggregates (NA), recycled concrete aggregates (RCA) and waste glass powder form (WGP) that replaces part of Portland cement, RCA and WGP as an alternative to conventional materials. The concrete design was carried out so that, in addition to other durability characteristics, a remarkable resistance to abrasion was obtained. It falls into the resistance class BcR5. The microstructure and compositional characteristics of the concrete were also investigated, to confirm the efficiency of WGP. This new composite offers several advantages in terms of reducing existing and potential volumes of mineral waste both economically and visually, reducing pollution and minimizing the consumption of natural resources and energy. By applying it in the construction industry, it makes it possible to move from a linear economy to a circular economy. |

| **RO.25.** | |
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| **Title EN** | **Braking mechanism with S cam** |
| **Authors** | Laze Daniel |
| **Institution** | **Technical University of Cluj-Napoca** |
| **Patent no.** | Patent OSIM no.: RO133631- B1/29.11.2024 |
| **Description EN** | The invention relates to an "S" cam braking mechanism having an actuating system consisting of a body supporting a shaft, and an axial movable assembly formed by the pusher shaft and the spindle with balls sliding in the grooves and causing the cam to rotate. Wear compensation and holding of |

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| | the shoes in the immediate vicinity of the drum is made with a mechanical reaction loop formed by the sawtooth coupling and the threaded assembly. |

| **RO.26.** | |
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| **Title EN** | **Parallel robot for recovery of lower limb joints in two planes** |
| **Authors** | Pîslă Doina Liana, Bîrlescu Iosif, Vaida Liviu-Călin, Tucan Paul- George-Mihai, Gherman Bogdan George, Machado Jose |
| **Institution** | **Technical University of Cluj-Napoca** |
| **Patent no.** | Patent application OSIM no.: A/00116/20.03.2024 & Portuguese Institute of Industrial Property (INPI) no.: 20252006789500 |
| **Description EN** | The invention relates to a parallel robot for the medical recovery of patients with neuromotor disorders of the lower limb which consists of two parallel robotic modules enabling the neuromotor rehabilitation of the lower limb in two planes. The first module is designed for the hip and knee neuromotor rehabilitation allowing the motions of flexion/extension of the hip and knee joints, and the abduction/adduction of the hip joint, and contains one guiding kinematic chain (where the lower limb is placed), and three input kinematic chains which provide the required motions for the neuromotor rehabilitation. The second module is designed for the ankle neuromotor rehabilitation allowing the motions of plantar flexion/extension and inversion/eversion and contains one guiding kinematic chains (where the foot is placed), and two input kinematic chains that provide the required motions for the ankle rehabilitation. |

| RO.27. | |
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| **Title EN** | **Automated surgical instrument for robotic-assisted minimally invasive surgery** |
| **Authors** | Pîslă Doina Liana, Chablat Damien, Bîrlescu Iosif, Vaida Liviu-Călin, Pușcă Alexandru-Vasile, Tucan Paul-George-Mihai, Gherman Bogdan George |
| **Institution** | **Technical University of Cluj-Napoca** |
| **Patent no.** | Patent application OSIM no.: A/00142/29.03.2024 & French Patent and Trademark Office (INPI-Institut national de la propriété industrielle) no.: FR2414038 |
| **Description EN** | The automated surgical instrument has 5 Degrees of Freedom (DoFs) for the active head (end-effector) of the surgical instrument (e.g., clips, scissors, dissector, etc.) to ensure high dexterity and easy access in difficult areas of the operating field. High dexterity is ensured by integrating a rotation in the distal area, at the level of the active head and easy access to the operator field is ensured by the controlled curvature of the instrument rod in the distal portion. The flexible segment of the instrument rod is manufactured using 3D printing and elastic materials with special geometry. Moreover, the surgical instrument within the present invention has decoupled motions which leads to increased rigidity, necessary for the manipulation of tissues in the operating field and the conduct of the surgical procedure. |

| RO.28. | |
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| **Title EN** | **Parallel robotic system for minimally invasive pancreatic surgery** |
| **Authors** | Vaida Liviu-Călin, Gherman Bogdan George, Tucan Paul-George-Mihai, Bîrlescu Iosif, Chablat Damien, Pîslă Doina Liana |
| **Institution** | **Technical University of Cluj-Napoca** |
| **Patent no.** | Patent application OSIM no.: A/00522/11.09.2024 & French Patent and Trademark Office (INPI-Institut national de la propriété industrielle) no.: FR2414265 |
| **Description EN** | The robotic system is designed to assist the main surgeon in various pancreatic MIS tasks such as manipulating active surgical instruments (staplers, scissors), manipulating the laparoscopic camera, and manipulating retractors. The robotic system consists of three modules, namely: (1) an innovative parallel robot with 3 Degrees of Freedom (DOFs) that manipulates a surgical instrument; (2) a spherical |

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| | parallel mechanism which constraints the surgical instrument in a Remote Center of Motion (RCM) type of motion (where the surgical instrument has three orientations with respect to the insertion point in the surgical field and one translation fir the instrument insertion/retraction); (3) the surgical instrument which is manipulated by the parallel robot (1) and constrained at the insertion point by the spherical mechanism (2) to avoid trauma. |
| **RO.29.** | |
| **Title EN** | **A VISION-GUIDED ROBOTIC SYSTEM FOR SAFE DENTAL IMPLANT SURGERY** |
| **Authors** | Doina-Liana Pîslă(UTCN), Cristian Mihail Dinu (UMFCJ), Paul-George-Mihai Tucan (UTCN), Rareș-Cristian Mocan (UMFCJ), Călin Liviu Vaida (UTCN), Vasile-Nicolae Bulbucan (UTCN), Daria Pîsla (UMFCJ), Mihaela-Carmen Hedesiu (UMFCJ) |
| **Institution** | **Technical University of Cluj-Napoca** |
| **Patent no.** | Patent application OSIM no.: A/00581/30.09.2024 |
| **Description EN** | Recent advancements in dental implantology have improved success rates, but challenges remain in precise implant positioning, especially for patients with complex anatomy. Our study introduces an innovative robotic system for implant surgery that integrates a collaborative robot with an end-effector-mounted 3D navigation camera designed to autonomously perform implant site drilling. The system builds upon traditional manual procedures, introducing a new medical protocol that includes a preplanning phase to optimize the surgery through CBCT scans. A personalized marker holder, created from the latter ensures accurate patient-robot calibration through the continuous visual feedback during surgery, assisting in precise implant placement. |
| **RO.30.** | |
| **Title EN** | **Procedure and installation for triboelectrostatic separation of a mixture from non-conductive granular materials** |
| **Authors** | Călin Florentin-Laur, Bilici Mihai-Alexandru, Samuilă Adrian-Păun |
| **Institution** | **Technical University of Cluj-Napoca** |
| **Patent no.** | Patent application OSIM no.: A/00035/06.02.2024 |
| **Description** | The invention refers to a procedure and installation for |

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| **EN** | triboelectrostatic separation of a mixture composed of non-conductive granular materials. According to the invention the procedure efficiently charges the components (A and B) of a granular mixture with opposite electric charges through repeated controlled collisions between granules and between granules and the walls of a particularly shaped device. The electrostatic separation of the mixture's components is achieved by diverting the granules charged with opposite electric charges on distinct trajectories in an electrostatic field zone. The charged granules are introduced into the electrostatic field zone through a variable-angle device that facilitates their diversion onto distinct trajectories, allowing their collection as separation fractions. |

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| **RO.31.** | |
| **Title EN** | **Method for making customized implants from titanium-graphene composite with controllable mechanical characteristics via selective laser melting process** |
| **Authors** | Cosma Sorin Cosmin, Bâlc Nicolae Octavian, Berce Petru |
| **Institution** | **Technical University of Cluj-Napoca** |
| **Patent no.** | Patent application OSIM no.: A/00109/18.03.2024 |
| **Description EN** | The present invention relates to a direct method of obtaining personalized medical implants used for bone reconstruction made of composite material developed from pure titanium (Ti) and graphene oxide (GO) powder. The implant developed with this method will have controllable mechanical characteristics, antibacterial and anticancer properties, and it will be fabricated using the selective laser melting (SLM) process. The method allows modifying the elastic modulus and flexural strength of Ti-1%GO implants according to the patient's needs, following the logic diagram shown in Figure 1. This method involves defining the mechanical characteristics and constraints on the SLM process parameters, and using the mathematical equations (1) and (2), they will generate the optimal solution for implant manufacturing. Thus, Ti-1%GO implants can be obtained with a specific elastic modulus, 25-50% lower than that obtained from pure Ti and/or an increased flexural strength (over 900 MPa). The method allows the estimation of the mechanical properties that can be obtained depending on SLM parameters and can improve productivity by generating an optimal solution, considering an increased |

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| | laser scanning speed. This new method has the following advantages: ►The elasticity modulus of implants made from this composite can be controlled and reduced, diminishing the stress shielding effect between the implant and host bone; ►The mechanical strength of implants can be improved (3 times higher than pure Ti) and the weight of them can be reduced via design optimization procedure, respecting also the medical requirements; ►The proposed method does not have a negative impact on environment. |

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| **RO.32.** | |
| **Title EN** | **Studies and research about obtaining natural fiber-based eco-materials** |
| **Authors** | Oana-Roxana Lăpușan (Handabuț), Ovidiu Nemeș, Ana Maria Jeflea |
| **Institution** | **Technical University of Cluj-Napoca** |
| **Patent no.** | Project „EcoNFCs” |
| **Description EN** | Natural Fiber Composites (NFCs) are emerging as sustainable, eco-friendly, and cost-effective alternatives to traditional composites, using renewable fibers like flax, jute, hemp, wool, and bagasse. While offering benefits like biodegradability, they face challenges such as moisture absorption and poor adhesion to hydrophobic polymer matrices. To address this, treatments like chemical, plasma, biological methods, coupling agents, and nanofillers are being explored to enhance fiber-matrix bonding and improve performance. Each fiber offers unique advantages—flax for stiffness, wool for insulation and fire resistance—and hybrid systems combining fibers show promise. Ongoing innovation is key to expanding NFCs' use in advanced technological sectors. |

# "Gheorghe Asachi" Technical University of Iasi

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| **RO.33.** | |
| **Title EN** | **Biocompatible titanium-based alloy with the addition of molybdenum, zirconium, and tantalum** |
| **Authors** | BĂLȚATU Mădălina Simona[1], VIZUREANU Petrică[1], GEANTĂ Victoraș[2], ȘTEFĂNOIU Radu[2], VOICULESCU Ionelia[2], SANDU Andrei Victor[1] |
| **Institution** | **[1] "Gheorghe Asachi" Technical University of Iasi, Romania**<br>**[2] National University of Science and Technology Politehnica Bucharest** |
| **Patent no.** | Romania A/00132/11.04.2025 |
| **Description EN** | The invention is about making a new titanium-based alloy called TMZT, which comes from the Ti15Mo7ZrxTa system (where x can be 5, 10, or 15), designed for use in medicine, particularly for orthopedic implants. The controlled choice of alloying elements—molybdenum, zirconium, and tantalum—gives the material a set of excellent properties: excellent biocompatibility, high mechanical strength, and a modulus of elasticity close to that of human bone (51.93–76.88 GPa), thus reducing the risk of stress and bone resorption.<br>The alloy is made by melting materials with over 99% purity in a controlled argon environment, which helps keep the composition uniform and the structure strong. The resulting structure is of the solid solution type, thermodynamically stable, which contributes to increased corrosion resistance and excellent behavior in biological environments.<br>Cell viability tests have demonstrated superior compatibility compared to classic alloys such as 316L stainless steel or CP titanium, supporting the use of this material in regenerative medicine. TMZT alloy is suitable for the fabrication of a wide range of medical devices – dental implants, orthopedic rods, joints and stents – due to its advanced hemocompatibility and durability properties.<br>**Acknowledgements:** This work was supported by Bio-Simtit Grant of the Ministry of Research, Innovation and Digitization, CCCDI – UEFISCDI, project number PN-IV-P7-7.1-PED-2024-0080, within PNCDI IV. |

**RO.34.**

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| **Title EN** | **METHOD FOR EXTRACTING QUASI-PERIODIC SIGNALS FROM NOISE** |
| **Authors** | VALERIU DAVID, CRISTIAN-IOAN FOȘĂLĂU, MARIUS-CIPRIAN BRÎNZILĂ |
| **Institution** | Gheorghe Asachi"Technical University of Iasi |
| **Patent no.** | 131475 |
| **Description EN** | The invention relates to a method for extraction of quasi-periodic signals from noise, intended to be used in processing biomedical signals, such as electrocardiographic signal (ECG), magnetocardiographic signal (MCG) or other quasi-periodic signals of reduced level, recorded in the presence of high-level noise. According to the invention, the method consists in that the waveform of a quasi-periodic signal of very low amplitude recorded in the presence of noise of high amplitude is obtained based on the prior determination (2.2) of duration of all sequences of the quasi-periodic signal, which allows the selection (2.3) of some groups of sequences randomly located in the record, but with the approximately the same value of durations, where, for each so-formed group, a replica of the signal of interest is obtained (2.4) which, together with a replica of the signal for the entire record, obtained by the signal sampling (2.5) and processing (2.6) corresponding to the duration of each sequence, are compared and analyzed (2.7) to permit identification and characterization of specific waves or of changes or evolutions of the signal of interest, even in the conditions in which the records exhibit a very low signal-to-noise ratio. |

**RO.35.**

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| **Title EN** | **Prosthetic Device for the Automatic Compensation of Leg Length Discrepancy** |
| **Authors** | Dimitrie-Cristian FODOR, Cristian AGHION, Dragoș-Florin CHITARIU, Neculai-Eugen SEGHEDIN |
| **Institution** | **Gheorghe Asachi** Technical University of Iasi |
| **Patent no.** | Patent application No. A436/2024 |
| **Description EN** | The traditional method of prosthetic height adjustment, performed manually during the initial fitting, is limited by inaccurate techniques that prevent precise calibration. This can lead to discrepancies between the prosthesis and the |

natural limb, affecting gait and causing discomfort, with potential consequences for the spine and joints. Additionally, the absence of an automatic adjustment system prevents the prosthesis from adapting to physiological changes, such as growth, leading to imbalances in clinical assessments.
A self-adjusting transtibial prosthesis has been proposed, which would prevent leg length discrepancies in amputee children and adults by anticipating these discrepancies with post-amputation temporary prostheses, and would correct lower limb length differences by assessing and correcting them.The performance of the prosthesis, which operates on a master-slave system for evaluating and compensating leg length discrepancies, has been tested and shown to compensate for a wide range of simulated leg length differences in a controlled environment.
This work was supported by the "National Research Grants—ARUT" program of the TUIASI, project number GnaC2023_269

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**RO.36.**

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| **Title EN** | **A natural sustainable carrier for bacterial immobilization used in bioremediation** |
| **Authors** | Volf I., Armanu G.E., Secula M.S. |
| **Institution** | „Gheorghe Asachi" Technical University of Iași |
| **Patent no.** | Patent application No. A/00606 from 11.10.2024 |
| **Description EN** | The patent application entitled " A natural sustainable carrier for bacterial immobilization used in bioremediation" presents an innovative natural, macro structured carbon-rich material derived from agricultural biomass waste, along with the preparation process. The biobased material, named hydrochar, is produced through hydrothermal carbonization (HTC) at moderate-temperature, followed by washing and drying. Hydrochar servs as an efficient, self-sustaining support for immobilizing microbes to bioremediate environmental factors (water, air, soil). This approach addresses the escalating pollution from industrial, agricultural, and urban activities, targeting critical pollutants like pesticides, volatile organic compounds, polycyclic aromatic hydrocarbons, plasticizers, heavy metals, and nuclear waste. Unlike traditional bioremediation, the use of immobilized microbes on hydrochar significantly enhances efficiency compared to free cells, leveraging the material's |

functional groups and macropores for microbial attachment.

The process involves selecting lignin-rich biomass (≥35% lignin), grinding it to 0.5–2 mm, and subjecting it to HTC in a stainless-steel autoclave in controlled conditions (e.g., 260°C, 30 minutes and 1:10 w/v ratio), yielding a solid hydrochar phase. Subsequent steps include preparing a mineral medium (M.M.) for bacterial inoculation and immobilizing the bacterial cells on hydrochar, forming biofilms within 24 hours. Experimental tests demonstrated superior diethyl phthalate biodegradation (8 mM DEP), with immobilized bacterial cells (Pseudomonas spp. and Microbacterium sp.) achieving 76% biodegradation (coupled with hydrocar adsorptive properties) efficiency after 24 hours, compared with 14 % of planktonic cells. Key advantages of this biotechnology include low-cost, sustainable synthesis, minimal waste and scalability, making it a promising solution for environmental remediation in a circular economy context.

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**RO.37.**

**Title EN**

**STUDIES ON THE SUSTAINABLE IMPACT OF ARTIFICIAL INTELLIGENCE IN TECHNICAL AND AGRICULTURAL UNIVERSITY EDUCATION: BENEFITS CHALLENGE AND FUTURE DIRECTIONS**

**Authors**

Mădălina-Maria BREZULEANU[1], Elena UNGUREANU[2], Raluca Sînziana ZAHARIA[2], Carmen-Olguța BREZULEANU[2]

**Institution**

[1]Gheorghe Asachi Technical University, [2]"Ion Ionescu de la Brad" University of Life Sciences

**Patent no.**

**Description EN**

This undertaken study analyzes how students and professors perceive the use of artificial intelligence (AI) in education, especially in technical higher education. At the same time, we wish to examine the perceived benefits, existing challenges, and future directions for implementation. The research is based on the analysis of a dataset collected through online questionnaires, which provides a detailed perspective on how AI influences technical educational processes. The results indicate that perceived AI is predominantly positive, being appreciated for its usefulness in personalizing learning and optimizing evaluation

processes, especially in technical fields. Nonetheless, it was noted that educators in technical higher education encounter considerable obstacles in adopting this technology owing to insufficient resources, the necessity for further training, and issues associated with its effective incorporation into technical educational practices. Consequently, a set of recommendations has been put forth to address these challenges, encompassing the creation of training programs for educators, advocating for investments in suitable technological infrastructure for the ethnic domain, and the formulation of a definitive ethical framework concerning the application of AI in education.

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**RO.38.**

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| **Title EN** | **Pneumatic Glove with Microsoft HoloLens2 for Hand Neuromotor Rehabilitation** |
| **Authors** | Nechifor Elena, Marian-Silviu Poboroniuc, Nechifor Sorin-George, Gabriel Florentin Chiriac. |
| **Institution** | **Faculty of Electrical Engineering, Energy and Applied Informatics, "Gheorghe Asachi" Technical University of Iasi** |
| **Patent no.** | EE PhD project |
| **Description EN** | The MANOREHAB system was developed with a comprehensive functional architecture that emphasizes seamless interaction between the physiotherapist and the HoloLens 2 headset. This augmented reality interface is used to control an actuator-based rehabilitation glove, enabling precise and responsive neuromotor therapy for patients with upper limb disabilities. The system integrates mechanical, hardware, and software components into a unified platform designed to support neurorehabilitation in clinical settings.<br><br>The MANOREHAB device operates in three primary modes: Manual, Mirror, and Headset (Augmented Reality). In Manual mode, the physiotherapist directly adjusts therapy parameters through a traditional interface. Mirror mode uses the patient's healthy limb to generate movement patterns, which are mirrored to the impaired limb to stimulate motor relearning. Headset mode employs the HoloLens 2 for immersive augmented reality experiences, guiding both patient and therapist through interactive rehabilitation |

exercises. This mode enhances engagement and offers visual feedback, which is critical in neuroplasticity-driven recovery processes.

A key advantage of the MANOREHAB system lies in its ability to offer real-time control and adaptability. Therapy protocols can be customized based on the patient's condition and progress, allowing for dynamic adjustment of intensity, range of motion, and repetition. This flexibility supports personalized rehabilitation strategies and encourages better adherence to therapy.

Overall, the MANOREHAB system represents a significant advancement in neurorehabilitation technology, combining state-of-the-art wearable robotics with intuitive user interfaces and real-time data processing to improve therapeutic outcomes and foster patient independence.

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**RO.39.**

**Title EN**

**An Advanced Haptic Real-Time Robotic Arm Control System**

**Authors**

Alexandru Scerbatii, Mihai-Andrei Gheorghe, Marian-Silviu Poboroniuc

**Institution**

**Gheorghe Asachi Technical University of Iasi, Faculty of Electrical Engineering**

**Patent no.**

EE Student project

**Description EN**

Conventional robotic arm control systems often struggle with response latency and precise environmental interaction, posing limitations across medical, industrial, and research domains. To address these challenges, we present a novel control framework built on real-time programming principles, incorporating tactile feedback to enable accurate and safe manipulation. This approach significantly improves adaptability, scalability, and operational efficiency. Recognizing the high cost of existing haptic technologies as a barrier to broader adoption, our work emphasizes accessibility. We propose a cost-effective tactile feedback system tailored for educational and research environments, making it suitable for university laboratories and so-called 'Do It Yourself'(DIY) initiatives where budget constraints are a concern. Furthermore, we demonstrate that effective and responsive control can be achieved even with limited resources.

| RO.40. | |
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| **Title EN** | **UAV Tracking System Proof of Concept** |
| **Authors** | Mihai-Andrei Gheorghe, Alexandru Șcerbatîi, Marian-Silviu Poboroniuc |
| **Institution** | **GHEORGHE ASACHI Technical University of Iasi, Faculty of Electrical Engineering** |
| **Patent no.** | EE Student Project |
| **Description EN** | The proposed system is a Proof-of-Concept of a point-defense, short-range system designed for the detection and tracking of UAVs. Such a system has applications not only in warfare but also in civilian environments, such as monitoring no-fly zones for safety or privacy reasons with possible deployment locations including airports, private property, and more. The system employs a pan-tilt mechanism to enable the surveillance of a semi-spherical area and features real-time video streaming to a smartphone via a mounted camera. Drone detection relies on a TDOA (Time Difference of Arrival) approach based on identifying the high-frequency sounds generated by propeller-driven UAVs. All structural components are 3D-printed, except for the wooden support used for anchoring. Future improvements may include enhanced detection accuracy through additional sensing methods, remote control via a smartphone app, and an optimized physical design with higher-quality materials for improved durability and performance. |

| RO.41. | |
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| **Title EN** | **Mentol- and propolis-backed transdermic plasters for the treatment of skin diseases** |
| **Authors** | Anca Mihaela Mocanu[1], Mihaela Șalariu[2], Corina Cernătescu[1] |
| **Institution** | **[1]"Gheorghe Asachi" Technical University of Iași, "Cristofor Simionescu", Faculty of Chemical Engineering and Environmental Protection, Romania.**<br>**[2]"Ion Holban" Technical College** |
| **Patent no.** | Innovative technology |
| **Description EN** | The contributions are directed to obtaining transdermal therapeutic patches provided with a functional cotton textile support (acting as a reservoir) which would result in the controlled release of certain natural bio-active principles |

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| | (propolis and menthol), with pharmaceutical action on people and children in order to support the treating and preventing of some irritations, wounds, injuries, scratches as well as certain allergic skin conditions in a natural, efficient and comfortable manner which would avoid the classic administration. |

| **RO.42.** | |
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| **Title EN** | **Study on the stability of cosmetic cream formulated using oil extract of sea buckthorn** |
| **Authors** | Claudia Cobzaru[1], Șchiopu Oana-Nicoleta[1], Anca Mihaela Mocanu[1], Mălina-Maria Cernătescu[2], Corina Cernătescu[1] |
| **Institution** | **[1]"Gheorghe Asachi" Technical University of Iași, "Cristofor Simionescu", Faculty of Chemical Engineering and Environmental Protection, Romania.** **[2]"Grigore T. Popa" University of Medicine and Pharmacy Iasi, Iasi, Romania.** |
| **Patent no.** | Innovative technology |
| **Description EN** | This study presents information on the thermal stability of the cosmetic cream with sea buckthorn oil macerate, obtained in the laboratory. More specifically, the possible physicochemical changes of the product were monitored, such as: appearance, pH and density. The cream obtained in the laboratory with sea buckthorn oil macerate is yellow, homogeneous, with a fine texture and the characteristic smell of sea buckthorn and gives the skin a feeling of softness and hydration. Even though it is obtained from natural ingredients, without preservatives, which has a short shelf life (max. 3-4 days), the stability study carried out shows that the product is stable for a period of approximately 2 weeks because its characteristics do not change under the normal and accelerated conditions tested. |

| **RO.43.** | |
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| **Title EN** | **"Academic Entrepreneurship Roadmap" (AcEntRoad) project** |
| **Authors** | Margareta Gabriela CIOBANU, Anca Mihaela MOCANU, Sofronia BOUARIU |
| **Institution** | **„Gheorghe Asachi" Technical University of Iasi, Romania** |
| **Description EN** | The "AcEntRoad" project, no. 2023-1-BG01-KA220-HED-000154889, is a European project Erasmus+ Programme: |

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| | Strategic partnership - Cooperation partnerships in higher education, with partners from Bulgaria, Italy, Malta, Turkey and Romania. The project is aimed to explore hidden strengths of academic entrepreneurship in details and in various aspects oriented to students, academic staff and businesspeople. The general objective of the project is to explore the ways for success in entrepreneurial activities to trigger students` initiative in an adapted way bringing together students from various social categories with focus on those who are discouraged in their study and lagging their peers. The specific objectives of the project are: (i) Revealing trends and influencing factors on entrepreneurship by exploration of entrepreneurial culture and attitudes across the targeted students: (ii) Closing the gap in cultivating academic and students' entrepreneurship by creation of methodologies for entrepreneurial education among the targeted students; (iii) Development of Entrepreneurial Journey based on Academic Entrepreneurship Roadmap, accompanied by series of lections, seminars, and workshops. Target groups and beneficiaries of the project are: students, academic staff / university lecturers, researchers, business people. |

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| **RO.44.** | |
| **Title EN** | **Natural Deep Eutectic Solvents (NADES): Sustainable Solvents for Enhanced Bioactive Phytoextracts in Dermato-cosmetic Formulations** |
| **Authors** | Claudia Maxim[1], Simona Barna[1], Adriana Trifan[2], Delia Turcov[3], Daniela Șuteu[1] |
| **Institution** | **1** "Gheorghe Asachi" Technical University of Iasi, Faculty of Chemical Engineering and Environmental Protection, Iași, România<br>[2] "Grigore T. Popa" University of Medicine and Pharmacy Iasi, Faculty of Pharmacy, Department of Pharmacognosy-Phytotherapy, Iasi, Romania |
| **Patent no.** | - |
| **Description EN** | The aim of this study is to explore sustainable alternatives for the extraction of bioactive compounds from medicinal plants, with a particular emphasis on their incorporation into natural dermato-cosmetic formulations.<br>NADES have emerged as promising candidates in green chemistry, offering a non-toxic alternative to traditional |

organic solvents for extracting bioactive phytochemicals.
This study evaluates the potential of NADES systems composed of betaine and 1,3-propanediol in extracting polyphenolic compounds from Acmella oleracea and Artemisia annua.
The NADES extracts were characterized by their total polyphenol and flavonoid content using spectrophotometric methods, while their antioxidant activity was evaluated via the DPPH and ABTS radical scavenging assays.
The findings indicate that ultrasonication was the most effective extraction technique, yielding the highest concentrations of polyphenols and flavonoids (6.48 mg GAE/mL and 14.5 mg QE/g for Acmella oleracea, and 22.63 mg GAE/mL and 5.54 mg QE/g for Artemisia annua, respectively. The optimal extraction parameters were NADES ratio 1:3, 25 °C, and 60 min of extraction time.
Subsequent phases of the study will focus on the development of dermato-cosmetic formulations incorporating one of the optimized extracts, in order to assess its antioxidant effects on the skin.

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| **RO.45.** | |
| **Title EN** | From Traditional Remedy to Modern Gemmocosmetics: Platanus orientalis bud Extract in Vitiligo Skin Regeneration |
| **Authors** | Simona Barna[1], Claudia Maxim[1], Mălina Ciumașu Rîmbu[3], Adriana Trifan[2] |
| **Institution** | [1] "Gheorghe Asachi" Technical University of Iasi, Faculty of Chemical Engineering and Environmental Protection, Iași, România<br>[2] "Grigore T. Popa" University of Medicine and Pharmacy Iasi, Faculty of Pharmacy, Department of Pharmacognosy-Phytotherapy, Iasi, Romania<br>[3] Spitalul Clinic Militar de Urgență I.Czihac Iași, România |
| **Patent no.** | - |
| **Description EN** | This study focuses on the development of an innovative formulation for gemmocosmetic O/W emulsions , for topical application in the treatment of vitiligo. The formulation incorporates glycerinated hydro-alcoholic bud extracts of Platanus orientalis at varying concentrations as the key ingredient, along with emulsifiers, emollients, humectants, and preservatives derived from renewable raw materials.<br>Vitiligo is a chronic autoimmune disorder that causes the |

destruction of melanocytes, leading to progressive loss of skin and mucosal pigmentation, as well as the formation of depigmented patches. It affects approximately 1% of the global population, manifesting in varying degrees of severity.
Due to its phytochemical composition, Platanus orientalis bud extract is rich in antioxidant bioactive compounds such as flavonoids and phenolic acids, which provide regenerative, anti-inflammatory, antioxidant and protective effects on the skin.
The gemmocosmetic emulsions were prepared using an anionic emulsification system composed of cetearyl alcohol, glyceryl stearate, jojoba esters, Helianthus annuus seed wax and sodium stearoyl glutamate. The dispersed phase included a mix of vegetable oils - Calophyllum inophyllum seed oil, Nigella sativa seed oil, Borago officinalis seed oil, Solanum lycopersicum seed oil - while the continuous phase consisted of Helichrysum italicum hydrosol.
To evaluate the antioxidant activity of the dermato-emulsions, DPPH and ABTS radical scavenging were employed. These assays were used to determine the optimal concentration and combination in the formulation, with a focus on antioxidant properties and the safety profile of the Platanus orientalis bud extract.
The results confirmed that the biologically active complex used in gemmoemulsions with Platanus orientalis exhibited significant antioxidant activity. These findings highlight the relevance of the formulations in vitiligo treatment, positioning it as a promising natural alternative to conventional corticosteroid-based therapies.

**RO.46.**

**Title EN**

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

**Authors**

BĂLȚATU Mădălina Simona, VIZUREANU Petrică, SANDU Andrei Victor, ACHITEI Dragoș Cristian, PERJU Manuela Cristina, BURDUHOS-NERGIS Dumitru Doru

**Institution**

**"Gheorghe Asachi" Technical University of Iasi, Romania**

Project number: PN-IV-P7-7.1-PED-2024-0080

**Description EN**

The BIO-SIMTIT project proposes the development and validation of new Ti-Mo-Zr-Ta titanium alloys for orthopedic implants, with the main objective of improving their bone integration and biocompatibility. By using advanced additive laser manufacturing (SLM) technology, high precision is ensured in the creation of personalized implants, adapted to the

specific needs of each patient. In addition, the application of a biomimetic surface treatment with hydroxyapatite contributes to the creation of an interface favorable to osteointegration, essential for the long-term success of the implants. This integrated approach not only meets the current requirements in the field of orthopedic implantology, but also opens up new perspectives in the personalization of treatments, offering sustainable and scalable solutions to improve the quality of life of patients.

**Acknowledgements:** This work was supported by Bio-Simtit Grant of the Ministry of Research, Innovation and Digitization, CCCDI – UEFISCDI, project number PN-IV-P7-7.1-PED-2024-0080, within PNCDI IV.

**RO.47.**

**Title EN**

**A new generation of metallic biomaterials as health solution for a sustainable life**

**Authors**

VIZUREANU Petrică, BĂLȚATU Mădălina Simona, SANDU Andrei Victor, ACHITEI Dragoș Cristian, PERJU Manuela Cristina, BURDUHOS-NERGIS Dumitru Doru

**Institution**

**Gheorghe Asachi Technical University of Iasi, Romania**

**Patent no.**

Project number: 8/2024

**Description EN**

In the search for more efficient and biocompatible materials for medical implants, titanium alloys have emerged due to their remarkable properties. Our project introduces a new class of metastable Ti–Mo–Nb–Sn alloys, developed by the electric arc remelting method, aimed at addressing common problems in biomedical implants, such as the stress shielding effect and allergic reactions caused by other biomaterials, such as 316L stainless steel and Co–Cr–Mo alloys.

Our studies show that Ti–Mo–Nb–Sn alloys exhibit a dual structure (β and α"+β), offering high flexural strength (1145–1255 MPa) and low elastic modulus (53–63 GPa). This combination improves their ability to match the mechanical properties of human bone better than many conventional materials, reducing the likelihood of the stress shielding effect. In addition, these alloys demonstrate an impressive modulus of resilience, substantially higher than that of pure commercial titanium and other titanium alloys. In particular, the metastable alloy Ti–5Mo–11Nb–7Sn showed the highest modulus of resilience, suggesting its potential for high-load applications. In comparison, 316L stainless steel and widely used Co–Cr–Mo

alloys exhibit either insufficient biocompatibility or excessively high elastic modulus, which can lead to adverse biological effects and mechanical mismatches with bone tissue. The innovative formulation of Ti–Mo–Nb–Sn not only minimizes these issues, but also promises improved implant longevity and performance.

The metastable Ti–Mo–Nb–Sn alloys hold significant potential to redefine standards in implantology, offering a synergistic balance between mechanical strength and biocompatibility. Our results invite further research to fully exploit these alloys in various medical applications, potentially leading to more successful and sustainable implant solutions. Their lower cost and improved performance metrics make them suitable candidates for replacing current materials used in industry, thus meeting the growing demand for advanced biomedical technologies.

**Acknowledgements**: This work was supported by a grant of the Ministry of Research, Innovation and Digitization, CNCS/CCCDI - UEFISCDI, project number ERANET-ERAMIN-3-Cool&SmartTit-1, contract no 8/2024 within PNCDI IV

**RO.48.**

**Title EN**

**Innovative products based on geopolymer composites with waste wood addition**

**Authors**

Dumitru-Doru BURDUHOS-NERGIS; Andrei-Victor SANDU; Petrica VIZUREANU

**Institution**

**„Gheorghe Asachi" Technical University of Iasi**

**Patent no.**

Arut Project

**Description EN**

The procedure described in this invention outlines a technology for producing innovative geopolymer composites suitable for civil engineering applications. These composites comprise an oxide matrix made from fly ash and slag, which is reinforced with particles of timber waste. The process for creating these environmentally friendly geopolymer composites involves mixing two components: one solid and one liquid. The solid component consists of 60% class F fly ash, 40% ground granulated blast furnace slag, and an additional 10% timber waste. The liquid component is a solution of sodium silicate ($Na_2SiO_3$) and sodium hydroxide (NaOH) in a mass ratio ranging from 0.9 to 1.1. The mass ratio of the liquid component to the solid component should be between 0.4 and 0.5, and the concentration of the NaOH solution is 12M. The size of the

wood chips varies from 10 to 30 mm, resulting from milling pine panels. Therefore, this eco-friendly manufacturing technology enables the reuse of three types of waste materials (fly ash, slag and timber) in order to develop innovative products.

This work was supported by a National Research Grants of the TUIASI, project number GNaC 2023_271/2024, Prefabricate inovative pe bază de compozite geopolimerice cu adaos de deșeuri lemnoase (Pre-Geo), Innovative products based on Geopolymer composites with waste wood addition (Pre-Geo).

**RO.49.**

**Title EN**

**Chemical conversion process for titanium alloy with Ca-Zn-Mg phosphate solution**

**Authors**

**Diana Petronela BURDUHOS NERGIS, Andrei Victor SANDU, Costica BEJINARIU, Petrica VIZUREANU, Elena-Luiza EPURE, Maria-Adriana ACASANDREI**

**Institution**

„Gheorghe Asachi" Technical University of Iasi

**Description EN**

The procedure described in the invention involves a solution that can be used to improve the surface characteristics of titanium alloys. Therefore, on the surface of the TI6Al4V was deposited a Ca-Zn-Mg phosphate conversion layer by the phosphating process. This process includes many steps, such as grinding, degreasing, pickling, surface activation, and deposition of a phosphate layer by immersing the metal into a phosphating solution. The invention's applications have the following benefits: better corrosion and wear resistance of the metal, the morphological characteristics of the layer enhance cell adhesion, and the layer has a high adherence to substrate and does not influence the mechanical properties of the substrate. All of these can reduce the risk of implant failure.

Acknowledgement:
This work was supported by a grant of the Ministry of Research, Innovation and Digitalization, CNCS-UEFISCDI, project number PN-IV-P2-2.1-TE-2023-1086.

**RO.50.**

**Title EN**

**Innovative layer-based Sr-Zr-Zn phosphate obtained by chemical conversion process (phosphating)**

**Authors**

**Diana Petronela BURDUHOS NERGIS, Andrei Victor SANDU, Alin-Marian CAZAC, Costica BEJINARIU, Anca CAZAC**

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| **Institution** | „Gheorghe Asachi" Technical University of Iasi |
| **Description EN** | In order to improve the biological response of titanium implants, a Sr-Zr-Zn phosphate layer was deposited, through the chemical conversion process, on the surface of the titanium alloy Ti6Al4V. Compared to other deposition processes, the phosphating process presents numerous advantages such as: low cost, excellent design and control capacity of the phosphating solutions, the possibility of obtaining morphological characteristics favorable to cell adhesion similar to biological functions, the possibility of introducing antibacterial and immunoregulatory metallic elements that favor bone formation into the phosphating solution, high stability, improved resistance to corrosion and wear, etc. Therefore, the layer was obtained by immersing the metal into a phosphating solution that contains phosphoric acid, strontium carbonate, zirconium oxide, and zinc. This solution also includes some accelerators and inhibitors. |
| | This work was supported by a National Research Grants of the TUIASI, project number GNaC 2023_272/2024, Straturi inovative obținute prin conversie chimică pentru îmbunătățirea răspunsului biologic al implanturilor din titan (BioTiC) - Innovative layers obtained through chemical conversion to improve the biological response of titanium implants (BioTiC). |

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| **RO.51.** | |
| **Title EN** | **ISOV - Innovative Skills for an Old Vocation** |
| **Authors** | Aura Mihai, Arina Seul, Mariana Costea, Raluca Lupu |
| **Institution** | Gheorghe Asachi Technical University of Iasi |
| **Project** | **Project number 2024-1-DE02-KA220-VET-000254492** |
| **Description EN** | Like all sectors, the industrial footwear production sector is facing the mega-trends of globalisation, digitalisation, and sustainability. To respond to changes in work processes, both Initial Vocational Education and Training (IVET) and Continuing Vocational Education and Training (CVET) must be further developed.<br>The project partners adapt their qualification offers to meet these challenges—while maintaining the sector-specific, work-process orientation and recognising the varying impact of different trend dimensions on different work processes.<br>Key activities include the development, pedagogical structuring, and piloting of courses for apprentices and/or |

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| | employees in industrial footwear production in Germany, Portugal, and Romania. These courses are based on scientifically grounded impact analyses that identify how specific trend dimensions influence the sector's 18 Spheres of Activity (SoA). The courses are tailored to the concrete SoA in which participants are currently working, are expected to work, or aim to work.<br>The project deliver (1) a comprehensive matrix mapping the influence of approximately 20 trend dimensions on the 18 SoA; (2) 12 quality-assured training manuals on how to address and communicate these impacts within relevant SoA; (3) SWOT analyses based on the piloting and evaluation of 15 courses (five in each country), forming the basis for updated IVET and CVET profiles. |

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| **RO.52.** | |
| **Title EN** | **S-Shoe - Sustainable, Therapeutic Footwear (Antimicrobial, with Self-Cleaning Properties), Biodegradable with a Reduced Carbon Footprint** |
| **Authors** | Oana Chiriac, Florea Ghebuță, Carmen-Cornelia Gaidău, Mirela Pantazi-Băjenaru, Mariana Costea, Aura Mihai, Arina Seul |
| **Institution** | SC Activ Ortopedic SRL, National Research & Development Institute for Textiles and Leather – INCDTP Bucharest, Gheorghe Asachi Technical University of Iasi – TUIASI, Romania |
| **Project** | **Project number 14PTE / 2025, code PN-IV-P7-7.1-PTE-2024-0226** |
| **Description EN** | The general objective of the project is the digital design and development of therapeutic footwear for people with diabetes, using high-performance, sustainable materials—eco-friendly, antimicrobial, biodegradable leathers with softness and elasticity adapted for orthopaedic use—which can reintegrate into the environment without causing pollution at the end of their life cycle.<br>The footwear design will benefit from the most advanced tools for data acquisition, simulation, and design, as well as life cycle analysis, ensuring compliance with current sustainability goals and foot protection standards.<br>The project outcomes will enable the expansion of design principles and production methods for sustainable therapeutic footwear for individuals with diabetes, as well as for other types of orthopaedic, sports, and everyday |

footwear.
Being a project that involves the main three actors—footwear producer, research institute, and higher education institution—it fosters a strong collaborative framework that bridges practical industry needs with scientific innovation and academic expertise. This partnership ensures a multidisciplinary approach to designing and developing therapeutic, sustainable footwear, enhancing both technological transfer and real-world applicability.

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| **RO.53.** | |
| **Title EN** | **ECO-STV: IoT-Enabled Vacuum Toilet System with Sensor-Controlled Pinch Valves for Sustainable Train Sanitation** |
| **Authors** | Petre-Daniel MATASARU |
| **Institution** | „Gheorghe Asachi" Technical University Iasi |
| **Description EN** | This invention presents an IoT-enabled vacuum toilet system, ECO-STV, as an efficient and sustainable sanitation solution for train wagons. The system is designed to minimize water consumption while ensuring hygienic and reliable waste disposal, making it ideal for mobile and resource-constrained environments. ECO-STV operates using vacuum technology and sensor-controlled pinch valves to manage the flow of waste and air.<br>When a user activates the toilet, onboard sensors detect usage and trigger a vacuum pump that creates a low-pressure environment in the waste chamber. Once the desired vacuum level is achieved, pinch valves open in a controlled sequence, allowing for the rapid and complete evacuation of solid waste into a sealed storage tank. This process significantly reduces water usage compared to conventional train toilets and eliminates the need for gravity-based discharge, enhancing hygiene and environmental compliance.<br>The system offers a reliable and eco-friendly sanitation solution and is integrated with an IoT platform that monitors real-time parameters such as vacuum levels, valve status, usage patterns, and tank capacity. It also provides maintenance alerts and operational diagnostics to reduce downtime and optimize service schedules. |

**RO.54.**

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| **Title EN** | **Using a Dedicated Encryption Module to Improve the Security of Smart Homes** |
| **Authors** | Luminița SCRIPCARIU, Petre-Daniel MĂTĂSARU |
| **Institution** | Faculty of Electronics, Telecommunications and Information Technology, ”Gheorghe Asachi” Technical University of Iași |
| **Description EN** | A smart home usually uses a Wireless Sensor Network (WSN) with a gateway offering access to the public Internet. Sensors installed all over the house collect data about the indoor environment like temperature, humidity, light intensity or sounds and also outdoor data that can be about protecting the physical security of the home or external assets. Sensors send data to the gateway. From this node, packets go to a control center monitorized remotely with fixed or mobile devices like smart phones. This research work aims at improving the security of WSN and data sent by public Internet in order to protect the smart home from various possible cyberattacks. Sensor nodes are in fact sensor boards with limited resources [1]. We use a sensor board that is a modular IoT kit from Bitron [2] with a microcontroller on the main board, a sensor module, an actuator module and a communication one. Even if the communication module has a co-processor designed for AES, running AES as a software application produces a high latency that can be critical in some cases. We propose to use a dedicated hardware module for AES, synthesized as an FPGA circuit [3]. The goal is to reduce the encryption and decyption runtime. The house’s owner has a secret password used to generate the key for AES. Using a decentralized key management system improves the system security. A low value of the data processing time represents an essential factor for a performant security system. |

**RO.55.**

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| **Title EN** | **CulturAI – A Cross-Cultural AI-Powered Evaluation Platform for International Advertising Campaigns** |
| **Authors** | **Ilinca-Maria Baltariu, Florin-Alexandru Luca, George-Călin Baltariu** |
| **Institution** | **Gheorghe Asachi Technical University of Iași**<br>**Alexandru Ioan Cuza University of Iași**<br>**Transilvania University of Brașov** |
| **Description EN** | This project proposes the development of a web-based platform or mobile application, CulturAI, which leverages artificial intelligence to analyze and evaluate advertising content—visuals, slogans, product names, and entire marketing campaigns—through a cultural lens tailored to specific |

international markets. The system is designed to detect culturally sensitive elements, linguistic misinterpretations, visual layout inconsistencies (e.g., left-to-right vs. right-to-left reading patterns), and potential offensive connotations arising from translation errors, homophonic similarities, or inappropriate symbolism.
The platform will operate by scanning both visual and textual advertising materials and comparing them against a comprehensive, continuously updated cultural database. This database will include sociolinguistic norms, taboos, superstitions, historical and religious sensitivities, and common preferences or aversions across global regions. The system will provide an evaluative score (ranging from low to high risk) along with concrete suggestions for content improvement.

CulturAI aims to prevent reputational damage to brands, reduce ineffective ad spending, optimize campaign adaptation before international rollout, and minimize dependency on costly cultural consultants. It has applications in international marketing, advertising, brand strategy, and global product launches, significantly enhancing pre-market evaluation efficiency, cross-cultural communication, and intelligent automation in creative industries.

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**RO.56.**

**Title EN**

**INSPEX+: Intelligent UAV-AR System for Automated Building Exterior Diagnostics and Data Standardization**

**Authors**

**George-Călin Baltariu, Florin-Alexandru Luca, Ion Șerbănoiu**

**Institution**

**Gheorghe Asachi Technical University of Iași**
**Transilvania University of Brașov**

**Description EN**

Building on previous research into UAV and AR integration for exterior building inspections, this project introduces INSPEX+, an intelligent system designed to automate condition assessment workflows and standardize diagnostic data across diverse structures and environments. The project expands the traditional UAV-AR approach by incorporating machine learning algorithms for real-time anomaly detection (e.g., cracks, discoloration, material fatigue) directly within the AR interface, allowing inspectors to receive automated insights during live UAV flights.
Additionally, INSPEX+ introduces a universal data schema for inspection outputs, enabling seamless reporting, archiving, and compliance with industry standards. The UAVs are equipped

with multi-sensor payloads (e.g., RGB, thermal, LiDAR), and the collected data is processed into high-fidelity 3D models enhanced with semantic labels through the AR interface. This allows for accurate defect tracking over time, facilitating predictive maintenance and heritage conservation efforts.
By addressing both the technical challenges of data acquisition and the need for standardized, actionable outputs, INSPEX+ sets a new benchmark for safe, scalable, and intelligent building diagnostics in architecture, engineering, and conservation domains.

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| **RO.57.** | |
| **Title EN** | **Smart Sensor-Based Data Acquisition Framework for ASLAM Platform Enhancement** |
| **Authors** | **George-Călin Baltariu, Florin-Alexandru Luca** |
| **Institution** | **Gheorghe Asachi Technical University of Iași**<br>**Transilvania University of Brașov** |
| **Description EN** | This project proposes the development of **SENSOIL**, a smart, scalable, and modular data acquisition framework designed to enhance the functionality of the ASLAM platform by enabling real-time, high-resolution soil and environmental data collection. Building upon ASLAM's existing capabilities in GIS, GPS, and VR-based visualization, SENSOIL introduces an integrated network of IoT-enabled soil sensors capable of capturing key parameters such as moisture, pH, temperature, and nutrient content.<br>The collected data will be automatically geo-tagged and uploaded to ASLAM's spatial database, providing users with up-to-date insights into land conditions and enabling advanced temporal analysis, predictive modeling, and personalized land management strategies. SENSOIL also includes a mobile companion app for manual data entry, photo uploads, and integration with low-cost citizen science tools to expand data coverage in underserved or remote regions.<br>By establishing a continuous feedback loop between on-the-ground conditions and the ASLAM platform's visualization and analysis tools, this project aims to **improve data quality, promote precision agriculture, and support sustainable land management decisions**. Furthermore, it sets the foundation for future AI-driven modules by ensuring the availability of rich, reliable, and granular field data. |

**RO.58.**

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|---|---|
| **Title EN** | **Organizational Sustainability: Neural Network Modeling for Probability-Based Scoring** |
| **Authors** | Ionut Viorel HERGHILIGIU[1/2], Ioan-Bogdan ROBU[2], Adrian VILCU[1], Marius PISLARU[1], Larisa-Victoria IVAȘCU[3], Ștefana-Cătălina POHONȚU-DRAGOMIR[1], Catalin Ioan BUDEANU[1] |
| **Institution** | [1]„Gheorghe Asachi" Technical University of Iasi, Romania<br>[2]„Alexandru Ioan Cuza" University of Iasi, Romania<br>[3]Polytechnic University of Timisoara, Romania |
| **Description EN** | Nowadays, organizations are increasingly seeking innovative approaches to assess and enhance their sustainability performance. This study investigates the application of artificial intelligence (AI), specifically neural networks, in developing a probabilistic evaluation model for organizational sustainability score. Unlike conventional assessment methods that depend on predetermined indicators - often prone to subjectivity - this research introduces a neural network framework capable of capturing the complex interplay between economic, social, and environmental dimensions. The empirical analysis is based on data from 30 companies listed on the Bucharest Stock Exchange. The model was implemented in MATLAB, employing a feed-forward neural network architecture with two hidden layers and trained using the Levenberg-Marquardt algorithm. Results reveal a mid-range sustainability probability score across the analyzed firms, suggesting a generally acceptable level of compliance, while also highlighting areas with potential for improvement. Notably, the social and environmental dimensions exert a greater influence on the final sustainability score compared to the economic aspect. These insights underscore the potential of AI-driven tools to enhance the objectivity and reliability of sustainability assessments. The study contributes to academic and managerial discourse by proposing a robust, data-centric methodology that supports AI-informed decision-making processes. |

# Lucian Blaga University of Sibiu

| RO.59. | |
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| **Title EN** | **Modular Mecanum Wheel Assembly Optimized for Traction on Sandy and Unstable Surfaces** |
| **Authors** | Aurel Mihail ȚÎȚU, Daniel BÂLC, Emanuel BÂLC |
| **Institution** | **Lucian Blaga University of Sibiu** |
| **Patent no.** | Patent Request in Progress |
| **Description EN** | This modular Mecanum wheel is specifically designed to ensure advanced mobility on low-traction surfaces or terrains that are traditionally challenging for this type of wheels, such as sand, gravel, or soft surfaces. Its modular design allows for rapid configuration and adaptation of individual components, providing a flexible solution for off-road applications or operations in difficult environments. Each roller is built using materials optimized for effective contact with sandy surfaces, featuring a profile that maximizes the contact area while minimizing sinking.<br>**(Prototype)** |

| RO.60. | |
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| **Title EN** | **Mecanum Wheel with Individual Flexring-Equipped Rollers for Vibration Damping and Enhanced Stability** |
| **Authors** | Daniel BÂLC, Aurel Mihail ȚÎȚU, Emanuel BÂLC |
| **Institution** | **Lucian Blaga University of Sibiu** |
| **Patent no.** | Patent Request in Progress |
| **Description EN** | This Mecanum wheel incorporates a damping component, based on the use of flexrings mounted on each individual roller. Flexrings are flexible structures that absorb vibrations generated by the rollers' contact with the rolling surface. This adaptation brings multiple benefits, especially for precision applications such as industrial robots or autonomous vehicles operating in vibration-prone environments or on uneven surfaces.<br>**(Prototype)** |

| RO.61. | |
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| **Title EN** | **Hybrid-Architecture Mecanum Wheel with Independently Actuated Rollers** |
| **Authors** | Emanuel BÂLC, Aurel Mihail ȚÎȚU, Daniel BÂLC |

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| **Institution** | **Lucian Blaga University of Sibiu** |
| **Patent no.** | Patent Request in Progress |
| **Description EN** | This Mecanum wheel represents a significant technological advancement by integrating an independent actuation system for the peripheral rollers. In traditional configurations, Mecanum wheel rollers are passive, rotating freely as the main wheel spins. In this hybrid wheel, each roller is equipped with its own actuation system, powered by a dedicated DC micro-motor capable of independently controlling the roller's speed and direction of rotation. **(Prototype)** |

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| **RO.62.** | |
| **Title EN** | **Autonomous parking drone** |
| **Authors** | Ionuț - Adrian ARMĂSĂREANU, Robert GRAUR, Radu Ioan ȘERB, Coordonator: Profesor Aurel Mihail ȚÎȚU |
| **Institution** | **Lucian Blaga University of Sibiu** |
| **Patent no.** | 2025 ULBS Scientific Research Project |
| **Description EN** | The project aims to develop a car-integrated robotic system capable of automatically identifying and occupying a parking space, reducing time and stress for drivers in congested areas. The idea started from the fact that in crowded cities it can be difficult to find a parking space. The autonomous parking drone is a small and efficient robotic system that can be integrated into a car and is automatically activated when the driver arrives in a high-traffic area or a large parking lot. Technical components include LIDAR sensors, GPS, 3D cameras, artificial intelligence algorithms for navigation and an efficient power system. The operating mechanism involves launching the drone from the car, searching for an empty space, assisting the car to park autonomously and returning to the vehicle. Advantages include reducing pollution and optimizing parking space, but there are technical challenges such as safety, battery range and weather conditions. Implementation involves three phases: hardware design, software development, prototype testing and improvements based on the results. Disadvantages include high costs, legal limits and autonomy, but these can be addressed in future versions of the product. In the future we also want to collaborate with shopping malls or airports to make it easier to find parking spaces in their parking lots. |

| RO.63. | |
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| **Title EN** | **Rim-integrated sensors for curb detection** |
| **Authors** | Marian Cătălin BĂLAN, Bogdan Gabriel CROITORU, Radu Marian MESIA, Coordonator: Profesor Aurel Mihail ȚÎȚU |
| **Institution** | **Lucian Blaga University of Sibiu** |
| **Patent no.** | 2025 ULBS Scientific Research Project |
| **Description EN** | The wheel-mounted sensors for detecting the distance to the curb represent a technological innovation designed to enhance the precision and safety of parking maneuvers. These sensors are integrated into the wheel structure and operate using advanced technologies such as ultrasound, radar, or LiDAR to detect, in real-time, the proximity of the curb or other obstacles near the wheels. By utilizing advanced data processing algorithms, the information collected by the sensors is transmitted to the vehicle's assistance systems, where it is analyzed and displayed as visual or acoustic warnings. Depending on the type of system used, the driver can receive detailed indications about the exact distance from the curb and the need to adjust the trajectory to avoid contact. These sensors can function independently or in combination with other safety systems, such as parking cameras and body-mounted proximity sensors. Their integration allows for more precise monitoring of the vehicle's position relative to surrounding obstacles, helping to reduce the risk of wheel damage. Additionally, the technology is designed to function efficiently in various weather conditions, providing accurate detection even in low visibility or on wet surfaces. The sensors are manufactured from materials resistant to external factors such as dust, water, and temperature variations, ensuring high durability and long-term reliable operation. |

| RO.64. | |
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| **Title EN** | **FingerPay** |
| **Authors** | Gabriel BANU, Ion-Dumitru BĂNĂȚEANU, Tudor Ioan ENCEA, Sebastian CÂRSTICA, Gabriel DODA, Dumitru BADIU, Coordonator: Profesor Aurel Mihail ȚÎȚU |
| **Institution** | **Lucian Blaga University of Sibiu** |
| **Patent no.** | 2025 ULBS Scientific Research Project |
| **Description EN** | FingerPay is an innovative payment method that uses fingerprint recognition to authorize transactions. It works by scanning the user's fingerprint, which is then compared with data stored in a secure system. If the fingerprint matches, the payment is instantly approved. |

| RO.65. | |
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| **Title EN** | **Innovative solar** |
| **Authors** | Daniel GOGOLOȘ, Ștefan NICORESCU, Nicoleta LUPU, Ilariana SPINCIU, Coordonator: Profesor Aurel Mihail ȚÎȚU |
| **Institution** | **Lucian Blaga University of Sibiu** |
| **Patent no.** | 2025 ULBS Scientific Research Project |
| **Description EN** | An innovative solar is an advanced agricultural structure designed to optimize plant growth through the use of modern technologies. It integrates smart solutions such as climate automation, efficient irrigation, solar panels and sustainable materials to ensure higher yields and reduced resource consumption. An essential element of such a solar is automated microclimate control. Smart sensors monitor temperature, humidity and light levels, automatically adjusting ventilation, shading systems and heating to maintain optimal growing conditions. For example, if the temperature rises too high, the system automatically opens windows or activates forced ventilation. Precision irrigation also reduces water consumption through methods such as drip or fine misting, giving plants exactly the amount they need without waste. Some solar are equipped with rainwater harvesting systems, further reducing environmental impact. Another important feature is the use of solar panels to supply electricity to automated systems. In this way, an innovative solar can become energy self-sufficient, reducing operational costs and dependence on traditional grids. In addition, modern materials such as UV-treated films or smart glass help improve photosynthesis efficiency and protect crops from extreme conditions. Some solar houses even include vertical growing or hydroponic technologies, increasing productivity on small areas. By combining these technologies, an innovative solar garden provides a sustainable, efficient and productive growing environment, contributing to modern agriculture and reducing environmental impact. |

| RO.66. | |
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| **Title EN** | **The wake-up bed** |
| **Authors** | Cristian-Andrei LOTREANU, Ionut-Madalin MOCOFANU, Andrei-Dumitru NANULESCU, Coordonator: Profesor Aurel Mihail ȚÎȚU |
| **Institution** | **Lucian Blaga University of Sibiu** |
| **Patent no.** | 2025 ULBS Scientific Research Project |
| **Description** | The wake-up bed is an innovative project for people who |

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| **EN** | have trouble waking up and sleep without hearing repeated alarms. We thought of such a project because we are part of that group of people who have trouble waking up in the morning and honestly it really gets annoying not being able to wake up when you need to. This can have negative effects both from a health point of view but it also has a great influence from other points of view: you are late for college, at work, you don't get to drop your children off at school on time and so on. This bed is made to save you from such unpleasant situations. |

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| **RO.67.** | |
| **Title EN** | **Automatic Tensioning System for Cargo Straps** |
| **Authors** | Bianca BUNESCU, Andreea PĂNĂZAN, Coordonator: Profesor Aurel Mihail ȚÎȚU |
| **Institution** | **Lucian Blaga University of Sibiu** |
| **Patent no.** | 2025 ULBS Scientific Research Project |
| **Description EN** | The invention is an automated system designed to tension securing straps used in cargo transport, with the main goal of increasing safety and efficiency in load securing operations. The system integrates a tension sensor mounted on the strap, a microcontroller that processes the data, and an electric motor that actuates the tensioning mechanism. At startup, the operator positions and manually pre-tightens the strap around the cargo. The system then continuously monitors the strap tension in real time. If the tension drops below the optimal value due to vibrations, shocks, or cargo shifting, the sensor sends a signal to the microcontroller, which activates the electric motor. The motor drives the tensioning mechanism to restore the correct tension level automatically, without human intervention. The system is equipped with a wireless communication module, allowing the operator to monitor the status remotely via a mobile application. It is ideal for road, maritime, or air transport, and can be configured safely even for fragile goods. The invention reduces the risk of cargo displacement, eliminates the need for frequent manual checks, and helps optimize the logistics process. |

| RO.68. | |
|---|---|
| **Title EN** | **Smart Container with Automated Climate Control for Flower Transport** |
| **Authors** | Andreea PĂNĂZAN, Bianca BUNESCU, Coordonator: Profesor Aurel Mihail ȚÎȚU |
| **Institution** | **Lucian Blaga University of Sibiu** |
| **Patent no.** | 2025 ULBS Scientific Research Project |
| **Description EN** | This invention presents a smart, fully automated container designed to ensure the safe transport of flowers, with the aim of preserving their freshness and quality throughout the entire journey. The container is equipped with integrated temperature and humidity sensors connected to a microcontroller, which processes the data and automatically controls the internal climate management equipment. At the start of the process, the operator places the flowers inside the container and sets the optimal temperature and humidity levels, tailored to the specific requirements of each flower type. The system continuously monitors the internal environment, and whenever it detects undesirable variations caused by external factors or handling, it sends a signal to the microcontroller. In response, the system activates the climate control units to restore the conditions to the pre-set values, without requiring manual intervention. The container is equipped with a wireless connection that enables remote monitoring of environmental parameters via a mobile application. It is perfectly suited for road, sea, or air transport and can be configured for a variety of delicate flower species. This system minimizes the risk of flower degradation, prevents losses due to inadequate transport conditions, and enhances the efficiency of the entire logistics chain dedicated to the floral industry. |

# Stefan cel Mare University of Suceava

| RO.69. | |
|---|---|
| **Title EN** | **HYBRID SOLAR SYSTEM WITH AUTOMATIC ADJUSTMENT** |
| **Authors** | **Visarion-Cătălin IFRIM, Ciprian BEJENAR, Constantin UNGUREANU, Laurențiu-Dan MILICI, Pavel ATĂNĂSOAE** |
| **Institution** | Stefan cel Mare University of Suceava |
| **Patent no.** | Patent Application No. A 2024 00274 |
| **Description EN** | Hybrid solar system with automatic adjustment, according to the invention, features an assembly consisting of solar panels intended for the production of electricity and heat, joined through thermo-mechanical actuators and elastic parts, which is why, the system supports the adaptive modification of the shape and operating regime, without external intervention, so that, in summer the production of electrical energy is facilitated, in winter the production of thermal energy is facilitated, and in spring and autumn it allows the simultaneous production of electricity and heat. |

| RO.70. | |
|---|---|
| **Title EN** | **METHOD AND SYSTEM FOR INCREASING HEATING POWER** |
| **Authors** | **Ciprian BEJENAR, Marian BEJENAR, Andrei-Dumitru NAȘCU, Daniel HRIȚCAN, Vasile-Eusebiu TOADER, Laurențiu-Dan MILICI** |
| **Institution** | Stefan cel Mare University of Suceava |
| **Patent no.** | Patent Application No. A 2025 00092 |
| **Description EN** | Method and system for increasing heating power, according to the invention, features a strategy and a digital command/control path, of the direct current passed through non-ideal heating elements, of the resistive-inductive (RL) type, based on a pulse modulation technique, to modify the effective value of the electric current without varying the amplitude of the electric voltage, which improves the regulation linearity of the systems that implement it. |

| RO.71. | |
|---|---|
| **Title EN** | **SYSTEM FOR SAVING LOW-BEAM LIGHT SOURCES AND METHOD FOR ADJUSTMENT** |
| **Authors** | **Gheorghiță-Stelian MIHĂILESCU, Ciprian BEJENAR, Laurențiu-Dan MILICI, Ștefan-Bogdan DULGHERU, Radu-Dumitru PENTIUC, Pavel ATĂNĂSOAE** |
| **Institution** | Stefan cel Mare University of Suceava |
| **Patent no.** | Patent Application No. A 2024 00331 |
| **Description EN** | System for saving low-beam light sources and method for adjustment, according to the invention, features the completion of the electrical circuit for powering adjustable low-beam lamps, so that it allows for fine and precise limitation of the electrical power supply depending on the external light, to extend the life of existing light sources and eliminate daytime running lights, while ensuring maximum visibility among traffic participants, in any driving condition that requires the use of the low-beam of equipped vehicles |

| RO.72. | |
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| **Title EN** | **DYNAMICALLY ADJUSTABLE SUNSHADE SYSTEM FOR VEHICLE WINDSHIELDS** |
| **Authors** | **Ciprian BEJENAR, Alexandru LEONTE, Laurentiu Dan MILICI, Andrei Emanuel PASCAN, Mihai DIMIAN, Daniela IRIMIA, Constantin UNGUREANU, Ciprian AFANASOV** |
| **Institution** | Stefan cel Mare University of Suceava |
| **Patent no.** | Patent Application No. A 2024 00274 |
| **Description EN** | The sunshade system with dynamic adjustment for vehicle windshields involves gradually controlled shading, in the vertical plane of the windshield, by progressively powering the elements arranged in layers in a package of films, transparent when not powered and opaque when powered, both manually, depending on the user's wishes, and automatically, depending on the elevation angle of the sun and the vehicle relative to the horizontal plane, so as to provide a distinct alternative for creating sunshades next to the vehicle windshield. |

# „Grigore T. Popa" University of Medicine and Pharmacy Iasi, Romania

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| **RO.73.** | |
| **Title EN** | **AI in Teledermatology for Infectious Diseases Diagnosis** |
| **Authors** | Alba Gómez de la Flor[1,2], Corciovă Călin[1], Luca Cătălina[1] |
| **Institution** | **[1]„Grigore T Popa" University of Medicine and Pharmacy Iasi, Romania , Faculty of Medical Bioengineering**<br>**[2]Computer Science School, UNED, Madrid (Spain), PhyUM Research Center, Artificial Intelligence Department** |
| **Patent no.** | - |
| **Description EN** | Neglected tropical diseases (NTDs) affect millions of people in low-resource locations, where access to specialized healthcare is limited. Teledermatology is a promising solution for having earlier diagnosis and management of dermatological conditions. This study presents the development of a teledermatology platform integrating software and hardware components for the classification of infectious and non-infectious skin diseases. The system includes an image analysis module using artificial intelligence (AI) techniques and an imaging device for standardized data acquisition. The project is carried out in collaboration with Fundación Anesvad, aiming to improve dermatological care and have an impact in the real world. Preliminary results indicate improved diagnostic accuracy and feasibility in remote healthcare clinics. Future work will focus on expanding the dataset and optimizing the AI-algorithm performance for deployment in sub-Saharan Africa. |

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| **RO.74.** | |
| **Title EN** | **Navigation Aid for Visually Impaired Persons** |
| **Authors** | Cozma Teodor-Cristian, Ciornei Claudiu-Ilie, Andrițoi Doru Ionuț |
| **Institution** | **„Grigore T. Popa" University of Medicine and Pharmacy Iasi, Romania , Faculty of Medical Bioengineering** |
| **Patent no.** | |
| **Description EN** | According to the World Health Organization (WHO), there are approximately 43 million people who are blind, either completely or with severely poor eyesight, globally. This emphasizes the growing need for assistive technology that |

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| | can make visually impaired individuals' lives better. The proposed device bridges this gap by employing a LiDAR sensor, which is more precise with faster response times compared to traditional ultrasonic sensors.<br>Data from LiDAR sensor is processed by a microcontroller that causes a buzzer to generate audio signals. The audio signals vary in pitch based on the range of obstacles sensed, providing the user with real-time, easy-to-understand feedback. The wearable gadget is designed to be worn on the forehead, with an adjustable angle in order to maximize its range of detection as well as provide wider spatial awareness.<br>This device enables users to travel more independently in indoor environments and less rely on guides or other mobility devices. Through accurate detection of obstacles and timely signals, the device should significantly improve the independence and quality of life of individuals who are blind or highly visually impaired. |
| **RO.75.** | |
| **Title EN** | **New systems used in motor skills recovery in patients with ASD** |
| **Authors** | Iustina Condurache, Cezar Mucileanu, Irina Duduca, Cătălin Ionițe, Marina Rotariu |
| **Institution** | **„Grigore T. Popa" University of Medicine and Pharmacy Iasi, Romania, Faculty of Medical Bioengineering** |
| **Patent no.** | - |
| **Description EN** | Autism spectrum disorder (ASD) manifests as a neurodevelopmental condition, characterized by persistent deficits in social communication and interaction, alongside repetitive and restricted behaviors, interests, or activities. Symptoms, with onset in early childhood and significant variability between individuals, generate a heterogeneous clinical presentation. The impact of ASD extends throughout life, affecting essential domains of functioning, including social and occupational aspects. Early identification and early intervention are crucial for mitigating difficulties, optimizing outcomes, and improving the quality of life for individuals with ASD.<br>In the context of the limitations of traditional pharmacological treatments, which can associate significant side effects, educational therapies and occupational therapy |

emerge as promising non-pharmacological alternatives. These approaches aim to ameliorate symptomatology and develop social, cognitive, and emotional skills, minimizing the risks associated with pharmacological interventions.
The present work aims to highlight a series of devices and activities specific to occupational therapy, integrated with educational therapies, that contribute to improving the quality of life of patients diagnosed with ASD.

Educational therapies and occupational therapy are appreciated for their adaptability to various educational and clinical contexts. The results suggest a significant potential of these therapies as viable alternatives or complements to standard pharmacological treatments, justifying the expansion of their application and further study in broader therapeutic contexts.

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**RO.76.**

**Title EN**

**Intelligent Blanket with Embedded Neuromuscular Stimulation System**

**Authors**

Corciovă Călin, Fuior Robert, Luca Cătălina

**Institution**

**„Grigore T. Popa" University of Medicine and Pharmacy Iasi, Romania, Faculty of Medical Bioengineering**

**Patent no.**

**Description EN**

The present project proposes the design and realization of a smart blanket with a built-in neuromuscular stimulation system (NMES), aiming to support muscle recovery and prevent atrophy in patients with limited mobility. The device integrates flexible textile electrodes and biometric sensors in a comfortable, easily adaptable material for long-term use in the clinical environment or at home. The system is controlled through a wireless interface, which allows the stimulation protocol to be customized according to the individual needs of the user. Preliminary tests have highlighted the effectiveness of the stimulation in activating peripheral muscles and a high level of perceived comfort during use. In addition to the direct benefits in neuromotor rehabilitation, the device has potential applications in other areas, such as elderly care, sports performance support through active recovery, as well as in telemedicine and remote monitoring scenarios. In the future, we aim to integrate intelligent algorithms for automatic therapy adaptation, extend functionalities through IoT connectivity, and validate the effectiveness on a large clinical sample. Thus, the proposed

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| | smart blanket represents a promising step towards the development of interactive textile solutions with significant impact in the healthcare field. |

| **RO.77.** | |
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| **Title EN** | **Device for detecting and reducing panic attacks** |
| **Authors** | Robert Fuior, Cătălina Luca, Andra-Cristiana Băeșu, Călin Corciovă |
| **Institution** | **„Grigore T. Popa" University of Medicine and Pharmacy Iasi, Romania , Faculty of Medical Bioengineering** |
| **Patent no.** | - |
| **Description EN** | The main objective of the project is to help people who suffer from panic attacks through an innovative device that detects early signs of panic attacks and provides interventions to reduce their intensity. The device monitors physiological signals, such as heart rate and sweating, through electrocardiogram (ECG) and galvanic skin resistance (GSR), and uses this data to identify the onset of a panic attack. When the characteristic signs of an attack are detected, the device can alert the user and provide personalized recommendations, including breathing and relaxation techniques. Another important element of the project is the integration of machine learning algorithms, which allow the device to adapt to the individual needs of the user, personalizing interventions to be more effective. In this way, users can learn to better recognize and manage the symptoms of panic attacks, improving their quality of life The ultimate goal of the project is to provide a discreet and effective solution that helps prevent and reduce panic attacks, contributing to increasing the autonomy and mental well-being of those affected. |

| **RO.78.** | |
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| **Title EN** | **Innovative Separation of Valeric Acid Using Ionic Liquids: A Sustainable Approach** |
| **Authors** | Alexandra Cristina Blaga, 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** |
| **Patent no.** | |
| **Description** | Valeric acid (VA), or pentanoic acid ($C_5H_{10}O_2$), is a straight- |

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| **EN** | chain carboxylic acid with a strong, unpleasant odor, found naturally in both free and esterified forms in plants and animals. Due to its fruity aroma, VA and its esters are valuable intermediates in the fragrance, cosmetic, pharmaceutical, and food industries.<br>This study presents an innovative method for VA separation using a hydrophobic ionic liquid, tri-hexyl-tetra-decyl-phosphonium decanoate ([P6,6,6,14][Phos]), as an effective extractant. The system was optimized by mixing [P6,6,6,14][Phos] with heptane, a physical solvent, to achieve an extraction yield of 99.65%. The organic phase is regenerated at 50°C using sodium hydroxide, enabling both VA recovery and extractant regeneration.<br>This process offers a sustainable and efficient approach for VA separation, with the potential for use in bio-based chemical production. |

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| **RO.79.** | |
| **Title EN** | **Novel Efficient Extraction of Mandelic Acid Using Ionic Liquids** |
| **Authors** | Alexandra Cristina Blaga, 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** |
| **Patent no.** | |
| **Description EN** | Mandelic acid, an aromatic alpha-hydroxycarboxylic acid derived from bitter almonds, is widely used in pharmaceuticals, cosmetics, and the chemical industry. It serves as a precursor for antibiotics and drugs and is a preferred ingredient in skincare for treating acne, wrinkles, and photoaging due to its gentler, less irritating effects compared to glycolic acid.<br>This study presents an innovative extraction method for mandelic acid using a hydrophobic ionic liquid, tri-hexyl-tetra-decyl-phosphonium decanoate ([P6,6,6,14][Phos]), as an effective extractant. A solvent mixture of heptane and 120 g/L [P6,6,6,14][Phos] was optimized, achieving a high extraction yield of 96.36%. The organic phase is regenerated at 45°C using sodium hydroxide, enabling the recovery of mandelic acid and the simultaneous regeneration of the extractant. |

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| | The proposed extraction system represents a promising alternative for the efficient recovery of mandelic acid, with potential applications in both industrial and cosmetic processes. |

| **RO.80.** | |
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| **Title EN** | **New design for lactic fermentation management** |
| **Authors** | Mădălina Poștaru[1], Delia Turcov[1], Alexandra Tucaliuc[2], Dan Cașcaval[2], Anca-Irina Galaction[1] |
| **Institution** | **[1]"Grigore T. Popa" University of Medicine and Pharmacy of Iasi, Faculty of Medical Bioengineering** **[2]"Gheorghe Asachi" Technical University of Iasi, "** |
| **Patent no.** | |
| **Description EN** | Lactic acid fermentation is an anaerobic biochemical process in which carbohydrates are converted by lactic acid bacteria into cellular energy, and the resulting metabolite is lactic acid. Lactic acid is widely used in the chemical industry as a raw material for the production of lactate ester, propylene glycol, 2,3-pentanedione, propionic acid, acrylic acid, acetaldehyde and dilactide, or in the food, cosmetic, pharmaceutical industries as a preservative. Depending on the type of bacteria and medium culture design, the fermentation process can be homofermentative or heterofermentative. The experiment aimed to identify microorganisms that lead to a higher amount of metabolite so that the process can be monitored and optimized intelligently. According with the chemical reaction stoichiometry, the enzymes involved in the process and the presence of specific inhibitors, the study indicated that Lactobacillus bulgaricus and Streptococcus termophilus are the microorganisms that lead to the largest amount of lactic acid. |

| **RO.81.** | |
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| **Title EN** | **Decoding Atopic Dermatitis Formulations: A New Data-driven Analysis of Ingredient Profiles, Biotechnological Innovation and Medical Engineering Integration** |
| **Authors** | Delia Turcov, Mădălina Poștaru, 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** | Modern dermatocosmetics represent a rapidly evolving field, |

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| **EN** | driven by advancements in biotechnology, medical engineering and a deeper understanding of skin physiology. This study presents a comprehensive, data-driven analysis of the ingredient composition of 12 distinct dermatocosmetic products formulated for atopic dermatitis.<br>The analysis goes beyond basic ingredient identification to "decode" formulation approaches, evaluating the presence and role of key ingredient categories. Furthermore, the investigation explores the incorporation of biotechnological innovations, such as peptides and pre/pro/postbiotics, and discusses the potential integration of medical engineering principles in delivery systems. Other investigated aspects were comparison across all products, claimed efficacy and supporting data, scientific rigor, medical engineering applications. The study provide valuable insights into the formulation trends, common practices, and innovative strategies employed in developing products for atopic dermatitis, highlighting the interplay of cosmetic science, biotechnology, and advanced delivery technologies. The findings will be of interest to dermatologists, cosmetic scientists, industry professionals and consumers seeking evidence-based information about dermatocosmetic products. Further research into optimizing delivery systems, microbiome modulation, and ingredient synergies, especially those derived through biotechnology, is essential for developing more effective and personalized treatments. |

| **RO.82.** | |
|---|---|
| **Title EN** | **Seeds of Defense: Unlocking the Power of Plant-Based Bioactives** |
| **Authors** | Șerban-Teodor Ghermănescu, Delia-Lorena Leontescu, Mădălina Poștaru, Marin Zagnat, Delia Turcov, Anca-Irina Galaction |
| **Institution** | **„Grigore T. Popa" University of Medicine and Pharmacy Iasi, Romania, Faculty of Medical Bioengineering** |
| **Patent no.** | |
| **Description EN** | Antibiotic resistance is a global problem that has attracted increased attention in recent years. Many of the clinically relevant bacteria have developed antibiotic resistance, and this is becoming one of the major public health threats. Natural extracts, which are valuable sources of bioactive compounds, mainly polyphenols, play an important role in the formation of a new strategy to combat pathogenic |

microorganisms. In addition to well-known antioxidant activity, polyphenols can also exhibit antibacterial, antifungal, anti-inflammatory and anticancer effects.
The study aimed to determine the antibacterial activity of flavonoids contained in two natural extracts, flax seeds (Linum usitatissimum) and walnut kernels (Juglans regia L.), obtained by solid-liquid extraction (SLE) and microwave-assisted extraction (MAE). The Kirby-Bauer diffusion method was used to investigate the antimicrobial activity of the obtained flavonoid extracts, the results highlighting a strong exerted antibacterial effect, even after 48 hours of contact with the Lactobacillus cell culture.

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**RO.83.**

**Title EN**

**New Method of Itaconic Acid Separation from fermentation broth**

**Authors**

Alexandra Tucaliuc[1], Lenuța Kloetzer[1], Alexandra Cristina Blaga[1], Dan Cașcaval[1], Mădălina Poștaru[2], Anca Irina Galaction[2]

**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 invention refers to itaconic acid recovery from fermentation media produced by fungus using reactive extraction which underscores the importance of optimizing both fermentation and downstream extraction processes. The most efficient system for extracting itaconic acid from broths produced by Aspergillus terreus (ATCC® 32588™) was TOA dissolved in dichloromethane with 20% 1-octanol reaching an impressive 97% extraction degree. An alternative system involving TOA with n-heptane and 20% 1-octanol yielded a lower extraction degree (67%) but offers a main advantage of low toxicity to microorganisms. Therefore, the results of this study offer a viable pathway for in situ reactive extraction using a non-polar solvent and a phase modifier system.

| RO.84. | |
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| **Title EN** | **Hand Rehabilitation with VR and Computer Vision - RehabKnight** |
| **Authors** | Constantin Baba Taiki, Andrei Gheorghita, Mihai Ilea, Iustina Condurache, Cezar Mucileanu, Marius Turnea, Mariana Rotariu |
| **Institution** | **„Grigore T. Popa" University of Medicine and Pharmacy Iasi, Romania, Faculty of Medical Bioengineering** |
| **Patent no.** | |
| **Description EN** | The integration of advanced technologies such as virtual reality (VR) and three-dimensional (3D) interactive systems has led to the development of rehabilitation games designed to facilitate motor recovery in stroke survivors. These systems utilize structured, repetitive exercises to restore hand and arm mobility. By incorporating real-time computer vision and hand-tracking technology, the system detects when a user forms a fist, triggering a virtual spacebar press. This gesture-based input reinforces essential motor functions by promoting the repetitive opening and closing of the hand, a fundamental movement in post-stroke rehabilitation.<br>The application of gamification in rehabilitation enhances patient engagement, motivation, and adherence to therapy. Furthermore, a built-in delay mechanism ensures precise gesture recognition, minimizing unintended activations and improving overall system responsiveness. By merging assistive technology with rehabilitation strategies, such interactive digital tools offer an accessible, intuitive, and immersive approach to motor skill recovery. This convergence of technology and therapy underscores the potential of digital interventions in advancing physical rehabilitation outcomes for stroke patients. |

| RO.85. | |
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| **Title EN** | **AI-Powered Holographic Virtual Teacher - Innovation in Education** |
| **Authors** | Andrei Gheorghita, Artemie Manoliu, Victor Vicol, Irina Duduca, Mariana Rotariu, Marius Turnea |
| **Institution** | **„Grigore T. Popa" University of Medicine and Pharmacy Iasi, Romania, Faculty of Medical Bioengineering** |
| **Patent no.** | |
| **Description** | Our innovative project, "Holographic Virtual Teacher," |

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| **EN** | provides a revolutionary solution for education by integrating a holographic interface with artificial intelligence software that offers continuous educational support to students. Utilizing a holographic device, the image projection of the teacher becomes accessible in a captivating and interactive format. This hologram, always available, can deliver relevant information about the university, the subjects taught, and other essential aspects of student life.<br>Students can interact with the hologram similar to a real human, receiving answers to predefined questions or requesting additional information about courses, educational resources, or extracurricular activities. This modern approach not only enhances accessibility to information but also fosters a more dynamic and engaging learning environment. Through this project, we aim to bridge the gap between students and educational resources, eliminating traditional communication barriers. Teachers thus become ever-present, ready to address students challenges and inquiries. With the "Holographic Virtual Teacher," we ensure a quality education tailored to the current needs of the digital generation. |

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| **RO.86.** | |
| **Title EN** | **The Role of Virtual Reality, Medical Imaging, and 3D Modeling in Complex Surgical Planning and Ultrasound-Based Fetal Reconstruction** |
| **Authors** | Andrei Gheorghiță[1], Ana-Maria Sticleț[3], Lavinia-Maria Luca[2], Florian-Cosmin Manea[1], Florin-Bogdan Popa[1], Loredana Toma[1] |
| **Institution** | **[1]„Grigore T. Popa" University of Medicine and Pharmacy Iasi, Romania, Faculty of Medical Bioengineering**<br>**[2]"Alexandru Ioan Cuza" University of Iasi**<br>**[3]"Gheorghe Asachi" Technical University of Iasi** |
| **Patent no.** | |
| **Description EN** | The integration of advanced technologies such as virtual reality (VR) and three-dimensional (3D) printing, also known as additive manufacturing, is transforming the planning and execution of complex surgical procedures. VR facilitates immersive 3D visualization, which is instrumental in preoperative planning and surgical simulation. By providing an enhanced spatial understanding of patient- |

specific anatomy, VR contributes to improved surgical proficiency and a reduction in intraoperative complications, as surgeons can better anticipate procedural challenges.
In parallel, 3D printing enables the fabrication of anatomically accurate patient-specific models derived from medical imaging modalities such as computed tomography (CT), magnetic resonance imaging (MRI), and ultrasound. Models generated from CT and MRI scans are particularly beneficial for comprehending intricate anatomical structures and complex pathologies, thereby enhancing preoperative preparation, especially in rare or high-risk surgical cases. Additionally, ultrasound-based data facilitate the creation of detailed fetal models, which have applications in prenatal diagnostics and parental visualization.
The use of patient-specific 3D-printed models significantly enhances surgical precision by enabling meticulous preoperative planning, ultimately improving procedural accuracy and mitigating operative risks. The convergence of VR and 3D printing represents a major advancement in contemporary surgical practice, fostering increased precision, operational efficiency, and personalized patient care. This technological integration underscores a paradigm shift in modern surgery, offering substantial benefits to both clinicians and patients.

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| **RO.87.** | |
| **Title EN** | **A new model for selecting sports equipment for winter sports based on biomechanical analysis and skeletal system conditions** |
| **Authors** | Cătălin Ionițe, Iustina Condurache, Cezar Mucileanu, Irina Duduca, Marina Rotariu |
| **Institution** | **„Grigore T. Popa" University of Medicine and Pharmacy Iasi, Romania, Faculty of Medical Bioengineering** |
| **Patent no.** | - |
| **Description EN** | Winter sports, such as skiing and snowboarding, have become increasingly popular among all age groups, with the growing interest in these activities. This trend has led to a higher incidence of injuries and associated pathologies.<br>Skiing and snowboarding generate vibrations at the equipment level, which propagate along the kinetic chain and can have both beneficial and adverse effects on the health of the musculoskeletal system. |

The study aimed to compare the vibrations felt by professional and non-professional athletes, determining which of the two sports generates higher levels of vibrations and analyzing their impact. The research was conducted in field conditions, using sensors to measure vibrations at the ski and snowboard level (tip/nose and tail), as well as sensors placed at the ankle level.
The results indicated a higher level of vibrations recorded during skiing, compared to snowboarding.
In the context of Whole-Body Vibration (WBV), controlled exposure to vibration can influence bone density. Thus, in young people, snowboarding could stimulate an increase in bone quality and quantity, while in older people, skiing offers a protective effect on the bone system by controlled propagation of vibrations along the kinetic chain.
Depending on the characteristics of the individual skeletal system, appropriately produced vibrations can contribute to an increase in bone density. However, in older people, uncontrolled exposure to vibration can have adverse effects on the health of the musculoskeletal system.

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**RO.88.**

**Title EN**

**A Customizable 3D-Printed Exoskeleton for Accessible Rehabilitation in Pediatric Paraplegia**

**Authors**

Florian-Cosmin Manea, Florin-Bogdan Popa, Mihnea-Daniel Nastasă, Vasile Raischii, Ana-Maria Vizitiu, Andreea Iosub, Robert Fuior, Călin Corciovă

**Institution**

**„Grigore T. Popa" University of Medicine and Pharmacy Iasi, Romania, Faculty of Medical Bioengineering**

**Patent no.**

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**Description EN**

This project details the development of a novel exoskeleton system conceived for pediatric paraplegia rehabilitation. Utilizing additive manufacturing (3D printing), the design facilitates the production of lightweight and highly customizable components, enabling patient-specific anatomical conformity. To ensure maximal stability and safety during therapeutic interventions, the exoskeleton is configured for stationery mounting on a fixed frame, contrasting with conventional ambulatory systems and providing a secure base for rehabilitation exercises.
Lower limb actuation is accomplished via integrated stepper motors, delivering controlled, active mobilization. An

electronic control architecture permits precise trajectory management, allowing clinicians to execute specific kinematic patterns according to predefined therapeutic protocols. The synergistic application of additive manufacturing for bespoke components and stepper motor-based actuation contributes to substantial cost reduction. Consequently, this system represents a cost-effective and potentially broadly accessible rehabilitation modality, engineered to enhance active range of motion in the lower extremities and support neuromuscular recovery in pediatric populations with paraplegia.

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**RO.89.**

**Title EN** **System for Assessing and Recovering Hand Mobility**

**Authors** Andreea Matei, Andreea-Larisa Țiploiu, Flavia-Iuliana Neculai, Mădălin Geru

**Institution** **„Grigore T. Popa" University of Medicine and Pharmacy Iasi, Romania, Faculty of Medical Bioengineering**

**Patent no.** -

**Description EN**

The hand represents the most complex limb segment in the human body because of its structural and functional adaptation to human activities. Hand injuries, which are on the rise, can cause significant disabilities and affect quality of life. In this context, we have proposed a solution to facilitate rehabilitation. Our system consists of hardware that allows us to evaluate the user's hand mobility and software that consists of two applications that guide the user through the evaluation procedure and therapeutic plan. Our main goal is to record the degrees of finger mobility relative to a reference point, compare them with physiological parameters, and finally transmit the data to two applications. Signal recording is carried out using accelerometer and gyroscope sensors. Data acquisition is done through the Arduino Mega development platform, then interpreted by specially designed software and transmitted via a Bluetooth module to the smartphone application. When the recorded values deviate from physiological parameters, a visual, intuitive response is triggered, as well as a response in the software application, indicating exactly where the movement deficit was detected. The treatment aspect is also addressed through the design of a secondary application aimed at engaging the user in a therapeutic game to support and encourage rehabilitation in an intuitive and enjoyable way.

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| **RO.90.** | |
| **Title EN** | **Virtual Reality Stress and Its Impact on Eating Behavior** |
| **Authors** | Cristiana A. Onița, Daniela-Viorelia Matei, Veronica Mocanu, Elena Chelarașu, Robert Fuior, Călin Corciovă, Stéphane Bouchard |
| **Institution** | **„Grigore T. Popa" University of Medicine and Pharmacy Iasi, Romania, Faculty of Medical Bioengineering** |
| **Patent no.** | **-** |
| **Description EN** | This study aims to investigate psychological and physiological responses of the autonomic nervous system to laboratory-induced stress in obese adolescents. It also explores how virtual stress influences eating behavior and evaluates the potential of virtual reality (VR) education to reduce anxiety and improve control over food consumption. This study involved 25 volunteer adolescents exposed to a virtual reality stressor based on the Trier Social Stress Test. Participants were immersed in a virtual classroom where they performed a speech and arithmetic task designed to induce stress. Stress levels will be evaluated using salivary cortisol samples and the Perceived Stress Scale (PSS). Immediately after the stress induction, participants completed a brief questionnaire assessing their levels of anxiety, stress, and food cravings, including specific cravings for sweet foods. They were then immersed in a virtual supermarket, where they selected the foods they craved. The choices, types, and quantities of food were recorded. Throughout the entire procedure, physiological data—including electrocardiograms, respiratory activity, electrodermal responses, and plethysmography—were continuously monitored to evaluate autonomic nervous system responses. This study aimed to clarify the link between stress and eating behavior in obese adolescents and to assess the role of virtual reality interventions in managing food cravings and emotional eating. |

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| **RO.91.** | |
| **Title EN** | **Environmental method for enhancing seed germination based on plasma exposure at atmospheric pressure** |
| **Authors** | Bianca Dumitrita Tatarcan[1], Ramona Huzum[2], Marian Burducea[3], Constantin Lungoci[4], Andrei Vasile Nastuta[1] |
| **Institution** | **[1]„Grigore T. Popa" University of Medicine and Pharmacy Iasi, Romania, Faculty of Medical** |

**Bioengineering.**
**[2]"Alexandru Ioan Cuza" University of Iași, Iasi, Romania, Interdisciplinary Research Institute, Integrated Center of Environmental Science Studies in the North Eastern Region (CERNESIM).**
**"Alexandru Ioan Cuza" University of Iași, Romania.**
**[3]Research and Development Station for Aquaculture and Aquatic Ecology.**
**[4]University of Life Sciences, Iasi, Romania Department of Plant Science, Iasi**

**Patent no.** 0

**Description EN**

An illustration of a technology capable of advancing sustainable agriculture is the application of atmospheric pressure plasma for seed treatment prior to sowing. This approach has significant promise. This study specifically investigates the germination of wheat seeds (Triticum aestivum L.). This study aims to examine the effects of plasma therapy, both direct and indirect via plasma-activated water, on wheat seedlings and to analyze those effects. Helium and argon served as the operational gases employed for plasma ignition during the procedure. The identification of nitrogen and oxygen reactive species in the environment was facilitated by the investigation of the species that were generated. A study on the germination and growth of the plant over fourteen days, corresponding to the wheat grass stage, was successfully conducted. The biochemical investigation of wheat grass revealed that plasma-treated variants had elevated levels of chlorophyll, flavonoids, and polyphenols. Nonetheless, there was no alteration in the quantity of soluble protein, the antioxidant activity, or the coloration [1]. All of these elements remained unchanged.

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**RO.92.**

**Title EN** **The design, 3D printing, and experimental validation of a static contact angle measurement device for the study of surface energy of materials**

**Authors** Florian Cosmin Manea, Florin Bogdan Popa, Sara Farauanu, Bianca Mihalea, Vasile Raischii, Bianca Dumitrița Tatarcan, Andrei Vasile Năstuță

**Institution** **„Grigore T. Popa" University of Medicine and Pharmacy Iasi, Romania, Faculty of Medical Bioengineering**

**Patent no.**

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| **Description EN** | A method for studying surfaces that allows us to access the surface energy of a material is the contact angle method. In this study, we propose using an experimental arrangement designed and 3D printed to study the contact angle. Addressing the need for accessible analysis, an innovative system utilizes a cost-effective 3D-printed device specifically designed for precise, reproducible contact angle measurements on diverse polymer surfaces. The arrangement involves a base structure, a smartphone, a holder for positioning the sample to be analyzed, a holder for the syringe, and a holder for the light source. This investigation employed the usage of the sessile drop technique, comparing the 3D-printed device against classical methods using common polymers like PLA, TPU, and PETG, with distilled water and glycerin as test liquids. After acquiring images of the liquid droplets on the studied surfaces, an open-source program is used to determine the contact angle value, as well as a calculation program to determine the work of adhesion in the case of using two liquids. The entire setup is compact and portable, thanks to its ergonomic design and small dimensions. It will simplify advanced material analysis, potentially accelerating innovation cycles in bioengineering, nanotechnology, and materials science by enabling rapid prototyping and optimization of surface interactions. We expect the proposed device to have a positive impact on the learning process of the contact angle measurement method due to its ease of assembly and use, as well as the reduced production costs. |

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| **RO.93.** | |
| **Title EN** | **"Combined Quadriceps Electrostimulation and Continuous Passive Motion Therapy in Postoperative Knee Rehabilitation: A Multimodal Approach to Enhance Recovery"** |
| **Authors** | Ilie Onu, Anca-Irina Galaction, Ana Onu, Daniela Matei |
| **Institution** | **„Grigore T. Popa" University of Medicine and Pharmacy Iasi, Romania, Faculty of Medical Bioengineering** |
| **Patent no.** | |
| **Description EN** | This study explores the effectiveness of a combined therapy approach in the early postoperative rehabilitation of patients after knee surgery. The therapeutic protocol integrates neuromuscular electrical stimulation of the quadriceps |

(NMES) with continuous passive motion (CPM) using a device developed in our laboratory. The innovation consists of synchronizing both modalities through a sensor-based feedback system. Specifically, a rotation sensor mounted on the Kinetec CPM device detects changes in joint angle and activates a series of electrical pulses to the quadriceps during maximum knee extension. When the device transitions to flexion, the stimulation intensity is gradually reduced until the pulses stop. This model of adaptive stimulation aims to optimize neuromuscular engagement during critical phases of joint movement, prevent early muscle atrophy, and improve functional recovery without overloading healing tissues. The combined therapy protocol supports early mobilization while maintaining muscle tone and joint nourishment, offering a promising alternative to traditional rehabilitation protocols in the acute postoperative phase.

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| **RO.94.** | |
| **Title EN** | **Intelligent Support and Medication Adherence System for Alzheimer's Care** |
| **Authors** | Eduard-Dănuț Pintilei, Robert Fuior, Călin Corciovă |
| **Institution** | **„Grigore T. Popa" University of Medicine and Pharmacy Iasi, Romania, Faculty of Medical Bioengineering** |
| **Patent no.** | - |
| **Description EN** | Omitting or incorrectly administering treatment can contribute to accelerating cognitive decline and worsening symptoms of Alzheimer's disease. Thus, maintaining rigorous therapeutic adherence represents an essential factor in the efficient management of Alzheimer's disease. The proposed solution aims to design and develop an automatic, intelligent medication dispensing device that follows treatment schedules established by healthcare specialists. The system uses servomotors to release medications from storage compartments and optical sensors to detect dispensed doses. Patients are alerted to medication times through alarms and guidance messages on an LCD display. The device connects via Bluetooth to a smartphone, which is used to set administration schedules. The testing shows the system functions according to expectations and effectively addresses problems caused by non-adherence to medication regimens. |

**RO.95.**

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|---|---|
| **Title EN** | **Single-Channel Electronic Device for ECG Signal Simulation** |
| **Authors** | Mihai Aron[1,2], Betina-Mihaela Melinte[1,3], Teofil Ilie Ursache[1,3], Gabriela-Gladiola Petroiu[1], Cristian Rotariu[1] |
| **Institution** | **1. „Grigore T. Popa" University of Medicine and Pharmacy Iasi, Romania, Faculty of Medical Bioengineering**<br>**2. Gheorghe Asachi Technical University, Faculty of Automatic Control and Computer Engineering**<br>**3. Gheorghe Asachi Technical University, Faculty of Electronics, Telecommunications and Information Technology** |
| **Patent no.** | |
| **Description EN** | Electrocardiography (ECG) plays a fundamental role in diagnosing and monitoring heart conditions. The main purpose of an ECG signal generator is to recreate ECG waveforms in order to simulate certain physiological conditions of a patient. Such a device can serve as a guideline for calibrating acquisition and processing systems or training students in analyzing and interpreting ECG signals.<br>This proposed device represents a portable, single-channel ECG signal generator built with an Arduino UNO R4 WiFi development board, which contains the Renesas RA4M1 32-bit microcontroller, and a custom designed shield, capable of attenuating the generated signal with 60dB. The generated signal is reconstructed with 500 samples/sec, and with a resolution of 12 bits/sample.<br>The device uses a set of normal and arrhythmic ECG signals, which are transmitted to the generator from the PC via USB. The signals are loaded and modified through an application developed in MATLAB. This application can generate signals with or without noise, with a heart rate ranging from 40 BPM to 100 BPM and amplitudes between 0.5 to 2.5 volts when the signal is measured from the DAC output, and between 0.5 mV to 2.5 mV when the signal is attenuated.<br>This ECG signal generator provides a versatile and cost-effective solution for simulating cardiac waveforms, facilitating medical training, device testing, and signal processing research. It offers adjustable morphology and real-time control allowing students, researchers, and engineers to analyses ECG signals efficiently in more scenarios. The compact design makes it a |

more portable and affordable alternative to traditional ECG sources.

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| **RO.96.** | |
| **Title EN** | **Low-Cost Wireless Transcutaneous Electrical Nerve Stimulation Device with Smartphone Connectivity** |
| **Authors** | Teofil Ilie Ursache[1,2], Mihai Aron[1,3], Andrei Crețu[4], Gladiola Gabriela Petroiu[1], Cristian Rotariu[1] |
| **Institution** | **[1]„Grigore T. Popa" University of Medicine and Pharmacy Iasi, Romania, Faculty of Medical Bioengineering**<br>**[2]Gheorghe Asachi Technical University, Faculty of Electronics, Telecommunications and Information Technology**<br>**[3]Gheorghe Asachi Technical University, Faculty of Automatic Control and Computer Engineering**<br>**[4]Regional Institute of Oncology** |
| **Patent no.** | |
| **Description EN** | The Transcutaneous Electrical Nerve Stimulation (TENS) technique is a non-invasive method of peripheral stimulation used to alleviate pain in patients with various conditions or in older individuals. The proposed device is developed using commercially available electrical components and modules, each characterized by low power consumption.<br>The device is composed from a custom developed TENS unit by using electronic analog circuits implemented around Arduino Uno development board, an HC-06 Bluetooth module used by the unit to receive commands and configuration parameters from the user smartphone, a smartphone running a user interface for pulse settings configuration, and wires and medical electrodes commercially available.<br>The device is remotely controlled via a smartphone using custom-developed software, which allows the user to configure parameters and select modes. An experimental device has been built, implemented, and partially evaluated, producing promising results. Functional tests were conducted in a laboratory environment under simulated body impedance.<br>While sharing similarities with conventional devices, the proposed device offers a more cost-effective solution, particularly emphasizing its compact design for enhanced portability. |

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| **RO.97.** | |
| **Title EN** | **New sensory devices for the recovery of plantar proprioception post-stroke** |
| **Authors** | Mariana Rotariu, Cezar Mucileanu, Iustina Condurache, Andrei Gheorghiță, Marius Turnea |
| **Institution** | **„Grigore T. Popa" University of Medicine and Pharmacy Iasi, Romania, Faculty of Medical Bioengineering** |
| **Patent no.** | - |
| **Description EN** | The most recent Global Burden of Disease (GBD) 2021 stroke burden estimates showed that among non-communicable disorders (NCDs), stroke remains the second leading cause of death (about 7 million) and the third leading cause of death and disability combined (as expressed by disability-adjusted life-years lost—DALYs; over 160 million DALYs) in the world.<br>The estimated global cost of stroke is over US $890 billion (0.66% of the global GDP) per year, and is projected to almost double by 2050. Rehabilitation is a crucial part of recovery for stroke survivors, and numerous studies have examined various exercises and treatments of stroke. In addition, it is very important for patients to choose the timing of rehabilitation and what kind of rehabilitation they will proceed with. In the context of post-stroke recovery, occupational therapy emerges as an essential component in the rehabilitation of plantar proprioception. This paper explores a range of innovative devices, designed to optimize the plantar proprioception recovery process, addressing not only post-stroke patients but also other categories of patients with sensory deficits. A notable example is sensory mats, designed with a variety of textures, specially adapted to stimulate and recalibrate the plantar proprioceptive system.<br>In synergy with conventional rehabilitation techniques, sensory mats constitute a valuable tool for physiotherapists, facilitating therapeutic interventions for patients with plantar sensory deficits, regardless of their etiology. This integrative approach emphasizes the importance of varied sensory stimulation in the recovery process, contributing to the improvement of patients' functionality and quality of life. |

**RO.98.**

| | |
|---|---|
| **Title EN** | **New approach of Pancreatic Neuroendocrine Tumors** |
| **Authors** | Mihaela-Madalina Gavrilescu, Ionut Hutanu, Dragos Viorel Scripcariu, Bogdan Filip, Maria-Gabriela Anitei, Iulian Radu, Viorel Scripcariu |
| **Institution** | **„Grigore T. Popa" University of Medicine and Pharmacy Iasi, Romania, Faculty of Medicine** |
| **Patent no.** | |
| **Description EN** | This study explores a retrospective analysis of PNET patients managed at the First Surgical Oncology Clinic over a 10-year period. Patient records were reviewed, focusing on the following parameters: gender, age, primary tumor location, disease extent, sites of metastasis, treatment approach, type of surgical intervention, histopathological findings, and postoperative outcomes including mortality and morbidity. Over a 10-year period, 16 patients were diagnosed with PNETs. Surgical procedures included pylorus-preserving pancreatico-duodenectomy in 5 cases, distal pancreatectomy in 3 cases, tumor enucleation in 4 cases, liver biopsy in 3 patients, and one case involving both choledochoduodenostomy and liver biopsy. The average hospital stay was 10.6 days. Among the study group, 4 patients experienced grade I–II complications according to the Clavien-Dindo classification. There were no instances of postoperative or 30-day mortality.<br>This study highlights the surgical approaches and clinicopathological features associated with PNETs. Surgical treatment should be individualized based on the tumor's characteristics and the patient's clinical profile. |

**RO.99.**

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|---|---|
| **Title EN** | **Algorithm protocol study for heart rate variability assessment in Parkinson's disease** |
| **Authors** | Daniela-Marilena Trofin, Daniela Matei |
| **Institution** | **„Grigore T. Popa" University of Medicine and Pharmacy Iasi, Romania, Faculty of Medical Bioengineering** |
| **Patent no.** | |
| **Description EN** | Associations between heart rate variability (HRV) values and Parkinson's disease (PD) indicate decreases in sympathetic and vagal activity from early stages. HRV analysis is an easy |

tool for measuring the vagal influence on heart rate autonomic dysfunction in PD.
First objective is proving that autonomic dysfunction is more attenuated in patients with hypokinesia/rigidity as an initial symptom, compared to patients with tremor present from the onset of the disease. Secondary, we investigate if HRV impairment is a consequence of abnormal autonomic nervous system (ANS) functioning, or related to the reduced physical activity along the bradykinetic-type impairment. We consider that identifying ANS abnormalities can provide opportunities to improve the treatment as tailored to the individual's symptoms.
We assume finding a pattern in which autonomic pathology during PD spreads centripetally from the peripheral nervous system to the central nervous system through autonomic nerve fibers, implicating the ANS as a major participant in the pathogenesis of PD. The literature on neurocardiac function in PD is rather modest up to this point, including partially contradictory reports. The degeneration of sympathetic nerve fibers and neurons leads to cardiovascular dysfunction, especially orthostatic hypotension and altered HRV, changes in ECG parameters and baroreflex dysfunction, which all can occur in both early and late stages of PD, worsening as the disease progresses. We find opportunity to better understand the pathogeny and assist further pharmacological interventions.

| **RO.100.** | |
|---|---|
| **Title EN** | **Rehabilitation system for hand motor skills using digital technology** |
| **Authors** | Toma Alessia-Maria, Pricop Irina, Abageru Ioan |
| **Institution** | **„Grigore T. Popa" University of Medicine and Pharmacy Iasi, Romania , Faculty of Medical Bioengineering** |
| **Patent no.** | - |
| **Description EN** | Stroke represents the leading cause of disability among adults and one of the most frequent causes of death worldwide. Among the secondary effects is hemianopsia, which involves the loss of control over motor functions necessary for daily activities. This project aims to design and develop an integrated hand rehabilitation device based on digital therapy. This device is designed to provide the patient with increased comfort, continuous monitoring, real-time |

feedback, and interactive recovery methods, such as playful exercises and electrical stimulation. The proposed system integrates essential components: flex sensors for motion monitoring, force sensors for grip assessment, an LCD screen for displaying interactive games, and a 555 timer responsible for generating the signal needed for TENS-based electrical stimulation. The collected data is recorded, processed, and transmitted through a mobile application that facilitates the tracking of the patient's progress and recovery.

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**RO.101.**

**Title EN** **Interactive Device for Recovery and Balance Feedback**

**Authors** Emanuela Buzenche, Denisa Deaconu

**Institution** **„Grigore T. Popa" University of Medicine and Pharmacy Iasi, Romania, Faculty of Medical Bioengineering**

**Patent no.**

**Description EN**

Balance is a crucial aspect of physical health, relying on sensory integration and motor responses. Impairments due to musculoskeletal and neurological conditions can lead to instability, reduced mobility, and fear of movement. Rehabilitation strategies focus on balance training, with emerging approaches incorporating video game-based therapy to enhance engagement and adherence.

The system comprises a hardware-software setup, including four 50 kg load sensors with an HX711 converter, an Arduino Uno board, and a Unity-based application. These sensors detect real-time weight shifts and translate them into game commands, enabling dynamic interaction. Results demonstrate the system's accuracy in tracking pressure variations, fostering an immersive rehabilitation experience.

This innovative approach supports functional recovery by promoting neuroplasticity, restoring joint mobility, enhancing muscle strength, and improving coordination. Additionally, it aids in injury prevention by optimizing movement mechanics and reinforcing musculoskeletal stability. The system's ability to provide real-time feedback and interactive training highlights its potential for advancing rehabilitation strategies.

| RO.102. | |
|---|---|
| **Title EN** | **High-Performance Bioprinting: A Novel Versatile System Design** |
| **Authors** | Florin-Bogdan Popa, Florian-Cosmin Manea, Andrei Vasile Năstuță, Liliana Vereștiuc |
| **Institution** | **„Grigore T. Popa" University of Medicine and Pharmacy Iasi, Romania, Faculty of Medical Bioengineering** |
| **Patent no.** | 0 |
| **Description EN** | This project proposes the development of an innovative 3D bioprinter focused on versatility, quality, and accessibility. The objective is to provide a high-performance platform capable of meeting rigorous quality standards in bioprinting, at a competitive price. The novelty lies in the intelligent integration of systems typically considered high-end, but at optimized costs, thus democratizing access to advanced technology.<br>A key element is flexibility: the bioprinter allows the use of standard needles and syringes, reducing reliance on expensive proprietary consumables. The dedicated software is designed to be extremely user-friendly and customizable, enabling efficient operation even without extensive technical knowledge.<br>Essential functionalities for tissue bioengineering applications are directly integrated: a controlled environment with capabilities for chamber sterilization, heating, and cooling, HEPA filters to maintain sterility, and a UV LED system for biomaterial photopolymerization. The adoption of an architecture based on open-source components enhances adaptability and allows for easy integration of new functionalities, thereby addressing diverse research requirements. This bioprinter combines performance, low cost, and ease of use to support advancements in the field of biofabrication. |

| RO.103. | |
|---|---|
| **Title EN** | **Advanced Cardiovascular Simulation System for Interventional Training and Pre-Procedural Planning** |
| **Authors** | Florian-Cosmin Manea, Florin-Bogdan Popa, Liliana Vereștiuc, Andrei Vasile Năstuță |
| **Institution** | **„Grigore T. Popa" University of Medicine and Pharmacy Iasi, Romania, Faculty of Medical Bioengineering** |

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| **Patent no.** | 0 |
| **Description EN** | This project proposes an interactive and versatile **simulator**, developed as an advanced cardiovascular training tool for students, residents, and specialists. The system creates a safe and controlled ex-vivo environment, optimal for testing, practicing, and perfecting complex interventional procedures, including catheterization, stent angioplasty, and Transcatheter Aortic Valve Implantation (TAVI).<br>The core element of this **simulator** consists of high-fidelity and high-precision anatomical models, created using 3D printing technologies (SLA/SLS) to replicate specific vascular structures. This methodology allows for the cost-effective production of detailed models, which can also be modular, thus facilitating the comparative testing of various techniques or devices on the same basic anatomical configuration.<br>To ensure simulation realism, this **testing system** integrates components that reproduce physiological hemodynamic conditions, using a circuit with a peristaltic pump, a fluid with viscosity close to that of blood, and thermal control at 37°C. Users can thus analyze in detail the results of simulated procedures, allowing for the optimization of interventional strategies and improvement of pre-procedural planning, with the ultimate goal of enhancing the safety and efficacy of cardiovascular interventions in clinical practice. |

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| **RO.104.** | |
| **Title EN** | **Evaluation of the antiradical antioxidant potential of niosomes with arginine and plant placenta incorporated into hydrogel based on fibroin and chitosan** |
| **Authors** | Iacob Andreea-Teodora, Lupașcu Florentina-Geanina, Maria Apotrosoaei, Ioana Vasincu, Chirliu Oana-Maria, Maria Dragan, Lenuța Profire |
| **Institution** | **"Grigore T. Popa" University of Medicine and Pharmacy** |
| **Description EN** | The aim of our research is the formulation of niosomes (NIO) incorporating plant placenta extract (PPE) and arginine (Arg), and then their introduction into a hydrogel based on fibroin (FIB) and chitosan (CS). The stages of this research consist of: 1) extraction of fibroin starting from Bombyx mori silkworm cocoons; 2) obtaining niosomes-type nanocarriers with Arg and/or PPE 3) incorporation of niosomes (NIO) into hydrogel based on chitosan and fibroin. After obtaining these |

nanoformulations, they were evaluated for their antioxidant action. The assessment of antiradical capacity was conducted with the DPPH free radical and ABTS+ radical cation assays. The antiradical capacity was determined as an inhibition percentage (I%) using the formula: I% = (A0–As/A0) x 100, where A0 represents the absorbance of the 0.1 mM DPPH methanolic solution or ethanolic solution of ABTS+., and As denotes the absorbance of the sample measured 30 minutes post-addition of the DPPH methanol solution or 6 minutes post-addition of the ABTS+. solution. Formulations containing NIO-Arg-PPE and incorporated into the hydrogel based on CS sol 1% medium molecular weight in 2% acetic acid and FIB 5% in acetic acid 3% in a 1:1 ratio had the best antiradical results, compared to formulations containing only CS and NIO-Arg-PPE, or only FIB and NIO-Arg-PPE. The studies and results obtained justify the further evaluation of the antibacterial and pro-healing potential in the treatment of various wounds, starting from the antibacterial effects of CS and the beneficial role of applied topical Arg and PPE.

**RO.105.**

**Title EN**

**New Embryological, Functional and Clinical Perspectives in Omphalocele**

**Authors**

Rosca-Al Namat Dina, Rosca Romulus Adrian, Al Namat Razan, Voiculet Nadia, Tarca Elena, Hanganu Elena, Hînganu Marius Valeriu

**Institution**

University of Medicine and Pharmacy „Grigore T. Popa”-Iasi

**Description EN**

Omphalocele is a rare congenital malformation of the abdominal wall, characterized by the persistence of abdominal contents outside the peritoneal cavity, covered by a sac formed from the peritoneum and amnion. Although it can occur in isolation, in most cases, it is associated with other congenital anomalies, including genetic syndromes and cardiac malformations. The survival rate is influenced by the severity of associated malformations, ranging from 75-80% in general cases to up to 90% in isolated cases.

Factors such as low birth weight and the presence of additional anomalies significantly impact mortality, whereas defect size and treatment method have not been clearly correlated with prognosis. However, survival rates are higher in centers with advanced neonatal care.

This study aims to analyze the morphofunctional aspects of omphalocele, particularly regarding the rectus abdominis muscles, vascularization, and the fibrous structure of the muscle sheath. Through a detailed histopathological and clinical approach, the goal is to identify risk factors involved in disease progression and to improve surgical strategies for reducing postoperative complications.
The findings will contribute to a better understanding of the embryological and pathophysiological mechanisms of omphalocele, with direct implications for pediatric surgery and neonatal medicine. Additionally, this project opens new avenues for international research collaborations and the development of standardized protocols for diagnosis and treatment.

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**RO.106.**

**Title EN**

**The Impact of COVID-19 Vaccination on Oxidative Stress and Cardiac Fibrosis Biomarkers in Patients with Acute Myocardial Infarction (STEMI), a Single-Center Experience Analysis**

**Authors**

Al Namat Razan, Tarca Elena, Duceac Letitia, Al Namat Dina, Rosca Adrian, Voiculet Nadia, Duceac (Covrig) Madalina

**Institution**

**Faculty of Medicine, "Grigore T. Popa" University of Medicine and Pharmacy, Iasi/ Faculty of Medicine and Pharmacy, "Dunărea de Jos" University, Galati**

**Description EN**

The relationship between the classical cardiac biomarker and acute myocardial infarction (STEMI) in patients with COVID-19 is far from being elucidated. Furthermore, superoxide dismutase (SOD) and Galectin-3 are significant for defining the relationship between oxidative stress and cardiac fibrosis in patients with COVID-19. Aim: Our single-center prospective study assesses the relationship between COVID-19 infection with/without vaccination and the value of SOD and Galectin-3 in STEMI patients. Material and methods: In total, 93 patients with STEMI and SARS-CoV-2 virus infection were included, patients were divided in two groups based on COVID-19 vaccination status. Echocardiographic and laboratory investigations for cardiac ischemia and fibrosis were investigated. Results: From 93 patients, the majority were male (72.0%), 45.2% (n = 42) were vaccinated against SARS-CoV-2; the mean age of vaccinated patients is 62 years, and 57% (n =

53) are smokers; Revascularization with one stent was achieved in 47.6% of the vaccinated people and 72.5% for the unvaccinated people (p = 0.015). Galectin-3 was slightly more reduced in the vaccinated patients (0.73 vs. 0.99; p = 0.202), also, Cu/ZnSOD was slightly more reduced in vaccinated patients (0.84 vs. 0.91; p = 0.740). Conclusions: Regarding patient's SARS-CoV-2 infection functional status, the results from our single-center analysis did not find a statistically significant decrease in oxidative stress and cardiac fibrosis biomarkers along with cardiovascular complication following STEMI treated with percutaneous coronary angioplasty (PCI) in the case of patients with COVID-19 vaccination compared with patients who did not receive COVID-19 vaccine.

**RO.107.**

**Title EN**

**Lignin, a versatile and innovative natural polymer in drug formulation**

**Authors**

Andreea Creteanu

**Institution**

**Department of Pharmaceutical Technology, University of Medicine and Pharmacy Grigore T Popa**

**Description EN**

Lignin nanoparticles have emerged as a viable medication delivery vehicle, can contain active pharmacological compounds, facilitating targeted distribution and regulated release within the body. Lignin's biocompatibility and capacity to interact with diverse molecules render it a versatile foundation for the advancement of novel drug delivery systems, especially in oncology and chronic illness management. The target for ligninis to create nanoparticles and microparticles renders it a very suitable contender for controlled drug-release systems. The lignin-based systems can enclose active medicinal compounds, offering protection against degradation and facilitating precise administration. Accurate dosing is especially crucial in treatments that necessitate precision administration for prolonged durations, such as cancer medicines.

In addition, lignin's biocompatibility and biodegradability make it an attractive option for sustainable drug delivery systems. Its ability to be modified for specific drug release rates further enhances its potential in the pharmaceutical industry.

# "Carol Davila" University of Medicine and Pharmacy, Bucharest, Romania

**RO.108.**

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| **Title EN** | **STANDARDIZED ANTHRISCUS SYLVESTRIS EXTRACTS - OBTAINING AND THERAPEUTIC USE** |
| **Authors** | DINU-PÎRVU Cristina Elena, ANUȚA Valentina, VELESCU Bruno Ștefan, NIȚULESCU George Mihai, OLARU Octavian Tudorel, GHICA Mihaela Violeta, ORȚAN Alina, POPA Ovidiu, BĂBEANU Narcisa |
| **Institution** | "Carol Davila" University of Medicine and Pharmacy, Bucharest, 37 Dionisie Lupu Str., 020021, Bucharest, Romania, e-mail: rectorat@umfcd.ro |
| **Patent no.** | **Patent No.: RO 132751 (B1)/2024** |
| **Description EN** | An integrated, reproducible technology for producing standardized dry extracts of Anthriscus sylvestris (cow parsley) is detailed. Finely milled aerial parts undergo hydro-alcoholic extraction under controlled temperature and optimized solvent-to-drug ratios. The filtrate is vacuum-concentrated, then spray-atomized in a fluid-bed dryer. The product is titrated to 4.4–6.6 g % total polyphenols, expressed as gallic-acid equivalents. Comprehensive profiling using HPLC-DAD-MS for individual phytochemical fingerprints and Folin–Ciocalteu spectrophotometry for global phenolics was performed. Physicochemical specifications—residual water ≤ 4 %, water activity ≤ 0.30, median particle size 50–150 µm, bulk density 0.35–0.45 g $cm^{-3}$—demonstrate long-term stability and formulation readiness. Pharmacodynamic validation employed carrageenan-induced paw-edema and cotton-pellet granuloma models. Oral administration at 100 mg $kg^{-1}$ reduced edema volume and granuloma mass to the same extent as 10 mg $kg^{-1}$ diclofenac ($p < 0.05$) while lowering TNF-α and IL-1β. No acute toxicity, behavioral alteration, or organ pathology appeared up to 2 g $kg^{-1}$. Accelerated stability testing (40 °C/75 % RH, six months) showed < 5 % degradation of marker polyphenols, supporting a projected shelf life beyond three years when packaged in moisture-barrier containers. The extraction yield averages 8 ± 1 % w/w, and the workflow follows current GMP regulations, permitting scale-up from pilot to industrial capacity. Because A. sylvestris thrives on marginal soils without agrochemical inputs, the process secures a low-impact, renewable supply chain. The standardized extract therefore constitutes a scalable, eco-sustainable source of anti-inflammatory active ingredients, offering a consistent, plant-based alternative to conventional non-steroidal agents. |

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| **RO.109.** | |
| **Title EN** | **NANOCOMPOSITE MATERIAL BASED ON POLY(METHYL METHACRYLATE) AND TITANIUM DIOXIDE NANOPARTICLES FOR 3D PRINTED DENTAL PROSTHESES AND THE METHOD OF OBTAINING IT** |
| **Authors** | CRISTACHE Corina Marilena, TOTU Eugenia Eftimie, NECHIFOR Gheorghe, DIDILESCU Andreea Cristiana, NECHIFOR Aurelia Cristina |
| **Institution** | "Carol Davila" University of Medicine and Pharmacy, Bucharest, 37 Dionisie Lupu Str., 020021, Bucharest, Romania, e-mail: rectorat@umfcd.ro |
| **Patent no.** | Patent No.: **RO 132968 (B1)/2023** |
| **Description EN** | The invention relates to a 3D printable composite material made from poly(methyl methacrylate) with titanium dioxide nanoparticles, as well as a method for obtaining it. This material is utilized for producing dental prostheses through additive manufacturing (3D printing).<br>1.Nanocomposite material based on poly(methyl methacrylate) and titanium dioxide nanoparticles characterized by having a weight percentage content of 0.4% titanium dioxide nanoparticles, a homogeneous structure, a uniform distribution of TiO2 nanoparticles in the polymer matrix, capable of withstanding a compression of 8023.31 N for a compression deformation of 1.09%, a shear strength of 239 x 106 Pa for a deformation of 0.91%, a glass transition temperature (Tg) of 118°C, a melting temperature of 335°C, and antimicrobial activity against Candida scotti species.<br>2.Process for obtaining the nanocomposite material defined in claim 1, characterized by comprising the following steps:<br>- obtaining titanium dioxide nanoparticles through controlled solvo-hydro-thermal synthesis from organometallic precursors such as tetrabutyl orthotitanate using dimedone as a chelating agent; - introducing the titanium dioxide nanoparticles into a polymer matrix composed of a solution of polymethyl methacrylate to which polyethylene methacrylate, methyl methacrylate monomer, and dibenzoyl peroxide promoter are added, allowing for complete cross-linking under the influence of UV radiation;<br>- obtaining the polymethyl methacrylate-based polymer matrix with a content of 0.4% by weight of titanium dioxide nanoparticles in a fluid form.<br>3.Nanocomposite material based on polymethyl methacrylate and titanium dioxide nanoparticles defined according to claim 1, characterized by its use in obtaining 3D printed dental prostheses. |

**RO.110.**

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| **Title EN** | **ASYMMETRIC PORPHYRIN IN HYDROXYPROPYLMETHYLCELLULOSE MATRICES FOR THE TREATMENT OF PREMALIGNANT SKIN DISEASES** |
| **Authors** | OZON Emma Adriana, BURLOIU Andreea Mihaela, BOSCENCU Rica, MANDA Gina, ANUTA Valentina, DINU PIRVU Cristina Elena, LUPULIASA Dumitru, MUSUC Adina Magdalena, ANASTASESCU Mihai, SOCOTEANU Radu Petre |
| **Institution** | "Carol Davila" University of Medicine and Pharmacy, Bucharest, 37 Dionisie Lupu Str., 020021, Bucharest, Romania, e-mail: rectorat@umfcd.ro |
| **Patent no.** | **Patent application: RO138620 (A0)/2025** |
| **Description EN** | The patent application discloses a topical hydrogel for photodynamic therapy (PDT) of premalignant skin lesions marked by keratinocyte hyper proliferation. The claimed product embeds an asymmetric porphyrin—5 (4 hydroxy 3 methoxyphenyl) 10,15,20 tris(4 acetoxy 3 methoxyphenyl) porphyrin (P2.2)—within a 10 % hydroxypropyl methylcellulose (HPMC) matrix plasticised with PEG 200. The invention covers (i) the gel composition, (ii) a scalable preparation process, and (iii) critical quality attributes defining suitability for PDT. Preparation dissolves P2.2 in PEG 200, disperses the solution into hydrated HPMC, degasses, and sterile fills the mixture.<br>The resulting gel exhibits pH 7.2, pseudoplastic flow and high spreadability, ensuring dermal tolerance and uniform film formation. UV Vis and fluorescence spectroscopy confirm that P2.2 retains its photophysical profile post incorporation. HPLC provides a linear assay over 0.078–10 μg $mL^{-1}$ (LOQ 0.032 μg $mL^{-1}$) and demonstrates sustained, Higuchi type release (2.505 μg $cm^{-2}$ $min^{-½}$) with a 35 minute lag. Release accelerates at pH < 7, mimicking acidic tumour microenvironments and enabling site selective activation. In vitro biocompatibility on Hs27 fibroblasts shows low metabolic activity yet minimal LDH leakage, indicating reduced proliferation without necrosis; the gel promotes spheroid formation.<br>Doubling the porphyrin load (0.2 → 0.4 mM) does not proportionally increase intracellular fluorescence, suggesting uptake saturation.<br>Advantages claimed include a short excipient list, preservation of porphyrin structure and activity, bioadhesion, pH triggered release, and verified uptake by HaCaT keratinocytes. Collectively, these features position the hydrogel as a patient |

friendly, environmentally benign platform for PDT of actinic keratosis and related precancerous conditions.

**RO.111.**

**Title EN** **HYDROXYETHYLCELLULOSE-BASED TOPICAL NAPROXEN GELS AND THEIR PREPARATION METHOD**

**Authors** GHICA Mihaela Violeta, DINU-PÎRVU Cristina-Elena, POPA Lăcrămioara, ANUȚA Valentina, PRISADA Răzvan Mihai, VELESCU Bruno Ștefan, TUDOROIU Elena-Emilia

**Institution** "Carol Davila" University of Medicine and Pharmacy, Bucharest, 37 Dionisie Lupu Str., 020021, Bucharest, Romania, e-mail: rectorat@umfcd.ro

**Patent no.** **Patent application: RO318082 (A0)/2024**

**Description EN**

The invention concerns a semisolid dermal delivery system that embeds naproxen, a non-steroidal anti-inflammatory drug, in a hydroxyethyl-cellulose (HEC) matrix enhanced with multiple penetration promoters. A 3 % HEC dispersion is first swollen in water; a cosolvent-promoter mixture containing 5–20 % Transcutol, 0–7.5 % polyethylene glycol 200, 5–20 % ethanol and 0–22.5 % isopropanol is prepared separately. The hydrated polymer is alternately triturated with the promoter phase and water until a clear gel base forms, after which 5–10 % naproxen, pre-solubilised in 10 % sodium-hydroxide, is homogenised into the matrix. The process yields translucent gels exhibiting pseudoplastic behaviour with flow-behaviour indices (n) of 0.38–0.42 and consistency indices (m) of 55.8–90.9 Pa·s, ensuring effortless spreading and accurate metering. Diffusion coefficients for naproxen range from $1.37 \times 10^{-6}$ to $1.94 \times 10^{-6}$ $cm^2\ s^{-1}$, while in-vitro release follows Higuchi kinetics, providing sustained delivery over several hours; 10 % drug loads achieve the highest cumulative release yet maintain the same mechanistic profile. Rheological and kinetic data identify two optimal prototypes (Examples 2 and 4) for clinical translation. Topical administration of these gels confers four principal benefits: (i) efficient drug permeation through stratum corneum to the injury site via synergistic solvent action, (ii) sustained analgesic and anti-inflammatory activity without frequent re-application, (iii) rheological characteristics compatible with patient-friendly packaging and application, and (iv) circumvention of systemic gastrointestinal, hepatic, renal and cardiovascular toxicities associated with oral NSAIDs. The platform therefore offers an adaptable, biocompatible vehicle for managing acute soft-tissue trauma while minimising systemic exposure.

**RO.112.**

**Title EN**

**WOUND-HEALING AND ANTI-INFLAMMATORY OINTMENT AND METHOD FOR ITS PREPARATION**

**Authors**

HOVANEŢ Marilena Viorica, OPREA Eliza, MOROŞAN Elena, ŞEREMET Oana Cristina, ANCUCEANU Viorel Robert, BUDURA Emma Adriana, DINU Mihaela, DUŢU Ligia Elena, ANCU Irina

**Institution**

"Carol Davila" University of Medicine and Pharmacy, Bucharest, 37 Dionisie Lupu Str., 020021, Bucharest, Romania, e-mail: rectorat@umfcd.ro

**Patent no.**

**Patent: RO132540 (B1)/2024**

**Description EN**

The invention introduces a topical composition that accelerates wound closure while curbing local inflammation. Its active ingredient is a standardized, polyphenol-rich Ziziphus leaf extract dispersed in a biocompatible hydrophilic base with penetration enhancers for sustained dermal delivery.

Wound repair entails platelet activation, leukocyte recruitment and new-tissue deposition. Conventional cicatrising creams containing silver–sulfadiazine (e.g., Cicatrol, Dermazin) prevent infection but can cause leucopenia, grey skin discoloration, photosensitivity and agryria. Silicone scar gels (Strataderm, Dermatix) cannot be applied to open wounds or deep burns, restricting their utility. A safer, multifunctional topical agent is therefore required.

The proposed ointment fills this gap by harnessing the antioxidant, antimicrobial and anti-inflammatory properties of Ziziphus extract. In-vitro assays show significant suppression of pro-inflammatory mediators, while ex-vivo permeation studies confirm effective trans-epidermal delivery. The semisolid exhibits pseudoplastic rheology, ensuring effortless spread over irregular wound beds and minimal residue.

Advantages include suitability for both open and closed lesions, lower irritation risk than silver salts, freedom from silicone-related occlusion, and avoidance of systemic adverse effects typical of oral NSAIDs. By combining wound-healing and anti-inflammatory actions in a single, biodegradable matrix, the invention offers a comprehensive, patient-friendly solution for managing acute and chronic skin injuries.

**RO.113.**

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| **Title EN** | **EXPLORING COMPARATIVELY THE CYTOTOXICITY OF MILLED AND 3D-PRINTED PMMA-BASED RESINS TO ORAL SQUAMOUS CANCER CELLS - WHAT SIGNALS COULD THE AKT/MTOR PATHWAY SEND US THROUGH ITS DOWNSTREAM EFFECTOR GSK-3?** |
| **Authors** | **Alexandra Ripszky, Radu Radulescu, Bianca Voicu-Balasea, Florentina Rus-Hrincu, Alexandra Popa, Marina Melescanu Imre and Silviu M. Pituru** |
| **Institution** | **The Interdisciplinary Center for Dental Research and Development – Carol Davila University of Medicine and Pharmacy** |
| **Description EN** | In this study, we aimed to provide more experimental data regarding the possible cytotoxic effects of two types of PMMA-based resin samples (CAD/CAM milled and 3D-printed) on human oral squamous carcinoma cells. Furthermore, we have also explored the possible alterations of the Akt pathway and its downstream target, apoptosis, in the exposed cells to the two types of resin samples. During the last few years, PMMA-based materials have been extensively explored and modified in order to obtain the desired and ideal properties for dentistry applications. However, there are certain unsolved issues regarding the PMMA-based obturators, including possible cytotoxicity due to the residual monomers. As far as we know there are no studies targeting the Akt/mTOR signalling pathway in the human oral squamous carcinoma cells, exposed to PMMA-based resins used for maxillary obturator manufacturing. |

# University of Medicine and Pharmacy „Iuliu Hatieganu" Cluj-Napoca

**RO.114.**

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| **Title EN** | **Process for preparing a micro-particle pharmaceutical system for transport and release of low molecular weight heparin at the colon level** |
| **Authors** | Dana Hales, Ioan Tomuță, Laurian Vlase, Marcela Achim |
| **Institution** | **University of Medicine and Farmacy „Iuliu Hatieganu" Cluj-Napoca** |
| **Patent no.** | RO 132376 B1/28.01.2022 / Patent application No. A/00577/2016 |
| **Description EN** | The invention represents a colon-specific drug delivery pharmaceutical system consisting of polymeric microparticles loaded with low-molecular-weight heparins. According to the invention, the pharmaceutical system consists of a mixture of a pH-dependent soluble polymer and an insoluble but permeable polymer with time-dependent release. The preparation of the pharmaceutical system involves the use of strong electrolytes (sodium chloride, sodium sulfate, sodium phosphate, potassium chloride, magnesium sulfate) in order to increase the loading amount of heparin and to control the release. The pharmaceutical system prevents heparin release in the stomach's acidic medium and in the small intestine, but allows the specific release of the drug in the colon. The pharmaceutical system appears as a fine, white, odorless powder, which can be combined in any proportions with other appropriate excipients to obtain a pharmaceutical formulation for oral administration, in particular gelatin hard capsules, tablets, granules or freeze-dried preparations.<br>Applications. The invention allows the elimination of the drawbacks associated with the parenteral route of administration of heparins (the need to sterilize the preparations, pain at the injection site, the risk of infection, etc.), and represents a potentially useful treatment of inflammatory bowel diseases. |

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| **RO.115.** | |
| **Title EN** | **Process for Obtaining Biocapsules for Immunoprophylaxis of Colon Adenocarcinoma** |
| **Authors** | Lucia Agoston, Teodora Mocan, Cornel Iancu,Lucian Mocan, Flaviu Tabaran, Cristian Matea |
| **Institution** | **University of Medicine and Pharmacy Cluj-Napoca, Romania** |
| **Patent no.** | 132630 / 30.03.2023 |
| **Description EN** | • The synthesis of gold nanoparticles (AuNP) is performed in an aqueous medium: 25mg of HAUC14 are dissolved in 50 mL of H2O bidist are brought to 100 ° C with continuous stirring, to which is added 10mL citrate solution sodium (concentration 20mg / mL). The reaction is allowed to continue to reflux for 120 minutes with stirring.<br>• The next step is to replace the citrate on the surface of gold nanoparticles with mercaptosuccinic acid (MSA)<br>• Coupling between AuNP-MSa and MUC-1 peptide is performed The coupling is left to completion for 30 minutes under agitation. The functionalized gold nanoparticles are subjected to successive centrifugation and re-dispersion steps in H20 bidis. in order to remove the secondary reaction products.<br>• To obtain the Allium ursinum extract, start from 3g of the Allium ursinum plant matrix which is crushed with an ultraturax homogenizer in , filtered and concentrated in a rotary evaporator to a volume of ImL.<br>• In order to encapsulate in alginate, the two solutions: 5 ml of AuNP-MSA-MUC-1 and 500 μL of Allium ursinum extract obtained in the previous steps are added to a solution of 2% sodium alginate added dropwise with the help of a syringes in a CaCl2 bath with a concentration of 1-2.5%. The thus obtained biocapsules are removed from the CaCl2 bath and are washed with H2O bidist. and subjected to atomic force (AFM) microscopy and dynamic light diffraction characterization. |

| RO.116. | |
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| **Title EN** | **Impregnation Resin Composition, Composite Material, And Method For Manufacturing Craniofacial Implants** |
| **Authors** | Rotar Alexandru Horațiu, Moldovan Mădălina-Anca |
| **Institution** | "Iuliu Hațieganu" University of Medicine and Pharmacy Cluj-Napoca |
| **Patent no.** | RO 133074 B1 |
| **Description EN** | The main objective was to develop a fiber-reinforced polymer composite biomaterial optimized for 3D cranial bone reconstruction. Key innovations include:<br>• A custom resin composition with a blend of dimethacrylate oligomers (Bis-GMA, UDMA, TEGDMA, HEMA), hydroxyapatite, zirconium oxide ($ZrO_2$), and gentamicin, ensuring mechanical strength, biocompatibility, and antibacterial properties.<br>• Manufacturing via advanced glass fiber impregnation and lamination techniques, allowing for custom 3D shaping.<br>• Personalized implant fabrication through 3D printing-based rapid prototyping, ensuring a perfect anatomical fit.<br>**Applications & Benefits**<br>• Medical application: Ideal for cranial and maxillofacial reconstructions.<br>• Enhanced patient outcomes: Stronger, safer, and more durable implants.<br>• Scalable & cost-effective: Efficient production allows widespread clinical use.<br>This technology represents a major advancement in craniofacial surgery, integrating biomaterials science, polymer engineering, and 3D printing to create next-generation custom implants for safer and more effective patient treatments. |

| RO.117. | |
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| **Title EN** | **A Fiber Glass Reinforced composite for CAD/CAM applications in dentistry** |
| **Authors** | Culic Bogdan, Dudea Diana, Varvara Adrian-Mihai, Burde Alexandru-Victor, Gasparik Cristina, Grecu Alexandru Grațian, Prejmerean Cristina Alexandra, Moldovan Marioara, Prodan Doina, Saroși Liana Codruța, Silaghi-Dumitrescu Laura, Filip Miuța, |
| **Institution** | **UMF Cluj-Napoca, University Babes-Bolyai Cluj Napoca** |

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| **Patent no.** | 134323 / 2023 |
| **Description EN** | The invention relates to a composition of fiber glass reinforced composite material based on thermo-baro-photopolymerizable composite resin and fiber glass fabric type E in the form of a veil and / or Stratimat, being indicated for obtaining a materiales to be used for obtaining for prosthetic restorations using CAD / CAM technology. The material has superior mechanical properties and corresponding radiopacity. The dental product is presented in the form of a composite disc reinforced with solid fiberglass, with a diameter of 98.5 mm and a height of 10 mm, dimensions specific to dental CAD/CAM technology. |

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| **RO.118.** | |
| **Title EN** | **Salivary optical sensor implemented by the lateral coupling of a side-emitting optical fiber and a fluorescent optical fiber integrated into an intra-oral device** |
| **Authors** | Faragó Paul[1], Gălătuș Ramona-Voichița[1], Groza Robert-Gheorghe[1], Băbțan Anida-Maria[2], Feurdean Nicoleta Claudia[2], Petrescu Bianca Nausica[2], Bosca Adina Bianca[2], Ilea Aranka[2] |
| **Institution** | **[1]Technical University of Cluj Napoca, [2]"Iuliu Haţieganu" University of Medicine and Pharmacy of Cluj-Napoca** |
| **Patent no.** | 134459 / 30.10.2024 |
| **Description EN** | This invention refers to a distributed salivary sensor for the detection of salivary compounds (e.g. advanced glycation products), implemented around the optical coupling of a side-emitting optical fiber and a fluorescent optical fiber, and integrated into an intra-oral device. The sensing technique is based on the fact that the analyte, interposed in-between the two fibers on the sensing area, filters the light radiation that is coupled from the side-emitting fiber into the fluorescent fiber and consequently changes the emission spectrum of the fluorescent optical fiber: gain, attenuation or the coupling of new spectral components. |

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| **RO.119.** | |
| **Title EN** | Functionalized magnetic nanostructures as platforms for drug transport/delivery |
| **Authors** | Ioana Bâldea, Anca Petran, Cristian Iacoviță |
| **Institution** | Universitatea de Medicină și Farmacie Iuliu Haţieganu, Cluj-Napoca |

**Patent no.** A/00171/11.04.2024

**Description EN**

The invention refers to a process for obtaining a core-shell magnetic nanostructure consisting of a magnetite core ($Fe_3O_4$) functionalized with a new biocompatible polymer Poly-3,4-dihydroxybenzylamine as a platform for the intracellular transport of drugs, specifically doxorubicin and a mediator for magnetic hyperthermia an oncological therapeutic procedure. The process for obtaining Poly-3,4-dihydroxybenzylamine@Fe3O4 according to the invention consists in the steps of obtaining the magnetite core from $Fe_3O_4$-EDTA by ultrasonication in a basic environment, followed by functionalization with 3,4-dihydroxybenzylamine (1:1) by mechanical stirring, then magnetic separation and successive washings. The doxorubicin adsorption process consists of the steps of dispersing Poly-3,4-dihydroxybenzylamine@$Fe_3O_4$, by ultrasonication, followed by functionalization with doxorubicin (20:1) by mechanical stirring and then magnetic separation and successive washings. Poly-3,4-dihydroxybenzylamine@$Fe_3O_4$ is a biocompatible magnetic nanostructure internalized by normal fibroblastic, endothelial and breast tumor cells and selectively decreases tumor viability following magnetic hyperthermia. Doxo@Poly-3,4-dihydroxybenzylamine@$Fe_3O_4$ is internalized and produces, through magnetic hyperthermia, decreased cell viability, apoptosis and cell cycle arrest of breast tumor cells.

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**RO.120.**

**Title EN** **Matrix with local antimicrobial and general immunomodulatory effect based on Doxycycline encapsulated in polylactic acid and hydroxyapatite nanofibers**

**Authors** Ilea Aranka[1], Dinte Elena[1], Boșca Adina Bianca[1], Barabas Reka[2], Bizo Liliana Antonela[2], Cadar Oana[3]

**Institution** **[1]Iuliu Hatieganu University of Medicine and Pharmacy, Cluj-Napoca; [2]Babeș-Bolyai University, Cluj-Napoca; [3]INCDO-INOE 2000, Research Institute for Analytical Instrumentation, Cluj-Napoca**

**Patent no.** A/00385/05.07.2022

**Description** Periodontal disease is a public health problem that affects

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| **EN** | over 50% of the adult population, alters the quality of life and increases the risk of systemic diseases. Periodontal disease is a chronic inflammation induced by periodontopathogenic bacteria and the immune-inflammatory host response, essentially involved in progression toward severe forms. The invention refers to the development of a novel matrix system: nanofibers of polylactic acid (PLA 5%) and nano-hydroxyapatite (HAP), doped with Doxycycline (7 g/l); local release of antibiotic has bactericidal effect to control local infection, reduces systemic meta-inflammation and modulates the general immune-inflammatory response, thus ensuring multimodal periodontal treatment. Relevance and novelty of multimodal treatment of periodontal disease is based on: (i) slow release of active substances through PLA degradation and nano-PAH metabolism; (ii) local antibacterial effect of Doxycycline released in antimicrobial concentrations; (iii) local immunomodulation and control of systemic meta-inflammation by subantimicrobial doses of Doxycycline; (iv) promoting tissue regeneration. |

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| **RO.121.** | |
| **Title EN** | **Process for obtaining a device for prolonged and controlled delivery of ruxolitinib in glioblastoma** |
| **Authors** | Florian Ioan-Ștefan, Șușman Valeriu-Sergiu, Ede Bodoki, Soriță Olga, Pește Petru-Cosmin, Florian Ioan-Alexandru, Iacob Bogdan-Cezar, Bărăian Alexandra-Iulia, Buruiană Andrei |
| **Institution** | **“Iuliu Hatieganu” University of Medicine and Pharmacy, Cluj County Emergency Clinical Hospital, Institute of Oncology "Prof dr. Ion Chiricuta" Cluj-Napoca** |
| **Patent no.** | **A/00444/25.07.2022** |
| **Description EN** | The invention addresses the current shortcomings of glioblastoma (GBM) chemotherapy by designing a molecularly imprinted drug reservoir tailored for post-surgical recovery. Our objective was to ensure the sustained release of the antitumor drug ruxolitinib (RUX), specifically targeting residual infiltrative cancer cells while mitigating adverse effects. In pursuit of this objective, we have effectively formulated and characterized four unique molecularly imprinted polymers (MIPs), with one progressing to in vivo experimentation. |

| RO.122. | |
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| **Title EN** | **Medical device for the fixation and stabilization of the lesser trochanter in cases of trochanteric fractures associated with fractures of the lesser trochanter** |
| **Authors** | Tomoaia Gheorghe, Benea Horea-Rareș-Ciprian, Oltean-Dan Daniel, Tomoaia-Cotișel Maria, Oltean-Dan Gligor, Bodea Eugen |
| **Institution** | Universitatea de Medicină și Farmacie „Iuliu Hațieganu” Cluj-Napoca și Universitatea Babeș-Bolyai, Romania |
| **Patent no.** | Patent application No. A/00513/25.08.2022 |
| **Description EN** | The invention relates to a medical device for the fixation and stabilization of the lesser trochanter in cases of trochanteric fractures associated with fractures of the lesser trochanter. It consists of a plate provided with holes for fixation to the femur with screws and an inclined tubular part for fixing the trochanter to the femoral head using a trans-trochantero-cervico-cephalic screw, known in itself, and a wing, positioned laterally to the plate, which can be either fixed or foldable. |

| RO.123. | |
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| **Title EN** | **Unlocking new avenues: Solid-state synthesis of molecularly imprinted polymers** |
| **Authors** | **Bogdan-Cezar Iacob, Andreea Elena Bodoki, Ede Bodoki** |
| **Institution** | **“Iuliu Hatieganu” University of Medicine and Pharmacy, Romania** |
| **Patent no.** | **A 00838 / 28.12.2022.** |
| **Description EN** | **Molecular imprinting** enables the fast, versatile, robust and cost-effective synthesis of biomimetic polymeric receptors with tailored selectivity for a wide variety of target molecules. Solvents are a critical component in the synthesis of **molecularly imprinted polymers (MIPs)**, both as a porogen and a reaction media, however their use comes with additional challenges: environmental concerns, target molecule binding to the polymer matrix interference, the use of specific solvents or solvent mixtures. To address some of the above-mentioned issues, but also to explore potential opportunities or further constraints, we report **the first solvent-free mechanochemical synthesis of MIPs via liquid-assisted griding (LAG)**.Short description of your invention. |

| RO.124. | |
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| **Title EN** | **Laparoscopic Instrument for Accurate Extralumenal Location of a Colorectal Tumor** |
| **Authors** | Bogdan MOCAN, Vasile BINTINTAN |

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| **Institution** | **Technical University of Cluj-Napoca**<br>**"Iuliu Haţieganu" University of Medicine and Pharmacy - Cluj-Napoca** |
| **Patent no.** | Patent no 131186 from 29.04.2021 |
| **Description EN** | The precise location of gastric and colorectal tumours is of paramount importance for the oncological surgeon as it dictates the limits of resection and the extent of lymphadenectomy. However, this task proves sometimes to be very challenging, especially in the laparoscopic setting when the tumours are small, have a soft texture, and do not invade the serosa. In this view, our invention relates to a laparoscopic instrument which facilitates the accurate position of a tumour in the colon tract in the abdominal laparoscopic surgery and also with possible applications in open surgery. Precise location of a rectal tumour is required to decide the appropriate line of distal resection but current methods like bimanual palpation is approximatively and very subjective, lacking the needed "surgical" precision.<br>**The principle for precise identification of tumour location is that the tumour will be made "visible" for the laparoscopic instrument by placing sensing trackers close to its margins.**<br>Using a laparoscopic approach, **the detection rate of this system reached 65% when the sensor scanned the bowel at a speed of 0.3 cm/s and applying slight pressure on the serosa.** This value increased to 95% when the sensor was guided directly on the point of clip attachment. The detection rate dropped sharply when the scanning speed exceeded 1 cm/s and when the sensor-clip distance exceeded the cut-off value of 3 mm. |

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| **RO.125.** | |
| **Title EN** | **Method and device of making the treatment of oncological diseases more efficient using the latest generation modern technologies** |
| **Authors** | Ștefan ȚÎȚU, Lucian MOCAN, Teodora MOCAN, Alexandru IRIMIE |
| **Institution** | **The Oncology Institute "Prof. Dr. Ion Chiricuţă" Cluj-Napoca, "Iuliu Haţieganu" University of Medicine and Pharmacy Cluj-Napoca** |
| **Patent no.** | Patent request in progress |
| **Description EN** | The innovative scientific research project develops a specific application of great relevance in the treatment of oncological disease and proposes a viable solution for the future, with the possibility of patenting under the conditions stipulated by the legislation in force in the European Union. |

# „Victor Babes”
# University of Medicine and Pharmacy Timisoara

| RO.126. | |
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| **Title EN** | **Hydrogen Sulfide Adsorbent Product and The Procedure for Its Obtaining** |
| **Authors** | Livia-Cristina Borcan, Florina Georgeta Popescu, Florin Borcan, Elena Ana Păuncu, Mirela Cleopatra Tomescu, Cristina Adriana Dehelean |
| **Institution** | **„Victor Babes” University of Medicine and Pharmacy Timisoara** |
| **Patent no.** | RO133956 |
| **Description EN** | The invention pertains to a product derived from a flexible, open-cell polyurethane foam, intended for use as personal protective equipment by employees in thermal baths or wastewater treatment facilities, as well as the process for its production. The product, as described in the invention, incorporates polyether-urethane microparticles containing a mixture of active substances—zinc oxide, disodium salt of ethylene-diamine-tetraacetic acid, and amorphous ferric oxide—in a molar ratio of 1:1:1.5. This composition is capable of reducing the concentration of hydrogen sulfide in an air stream by facilitating its conversion through chemical reactions such as precipitation, complexation, and redox processes. |

| RO.127. | |
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| **Title EN** | **Veneer-Retained Fixed Partial Denture with Axial Grip Extensions** |
| **Authors** | Cosmin Sinescu, Christa Serban, Andreea Codruta Novac, Carina Sonia Neagu, Cristian Zaharia, Anca Jivanescu, Marius Traian Leretter, Florin Borcan, Codrina Levai, Mihai Rominu, Meda Lavinia Negrutiu |
| **Institution** | **„Victor Babes” University of Medicine and Pharmacy Timisoara** |
| **Patent no.** | Patent application No. 00486/2022 |
| **Description EN** | This invention patent presents an innovative method for fixed partial prosthetic restoration (FPPF) using dental veneers with axial extensions in the form of parapulpal pins. The solution is designed for the treatment of reduced edentulism in the anterior region through a minimally invasive approach aimed at enhancing the aesthetics and retention of restorations. FPPF are used to replace missing teeth, being supported by adjacent teeth or implants. In the context of minimally invasive |

dentistry, Maryland bridges are a commonly used option, relying on adhesive palatal bonding of restorations. In cases where adjacent teeth require aesthetic rehabilitation, this concept can be extended to the use of dental veneers for improved retention.

This invention introduces an innovative element: axial extensions in the form of parapulpal pins, which increase the retention and stability of the restoration. These extensions are inspired by the use of parapulpal pins in amalgam restorations, serving to enhance the strength of prosthetic restorations without affecting the pulp chamber.

The advantages of this type of restoration include: enhanced aesthetics, due to the integration of dental veneers into the prosthetic design; increased retention, ensured by the axial extensions in the form of parapulpal pins; pulp protection, avoiding its exposure through careful planning of extension placement with CBCT imaging. This technique is suitable for patients with reduced anterior edentulism and requires minimally invasive preparation of the abutment teeth. A guiding splint is used for drilling the parapulpal pins, ensuring precise positioning. The final restoration is obtained through pressing techniques and aesthetic customization.

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**RO.128.**

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| **Title EN** | **CAD-designed custom orthodontic appliance for impacted teeth and fabrication process** |
| **Authors** | Riham Nagib, Florin Borcan, Camelia Szuhanek |
| **Institution** | **„Victor Babes" University of Medicine and Pharmacy Timisoara** |
| **Patent no.** | Patent application No. 00582/2023 |
| **Description EN** | Treatment of impacted teeth often implies placing a bonded attachment and using orthodontic forces to move the tooth into occlusion. The aim of the invention is to describe a novel methodology of manufacturing orthodontic attachments for impacted teeth using the latest CAD software and 3D printing technology. A biocompatible acrylic based resin was used to print a custom-made attachment designed based on the volumetric data acquired through cone bean computer tomography. Custom design of the attachment simplified clinical insertion and treatment planning and 3D printing made its manufacturing easier. |

# "Alexandru Ioan Cuza" University of Iasi

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| **RO.129.** | |
| **Title EN** | **Process for obtaining a new class of anthracene-imidazole compounds** with antituberculosis activity |
| **Authors** | Mangalagiu I.I., Amariucai-Mantu D., Antoci V., Zbancioc Ghe., Moldoveanu C., Cucu D., Danac R., Mangalagiu V. |
| **Institution** | Alexandru Ioan Cuza University of Iasi |
| **Patent** | RO134192-A3, 30.03.2021 / A61K-031/06; A61K-031/41; C07D-403/14 |
| **Description EN** | The invention relates to a process for obtaining a new class of anthracene-imidazole compounds (namely 1-(anthracenyl-9-methylene)-3-(2-(4-Z-phenyl)-2-oxoethyl)-1H-imidazol-3-ium bromide and 1-(anthracenyl-9-methylene)-3-(2-(4-Z-phenyl)-2-oxoethyl)-1H-benzimidazol-3-ium bromide, respectively) with antituberculosis activity, having as its field of application organic chemistry and pharmaceutical chemistry. The synthesis procedure for obtaining imidazole/benzimidazol-anthracene derivatives is efficient and direct, the process having only 2 (two) steps, using readily available raw materials, having a short working time, presenting energy efficiency and good yields. The antituberculosis activity of the compounds against Mycobacterium tuberculosis proved to be very good, with a MIC ranging between 10-40 μM, an IC50 ranging between 5-20 μM, and an IC90 ranging between 15-45 μM. |

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| **RO.130.** | |
| **Title EN** | **Detecting Fraud Risk with Random Forest Algorithms: Implications for Sustainability in the Automotive Industry** |
| **Authors** | Maria-Cosmina IORDACHE, Eusebiu IORDACHE, Ioan-Bogdan ROBU |
| **Institution** | Alexandru Ioan Cuza University of Iași, Faculty of Economics and Business Administration, Iași, România |
| **Description EN** | In an era of increasing industry complexity, automotive manufacturing companies are facing growing pressures regarding the transparency of both financial and non-financial reporting, as well as their compliance with sustainable development goals. Within the automotive sector, the risk of fraud is becoming more pronounced, driven by the need for companies to align with current |

regulations and evolving market standards, which place an increasing emphasis on sustainability. As legislative frameworks surrounding sustainability become more rigorous, the risk of fraud rises accordingly, highlighting the urgent need for efficient fraud risk mitigation strategies. While fraud detection and prevention have traditionally relied on financial audits, statistical models, and rule-based systems, these methods often struggle to keep pace with increasingly sophisticated fraud techniques. In this context, Random Forest algorithms offer innovative solutions through the application of machine learning techniques and deliver high accuracy when handling large and complex datasets. This study aims to analyze the applicability of the Random Forest algorithm in identifying fraud risk and to explore the implications of such an approach on sustainable development. Using data extracted from the financial and non-financial reports of companies in the automotive sector, a classification model will be developed to distinguish between companies with high and low fraud risk. The results will demonstrate the usefulness of Random Forest algorithms as a powerful and interpretable tool for improving fraud risk detection systems and enhancing the reliability of annual reporting.

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**RO.131.**

**Title EN**

**Financial Statement Fraud Detection with Support Vector Machine**

**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 Iași**

**Description EN**

Machine learning is an important topic in today's society. This is due to its efficiency in performing activities and tasks in all fields of activity. Currently, machine learning techniques have also proven to be useful in analyzing the financial reporting of companies. The financial fraud risk is a matter of concern, as evidenced by the large number of fraud cases. The goal of this research is to analyze and assess the fraud risk in financial reporting. For the realization of this study, the analyzed population will include listed companies in Romania. From the total population were eliminated the companies that do not have all the necessary information for

the analysis resulting in a sample of 62 companies listed on the Bucharest Stock Exchange. The analysis period is 2018-2023. The variables analyzed are represented by a set of financial reports, representative in the analysis of the financial situation of a company. To analyze these variables, the support vector machine method was applied. The obtained results showed that the techniques based on machine learning, namely the support vector machine, are an important procedure in detecting the extent to which a company's financial statements contain fraudulent acts. In addition, the accuracy of this technique was significant, which further reinforces its usefulness in the financial domain.

**RO.132.**

**Title EN**

**Sustainable or just greenwashing experts? An analysis of companies listed on the Bucharest Stock Exchange**

**Authors**

Ionela-Daniela ROȘCA[1], Ioan-Bogdan ROBU[1], Ionuț Viorel HERGHILIGIU[2,] Costel-Sorin CHIRU[1]

Institution

**[1] Alexandru Ioan Cuza University of Iasi**

**[2] Gheorhe Asachi Technical University of Iași**

**Description EN**

**Research purpose:** The implementation of the Sustainable Development Goals and the increased attention of environmental stakeholders has prompted large companies to take action on sustainability and corporate responsibility. Under pressure from international regulations, investors and consumers increasingly aware of their environmental impact, companies have started to adopt strategies aimed at reducing their carbon footprint, using resources efficiently and promoting ethical business practices. The research aims to analyze the extent to which firms listed on the Bucharest Stock Exchange (BVB) are implementing genuine sustainability practices or whether they are resorting to greenwashing - promoting green initiatives more in window dressing than in reality.

**Research methodology:** The study is exploratory and descriptive, and the method used is qualitative, with data being collected through content analysis to identify elements related to sustainability and possible discrepancies between discourses, i.e. official reports and concrete actions of companies. The companies listed on the Bucharest Stock

Exchange that have prepared 2023 sustainability reports will be considered.

**Preliminary results:** Preliminary analysis of the companies listed on the Bucharest Stock Exchange (BVB) indicates an uneven picture in terms of actual commitments to sustainability compared to the communication and promotion practices associated with the concept of green business. Although more and more companies are integrating terms such as 'sustainable', 'green' or 'social responsibility' into their public discourse, in very few cases are these claims backed by concrete actions and measurable data. But there are also some positive examples. Particularly in the banking sector, where the requirements for compliance with international standards are clearer, there is an emerging trend towards transparent reporting and commitments. However, these cases remain isolated and do not yet define a widespread practice in the Romanian capital market.

**Originality:** Although the term Greenwashing has been around since 1986, there are few publications that talk about this phenomenon. Most existing studies focus on international companies, and the analysis of companies listed on the Bucharest Stock Exchange offers a new perspective on this phenomenon, especially in Romania. The research uses recent data to highlight current trends, unlike other studies that use more general or historical information.

**Keywords:** Sustainability, sustainable development, Greenwashing, ESG (Environmental, Social, Governance), Bucharest Stock Exchange (BVB), responsible investments, environmental practices, sustainability strategy.

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| **RO.133.** | |
| **Title EN** | **Detecting Fraud Risk with Random Forest Algorithms: Implications for Sustainability in the Automotive Industry** |
| **Authors** | Maria-Cosmina IORDACHE, Eusebiu IORDACHE, Ioan-Bogdan ROBU |
| Institution | Alexandru Ioan Cuza University of Iași, Faculty of Economics and Business Administration, Iași, România |
| **Description EN** | In an era of increasing industry complexity, automotive manufacturing companies are facing growing pressures regarding the transparency of both financial and non- |

financial reporting, as well as their compliance with sustainable development goals. Within the automotive sector, the risk of fraud is becoming more pronounced, driven by the need for companies to align with current regulations and evolving market standards, which place an increasing emphasis on sustainability. As legislative frameworks surrounding sustainability become more rigorous, the risk of fraud rises accordingly, highlighting the urgent need for efficient fraud risk mitigation strategies. While fraud detection and prevention have traditionally relied on financial audits, statistical models, and rule-based systems, these methods often struggle to keep pace with increasingly sophisticated fraud techniques. In this context, Random Forest algorithms offer innovative solutions through the application of machine learning techniques and deliver high accuracy when handling large and complex datasets. This study aims to analyze the applicability of the Random Forest algorithm in identifying fraud risk and to explore the implications of such an approach on sustainable development. Using data extracted from the financial and non-financial reports of companies in the automotive sector, a classification model will be developed to distinguish between companies with high and low fraud risk. The results will demonstrate the usefulness of Random Forest algorithms as a powerful and interpretable tool for improving fraud risk detection systems and enhancing the reliability of annual reporting.

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| **RO.134.** | |
| **Title EN** | **Technologies, Materials, and Cultural "Signatures": A Comparative and Experimental Study of the Eneolithic Pottery of Eastern Romania** |
| **Authors** | Ana Drob, Neculai Bolohan, Viorica Vasilache, Bogdan Gabriel Rățoi, Bogdan Ștefan Novac |
| Institution | Alexandru Ioan Cuza" University of Iași, Arheoinvest Centre, Department of Exact Sciences and Natural Sciences, The Institute of Interdisciplinary Research, 700506 Iași, Romania |
| **Description EN** | - The study of pottery encompasses a diverse range of methodologies and techniques that allow for the identification of aspects related to prehistoric manufacturing technologies. Archaeological ceramics have long served, and continue to |

serve, as key "evidence" for distinguishing the temporal and spatial evolution of various archaeological cultures, reflecting the development of distinct communities or groups of human populations.

This research presents a comparative analysis of Eneolithic pottery unearthed from various stratigraphic levels within a defensive ditch at the Hoisești-La Curmătură settlement. The investigation is centered on mineralogical and physicochemical analyses conducted on three distinct ceramic categories—fine, semi-fine, and coarse. The goal is to compare and elucidate the characteristics of each category, with a focus on the primary stages of the manufacturing process. Additionally, the study explores the potential sources of raw materials in the vicinity of the settlement, examining their exploitation and utilization in relation to the analyzed ceramic categories.

The primary objective of this contribution is to examine the technological expertise and preferences of the Eneolithic community of Hoisești from both a synchronic and diachronic perspective. The findings provide a more nuanced understanding of the local technological traits, which may offer insights that can be extended to the broader regional context of ancient communities situated east of the Carpathians. This research introduces a novel approach by integrating detailed scientific analysis with archaeological data, thus contributing to the advancement of knowledge in Eneolithic technological practices and material culture.

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**RO.135.**

**Title EN** **Cucuteni Unearthed: A 3D Journey Through Time**

**Authors** Radu-Alexandru BRUNCHI, Andrei ASĂNDULESEI, Felix-Adrian Tencariu

Institution **Alexandru Ioan Cuza" University of Iași, Arheoinvest Centre, Department of Exact Sciences and Natural Sciences, The Institute of Interdisciplinary Research, 700506 Iași, Romania**

**Description EN**

Pioneering a new era in archaeological investigation, this study unveils the development of a comprehensive 3D model for the Cucuteni-Cetățuia archaeological site (NE Romania), the very heartland of the Chalcolithic Cucuteni culture. This groundbreaking project transcends traditional approaches by seamlessly integrating cutting-edge multidisciplinary methodologies, including drone and high-resolution camera photogrammetry, alongside terrestrial 3D scanning and sophisticated Geographic Information System (GIS) analysis. Its

revolutionary core is the creation of an interactive online platform, a first-of-its-kind portal enabling both specialists and the public to immerse themselves in the archaeological site. Featuring Virtual Reality (VR) functionalities and interactive visualization tools, this innovative platform allows remote exploration of excavation trenches, past discoveries, and newly identified subsurface features, which otherwise would not be visible. By radically bridging the divide between scientific rigor and public accessibility, this project fosters a truly participatory approach to heritage preservation and interpretation. The novel integration of advanced digital modeling with online dissemination marks a paradigm shift in archaeological methodology, providing researchers with an unprecedented tool for spatial analysis and hypothesis testing. Simultaneously, it democratizes access to cultural heritage on an unprecedented scale, particularly for sites facing logistical or preservation challenges. This initiative boldly underscores the transformative potential of digital technologies in making historical landscapes and their stories universally available, all while championing interdisciplinary collaboration. This case study demonstrates the profound and far-reaching implications of such digital frameworks for the documentation, conservation, and presentation of archaeological sites across the globe.

**RO.136.**

**Title EN**

**Blurred Identity, Rising Distress: A Serial Mediation Approach to Social Media and Depression**

**Authors**

Alexandra Maftei, Cristian Opariuc-Dan, Ana Nicoleta Grigore

Institution

Alexandru Ioan Cuza University of Iași

**Description EN**

This study tests a serial mediation framework to understand better how social media use influences mental health. While digital stress may serve as an initial trigger for psychological distress, its effects may further be compounded by the impact on self-concept clarity. Thus, we examined how digital stress and self-concept clarity may serially mediate the relation between social media use and depressive symptoms. The study sample included 995 Romanian participants aged 17 to 79 (M = 25.05; SD = 9.52, 63.22% females). Results suggested a positive association between digital stress and social media use and a negative association between self-concept clarity, digital stress, and depressive symptoms. Results also suggested a significant link between prolonged social media usage and digital stress, as well as a correlation between elevated digital stress levels and

low self-concept clarity scores, which in turn contribute to the development of depressive symptoms. However, the relation between digital stress and self-concept clarity did not fully account for the positive correlation between social media usage time and depressive symptoms. Thus, the mediation effect was incomplete, as the direct relationship between social media use and depressive symptoms persisted, remaining positive and statistically significant. We discuss these findings regarding their practical implications in mitigating the effects of social media use on individuals' mental health, focusing on the relation between digital stress and self-concept clarity.

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**RO.137.**

**Title EN**

## Separation by electrodeposition of useful components from flotation mining tailings

**Authors** **Dumitru Bulgariu**[(1,3)], **Laura Bulgariu**[(2)]

Institution

**[1]„Alexandru Ioan Cuza" University of Iaşi**

**[2]Technical University „Gheorghe Asachi" of Iaşi**

**[3]Romanian Academy, Iaşi Branch, Geographical Research Center**

**Description EN**

Worldwide, in the period 2010-2024, the production of metals from the processing of "secondary resources" increased by approx. 47% (worldwide average value for the total production of industrial metals: Fe, Co, Cu, Ni, Zn, Cr, Mn, Ti, V, Mo, Zr, W, Al, Sn, Pb). In this context, our studies aimed at developing a separation process by electrodeposition of metals of industrial importance (Cr, Mn, Co, Ni, Cu, Zn, Pb) from flotation mining tailings (figure 1), within an experimental methodology potentially applicable in practice. The optimal working conditions for achieving separations with acceptable yields were established, as well as the applicability limits of the separation process. Also, the suitability and feasibility analysis of the electrodeposition separation process was carried out within a methodology for the advanced separation and recovery of metals from flotation mining tailings. The results showed that the tested separation process satisfies to an acceptable extent the economic and ecological optimum conditions, having a good application potential for the separation of metals. Our option for valorizing flotation tailings is justified by the fact that Romania has significant quantities of such secondary resources (in a relative estimate, the volume of tailings from tailings ponds in Romania is approximately 340.43 million $m^3$).

# University Politehnica of Timișoara

**RO.138.**

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| **Title EN** | **INFRARED RULER** |
| **Authors** | Șaptebani Neta Ionelia, Mocan Liviu Marian, Dragan Florin, Ivascu Larisa, Pislaru Marius |
| **Institution** | **Politehnica University of Timisoara, CITT Politehnica 2020, "Gheorghe Asachi" Technical University of Iasi, Romania** |
| **Patent no.** | A/00388/2024 |
| **Description EN** | The invention relates to an infrared ruler used for measuring linear dimensions. This is achieved by wrapping an electrically heated conductor wire around an assembly of insulating plates, with a centrally located metal plate cooled by forced ventilation or cooling elements. Alternatively, the wire can be arranged on an insulating structure with compartments through which a cooling fluid circulates, either in a single compartment or in systems with opposing or multiple flows, ensuring the uniformization of the thermal field.<br>The ruler is useful in research and design, allowing measurements of thermal zones in heating-cooling systems, optimizing air flows, designing and thermally optimizing electrical and electronic circuits, as well as other equipment that requires temperature management. |

**RO.139.**

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| **Title EN** | **MONITORING SYSTEM FOR CONTROL OF VEHICLE SPEED LIMITS ON PUBLIC ROADS** |
| **Authors** | Pavel Ștefan, Ungureanu Daniel-Viorel Corneliu |
| **Institution** | **Politehnica University of Timisoara, CITT Politehnica 2020, Romania** |
| **Patent no.** | A/00001/03.01.2024 |
| **Description EN** | The invention refers to a fixed electrical system for preventing accidents caused by excessive speed on public road segments with vehicle speed restrictions.<br>ADVANTAGES:<br>Detects when a vehicle exceeds the allowed speed limit on a |

designated road segment and determines its actual speed. It prevents the driver from exceeding the legal speed limit. Verifies compliance with speed adjustment requests. In case of noncompliance, it neutralises the vehicle's control system through an electromagnetic pulse, causing it to come to a stop. It records, archives and transmits data via an internet connection to authorised authorities responsible for managing such situations. The installation is energy self-sufficient. The installation does not pollute the environment. The generation of the electromagnetic pulse is automatically disabled when emergency vehicles (police, rescue, firefighters, military, government officials, etc.) pass through the designated area and are reactivated after their passage.

**RO.140.**

**Title EN**

**AIR CAPTURE AND RECOVERY DEVICE FOR LARGE TRUCK&BUS ENGINES**

**Authors**

Corneliu BIRTOK-BANEASA, Vlad-Mircea MIHAESCU, Adina BUDIUL-BERGHIAN, Ana Virginia SOCALICI, Roxana SlRBU, Petru NEGREA, Daniel-Horatiu URSU, Gabriel Petre GORECKI

**Institution**

**Politehnica University of Timisoara, CITT Politehnica 2020, Romania**

**Patent no.**

A/00087/ 23.02.2023

**Description EN**

The device intended for the operations of capturing, recovering, reversing, filtering and treating fluids, has applicability in any field that involves the circulation of fluids, its component elements adapting according to the rheology of the fluid (air, water, oil, liquefied gas, etc.).

The architecture of the device allows its adaptation including in the case of the intake system of large-capacity internal combustion engines, such as: trucks, machinery, installations, sea vessels, etc.

The modification of the architecture of the device consists in adapting the external diffuser, the direction reverser, the filtering element, the aerodynamic element for directing and treating, the double diffuser for recovery and the recovery cone, depending on the architecture of the engine intake system, while maintaining the functions of capturing, recovering, reversing, filtering and treating the fluid, in this case air.

**RO.141.**

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| **Title EN** | **ENHANCING CLIMATE RESILIENCE AND SUSTAINABILITY THROUGH MODULARITY AND FLEXIBILITY IN ARCHITECTURAL DESIGN** |
| **Authors** | Kenza Belkhiri; Mentor: Daniel-Viorel Ungureanu |
| **Institution** | **Politehnica University of Timisoara, CITT Politehnica 2020, Romania** |
| **Patent no.** | PhD Thessis |
| **Description** | The climate crisis has been ranked with some of the most pressing challenges of the 21st century and calls for very creative architectural responses, if a significantly different built environment is to be achieved. Extreme weather changes, depletion of resources and high temperatures would increasingly result in changes that architecture would need to make in order to better address sustainability and resilience. Modularity is based on prefabrication and standardization, which has very great benefits concerning material waste reduction, simplification of construction processes, and Circular Economy principles by means of scalability and reuse. Flexibility refers to how much a building can adapt to changing functional, environmental, and spatial requirements and lengthens the life of structures as well as reduces their chances of obsolescence. Together, these strategies direct architecture to the dual commands of climate adaptation and mitigation. Inquiry into such concepts advances transformative strategies supportive of environmental stewardship and the goals related to global resilience, thus adding to the broader discourse on sustainable architecture. This paper discusses the merits of combining flexibility and modularity by architectural practices into a strong argument for sustainable design. |

**RO.142.**

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| **Title EN** | **ULTRASONIC WELDABILITY OF COMPOSITES CREATED THROUGH ADDITIVE MANUFACTURING** |
| **Authors** | Emilia DOBRIN, Gabriela-Victoria MNERIE, Ileana Lavinia SÎRBU |
| **Institution** | **Politehnica University of Timisoara, CITT Politehnica 2020, Romania** |
| **Patent no.** | PhD Thessis |
| **Description** | Ultrasonic welding is a sustainable and non-toxic joining |

**EN** process widely utilized by leading industrial manufacturers and aligned with European circular economy regulations. This study investigates the ultrasonic welding behavior of additively manufactured composites reinforced with materials such as glass fiber, Kevlar (K), and copper wire. These composites are structured in a sandwich configuration with varying reinforcement types and welded using ultrasonic technology. The welded samples were analyzed and compared to the base material through non-destructive (NDT) and destructive testing, including visual inspection, microscopic and macroscopic analysis, tensile testing, hardness testing, and bending tests. The results provide insights into the mechanical performance and structural integrity of ultrasonic-welded, additively manufactured composites.

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**RO.143.**

**Title EN** **SYSTEM AND METHOD FOR DETERMINING VERY LOW ELECTRICAL RESISTANCE OR ELECTRICAL RESISTANCE AT INTERFACIAL CONTACT**

**Authors** Ercuța Aurel, Crăciunescu Corneliu-Marius, Vaszilcsin Nicolae, Kellenberger Andrea, Mitelea Ion, Laedre Sigrid, Khoza Thulile

**Institution** **Politehnica University of Timisoara, CITT Politehnica 2020, Romania**

**Patent no.** A 2024 00220 din 26.04.2024

**Description EN**

The invention relates to a system for measuring the values of current and voltage through a sample the very low resistance of which is to be determined and to a method for accurately determining the same, or for determining the electrical resistance at the contact between faces, for a sandwich-type sample. According to the invention, the measuring system comprises a low-frequency oscillator (1) which generates a sinusoidal voltage of controllable frequency and amplitude, having a value set depending on the material of the sample to be measured, which is amplified by means of an operational bipolar power source (2) which further supplies a series circuit consisting of a current limiter (3) with known resistance and a milliammeter (4) of alternating current for measuring the effective value of the current intensity through the measuring sample (5) which closes the circuit at the

reference potential (ground), the voltage drop on the sample (5) being amplified by means of a selective nanovoltmeter (6) with the RLC circuit tuned to the excitation current frequency (in resonance) so that the voltage value at its output, measured by means of a digital millivoltmeter (7), is used for determining the actual value of the voltage drop on the sample (5), calculated separately for each measuring range used, taking into account that the voltage is normal at the maximum indication for each range, at the output of the nanovoltmeter (6). The claimed method uses the values of current and voltage through the sample to be measured, determined with the above-described system, so that the very small value of the sample electrical resistance or the resistance at the contact between faces, in the case of sandwich-type samples, can be determined accurately.

**RO.144.**

**Title EN** **ALUMINUM ALLOYS FOR CAR RIMS**

**Authors** Doru SAPTA, Ana SOCALICI, Corneliu BIRTOK BANEASA, Vasile PUTAN

**Institution** **Politehnica University of Timisoara, CITT Politehnica 2020, Romania**

**Patent no.** PhD Thesis

**Description EN**

Aluminum alloy 6082 is used in various applications in the automotive industry, construction, and the transportation sector. It is widely used and has replaced alloy 6061 in many applications. It has high corrosion resistance and high hardness. It is very difficult to achieve fine-grained structures in aluminum alloys through various processes. In the case of aluminum alloy 6082, the hardening phase is Mg2Si. Its size is determined by the presence of iron and silicon. These alloys use magnesium and silicon in their composition, can be heat-treated, have good forgeability, and high corrosion resistance. Globally, the manufacturing of automotive wheels is carried out using aluminum alloys through casting and/or plastic deformation.

The experimental data were collected and processed statistically. The goal was to establish correlations between grain size (considered a dependent parameter) and the chemical composition elements that influence grain refinement. It is observed that the alloying elements Si, Mg,

Mn, as well as Ti, used for grain refinement, positively influence the mechanical properties within the limits of these elements. Specifically, an increase in Ti leads to finer grain size, which also results in higher values for mechanical characteristics. Using high-quality charge materials leads to minimal variations in the chemical composition elements, and following alloying, only small differences in chemical composition are observed from one batch to another. The narrow variation limits for chemical elements resulted in acceptable variations in the alloy's qualitative characteristics.

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**RO.145.**

**Title EN**

## ELECTROSTATIC DEVICE FOR MEASURING ELECTRICAL VOLTAGE WITH OPTICAL INDICATOR ELEMENT

**Authors**

Ordodi Laurențiu Valentin, Vatău Doru, Salinschi Marin, Olariu Adrian Flavius, Dumitrel Gabriela Alina, Pană Ana-Maria, Vaszilcsin Nicolae, Dan Mircea Laurențiu, Mâțiu-Iovan Liliana, Ionel Raul Ciprian, Udrea Ioan Alexandru, Bonciog Daniel Dumitru, Vereș Denisa Alexandra, Stănese Cristian Marcel, Păunescu Virgil, Bojin Maria Florina, Gavriliuc Oana Isabela, Lukinich-Gruia Alexandra Teodora, Negru Șerban, Crîsnic Daniela, Frunză Gigel Viorel

**Institution**

**Politehnica University of Timisoara, CITT Politehnica 2020, Asociatia OncoGen Timisoara, Asociatia ONCOHELP Timisoara, SC Biodim SRL Timisoara, Romania**

**Patent no.** RO 137476 B1

**Description EN**

The invention relates to an electrostatic device for measuring high electrical voltages in electrical and energy equipment and in radiological and radiotherapeutic medical equipment. According to the invention, the device is made in such a way that the direct or alternating voltage to be measured is applied by means of an input terminal (4), insulated with teflon (5) from the ground (14) of the device, to a disk-shaped copper electrode (3) placed in a sealed polypropylene tube (I), with removable side covers and glass window (1), the electrode (3) producing a uniform electric field in the lines of which an optical indicator element (8) slides, said element consisting of a low-pressure neon discharge tube connected to the ground (14) of the device, positioned at the end of a sliding rod (7) coaxial with the disk-

shaped electrode (3), until the neon tube emits a red-orange color, i.e. when it is in an area of the electric field with a sufficiently high intensity to generate a luminescent discharge, so that, after reading the distance D on a graduated ruler (10), by means of an indicator needle (11) rigidly fixed on the sliding rod (7), and based on a calibration curve established when the device was put into operation, the applied electrical voltage can be estimated.

**RO.146.**

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| **Title EN** | **PHOTO-CATALYTICALLY ASSISTED FILTERING PLANT FOR TREATING WATER FOR DRINKING PURPOSE** |
| **Authors** | Manea Florica, Orha Corina, Lazau Carmen, Pode Rodica, Ursu Daniel, Pop Aniela |
| **Institution** | **Politehnica University of Timisoara, CITT Politehnica 2020, National Institute of Research and Development for Electrochemistry and Condensed Matter, Romania** |
| **Patent no.** | RO 133757 B1 |
| **Description EN** | The invention relates to a photo-catalytically assisted filtering plant, of the multi-layer type, having a double role: to retain the water pollutants as a system for filtering and/or degrading the water pollutants and as photo-catalytic system which requires the use of a UV-type light source. According to the invention, the plant consists of a multi-layer filtration column (5) filled with three filtering layers: a layer (9) of quartz sand, a layer (10) of zeolite modified with TiOand a layer (11) of active carbon modified with TiO, it is provided with a central concentric cylindrical quartz tube (7) equipped with a cooling system wherein the UV lamp (6) is immersed, said lamp (6) being supplied from a current source (8), the filtration column (5) being supplied, at the lower side, with raw water from the supplying tank (1) by means of a pump (2), it further passing through a flow controller (3) and getting through the filtering layers up to the upper side of the filtration column (5), wherefrom the treated water is collected in the storage tank (9) and where, air is optionally bubbled by the compressor (4). |

**RO.147.**

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| **Title EN** | **SELF-ADAPTIVE DIFFERENTIAL GROUP** |
| **Authors** | ROMEO CĂTĂLINOIU, SORIN AUREL RAȚIU, IMRE ZSOLT MIKLOS |
| **Institution** | **Politehnica University of Timisoara, Coramex by Service** |

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|---|---|
| | **Automobile SA, CITT Politehnica 2020, Romania** |
| **Patent no.** | 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. |

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| **RO.148.** | |
| **Title EN** | **NiCr coating with Ti addition manufactured by laser cladding for bipolar plates** |
| **Authors** | Diana Nicoleta AVRAM, Nicolae VASZILCSIN, Iosif HULKA, Andrea KELLENBERGER, Mircea Laurentiu DAN, Alexandru PASCU |
| **Institution** | **Politehnica University Timisoara and Transilvania University of Brasov** |
| **Patent no.** | - |
| **Description EN** | The novelty of this research lies in the synergistic combination of a low-cost, readily available base material such as low carbon steel with a high-performance coating, manufactured using laser cladding process. The addition of titanium (Ti) within NiCr-based coatings and deposited on low carbon steel substrates presents an innovative way to manufacture high-performance bipolar plates for proton exchange membranes fuel cells (PEMFC). The innovation relies on preparing the NiCr feedstock powder with 3% Ti addition and deposited via laser cladding to obtain dense and well-adhered coating on the surface of the base material. As a result, the new coating has significantly improved mechanical performance, enhanced corrosion resistance and low interfacial contact resistance (ICR), properties required for fuel cell operation in harsh conditions. The new NiCr + 3% Ti coating successfully addresses a major challenge of balancing cost reduction with functional performance, positioning it as a viable alternative to expensive PEMFCs manufactured from TiN (deposited on pure Ti using arc-PVD), $Cr_2N$ (deposited on Ti–6Al–4V using PIRAC), Au |

(deposited on SS 316L steel substate using PVD and CVD), etc. The innovation is in line with sustainable manufacturing goals and promotes energy efficiency. PEMFCs with NiCr + 3% Ti coating might be a clean energy solution and support global efforts to contribute to the growth of a green industry with applicability in sectors such as automotive, portable power, home energy storage and backup power systems.

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**RO.149.**

**Title EN** **Innovative application of Concentrated Solar Power for Testing Hybrid Thermal Barrier Coatings**

**Authors** Iosif Hulka, Dragos Utu, Jonáš Dudík

**Institution** **Politehnica University Timisoara (Ro), Institute of Plasma Physics of the Czech Academy of Sciences (CZ)**

**Patent no.** -

**Description EN**

This innovation introduces a novel method for testing hybrid thermal barrier coatings (TBCs), which are critical for turbines used in propulsion and Concentrated Solar Power (CSP) systems. High-temperature applications demand rigorous TBC testing to understand degradation mechanisms and enhance performance. In this study, TBCs were produced using a water/argon stabilized plasma system from yttria-stabilized zirconia (YSZ), yttrium aluminum garnet (YAG), and gadolinium zirconate (GZO) suspensions mixed with coarse YSZ powders. Traditional methods like isothermal and thermal cycling tests are costly, energy-intensive, and limited in temperature range. Furthermore, the presence of the particles derived from desert sands or volcanic ashes, so called CMAS ($CaO$-$MgO$-$Al_2O_3$-$SiO_2$) may be encountered during operation. Its infiltration into TBCs causes coating failure through cracking and delamination, leading to premature maintenance. Using CSP to test TBCs is a novel method that can reveal new behaviors, failure modes or properties of coatings. The method significantly reduces energy costs, test time and environmental impact compared to traditional testing methods, while reducing the negative impact of CMAS on test equipment. This innovation not only deepens our understanding of how TBCs perform under extreme conditions but also provides valuable insight into the development of efficient and environmentally friendly testing methods for aerospace and energy applications. This method provides cost-effective and sustainable testing for the next generation of TBCs, while minimizing the impact on the environment and testing equipment in line with global energy sustainability goals.

# Transilvania University of Brasov

**RO.150.**

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| **Title EN** | **Metrological Device with sensors, touchscreen and Artificial intelligence** |
| **Authors** | Goga Alexandru Silviu |
| **Institution** | **University Transylvania Brașov** |
| **Patent no.** | 2024 00263 |
| **Description EN** | Introducing a groundbreaking advancement in industrial metrology: an innovative all-in-one smart measurement device developed by Alexandru Silviu Goga, a second-year doctoral student at ITMI. This revolutionary instrument, created as part of the "Industrial Portfolio Management with Artificial Intelligence" research project, represents a significant technological leap in the field.<br>The device combines over 15 advanced sensors with artificial intelligence, creating a portable and intuitive solution that integrates complex measurements, structural analysis, and project management capabilities. What sets this instrument apart is its ability to simultaneously perform and process multiple types of measurements while providing real-time AI-powered recommendations.<br>Key features include the ability to detect hidden pipes within walls instantly, simultaneous multi-dimensional measurements, and intelligent material and tool suggestions for any project. The device seamlessly communicates with users in real-time and integrates with management systems, even anticipating potential project issues before they arise.<br>Built for durability and practical use, the instrument offers 6-hour battery life and shock resistance, making it ideal for construction and industrial professionals. This "Swiss Army knife" of metrology doesn't just measure – it thinks, analyzes, and guides users through their projects.<br>The device represents the first intelligent metrological instrument of its kind globally, offering a unique combination of "seeing," "thinking," and real-time solution provision. This innovation marks a new era in industrial metrology, where advanced technology meets practical application in a single, user-friendly package that revolutionizes how measurements and project management are approached in industrial settings. |

# "Vasile Alecsandri" University of Bacau

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| **RO.151.** | |
| **Title EN** | Innovative Nanomaterial Used as Catalyst and Bacterial Inhibition Agent |
| **Authors** | Mirila Diana-Carmen, Rosu Ana-Maria, Georgescu Ana-Maria, Muntianu Gabriela, Nedeff Florin, Panainte-Lehadus Mirela, Nistor Ileana-Denisa |
| **Institution** | *"Vasile Alecsandri" University of Bacau, 157 Calea Marasesti Street, 600115 Bacau, Romania* |
| **Patent no.** | - |
| **Description EN** | An innovative, eco-friendly, and cost-effective method was developed to prepare a microporous material based on chemically modified bentonite with silver ions (BN-$Ag^0$). This material exhibits excellent catalytic activity against Malachite Green (MG) dye and bacteriostatic activity against *Escherichia coli*. BN-$Ag^0$ was characterized by using advanced techniques such as EDX, SEM, BET analysis, FTIR spectroscopy, TPD, and XRD. BN-$Ag^0$ demonstrated significant antibacterial activity against *Escherichia coli*, aiding in the control of waterborne diseases. As a catalyst in the ozonation of MG dye, BN-$Ag^0$ enhances oxidation due to its good adsorption and catalytic properties, making it effective for water purification. The study promotes sustainable practices by using natural bentonite and silver ions, reducing reliance on harmful chemicals. The dual functionality of BN-$Ag^0$ as both a catalyst and antibacterial agent opens possibilities for various industrial applications, including wastewater treatment and environmental remediation. This research advances scientific understanding and offers practical solutions to environmental and public health challenges. |

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| **RO.152.** | |
| **Title EN** | Influence of rosehip powder addition on the artisanal biscuits' quality |
| **Authors** | Moroi Alina-Mihaela, Vartolomei Nicoleta, Tănasă Simina, Rosu Ana-Maria, Mirila Diana-Carmen, Tomozei Claudia, Lehadus-Panainte Mirela |
| **Institution** | *"Vasile Alecsandri" University of Bacau, 157 Calea Marasesti Street, 600115 Bacau, Romania* |
| **Patent no.** | - |
| **Description EN** | The purpose of this work was to study the influence of organic rosehip powder addition on the quality of artisanal biscuits. To estimate the physico-chemical and sensory characteristics of complex products with added vegetable powder, artisanal biscuits with rosehip powder were prepared in ratios of 0.5%, 1.0%, 1.5%, 2%, and 2.5%.<br>Rosehip fruits (*Rosa canina L.*) are used in food due to their rich content of bioactive compounds such as polyphenols, essential fatty acids, galactolipids, folates, antioxidants, vitamins, and minerals, especially vitamin C (ascorbic acid). Rosehips are recognized as a plant source rich in vitamin C. The increased antioxidant potential of plant powder from native plant sources was theoretically and experimentally demonstrated through the analysis of quality indicators, antioxidant activity, and CIELab color parameters.<br>For the sensory analysis, five basic parameters were evaluated: color, taste, texture, appearance, and smell. Each index was rated on a scale of 1-5 points.<br>Following the estimation of the organoleptic indices, it was established that artisanal biscuits with the addition of 1.5% rosehip powder have a pleasant color and smell, favorably influencing the organoleptic indices of the samples obtained. These biscuits can be proposed for consumption by potential consumers on the market. |

# Dunarea de Jos University of Galati

| RO.153. | |
|---|---|
| **Title EN** | **Modified immunosensor with hybrid nanostructured material and method for rapid cancer detection** |
| **Authors** | Bușilă Mariana, Herbei Elena Emanuela, Alexandru Petrică |
| **Institution** | **„Dunarea de Jos" University of Galati** |
| **Patent no.** | Patent application No. a 2022 00667/ RO-BOPI 4/2024 |
| **Description EN** | The invention referred to a method of obtaining a modified electrochemical biosensor, used for the early detection of cancer. The process, according to the invention, consists of the following steps: preparation of hybrid nanostructures of ZnO (ZnONP) functionalized with PEG 200 in a chitosan matrix, modification of the working electrode with the carbon working surface (C) of the sensor with screen-printed electrodes model C110, with 10 µL of ZnO in chitosan matrix (CS), coating with 20 µL of cystamine solution, respectively, glutaldehyde solution, immobilization on the surface of the modified ZnONP-CS working electrode of 10 µL of anti-CA 125 antibody diluted in phosphate buffer solution at a ratio of 1:1000, respectively, diluted human recombinant CA125/MUC16, resulting in a functionalized spherical ZnONP-CS-based modified biosensor for rapid and low-concentration electrochemical detection of biomarker present in early stages of cancer. |

| RO.154. | |
|---|---|
| **Title EN** | **New antitumor hybrid systems based on zinc oxide nanoparticles functionalized with lanthanide complexes** |
| **Authors** | Aurel Tăbăcaru, Andreea Veronica Botezatu, Simona Butan, Mariana Bușilă |
| **Institution** | **„Dunărea de Jos" University of Galați** |
| **Patent no.** | Research project no. PN-IV-P2-2.1-TE-2023-1242<br>Period of implementation: 03.01.2025 – 31.12.2026 |
| **Description EN** | The present research project aims to open the way to the development of new hybrid systems based on zinc oxide nanoparticles functionalized with lanthanide complexes, which are expected to show enhanced antitumor activity. The uniqueness of nanofunctionalized lanthanide complexes would play a crucial role in medicinal chemistry, especially in cancer chemotherapy. Among metal ion-based |

chemotherapeutic drugs, lanthanide complexes exhibit large coordination numbers, high structural flexibility, relatively low toxicity, and remarkable antitumor activities. Nanosized zinc oxide is a well-known promising material, due to its specific physicochemical properties, it is cheap and less toxic, and it presents excellent biomedical applications, behaving as a protector of bioactive elements in compounds with increasing bioavailability and their reduced destruction on the route of the reaction sites. Determined by the promising results we obtained previously regarding the remarkable antitumor activity of some lanthanide complexes and a series of organosilane-modified zinc oxide nanoparticles, we aim in this project to create a bridge between lanthanide complexes and zinc oxide nanoparticles to generate new hybrid systems with much better antitumor properties than the individual species or cisplatin, a drug already used in cancer therapy.

**Acknowledgements:** This work was supported by a grant of the Ministry of Research, Innovation and Digitization, CNCS – UEFISCDI, project number PN-IV-P2-2.1-TE-2023-1242, within PNCDI IV, contract no. 100TE/03.01.2025.

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**RO.155.**

**Title EN**

## APPLICATION OF CERAMIC VENEERS IN ESTHETIC DENTISTRY: TECHNIQUES, MATERIALS, AND PROGNOSIS

**Authors**

Madalina-Nicoleta Matei[1], Oleg Solomon[2], Sonia-Teodora Statescu Manaila[1], Ada Stefanescu[1], Anamaria Zaharescu[1], Alina-Ramona Dimofte[1], Gabriel Valeriu Popa[1], Raluca Cristina Mocanu Branza[1], Antoanela Magdalena Covaci[1], Petru Trifautanu[1], Cristina Aron[1], Marius Vacaru Carnaru[1], Kamel Earar[1]

**Institution**

[1] "Dunarea de Jos" University of Galati, Faculty of Medicine and Pharmacy, Galati, Romania

[2] "Nicolae Testemitanu" State University of Medicine and Pharmacy of the Republic of Moldova, Faculty of Dentistry, Chisinau, Republic of Moldova

**Patent no.**

Innovative Research

**Description EN**

The aim of this research is to analyze dental veneering techniques, explore the materials used in restoring anterior dental units, and evaluate the medium and long-term prognosis of ceramic veneers. The main objective is to assess the results of dental aesthetics and analyze patient

satisfaction following veneering treatments.
Ceramic veneers demonstrated high efficacy in restoring both dental aesthetics and functionality, becoming the ideal standard in esthetic dentistry. The medium- and long-term prognosis is favorable, with excellent results regarding retention and aesthetic stability. The success of the treatment depends on following the correct planning stages, using high-quality materials, and ensuring good communication between the dentist, patient, and dental laboratory. Overall, ceramic veneers have significantly improved patients' quality of life by restoring their aesthetic appearance and eliminating discomfort associated with dental sensitivity.

**RO.156.**

**Title EN**

**FUNCTIONAL AND ESTHETIC REHABILITATION OF TOTAL EDENTULISM THROUGH REMOVABLE PROSTHESIS**

**Authors**

Kamel Earar[1], Oleg Solomon[2], Ada Stefanescu[1], Petru Trifautanu[1], Sonia-Teodora Statescu Manaila[1], Gabriel Valeriu Popa[1], Marius Vacaru Carnaru[1], Antoanela Magdalena Covaci[1], Raluca Cristina Mocanu Branza[1], Alina-Ramona Dimofte[1], Ana Maria Necula[1], Anamaria Zaharescu[1], Madalina-Nicoleta Matei[1]

**Institution**

[1] "Dunarea de Jos" University of Galati, Faculty of Medicine and Pharmacy, Galati, Romania

[2] "Nicolae Testemitanu" State University of Medicine and Pharmacy of the Republic of Moldova, Faculty of Dentistry, Chisinau, Republic of Moldova

**Patent no.**

Innovative Research

**Description EN**

The main objective of the research was to assess the factors contributing to the onset of total edentulism, such as untreated carious lesions and periodontal diseases. The study analyzed the prevalence of this condition in patients aged 66 to 75 years and its impact on the intermaxillary relationship and temporomandibular joint function.
In the case of removable prosthetics, aesthetic success depends on several factors, including the choice of materials and adherence to gingival characteristics. The study emphasized the importance of correct positioning of the maxillary model in the articulator to obtain a correct arc of movement when the mouth is opened. The use of the

facebow significantly reduces occlusal errors, and prosthetic treatment with the articulator helps achieve faster adaptation of the dentures in the oral cavity, minimizing the need for multiple adjustments.

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| **RO.157.** | |
| **Title EN** | **POSSIBILITIES FOR MORPHO-FUNCTIONAL RESTORATION OF THE FRONTAL AREA OF THE MAXILLARY ARCH** |
| **Authors** | Madalina-Nicoleta Matei[1], Oleg Solomon[2], Alina-Ramona Dimofte[1], Gabriel Valeriu Popa[1], Anamaria Zaharescu[1], Marius Vacaru Carnaru[1], Antoanela Magdalena Covaci[1], Sonia-Teodora Statescu Manaila[1], Petru Trifautanu[1], Raluca Cristina Mocanu Branza[1], Ada Stefanescu[1], Maria Olaru[1], Kamel Earar[1] |
| **Institution** | [1] "Dunarea de Jos" University of Galati, Faculty of Medicine and Pharmacy, Galati, Romania<br>[2] "Nicolae Testemitanu" State University of Medicine and Pharmacy of the Republic of Moldova, Faculty of Dentistry, Chisinau, Republic of Moldova |
| **Patent no.** | Innovative Research |
| **Description EN** | The research focused on evaluating the influence of non-invasive clinical and paraclinical examinations on the development of the therapeutic plan, determining the prevalence of various dental lesions in the frontal area, and identifying the types of lesions and the corresponding treatment needs.<br>The largest proportion of patients requesting aesthetic treatments for their front teeth were women (68.09%). Carious and non-carious lesions, along with prosthetic restorations, were frequently encountered in the upper frontal area (80.85%). The most requested treatments for restoring the aesthetics of the front teeth were minimally invasive procedures, such as dental veneers. The diversity of aesthetic causes significantly influences the choice of the appropriate therapeutic method. |

**RO.158.**

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| **Title EN** | **THERAPEUTIC APPROACHES FOR THE MORPHO-FUNCTIONAL REHABILITATION OF THE PARTIALLY EDENTULOUS AREA THROUGH TEMPORARY PROSTHESIS: CLINICAL OUTCOMES EVALUATION** |
| **Authors** | Kamel Earar[1], Oleg Solomon[2], Gabriel Valeriu Popa[1], Alina-Ramona Dimofte[1], Antoanela Magdalena Covaci[1], Raluca Cristina Mocanu Branza[1], Marius Vacaru Carnaru[1], Sonia-Teodora Statescu Manaila[1], Petru Trifautanu[1], Anamaria Zaharescu[1], Ada Stefanescu[1], Ion Mocanu[1], Madalina-Nicoleta Matei[1] |
| **Institution** | [1] "Dunarea de Jos" University of Galati, Faculty of Medicine and Pharmacy, Galati, Romania<br>[2] "Nicolae Testemitanu" State University of Medicine and Pharmacy of the Republic of Moldova, Faculty of Dentistry, Chisinau, Republic of Moldova |
| **Patent no.** | Innovative Research |
| **Description EN** | The main objectives of the study are to evaluate the impact of temporary prosthesis on the morpho-functional rehabilitation of patients with partial edentulism, analyze the clinical particularities of patients from different age groups and health conditions, and identify the prosthetic solutions specific to each case. The study also aims to establish a personalized therapeutic plan that includes temporary prosthesis to ensure an effective transition period until definitive prosthodontics.<br>The study results showed that temporary prostheses had a significant impact on restoring functionality and aesthetics in patients with partial edentulism. Temporary prosthodontics contributed to improving masticatory function, pronunciation, and the patient's facial appearance, especially in younger patients, who benefited from rapid recovery due to the body's compensatory mechanisms. In elderly patients, the prosthetic treatments were adapted considering the general health status, having a slower but significant impact on functionality and aesthetics. Temporary prosthesis proved to be an effective solution during the intermediate period, helping to maintain morpho-functional balance until definitive prosthodontics were completed. |

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| **RO.158A** | |
| **Title EN** | **Phytotherapeutic Formulations for Preserving Prostate Health and Balancing Urinary and Salivary pH** |
| **Authors** | Viorel JINGA, Emil CEBAN, Kamel EARAR, Solomon OLEG, Simona PÂRVU, Andrei Victor SANDU, Mariana LUPOAE |
| **Institution** | Carol Davila University of Medicine and Pharmacy<br>Dunarea de Jos University of Galati<br>N.Testemitanu University of Medicine and Pharmacy<br>Gheorghe Asachi Technical University of Iasi. |
| **Patent no.** | - |
| **Description EN** | The invention relates to a phytotherapeutic formulation designed to support long-term prostate vitality and promote a balanced internal environment. It consists of extracts or dried parts of carefully selected medicinal plants known for their synergistic effects: Urtica dioica (nettle) – recognized for its diuretic, anti-inflammatory, and detoxifying properties; Epilobium parviflorum (small-flowered willowherb) – known for its targeted anti-inflammatory action on prostate tissue; Equisetum arvense (horsetail) – valued for its remineralizing and pH-regulating effects on the urinary tract; Taraxacum officinale (dandelion) – a powerful liver and kidney detoxifier that contributes to creating an alkaline systemic environment; and Betula pendula (birch) – offering mild diuretic and anti-inflammatory support. The composition is intended to maintain prostate health and function over time, while also aiding in the regulation of urinary and salivary pH. |

| RO.158B | |
|---|---|
| **Title EN** | **Intelligent device integrated in Mobile prostheses for patients with disabilities** |
| **Authors** | Kamel Earar, Aurel Nechita, Mircea Beuran, Oleg Solomon, Claudia Hadjioglo, Emil Ceban |
| **Institution** | **Dunarea de Jos University of Galati, Romania & Nicolae Testemiţanu State University of Medicine and Pharmacy, Republic of Moldova** |
| **Patent no.** | - |
| **Description EN** | The device has a chip that is mounted in the acrylate prosthesis, in the case of mobile prosthesis or even in other types of prosthesis.<br>The chip contains the patient's identity information, the emergency contact number, so that it can be identified in case of loss. It is very useful for patients with Alzheimer's or memory loss. Relatives can monitor the patient's location (GPS) with the help of a phone program.<br>The idea is similar to pet chips. |

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| **RO.159.** | |
| **Title EN** | **Research on 3D Prototyping of Thermometer Shields Used in Meteorology** |
| **Authors** | Sorin Frasina, Cristian Tilea, Catalin Fetecau, Felicia Stan, Gabriel Murariu |
| **Institution** | **"Dunărea de Jos" University of Galati, Center of Excellence Polymer Processing** |
| **Patent no.** | Research in progress |
| **Description EN** | World Meteorological Organization requirements for accurate temperature recording involve the use of thermometer shields/screens to eliminate the influence of other environmental parameters on the temperature values recorded by the measuring instrument. ISO 17714 defines characteristics of a thermometer shield/screen. It also defines test methods to inter-compare the behavior of different screen designs, but WMO No. 8 norms do not impose any restrictions on their design. An additional challenge to accurate temperature measurement arose in 2013 with the adoption by the UN of the Minamata Convention on Mercury. The Convention requires the elimination of mercury thermometers from weather stations which has led to their replacement with modern alternatives based on the translation of electrical signals into accurate temperature values. Since, for certain temperature transducers, not only radiation influences the output data set of the thermometer-shield assembly but also wind direction and speed, in this study we apply FDM 3D printing technology to produce different types of thermometers shields in order to obtain better accurate data sets. |

# Iasi University of Life Sciences "Ion Ionescu de la Brad", Romania

**RO.160.**

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|---|---|
| **Title EN** | **Lignocellulosic Waste Valorization: Lignin as a Biosorbent for Heavy Metals [Pb(II), As(III), and Zn(II)] Removal from Aqueous Medium** |
| **Authors** | Elena Ungureanu[1], Maria-Emiliana Fortună[2], Răzvan Rotaru[2], Ovidiu C. Ungureanu[3], Bogdan–Marian Tofănică[1*] |
| **Institution** | **1. "Ion Ionescu de la Brad" Iasi University of Life Sciences, 3 Mihail Sadoveanu Alley, 700490 Iasi, Romania**<br>**2. "Petru Poni" Institute of Macromolecular Chemistry, Grigore Ghica Voda Alley 41A, 700487 Iasi, Romania**<br>**3. "Vasile Goldis" Western University of Arad, 94 The Boulevard of the Revolution, 310025 Arad, Romania** |
| **Patent** | Pending |
| **Description EN** | Heavy metal pollution poses a significant threat to environmental and human health due to the persistence and toxicity of these pollutants. This study investigates the effectiveness of unmodified lignin as a biosorbent for the removal of Pb(II), As(III), and Zn(II) from aqueous solutions. The adsorption process was examined under various experimental conditions, including pH, adsorbent dosage, solution concentration, and contact time, to determine optimal removal conditions for each metal. The experimental data were analyzed using Langmuir and Freundlich isotherm models to describe the equilibrium of adsorption, and Lagergren pseudo-first-order and Ho-McKay pseudo-second-order kinetic models to understand the adsorption kinetics.<br>Lignin demonstrated a good capacity for removing Pb(II), As(III), and Zn(II) from aqueous solutions. The adsorption processes were influenced by the experimental parameters, with optimal removal conditions varying for each metal. Kinetic studies suggested that the adsorption of these metals onto Sarkanda Grass lignin involves chemical interactions, with the Ho-McKay model providing the best fit for the experimental data.<br>These findings suggest that lignin is a potentially effective, low-cost, and environmentally friendly biosorbent for the |

removal of Pb(II), As(III), and Zn(II) from aqueous medium.

| RO.161. | |
|---|---|
| **Title EN** | Using chickpea flour to obtain an oven based fish (Sparus aurata) product |
| **Authors** | FOTEA L., RÎMBU C.M., HORHOGEA C.E. |
| **Institution** | *University of Life Sciences Ion Ionescu de la Brad, Iasi Romania* |
| **Patent no.** | |
| **Description EN** | Fish is considered a functional food, being very indicated for human consumption, due to its beneficial effects. It has been discovered that chickpea flour positively affected properties of fish meat, having an effective impact on improving the quality of the fish meat and sensorial experience.Applying chickpea flour on fish products as a coating has shown more beneficial effects compared to corn flour, and different ways of consuming this flour have also been highlighted. It has the lowest water retention capacity. It has a high digestibility due to its content of proteins (20-25%), fibers, and complex carbohydrates. These components are beneficial for the digestive system, and the fibers in chickpea flour can contribute to slower and more efficient digestion, helping to maintain a steady energy level. Additionally, it is a good option for those following gluten-free diets or looking for a high-quality plant-based protein source. The fish was cooked using the baking technique in the oven at a temperature of 180°C for 25 minutes. |

| RO.162. | |
|---|---|
| **Title EN** | **AGAR-BACTERIOPHAGE BASED GEL: PROTOTYPE FOR INTRAMAMMARY THERAPY** |
| **Authors** | **Rîmbu Cristina Mihaela, Horhogea Cristina Elena, Daraban Florentina, Dascălu Mihaela Anca, Tănase Oana Irina, Lenuța Fotea** |
| **Institution** | **Ion Ionescu de la Brad" Iași University of Life Sciences** |
| **Patent no.** | - |
| **Description EN** | Lately, bacteriophage therapy is revived due to the high level of antibiotic resistance reported in both human and animals. Despite advances in pharmaceutical industry, antibiotic development wasn't able to control resistance spread. There is, therefore, a major interest in identifying innovative |

formulas that can reverse antibiotic therapy failures. In dairy ruminants, mastitis is a common, painful condition with significant economic losses. Limited local therapeutic options and antimicrobial resistance are the main factors that urged to obtain a phage therapeutic bioproduct for intra-mammary administration. Bacteriophages are bacteria specific pathogenic viruses that lyse host cells during multiplication.

In this context, an experimental product consisting of a commercial Omniphage polyphages suspension (Phagebio Lab, Georgia), embedded in sterile semisolid Agar gel (1.4%) was developed and tested. Agar powder (1.4 g, Oxoid) dissolved and homogenized in distilled water (100 ml) was sterilized by autoclaving ($121^0$C/15 minutes). Over the gel cooled to $40^0$C (100 ml), 40 ml of bacteriophage suspension was added and homogenized for 10 minutes/500 rpm. Subsequently, 20 ml of Phagogel (C%=28.57%) was aspirated into sterile syringes recommended for intramammary administration.

The in vitro experimental plan requires personalized implementation and must include two stages: **Stage I.** Bacteria isolation and identification, with sensitivity testing to specific bacteriophages. **Stage II.** Testing the isolated bacteria with the therapeutic phage gel final formula.

The agar gel matrix maintained bacteriophages viability, and when administered intra-mammary, they showed good adhesion and maintenance in the galactophore ducts, favoring permanent contact with the pathogens in the mammary gland and achieving healing.

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**RO.163.**

**Title EN** **THE TRANSITION TO DIGITAL AGRICULTURE: CHALLENGES AND OPPORTUNITIES**

**Authors** Raluca-Sînziana ZAHARIA, Carmen-Olguța BREZULEANU

**Institution** **„Ion Ionescu de la Brad" Iasi University of Life Sciences**

**Patent no.** -

**Description EN**

The use of technologies and innovations in agriculture plays a crucial role in shaping the future of the global agricultural sector. Advances in artificial intelligence, the Internet of Things (IoT), precision agriculture and biotechnology

enhance productivity, reduce environmental impact and strengthen farmers' resilience. However, the digital transformation of agriculture highlights a significant gap between developed and developing regions in terms of innovation adoption, necessitating measures to bridge this disparity—essential for a sustainable and efficient agricultural sector. At the same time, emerging technologies are reshaping the labor market by reducing demand for manual labor and increasing the need for advanced skills, requiring continuous adaptation and investment in education. This study aims to review existing literature on the key factors influencing digital agriculture adoption, providing relevant data to inform public policies and emphasizing strategic measures to accelerate digital integration.

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**RO.164.**

**Title EN**

**Meat Meets Innovation: Oleogel-Infused Sausages for a Healthier Future**

**Authors**

Roxana-Georgiana Bobeica; Andra-Sabina Neculai-Văleanu; Gabriel Vasile Hoha; Catalin Emilian Nistor; Benone Pasărin

**Institution**

**Iași University of Life Sciences, Romania**

**Description EN**

This project presents a novel method for sausage formulation by partially substituting animal fat with an oleogel synthesized from cold-pressed rapeseed and sea buckthorn oil. The objective was to improve the health advantages of conventional sausages while preserving their sensory attractiveness and overall quality.

Our research aligns with the increasing trend of converting traditional meat products into functional foods. Research has shown that fortifying meat with sea buckthorn oil enhances its antioxidant potential and physicochemical characteristics. This innovation features an oleogel matrix that replicates the textural properties of conventional fat while also providing bioactive ingredients that promote cardiovascular health and decrease saturated fat consumption. The proposed sausages have been developed and evaluated for physicochemical stability and consumer acceptability. Findings demonstrate that the incorporation of oleogel improves oxidative stability and provides a harmonious sensory experience and texture while maintaining nutritional integrity.

This novel approach of meat product composition has substantial implications for the food sector, providing a sustainable and healthier substitute for traditional sausages.

Our technology connects functional plant-based ingredients with conventional animal products, facilitating the development of advanced meat products that offer superior health advantages and improved consumer perception.

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**RO.165.**

**Title EN**

**NeuroCheese: Brain-Boosting Cheese with Lion's Mane & Walnuts for Cognitive Health**

**Authors**

Cătălina Sănduleanu, Andra Sabina Neculai Valeanu, Roxana Nicoleta Ratu, Aida Albu, Vasile Maciuc, Marius Giorgi Usturoi

**Institution**

**Iasi University of Life Sciences "Ion Ionescu de la Brad"; Research and Development Station for Cattle Breeding Dancu, Iasi;**

**Patent no.**

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**Description EN**

NeuroCheese is an innovative aged Caciotta cheese infused with Lion's Mane mushroom (Hericium erinaceus) and walnuts, designed to enhance cognitive function and brain health. This artisanal hard cheese combines the umami richness of Lion's Mane, known for its neuroprotective and memory-enhancing properties, with omega-3-rich walnuts, which support brain cell regeneration and mental clarity.

The cheese is produced using traditional Caciotta techniques, incorporating finely ground Lion's Mane powder and toasted walnut pieces into the curd. The cheese is then aged for 3-6 months, allowing flavors to develop while preserving the bioactive compounds of the functional ingredients. The result is a firm, nutty, and earthy cheese with a creamy yet crunchy texture.

NeuroCheese stands out as a natural, functional food product that bridges the gap between gourmet cheesemaking and neuroscience-backed nutrition. By leveraging fermentation and controlled aging, this cheese offers a probiotic-rich, antioxidant-packed alternative to traditional dairy products. This innovation supports cognitive longevity, brain function, and sustainable artisanal cheesemaking, making it an exciting contribution to the future of biofunctional dairy foods.

**RO.166.**

| | |
|---|---|
| **Title EN** | **CoolFeed– Functional Plant-Based Feed Additive for Heat Stress Relief in Dairy Cattle** |
| **Authors** | Cătălina Sănduleanu, Andra Sabina Neculai Valeanu, Ioan Sebastian Bruma, Codrin Dinu Vasiliu |
| **Institution** | **Iasi University of Life Sciences "Ion Ionescu de la Brad"; Research and Development Station for Cattle Breeding Dancu, Iasi; Cattle4Future Living Lab, CESAR2030** |
| **Description EN** | Heat stress is a major challenge in dairy farming, leading to reduced milk production, impaired fertility, and increased metabolic disorders. CoolFeed is an all-natural, plant-based functional feed additive designed to help dairy cattle mitigate heat stress, improve thermoregulation, and maintain productivity during high-temperature conditions. Unlike conventional electrolyte-based solutions, CoolFeed™ leverages the bioactive properties of heat-adaptive plant extracts to provide a natural cooling effect, enhance hydration, and reduce oxidative stress.<br>CoolFeed™ is formulated with a synergistic blend of: **Peppermint (Mentha piperita)** – Cooling effect, supports respiration, **Aloe Vera (Aloe barbadensis)** – Enhances hydration, gut protection, **Fenugreek (Trigonella foenum-graecum)** – Promotes sweating & thermoregulation, **Holy Basil (Ocimum sanctum)** – Adaptogen, reduces heat stress impact, **Coriander (Coriandrum sativum)** – Digestive support, reduces internal heat load.<br>The additive is administered through feed, ensuring consistent intake during hot weather. By reducing body temperature, maintaining electrolyte balance, and minimizing stress-related milk yield losses, CoolFeed provides a sustainable and antibiotic-free approach to managing heat stress in dairy cows. This innovation supports animal welfare, farm productivity, and environmentally conscious livestock management, making it a valuable solution for modern dairy farming. |

**RO.167.**

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|---|---|
| **Title EN** | **SMARTREGEN BOVISYSTEM – An Innovative Smart and Regenerative Micro-Farm Model for Sustainable Cattle Farming** |
| **Authors** | Bianca-Maria MĂDESCU, Paul-Corneliu BOIȘTEANU |
| **Institution** | **"Ion Ionescu de la Brad" Iasi University of Life Sciences** |
| **Description EN** | The concept is currently under development, with plans to initiate the patenting process in the near future<br>SMARTREGEN BOVISYSTEM is an innovative, prototype-stage concept designed to revolutionize cattle farming by integrating smart farming technologies with regenerative agriculture principles. This scalable micro-farm system is modular, space-efficient, and equipped with advanced sensors that monitor environmental conditions (temperature, humidity, ammonia levels) and animal health (motion and behavior). Automated feeding and watering systems are tailored to individual animal needs, ensuring precise resource management. Incorporating IoT connectivity, the system provides real-time data visualization and control via a user-friendly digital interface. The farm also integrates regenerative practices such as waste composting, rainwater harvesting, and the use of alternative feed sources like microgreens and agricultural by-products, contributing to a circular economy and minimizing ecological impact. By leveraging automation, sustainability, and digital innovation, SMARTREGEN BOVISYSTEM addresses the pressing challenges of modern cattle farming while promoting animal welfare and environmental stewardship. This concept offers a scalable model for the future of agriculture, ensuring both productivity and sustainability.<br>Applicability: SMARTREGEN BOVISYSTEM offers a flexible and innovative solution for transforming traditional farms into smart, sustainable, and automated micro-farms by integrating digital technologies into an adaptable, eco-friendly model ready for the future of agriculture. |

# University of Life Science "King Mihai I" from Timisoara

**RO.168.**

**Title EN**

**RESEARCH ON THE FRUIT QUALITY AND GENETIC DIVERSITY OF SEVERAL FIG GENOTYPES FROM THE SOUTH-WESTERN REGION OF ROMANIA- Ph D Thesis**

**Authors** **Ana Bona, Popescu Sorina, Olimpia Iordanescu**

**Institution** University of Life Sciences "King Mihai I" from Timisoara, 300645, Timisoara, Romania

**Patent no.**

**Description EN**

Figs are widely recognized as a valuable food source in many parts of the world due to their rich nutritional content and overall fruit quality. Consequently, evaluating fig quality remains an ongoing and important focus in scientific research.

This study aimed to assess the quality of fig fruits by analyzing a range of parameters, including physical traits, pulp texture, aroma, chemical composition, concentrations of macro- and microelements, antioxidant activity, and genetic characteristics.

The results showed that sugar content among the examined genotypes, measured over two harvest seasons, ranged from 18.15% in genotype IJ1 to 28.90% in genotype C3. Among the macrominerals, calcium and potassium were present in the highest concentrations across all genotypes, while iron and zinc were the most abundant microminerals.

Regarding total polyphenol content, genotypes with purplish fruit skin exhibited significantly higher levels, indicating a potentially enhanced antioxidant capacity likely influenced by fruit pigmentation.

For the genetic analysis, DAMD (Directed Amplification of Minisatellite DNA) and SCoT (Start Codon Targeted) markers were employed. The molecular marker data were used to construct binary matrices (presence/absence, denoted as 1/0), which were subsequently analyzed statistically to determine genetic relationships among the samples. This analysis enabled the creation of a dendrogram, visually illustrating the genetic similarities and clustering patterns within the group.

The assessment of genetic diversity using molecular markers confirmed the value of this method as an essential tool for the identification and conservation of valuable fig genotypes. Given its adaptability and nutritional potential, the fig tree could play a more prominent role in enhancing both local and national economies—particularly if growers increasingly prioritize its cultivation. Ongoing research into this species is crucial, especially in the context of climate change and the expanding suitability of fig cultivation in new regions. Despite its notable resilience to environmental conditions, fig cultivation is still geographically limited in many areas of the country.

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**RO.169.**

**Title EN**

**DEVELOPING AN INNOVATIVE PRODUCT FROM PORK WITH DEHYDRATED FRUITS FILLING AND CRUST**

**Authors**

**RABA DIANA NICOLETA, MIȘCA CORINA DANA, BORDEAN DESPINA MARIA, DUMBRAVĂ DELIA GABRIELA, POPA VIORICA MIRELA, MOLDOVAN CAMELIA**

**Institution**

University of Life Sciences "King Mihai I" from Timisoara, 300645, Timisoara, Romania

**Patent no.**

**Project code: PN-III-P2-2.1-CI-2017-0562**

**Description EN**

The faster external changes occur, the more the need for innovation grows and becomes imperative. The phenomenon of globalization, along with the facilitation and optimization of access to information sources, has led to changes in consumer habits across all levels. This reality also compels food producers, regardless of company size, to bring to the attention of all consumer categories new, complex products with optimal nutritional profiles and superior sensory characteristics, designed to meet their dynamic needs. The project aimed to develop an alternative strategy for improving food quality and safety, while increasing competitiveness and profitability in the meat processing sector. The project materialized through the creation of an innovative product prototype—oven-roasted pork stuffed with and coated in ground dried fruits, made exclusively from locally sourced natural ingredients.

**RO.170.**

| | |
|---|---|
| **Title EN** | **Wildlife as a Reservoir of Zoonotic Parasites: One Health** |
| **Authors** | Maria Monica Florina Moraru, Ana-Maria Marin, Dan-Cornel Popovici, Azzurra Santoro[3], Kalman Imre, Sorin Morari[1], Narcisa Mederle |
| **Institution** | University of Life Sciences "King Mihai I" from Timisoara |
| **Patent no.** | Research project |
| **Description EN** | Wildlife represents an important ecological reservoir for numerous parasitic pathogens, playing a significant role in their maintenance and transmission to domestic animals and humans. Due to increasingly frequent interactions between wildlife, domestic animals, and the human population—within the context of environmental changes and habitat expansion—the risk of zoonotic parasite transmission is rising.<br>Large wild carnivores, such as the brown bear (Ursus arctos), wolf (Canis lupus), and Eurasian lynx (Lynx lynx), as well as mesocarnivores including the golden jackal (Canis aureus), red fox (Vulpes vulpes), raccoon dog (Nyctereutes procyonoides), European wildcat (Felis silvestris), and European badger (Meles meles), are considered key hosts for a variety of zoonotic pathogens. These species contribute to the persistence and spread of parasitic agents through ecological networks with potential impacts on both public and veterinary health. In Romania, parasitological studies focused on wildlife—particularly wild carnivores—are relatively scarce, resulting in insufficient data regarding their parasitic burden.<br>This doctoral research project, conducted under the supervision of Prof. Narcisa Mederle, aimed to perform a comprehensive investigation of the parasitic load in wild mammals from Romania. A total of 441 wild animals, belonging to 11 host species, were examined: Brown bear (Ursus arctos), wolf (Canis lupus), Eurasian lynx (Lynx lynx), Golden jackal (Canis aureus), Red fox (Vulpes vulpes), Raccoon dog (Nyctereutes procyonoides), European wildcat (Felis silvestris), European badger (Meles meles), European polecat (Mustela putorius), Pine marten (Martes martes), Stone marten (Martes foina) |

The samples were collected from various hunting grounds located in 28 counties across Romania. Through classical diagnostic methods, both ectoparasites (mites, insects, and non-dermatophytic fungi) and endoparasites (from the phyla Protozoa, Trematoda, Cestoda, and Nematoda) were identified.

Preliminary results revealed a significant diversity of parasitic species, with variations based on host species and geographical region. Based on these findings, the research was further refined to focus on cestodes in wild carnivores, due to their high zoonotic relevance and underrepresentation in Romanian parasitological literature.

Among the 441 examined animals, cestodes were identified in the following hosts: Brown bear (Ursus arctos) – 1/115, Wolf (Canis lupus) – 5/10, Eurasian lynx (Lynx lynx) – 1/1, Golden jackal (Canis aureus) – 29/83, Red fox (Vulpes vulpes) – 72/161, European wildcat (Felis silvestris) – 22/27, European badger (Meles meles) – 7/22.

Molecular biology techniques allowed the identification of cestode species with significant zoonotic potential. This project reports, for the first time in Romania, the presence of Taenia arctos in brown bears and Mesocestoides melesi in badgers, contributing novel data to the knowledge of parasite biodiversity in Romanian wildlife.

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**RO.171.**

**Title EN**

**Environmental welfare and THIcare App for small ruminants**

**Authors**

Gerardo Caja[1], Abdelaali ElHadi[1], Claire Morgan-Davies[2], Cathy Dwyer[2], Evangelia Sossidou[3], Sotiris Patsios[3], Ludovic Cziszter[4], Sorin Voia[4], Germain Tesniere[5], Jean-Marc Gautier[5], Valeria Giovanetti[6], Lise Grova[7], Tim Keady[8], Leticia Riaguas[9], Ilan Halachmi[10]

**Institution**

**[1]UAB, Spain, [2]SRUC, Scotland, UK, [3]HAO DEMETER, Greece, [4]ULST, Romania, [5]IDELE, France, [6]AGRIS SARDEGNA, Italy, [7]NIBIO, Norway, [8]TEAGASC, Ireland, [9]OVIARAGON, Spain, [10]ARO, Israel**

**Patent no.**

TechCare project, Horizon 2020 No. 862050

**Description EN**

An application for mobile phone was developed within the TechCare project (www.techcare-project.eu), to provide an **early warning system** (EWS) for small ruminant dairy

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| | farmers on environmental risks associated with animal welfare. The application was named **THIcare** and is based on weather stations placed in the farm, monitoring temperature, humidity, and bedding quality. Environmental indicators were calculated using the weather station measurements: thermal comfort (THI), air quality (AQI) and bedding quality (BQI). Critical thresholds of these environmental indicators were set up in the EWS. Measured indicators are presented in application with different colours in order for the farmer to have a rapid understanding and take quick decisions in respect with alterations of the environmental condition in their farm. |

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| **RO.172.** | |
| **Title EN** | **ProAmaranth Bar by Akademika Food** |
| **Authors** | Mihaela Lacatus, Despina-Maria Bordean, Tiberiu Iancu, Luminita-Cornelia Pirvulescu, Georgeta-Sofia Popescu, Diana-Nicoleta Raba, Aurica-Breica Borozan, Daniela Stoin, Liana Maria Alda, Delia-Gabriela Dumbrava, Corina Dana Misca, Camelia Moldovan, Mariana-Atena Poiana, Laura Radulescu, Diana Moigradean, Viorica-Mirela Popa, Patricia-Cristina Tarkanyi, Simion Alda, Alexandru-Erne Rinovetz |
| **Institution** | **Faculty of Food Engineering, University of Life Sciences "King Mihai I" from Timisoara, 300645, Timisoara, Romania** |
| **Patent no.** | M2025/002502 |
| **Description EN** | In a world burdened by economic and ecological challenges, Amaranth, a pseudocereal, could represent an innovative solution for the development of functional products. With a notable nutritional profile, we can direct the growing interest in healthy and sustainable food alternatives towards amaranth seeds.<br>This work pursues new approaches in the development of a new functional protein bar based on amaranth seeds. The two main goals of the study are valorization and promoting this valuable ingredient. Aspects such as nutritional value, texture and the introduction of natural and minimally processed ingredients were analyzed.<br>The ProAmaranth Bar is a nutritious and energy-boosting snack make with expanded amaranth seeds, flaxseeds, honey, walnuts and pollen. Rich in essential nutrients, it |

provides a valuable source of energy and supports a balanced diet. The protein and omega-3 content is improved thanks to the combination of amaranth and flax seeds, while a natural source of carbohydrates and antioxidants are provided by honey and pollen. The walnuts add a creamy texture, making this bar a healthy and delicious choice.
The obtained results demonstrate that amaranth seeds can be successfully integrated into protein bars, offering a viable alternative to conventional products. This research contributes to the promoting of healthier and sustainable food sources, adapted to current lifestyle and nutritional requirements.

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| **RO.173.** | |
| **Title EN** | **Liposomal Carrier Encapsulating Lavandula angustifolia Oil and Eugenol for Antifungal, Antibiofilm, and Anti-Inflammatory Activity Against Candida albicans** |
| **Authors** | **Obiștioiu Monica Diana, Hulea Anca Sofiana, Brezovan Diana, Floareș (Oarga) Doris, Popescu Iuliana, Imbrea Ilinca Merima, Neacșu Alina, Hulea Călin, Popescu Cosmin Alin, Imbrea Florin** |
| **Institution** | **University of Life Sciences "King Michael I" from Timisoara/Timis** |
| **Patent no.** | Research project |
| **Description EN** | This research project focuses on developing a liposomal delivery system incorporating Lavandula angustifolia (Lavender) essential oil and eugenol as a natural antifungal, antibiofilm and anti-inflammatory formulation. The study aims to assess the efficacy of liposome-encapsulated bioactives against Candida albicans biofilm, particularly in the oral cavity, and its potential for reducing inflammation associated with fungal infections. Liposomes as drug carriers enhance stability, bioavailability, and control the release of active compounds. Their role is also to improve penetration in fungal biofilms, increasing antifungal efficiency. Lavandula angustifolia essential oil, also obtained in our laboratory, contains linalool and linalyl acetate, which are known for their antifungal, anti-inflammatory, and soothing properties. The presence in the liposome system, besides the antifungal effect, helps reduce irritation and discomfort caused by fungal infections. Eugenol as a standard bioactive component) is a potent antifungal compound disrupting |

Candida albicans cell membranes. The bioactive standard synergises with lavender oil to enhance antifungal and anti-inflammatory activity. The system ensures controlled release, improved penetration, and prolonged antifungal activity. The Lipid Phase (Phospholipid Membrane) included 1% Lavandula augustifolia essential oil and 0.5% bioactive standard. Considering the enhanced efficacy observed with liposomal encapsulation, the MIC ranging from 125 μg/mL to 250 μg/mL proved to be lower than the MIC demonstrated by the free components (Eugenol 800 μg/mL and Lavandula essential oil at 380 μg/mL).

# Petroleum-Gas University of Ploiesti

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| **RO.174.** | |
| **Title EN** | Device for determining the coefficient of friction when sliding in static mode with digital dynamometer |
| **Authors** | Bogdan – Roth Mihail, Romanet Mirela |
| **Institution** | Petroleum – Gas University of Ploiesti |
| **Patent no.** | RO-BOPI 135282 A0/10/2021 |
| **Description EN** | The invention relates to a device for determining the coefficient of friction on sliding in static mode equipped with a digital dynamometer **(5)** intended for the investigation of pairs of plastics with metallic materials. More specifically, the device determines static friction coefficients for the materials used in the construction of non-circular gears. |

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| **RO.175.** | |
| **Title EN** | Non-circular gear with continuous variation of the distance between axles (with a slide and sliding stone) with automatic adjustment |
| **Authors** | Bogdan – Roth Mihail, Romanet Mirela, Rîpeanu Razvan - George |
| **Institution** | Petroleum – Gas University of Ploiesti |
| **Patent no.** | RO-BOPI 6/2022 A0135847 |
| **Description EN** | The invention relates to a variable offset gear produced by a remote-controlled electric motor.<br>The use of this device allows a wide range of variable gear ratios to be obtained. This device has a wide range of use and can replace a connecting rod-crank mechanism.<br>The device contains a circular gear that can be offset by means of a worm gear and a motor for the variation of the misalignment.<br>The auger-auger mechanism ensures that this system is self-locking during operation without the need for any other safety elements.<br>The device can be used for actuators in the field of agricultural machinery and textiles or packaging in the automated process. Practice shows that there are many situations in which the need for a variable gear ratio is required for the control of assembly or mechanical processing processes.<br>Variable gear ratios can convert rotational motion into linear or oscillating displacements with variable speeds.<br>The realization of these variable gear ratios or the variable displacement between axles can also be achieved with the help of these eccentrically offset non-circular wheels operated by |

remote control and during operation.

| RO.176. | |
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| **Title EN** | Eccentric circular geared wheel with gearmotor attached for continuous variation between the axes of a gear with remote control operation of the motor during operation |
| **Authors** | Bogdan – Roth Mihail, Romanet Mirela, Rîpeanu Razvan – George. |
| **Institution** | Petroleum – Gas University of Ploiesti |
| **Patent no.** | RO-BOPI 6/ 2022 135849 A0 |
| **Description EN** | The invention relates to a variable offset gear produced by a remote-controlled electric motor.<br>The use of this device allows a wide range of variable gear ratios to be obtained. This device has a wide range of use and can replace a connecting rod-crank mechanism.<br>The device contains a circular gear that can be offset by means of a worm gear and a motor for the variation of the misalignment.<br>The auger-auger mechanism ensures that this system is self-locking during operation without the need for any other safety elements.<br>The device can be used for actuators in the field of agricultural machinery and textiles or packaging in the automated process. Practice shows that there are many situations in which the need for a variable gear ratio is required for the control of assembly or mechanical processing processes.<br>Variable gear ratios can convert rotational motion into linear or oscillating displacements with variable speeds.<br>The realization of these variable gear ratios or the variable displacement between axles can also be achieved with the help of these eccentrically offset non-circular wheels operated by remote control and during operation. |

| RO.177. | |
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| **Title EN** | Device for bending a recessed console with digital measurement of its own actuation force |
| **Authors** | Bogdan – Roth Mihail, Romanet Mirela |
| **Institution** | Petroleum – Gas University of Ploiesti |
| **Patent no.** | RO-BOPI 9/2022 A0135999 |
| **Description EN** | The invention relates to a device for bending test recessed bars driven by a force at the free end with the possibility of applying the force itself with a digital dynamometer. To measure the force, it is read on the digital display of the dynamometer. The |

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| | device is intended for the investigation of plastic specimens subjected to bending in brackets. Due to the small size of the device, it can be inserted between the polarization filters of a photoelasticimeter, where the state of tensions in the specimen can be visualized in polarized light, depending on the load achieved by operating the operating wheel. The self-pressure force can be precisely adjusted, as the force value is read on the display of the digital dynamometer with an accuracy of three decimal places. |

| **RO.178.** | |
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| **Title EN** | Straight-toothed circular tooth-testing device |
| **Authors** | Bogdan – Roth Mihail, Romanet Mirela |
| **Institution** | Petroleum – Gas University of Ploiesti |
| **Patent no.** | RO-BOPI 7/2022 A0135898 |
| **Description EN** | The invention relates to a device for testing the teeth of circular tooths with straight plastic teeth. The device conforming to the invention comprises a partially toothed metal wheel which can rotate around a fixed shaft engaged in the rotational movement by means of a movable rack operated by a testing machine. On the partially toothed wheel is mounted a metal piece of rack-and-pinion tooth type that acts on a plastic toothed wheel with the role of test specimen, mounted on the same horizontal shaft fixed on a support. |

| **RO.179.** | |
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| **Title EN** | Stand for the determination of stresses and deformations along and at the height of the tooth for gears with inclined teeth and large widths by the method of resistive tensometry |
| **Authors** | Bogdan - Roth Mihail, Bucur Mihai -Tiberiu, Cananau Sorin, Romanet Mirela, Rîpeanu Razvan-George, Dinita Alin |
| **Institution** | Petroleum – Gas University of Ploiesti end Polytechnic University of Bucharest |
| **Patent no.** | A00095/12-03-2025 |
| **Description EN** | The invention relates to a stand for the determination of stresses and deformations in the length and height of the tooth for gears with inclined teeth and large widths by the method of resistive tensometry. With the original design stand, it is possible to simulate the operating behavior of gears with long, inclined, bent teeth, from the moment they enter the gear until they exit the gear. The variant of the stand designed by the author differs a lot from a constructive point of view compared to other stands. |

The stand is designed to operate attached to a universal laboratory machine for compression, which generates the force applied tangentially to the tooth, a force that determines the bending moment of the tooth along its length and height.

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| **RO.180.** | |
| **Title EN** | Stand with digital dynamometer for the research of plastic sliding bearings by the photoelastic method |
| **Authors** | Romanet Mirela, Bogdan -Roth Mihail, Zisopol Dragos – Gabriel, Rîpeanu Razvan - George, Minescu Mihail |
| **Institution** | Petroleum – Gas University of Ploiesti |
| **Patent no.** | A/00188/2024 |
| **Description EN** | He invention relates to a stand with a digital dynamometer for researching sliding bearings made of plastic materials using the photoelasticity method. To apply the force $F_2$ on the test shaft, the control wheel is operated and the previously calculated force $F_1$ is set and read on the dynamometer dial. The force $F_1$ generated by this dynamometer is amplified by a system of levers with equidistant holes for adjusting the arm lengths of the two levers. After calculating the lever length ratio, the resulting force $F_2$ presses on the test shaft and the experimental bearing.<br>The research is conducted under polarized light, and the resulting isoclinic and isochromatic fringes indicate the stress state along the contour formed on the contact surface of the experimental sliding bearing.<br>The stand, as designed and built, was made with minimal material consumption and low production cost. It does not require large storage space, can be redesigned and resized depending on the dimensions of the sliding bearings, has its own system for generating and measuring the loading force $F_2$, does not rely on other universal machines for mechanical loading, and does not require connection to the power grid. |

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| **RO.181.** | |
| **Title EN** | Device with digital force measurement for determining the elastic characteristic of low-stiffness springs. |
| **Authors** | Bogdan - Roth Mihail, Romanet Mirela, Dinu Florinel, Dinita Alin, Nae Ion |
| **Institution** | Petroleum – Gas University of Ploiesti |
| **Patent no.** | RO-BOPI 6/2022 |
| **Description EN** | The invention relates to a digital device for determining the characteristics of low-stiffness helical tension springs intended |

for studying soft springs made of materials that must comply with Hooke's Law. More specifically, the device is used to obtain force–deformation values necessary for creating the graph shown in Fig. 1, which represents the characteristics of the tested springs.The device features a simple construction and can be resized according to the dimensions of the springs. It is compact, does not require large storage space, can be manufactured at low cost, uses minimal materials, and does not require a connection to the electrical grid. An original device is presented for determining the elastic characteristic of springs. The characteristic of a spring, as shown in the graph, represents the relationship between the force (F) applied to the spring and the deformation (δ). The spring constant (c) is represented by the slope of the force–deformation graph.

$$c = \operatorname{tg}\alpha = \frac{F}{\delta}$$

Where: c – spring constant; F – force applied to the spring; and δ – deformation (deflection).
The linear characteristic of the graph is met when the material of the spring obeys Hooke's Law. Soft springs have a low, constant stiffness and a small angle α. As a result, small variations in the applied force F lead to very large deformations δ.

Device usage:

The selected spring for characteristic determination is mounted in the device, with one end attached to the digital dynamometer and the other to the force application cable. Before applying force F, the spring is fixed in place using the clamping screw, and the initial position is read on the ruler. Spring tensioning is performed by turning the control wheel, displacing the reference marker in 10 mm increments along the graduated ruler. For each 10 mm displacement, as long as the spring remains within its elastic limit (no permanent deformation), the corresponding force F value is read on the digital dynamometer display. With the collected values, a force–deformation graph is constructed.

# University of Agronomic Sciences and Veterinary Medicine of Bucharest

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| **RO.182.** | |
| **Title EN** | **Development of a Detection Method for Gall Mite-Resistant Biotypes in Lycium chinense (Goji)** |
| **Authors** | Roxana Ciceoi, Oana Venat, Mihaela Iordăchescu, Cătălina Nicolae, Ana Butcaru, Vasilica Luchian, Minodora Tudose, Mala-Maria Stavrescu-Bedivan, Dan Popescu, Adrian Asanică, Florin Stănică |
| **Institution** | **Research Center for Studies of Food Quality and Agricultural Products, University of Agronomic Sciences and Veterinary Medicine of Bucharest** |
| **Patent no.** | Patent application No. 138158 A2 |
| **Description EN** | The present invention concerns a preliminary selection method for Lycium chinense (goji) biotypes exhibiting resistance to gall mite (Aceria kuko) infestation, utilizing molecular marker-assisted techniques. Designed to support breeding programs, the invention encompasses both methodological and compositional elements for evaluating plant resistance.<br>It involves a sequence of analytical steps applied to plant tissues derived from in vitro seedlings, which originate from seeds of genetically valuable biotypes.<br>Furthermore, the final phase of the method, based on the use of ISSR (Inter Simple Sequence Repeat) and SSR (Simple Sequence Repeat) molecular markers, is applicable not only to laboratory-grown seedlings but also directly to tissues sampled from planting material intended for new plantation establishment or from specimens already cultivated in the field.<br>The procedure for generating plant material suitable for rapid screening of resistant biotypes includes a sterilization step using sodium hypochlorite at concentrations ranging from 10% to 15%, applied progressively. Cultivation is performed on Gamborg B5(-) medium devoid of growth regulators.<br>Differentiation of resistant biotypes is achieved through one SSR and two ISSR molecular markers. These markers collectively produce ten diagnostic bands, of which six are indicative of resistance by their presence in resistant genotypes, while four are specific to sensitive biotypes, |

serving as negative indicators for resistance.
This patent application was developed with the support of the University of Agronomic Sciences and Veterinary Medicine of Bucharest, under project number 1268/30.07.2021, acronym ProtectGoji, funded through the IPC 2021 internal competition.

| **RO.183.** | |
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| **Title EN** | Obtaining active wine yeast biomass of Saccharomyces cerevisiae |
| **Authors** | Teodorescu Razvan Ionut, Barbulescu Iuliana Diana, Begea Mihaela, Frincu Mihai, Diguță Filofteia Camelia, Marculescu Simona Ioana, Dumitrache Corina, Cîrîc Alexandru Ionuț |
| **Institution** | Participant: University of Agronomic Sciences and Veterinary Medicine of Bucharest |
| **Patent no.** | Patent application No. A00470/08.08.2024 |
| **Description EN** | The invention refers to the production of an active yeast biomass of S. cerevisiae NCAIM (P) Y 001534 to be used in the winemaking of white wines. Saccharomyces strain was isolated from Cabernet Sauvignon grape must from Pietroasa Research and Development Station and identified by applying molecular methods.<br>This product represents a first step in exploiting the oenological potential of indigenous yeasts to produce wines of superior quality, with a characteristic sensory typicity. |

| **RO.184.** | |
|---|---|
| **Title EN** | **New Romanian kiwiberry** Actinidia arguta **cultivars:- ARIANA and ANDROS** |
| **Authors** | Lavinia Mihaela UDREA (ILIESCU), Giuseppe ZUCCHERELLI, Constantin PĂUN, Marian Nicolae VELCEA, Liliana Aurelia BĂDULESCU, Florin STĂNICĂ |
| **Institution** | **Faculty of Horticulture, University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania** |
| **Patent no.** | 6407/31.07.2023; 6408/31.07.2023 |
| **Description EN** | Kiwiberry plants (Actinidia arguta) can be cultivated with very good results in all Romanian fruit growing favorable area, including plum zone. After more than 25 years of research, the Faculty of Horticulture in Bucharest registered two new Actinidia arguta cultivars – Ariana and Andros. |

Ariana is a unisex cultivar (female) with medium blooming period; medium-large fruit, with 12-14 g weight, 40 mm length and 60.97 mm diameter; 13.71% soluble solids and 70.15 mg ascorbic acid/100 gfw fruit composition at consumption maturity; 2-3 months storage capacity, in controlled atmosphere. Their excellent fruit quality remained constant through the years, becoming a better alternative to the import varieties found in the market.
Andros is a unisex cultivar (male) with abundant flowering; good pollen viability and germinability; long flowering period, which coincides with the female selections.

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**RO.185.**

**Title EN**

**CLIMATE CONTROL ENERGY SYSTEM IN ORDER TO REDUCE ENERGY CONSUMPTION IN GREENHOUSES**

**Authors**

Jerca Ionuț Ovidiu1, Bădulescu Liliana Aurelia1, Cîmpeanu Sorin Mihai1, Teodorescu Răzvan Ionuț1, Postamentel Mariana1, Sannan Sigurd2, Gether Harald3

**Institution**

**1- UNIVERSITY OF AGRONOMIC SCIENCES AND VETERINARY MEDICINE OF BUCHAREST – BUCHAREST; 2- SINTEF Energy Research, Trondheim, Norway; 3- Gether AS, Stavern, Norway**

**Patent no.**

Patent application U/00006 / 13.02.2025

**Description EN**

Description: The energy system for controlling climatic factors in order to reduce energy consumption in greenhouses is intended to ensure superior energy efficiency of continuous tomato production in controlled spaces located in the temperate-continental climate zone, characterized by excessive heat in the summer.
The system is based on the energy supplied by 3 water-water heat pumps that exchange heat with a ground-water heat exchanger consisting of 30 100 m deep wells and a water-air dry cooler.
This heating/cooling heat supply unit allows energy modulation depending on the required needs according to an experimentation plan. The cooling capacity can have any value in the range of 25-150 kW. The dry cooler is connected to the heat pump condenser and releases heat to the ambient space. The heat agent used is water with glycol additives.

The cooling/heating agent produced by the heat pumps is transported through insulated pipes in each of the greenhouse compartments to the local distribution units - 2 in each compartment, consisting of water-to-air air heaters. These units distribute the air evenly through tubes located under the culture troughs and at the same time dehumidify the air in the greenhouse compartments.

A suitable microclimate for plant growth requires an additional supply of CO2; this is ensured by a dedicated circuit supplied from cylinders.

The uninterrupted operation of the entire installation is controlled by a computer, through procedures developed for summer day/night operation, winter day/night operation and spring/autumn day/night operation.

# West University of Timisoara

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| **RO.186.** | |
| **Title EN** | **ASSESSING DIGITAL TRANSFORMATION: A METHODOLOGY FOR EVALUATING GOVERNANCE EFFECTS** |
| **Authors** | **CRISTE Cristina, LOBONȚ Oana Ramona, MIHAILA Svetlana, ZARIN Jasmina,** |
| **Institution** | West University of Timisoara / Academy of Economic Studies of Moldova |
| **Patent no.** | Doctoral Research Project |
| **Description EN** | The invention introduces an integrated methodological approach for empirically assessing the impact of digital tool implementation on public governance within the European Union member states during the period 2018–2022. This methodology is grounded in the development and application of composite indicators that integrate digitalisation dimensions alongside technical and democratic aspects of governance derived from multidimensional datasets.<br>This process utilises advanced statistical techniques, including Cluster Analysis and Principal Component Analysis (PCA) conducted in RStudio, alongside the application of the Ordinary Least Squares (OLS) method in EViews software and a Bibliometric Analysis in VosViewer.<br>The proposed invention demonstrates that, prior to the COVID-19 pandemic, digitalization levels in several EU countries reflected constrained technological advancement. However, empirical findings reveal a positive correlation between high digital intensity and superior public governance, with Nordic countries such as Sweden, Finland, Denmark, and the Netherlands serving as benchmarks for best practices. Notably, the invention identifies countries like Romania and Bulgaria as possessing substantial latent potential for digital advancement, despite initially lower digitalization and governance scores.<br>The invention supports: Cross-national digital governance evaluation;Feasibility and impact studies;IT project prioritization; Governance-oriented software design; Digital policy alignment and evaluation; Transparency, efficiency, and resource optimization.<br>Trends show digital transformation enhances governance through collaboration, innovation, and e-governance, requiring effective tools for evaluation and decision-making. |

# National Institute for Research and Development in Electrical Engineering ICPE-CA Bucharest

| RO.187. | |
|---|---|
| **Title EN** | **MODEL OF TEMPERATURE SENSOR WITH FERROMAGNETIC MICROWIRES FOR ELECTRIC MOTORS** |
| **Authors** | IORGA Alexandru, MANTA Eugen, PĂTROI Eros-Alexandru, PARASCHIV Alexandru, NACIU Cătălin-Andrei, NICOLAE Mihai |
| **Institution** | **National Institute for Research and Development in Electrical Engineering ICPE-CA Bucharest** |
| **Patent no.** | Patent application No. **A/00627/ 14-10-2021** |
| **Description** | This invention presents a novel method for non-contact temperature measurement of electric motors during operation. The method utilizes a detection element mounted on the rotor, consisting of a permanent NdFeB magnet and ferromagnetic microwires with a predetermined Curie temperature (Tc). The dimensions of the detection element vary depending on the motor and the desired operating temperature range. |

| RO.188. | |
|---|---|
| **Title EN** | **Tremor compensation system** |
| **Authors** | **MIHAI Romulus Marian [1], OVEZEA Dragoș [1], ILIE Cristinel Ioan [1], POPA Marius [1], TĂNASE Nicolae [1], NEDELCU Adrian [1], GUȚU Mihai [1], UDREA Radu Mihail [3], COMEAGĂ Constantin Daniel [2]** |
| **Institution** | **[1] National Institute for Research and Development in Electrical Engineering ICPE-CA Bucharest**<br>**[2] National University of Science and Technology POLITEHNICA Bucharest**<br>**[3] Apel Laser SRL** |
| **Patent no.** | **A/00716/2021** |
| **Description** | The invention relates to a system for compensating hand tremor. The system, according to the invention, uses two LASER beam deflection systems with bimorph piezoelectric actuators or electromagnetic actuators on two orthogonal directions. The system includes an optical device (1) that projects the LASER beam received through an optical fiber onto the deflection systems (2, 3), directing it towards an |

output orifice (6) in a shell (5) of a pistol-shaped housing. The spatial position of the system and the tremor parameters are determined using a sensor (4) for relative spatial orientation and vibration detection. The deflection systems consist of a mirror, whose position can be adjusted by the respective actuators.

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**RO.189.**

**Title EN**

**Process for obtaining some disc-shaped zinc oxide varistors**

**Authors**

Magdalena Valentina LUNGU [1], Cristiana Diana CÎRSTEA [1], Mihai MARIN [1], Dorinel TĂLPEANU [1], Alina Ruxandra CARAMITU [1], Delia PĂTROI [1], Virgil Emanuel MARINESCU [1], Gabriela Beatrice SBÂRCEA [1], Ciprian-Alexandru MANEA [1], Petrișor GODEANU [2], Alexandra Cătălina BARBU [2]

**Institution**

[1] **National Institute for Research and Development in Electrical Engineering ICPE-CA Bucharest**

[2] **SC MAIRA MONTAJ SRL**

**Patent no.**

Patent application No. A/00741/2021 filed with and published by the State Office for Inventions and Trademarks (OSIM) in RO BOPI No. 6/2023 (137536 A2)

**Description**

The invention describes an efficient process for producing reliable disc-shaped ZnO-based varistors for application in medium or high-voltage surge arresters. The metal oxide varistors (MOVs) consist of high-purity micron-sized powder mixtures containing 96–97.5 mol.% ZnO and four or five MO additives (V2O5, SnO2, Sb2O3, Co3O4, and Cr2O3), each at 0.5–1 mol.%, consolidated via powder metallurgy techniques. The desired powder mixtures are achieved by sonicating and vigorously stirring an alcoholic suspension of ZnO and MO powders, drying and mechanical homogenization. The uniformly dispersed powder mixtures are granulated, then pressed into green compacts, measuring 20–40 mm in diameter and 10–20 mm in height, utilizing a pressing pressure of 100–150 MPa. Subsequently, the powder compacts undergo sintering in air at 1200–1250°C for 2–4 h, followed by annealing at 900–950°C for 4–8 h. The resulting MOV discs exhibit high density, achieving a compaction level of minimum 95%, a Vickers hardness of minimum 142 HV, an elastic modulus of minimum 110 GPa, and a uniform fine-grained microstructure. The silver-plated

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| | MOV discs demonstrate very good electrical performance under real operating conditions (certified prototypes at TRL 7).<br>The advantages of the process are: (i) allows the realization of ZnO-based varistors with fewer MO additives, homogeneous microstructure and superior functional characteristics;(ii) ensures the reproducibility of the technical characteristics of MOVs; (iii) easy implementation with standard inorganic synthesis and powder metallurgy equipment; (iv) efficient and scalable for industrial production of MOVs.<br>Applications: Silver-plated MOV discs are used in medium or high-voltage surge arresters. |

| **RO.190.** | |
|---|---|
| **Title EN** | **HTS superconducting quadrupole lens assembly** |
| **Authors** | Ion DOBRIN, Dan ENACHE, George DUMITRU, Romulus Marian MIHAI, Radu Gabriel PINTEA† |
| **Institution** | **National Institute for Research and Development in Electrical Engineering ICPE-CA Bucharest** |
| **Patent no.** | Patent application No. A/00751 from 07-12-2021 |
| **Description** | The assembly of superconducting quadripolar lenses, for focusing the beam of accelerated particles, characterized by the fact that it is made up of two identical superconducting electromagnets A and B, mounted coaxially, and lens B has poles oriented at 45° to the poles of lens A. Each lens is made up of a magnetic yoke and four superconducting coils, placed on the four magnetic poles. The magnetic yoke is surrounded by a copper thermal shield, for the uniform cooling of the superconducting coils. The assembly of magnetic lenses A and B are mounted in a cryostat which is evacuated to a pressure of at least $10^{-5}$ mbar and cooled to a temperature of 10-20 K by the cryocooler, by coupling to the $2^{nd}$ cooling stage of the 4.2 K cryocooler. |

| **RO.191.** | |
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| **Title EN** | **Cryoelectromagnet generator of uniform pulsed magnetic field** |
| **Authors** | DOBRIN Ion, ENACHE Dan, DUMITRU George, †PINTEA Radu Gabriel |
| **Institution** | **National Institute for Research and Development in Electrical Engineering ICPE-CA Bucharest** |
| **Patent no.** | Patent application no. A/00752 from 07-12-2021 |

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| **Description** | The cryo-electromagnet generator of an intense and uniform magnetic field in pulse, characterized by the fact that it consists of an assembly of two normally conducting coils and a magnetic screen, which are mounted in a cryostat by means of mechanical supports, the access to the magnetic field area generated by the normally conducting coils being through the vacuum channel with the help of the probe, to which the sample is fixed. The normally conducting coils is immersed in a bath of liquid nitrogen, its access to the cryostat is carried out through the supply tube, and the exhaust of nitrogen gas from the cryostat, is done through the exhaust nozzle. |

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| **RO.192.** | |
| **Title EN** | **Electronic conditioning system for use in the acquisition of biological signals** |
| **Authors** | Lucian PÎSLARU-DĂNESCU, Victor STOICA, George-Claudiu ZĂRNESCU |
| **Institution** | **National Institute for Research and Development in Electrical Engineering ICPE-CA Bucharest** |
| **Patent no.** | Patent application No. A/00287/2022<br>BOPI 11/2023, page 58 |
| **Description** | The patent application consists in the realization of an electronic conditioning system capable of taking over the electrical signal carrying physiological information, available as a direct variation detectable through electrodes. This electronic conditioning system is realized by arranging in cascade three electronic modules, namely: an instrumentation amplifier in the "differential mode at input" connection, followed by a precision amplifier with isolation, a band-pass filter, as well as an output common-mode amplifier. An electronic module for the protection of specific stabilized voltage sources realizes the protection of the entire electronic system by automatically disconnecting from the alternating current network. The electronic protection module achieves the disconnection of the supply voltage without producing electrical sparks that can start a fire if combustible gases are present in a dangerous concentration. |

| RO.193. | |
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| **Title EN** | **River water intake with behavioural barrier to reduce impact on fish fauna** |
| **Authors** | Gabriela CÎRCIUMARU, Rareș-Andrei CHIHAIA, Paul Alexandru DANCĂ, Andreea VOINA |
| **Institution** | **National Institute for Research and Development in Electrical Engineering ICPE-CA Bucharest** |
| **Patent no.** | Patent Application No. A/00357/2022 |
| **Description** | The invention relates to a water intake for rivers with a behavioural barrier to reduce the impact on fish fauna, used to capture water for the production of electricity or for the supply of drinking, industrial, irrigation or fish farming water. The river water intake has integrated a system for generating an air bubble curtain and an optoelectronic device for generating strobe light, which together create a behavioural barrier that prevents the accidental entry of small fish or fry through the intake openings.<br>According to the invention, the river water intake with behavioural barrier is composed of the following main elements: a trapezoidal channel that follows the bed and slope of a river and an intake chamber, in which the water is taken through a perforated plate placed on a channel slope. The behavioural barrier integrated in the water intake is formed by a porous hose arranged on the perforated plate contour, supplied with compressed air and an optoelectronic device of LEDs placed in specific openings, with a dedicated control system. |

| RO.194. | |
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| **Title EN** | **PTC material and method for obtaining a heating cable with a self-regulating thermal effect** |
| **Authors** | SETNESCU Radu, LUNGULESCU Eduard Marius, NICULA Nicoleta Oana, BĂRA Adela, CARAMITU Alina Ruxandra |
| **Institution** | **National Institute for Research and Development in Electrical Engineering ICPE-CA Bucharest** |
| **Patent no.** | Patent Application No. A/00503/2022 |
| **Description** | The invention relates to a heating cable with a self-regulating thermal effect and a method for obtaining it, characterized by the use of a composite material with a mixed (binary) polymer matrix in granular form and a thermal and pressure treatment applied to the extruded cable. Alternatively, a |

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| | mixture of polymer powders and carbon-based material can be used, followed by pressure extrusion, to achieve the electrical conductivity properties and the Positive Temperature Coefficient (PTC) effect of electrical resistivity. The invention eliminates the issue of lack of electrical conductivity (depercolation) that occurs with conventional extrusion from pellets. The manufacturing process is simple and involves low costs for raw materials and processing. The composite material can be processed using standard equipment and allows for strong PTC effects at low concentrations of the carbon phase (consisting of common carbon materials), ranging from 8 % to 20 %. Self-regulating heating cables are designed for applications such as home heating, de-icing, surface or pipe heating, etc. |

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| **RO.195.** | |
| **Title EN** | **Nanocomposites based on polyurethane foam/silver nanoparticles and the process of their obtaining** |
| **Authors** | LUNGULESCU Eduard Marius [1], NICULA Nicoleta Oana [1], SETNESCU Radu [1], ION Ioana [1], MARINESCU Virgil Emanuel [1], FIERĂSCU Radu Claudiu [2], STAN Miruna Silvia [3] |
| **Institution** | [1] **National Institute for Research and Development in Electrical Engineering ICPE-CA Bucharest**<br>[2] **National Institute for Research & Development in Chemistry and Petrochemistry ICECHIM**<br>[3] **University of Bucharest, Faculty of Biology** |
| **Patent no.** | Patent Application No. A/00662/11.10.2022 |
| **Description** | The invention relates to nanocomposites based on polyurethane foam (PUF) and silver nanoparticles (AgNPs), synthesized in situ with controllable properties (size, narrow size distribution, and high stability) and antimicrobial activity, as well as to the process for their obtaining. According to the invention, polyurethane foam/silver nanoparticle nanocomposites are obtained by γ-radiation exposure of a polyether polyol solution which contains a small amount of water (less than 1.0%), in which a silver ion precursor is dissolved. The in-situ synthesis of silver nanoparticles within polyol presents an innovative approach for polyurethane foam nanocomposites, enabling direct nanoparticle integration without additional stabilizers. The results confirm that PUF/AgNPs are biocompatible, showing |

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| | no cytotoxicity, membrane damage, or pro-inflammatory effects in HaCaT cells after short-term exposure. Additionally, the uniform nanoparticle distribution enhances mechanical strength and antimicrobial properties, making these nanocomposites promising for biomedical applications, such as hospital bed mattresses, floor mats, and covering materials. |

| **RO.196.** | |
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| **Title EN** | **Wheel inclination adjustment system for a pipe inspection robot** |
| **Authors** | Cristinel Ioan ILIE, Nicolae TĂNASE; Marius POPA, Dragoș OVEZEA, Daniel LIPCINSKI, Mihai GUȚU, Romulus Marian MIHAI |
| **Institution** | **National Institute for Research and Development in Electrical Engineering ICPE-CA Bucharest** |
| **Patent no.** | A/00750/22.11.2022 |
| **Description** | The invention relates to a system for tilting the wheels of a pipe inspection robot, so that it can move in optimal conditions of adhesion in pipes of different sizes, in two constructional variants: with a manual wheel tilting system and with an automatic wheel tilting system. In both cases, a screw-nut mechanism is used to tilt the wheels. In the case of the manual system, the front and rear wheels are tilted in turn, taking care that the tilt is the same. In the case of the automatic wheel tilting system, all four wheels tilt at the same time, using a gear motor and a gear transmission. In this case, to obtain the same wheel inclination both front and rear, it is mandatory that the transmission ratio between the gear motor pinion and the two front and rear transmission systems to be the same. |

| **RO.197.** | |
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| **Title EN** | **Process for obtaining expanded graphite under standard temperature and pressure conditions** |
| **Authors** | Gabriela HRISTEA |
| **Institution** | **National Institute for Research and Development in Electrical Engineering ICPE-CA Bucharest** |
| **Patent no.** | RO137770A2 |
| **Description** | Compared to existing methods for obtaining expanded graphite (EG), this novel approach offers an environmentally friendly, more efficient, and simplified alternative with minimal ecological impact. It enables the rapid production of modified vermicular-type graphite, exhibiting morphological and |

physical-chemical characteristics analogous to EG synthesized via thermal, electrochemical, or irradiation techniques. Additionally, the method enhances scalability for industrial applications while significantly reducing energy consumption and overall production costs by eliminating the need for extreme processing conditions, thereby representing a more sustainable and cost-effective solution relative to thermal and irradiation-based approaches.

**Applications**:

•Energy Storage & Batteries; Thermal Management & Heat Dissipation; Environmental Applications.

•Sealing & Gaskets; Electronics & Conductive Materials.

•Aerospace & Defense; Fire-Resistant Materials.

Additive Manufacturing & Composites.

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**RO.198.**

**Title EN**

**$Co_xCrFeNiTi$ HIGH ENTROPY ALLOYS SYSTEM TARGETS FOR PHYSICAL DEPOSITIONS AND THEIR OBTAINING PROCESS**

**Authors**

Ciprian Alexandru MANEA [1], Laura Elena GEAMBAZU [1], Dorinel TĂLPEANU [1], Virgil Emanuel MARINESCU [1], Gabriela Beatrice SBÂRCEA [1], Delia PĂTROI [1], Radu Mihail UDREA [2], Magdalena Valentina LUNGU [1]

**Institution**

**[1] National Institute for Research and Development in Electrical Engineering ICPE-CA Bucharest**

**[2] APEL LASER SRL**

**Patent no.**

Patent application No. A 00470/2023

**Description**

The present invention relates to the development of high entropy alloys (HEAs) from the **$Co_xCrFeNiTi$** (x = 0.5; 1) system obtained by solid state processing and consolidated by spark plasma sintering (SPS), with the goal of manufacturing targets for the production of protective coatings by physical deposition technologies. The obtaining process of $Co_xCrFeNiTi$ HEA powders involved 30 hours of mechanical alloying in an Ar protective atmosphere of the constituent high purity elemental powders using a planetary ball mill. Other parameters: 250 rpm, 10:1 BPR and 2 wt% n-Heptane as PCA. The targets according to the invention were made by consolidation of the obtained powders in a SPS equipment at 1000°C and a dwell time of 10 minutes. The sintered deposition targets presented both a homogeneous structure, without cracks or pores that could affect the integrity of the material, as well as high-performance physical-mechanical and functional properties.

# National Institute of Materials Physics

| RO.199. | |
|---|---|
| **Title EN** | **Electrochemical Device with Integrated Flexible Fibrillary Structure** |
| **Authors** | Botta Oana-Daciana, Diculescu Victor Constantin, Enculescu Ionut-Marius, Beregoi Mihaela, Evanghelidis Alexandru Ionut, Matei Elena |
| **Institution** | **National Institute of Materials Physics** |
| **Patent no.** | Patent application No.EP24207779 / 21.10.2024 |
| **Description** | The invention describes an electrochemical device with integrated flexible fibrillary structure, with applicability in performing electrochemical analysis or measurements including, but not limited to, the field of sensors, which can be used with liquid electrolytes. The novelty of this invention consists in the use of submicrometer polymeric fibers as substrate for electrode fabrication, integrated with a fibrillar hydrophilic substrate.<br>The electrochemical device, proposed by the present invention, employs electrodes with a flexible fibrillar structure obtained from conductive polymeric fibers, placed on the surface of a hydrophilic substrate with fibrillar structure (paper, textile or any other polymeric substrate), which has a role both in directing the flow and in storing the fluids used in the analysis, as well as redox probes or other macromolecules with a role in biorecognition (such as nucleic acids, enzymes, antibodies, etc.). This configuration has significant advantages such as: electrodes with high surface area provided by the geometry of the fibers, optimal contact between the electrodes and the fluid, flexibility of the whole assembly, portability and ease of use.<br>The applicability of the proposed invention was demonstrated in laboratory conditions for the detection and quantification of glucose from artificial sweat and PCR-amplified products of nucleic acids from human samples. |

| RO.200. | |
|---|---|
| **Title EN** | **Process for synthesis of polycrystalline targets and thin films of Kx[FeSe1-y]2 type by laser pulverization** |
| **Authors** | Miclea Corneliu Florin, Vlaicu Aurel Mihai, Palade Petru, Chirilă Florentina Cristina, Giurgiu Dan, Cioangher Marius Cristian, Leonat Lucia Nicoleta, Trupina Lucian, Crișan Adrian Ioan, Nedelcu Liviu, Leca Aurel, Toma Vasilica |
| **Institution** | **National Institute of Materials Physics** |
| **Patent no.** | Patent application OSIM No. A00702/14.11.2024 |
| **Description** | The OSIM Patent request No. A00702/14.11.2024 describes a preparation process for $K_x[FeSe_{1-y}]_2$ thin films on monocrystalline $SrTiO_3$ (STO) substrates by pulsed laser deposition (PLD). There are no PLD methods reported in literature for this material. $K_x[FeSe_{1-y}]_2$, both as bulk and thin films is relevant for fundamental research studies and has potential applications as a superconductor and in quantum computing.<br>The patent request also includes a detailed method to synthetize policrystalline targets of $K_x[FeSe_{1-y}]_2$ for PLD, with controlled stoichiometry, morphology and structure. The targets are obtained in two main stages: in the first stage, $FeSe_{1-x}$ is prepared starting from Fe and Se precursors, and in the second stage $FeSe_{1-x}$ is combined with metallic K, calcined and then pressed and sintered.<br>Growth condition for PLD: preliminary vacuum with pressure $p = 4 \cdot 10^{-6}$ mbar; deposition in argon with $p_{Ar} = 3.5 \cdot 10^{-6}$ mbar; $T_{substrate} = 450$ °C, laser fluences of 1.2 J/cm$^2$ or 0.8 J/cm$^2$ pulses frequency f = 5 Hz; distance target substrate $d_{T-S} = 5$ cm; annealing treatment immediately after growth, without removing the film from the deposition chamber; heating with 10 °C/h at 470 °C, dwell for 3h followed by rapid cooling to room temperature. |

| RO.201. | |
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| **Title EN** | **Reaction cell for high temperatures and very reactive materials** |
| **Authors** | Miclea Corneliu Florin, Giurgiu Dan, Cioangher Marius Cristian, Cioca Mihai |
| **Institution** | **National Institute of Materials Physics** |
| **Patent no.** | Patent application OSIM No. A00701/14.11.2024 |

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| **Description** | OSIM invention No. A00701/14.11.2024 describes a reaction cell made from high temperature stainless steel (EN 1.4841) or Haynes 230 alloy.<br>The reaction cell can be reused and is designed for synthesizing compounds that contain very reactive chemical elements, at high temperatures.<br>For the construction of the reaction cell only standard mechanical processing are required (turning and milling);<br>The reaction cell is composed from a cylindrical main part in which the chemical elements used for synthesis are introduced, in alumina crucibles and a cover with threaded cap with which it then is sealed inside the glove box in argon atmosphere.<br>It is important to notice that sealing of the cell is done by a cone closing system, at angles between 30° and 45° and the thread has a large pitch (M16 with 2 mm pitch).<br>Typically, the pressure of the inert gas inside the cell at 1100 $^{o}$C reaches around 3 bars. |

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| **RO.202.** | |
| **Title EN** | **Electrochemical devices based on ionophores and liposomes for the detection of sodium, potassium and chlorine ions** |
| **Authors** | Aldea Anca, Victor Constantin Diculescu |
| **Institution** | **National Institute of Materials Physics** |
| **Patent no.** | Patent application No. 2114/25.11.2025 A/00737 |
| **Description** | The present invention describes two electrochemical detection devices for the detection of ions in fluids, which use an electrochemical sensor based on liposomes and ionophore. The detection mechanism is based on the change in equilibrium potential following the formation of the [Ionophore-Ion$^{\pm n}$] complex that occurs upon the addition of an electrolyte containing ions. Potentiometric electrochemical sensors create a potentiometric cell in which the difference in equilibrium potential between two electrodes is determined by the activity of an analyte. Thus, following the formation of the [Ionophore-Ion$^{\pm n}$] complex in the vicinity of the electrode, a change in potential occurs directly proportional to the amount of ions introduced into the system, and based on this response, the calibration curve can be constructed, which correlates the increase in potential ($\sum_{n=1}^{5} \Delta E_n$) with the ion concentration (the equation of the line y = intercept+slope*x). |

| RO.203. | |
|---|---|
| **Title EN** | **Composites based on Poly(ortho-toluidine) and $WS_2$ sheets for applications in the supercapacitor field** |
| **Authors** | T. Burlanescu, I. Smaranda, A. Androne, C.S. Florica, M. Cercel, M. Paraschiv, A. Udrescu, A. Lorinczi, P. Palade, A. Galatanu, C. Negrila, E. Matei, M. Dinescu, R. Cercel, M. Baibarac |
| **Institution** | **National Institute of Materials Physics** |
| **Patent no.** | WOS:001404612000001 |
| **Description** | The present study concentrated on methodologies for the synthesis of POT/WS2 composites. Three distinct synthesis methods were employed: i) chemical synthesis via polymerisation of o-toluidine (OT) monomers in the presence of WS2 nanosheets exfoliated by ball milling; ii) electrochemical synthesis of POT/WS2 composites and iii) physical interaction between POT and WS2 powders;<br>The synthesis methods employed have a significant impact on the resulting structure of POT, as it is capable of forming different architectures that contain repeating units of either leucoemeraldine salt (LS) or emeraldine salt (ES). In this study, the characterization techniques used to investigate chemically synthesized POT/$WS_2$ composites indicated the presence of LS-type repeating units in the POT structure. Conversely, for electrochemically synthesized POT/$WS_2$ composites, ES-type repeating units were identified in the POT structure;<br>The POT/WS2 composites resulting from the three different synthesis techniques were tested as electrode active materials in symmetric supercapacitors using cyclic voltammetry. The electrodes that were tested in supercapacitors contained 80% active materials (POT/WS2 composites), 5% PVDF (polyvinylidene fluoride) and 15% super P carbon. The capacitance values of the supercapacitors containing the POT/WS2 composites as active materials were reported to be: i) 123.5 $mFcm^{-2}$ using the POT-ES/WS2 composites obtained by the mechano-physical interaction between the constituents; ii) 465.76 $mFcm^{-2}$ using the POT-ES/$WS_2$ composites synthesised via chemical polymerisation; and iii) 751.6 $mFcm^{-2}$ in the case of the electrochemical synthesis. |

| RO.204. | |
|---|---|
| **Title EN** | **Method for Separation of Cathode Components in Spent Rechargeable Lithium Batteries (RLIB)** |
| **Authors** | M. Dinescu, C. S. Florica, M. Vaduva, D. Nastac, M. Baibarac |
| **Institution** | **National Institute of Materials Physics, Magurele, Ilfov** |
| **Patent no.** | Patent application No. A00096/2023 |
| **Description** | The invention relates to a method of separating the constituents of cathodes having as active material polydiphenylamine (PDPA) and carbon nanotubes (CNTs) from spent lithium rechargeable batteries (RLIB). Their contents include materials such as multi-walled carbon nanotubes functionalized with polydiphenylamine (MWNTs-PDPA) (the active component), MWNTs-COOH, MWNTs doped with lithium ions and C superconducting P, polyvinylidene fluoride (PVDF), $Li_2CO_3$ and $LiPF_6$.<br>The classical methods used in the destruction and/or recovery of battery materials involve expensive technologies and generation of polluting by-products [1-3].<br>The staged separation method described in this patent involves the use of simple, economical processes, eliminating the generation of polluting by-products. It involves cathode shattering followed by successive solubilization in water and N-methylpyrrolidone (NMP), and by filtration to remove components such as PVDF, MWNT-PDPA, and completed by reduction of the acid groups of MWNT-COOH to obtain the final products MWNTs and superconducting carbon P.<br>The utility of the invention is reflected in redefining the utilization of recycled materials from the cathodes of spent RLIB, therefore, the final products, namely MWNTs and C superconducting P, are subsequently used for incorporation in electronic devices. |

| RO.205. | |
|---|---|
| **Title EN** | **Process for manufacturing polydimethylsiloxane sponge structures with variable geometry using sacrificial matrix** |
| **Authors** | Monica Enculescu, Mihaela-Cristina Bunea, Mihaela Beregoi, Ionut Enculescu |
| **Institution** | **National Institute of Materials Physics** |
| **Patent no.** | Patent application No. A 2024 00088 |

| | |
|---|---|
| **Description** | The invention describes a process for manufacturing polydimethylsiloxane (PDMS) sponge structures using prepolymer, crosslinking agent, solvent and sacrificial matrix by the dissolution of which pores are created in the polymer structure. For the productive use of the manufacturing process, the present invention proposes a new technical solution that leads to the possibility of obtaining polydimethylsiloxane sponge structures with variable geometries by using different shapes of the mold in the molding process.<br>The applications in the water purification process have a much improved efficiency by choosing an appropriate morphology. Also, the process can be scaled in a simple and low-cost way, adapting to the process requirements. The material used as a sacrificial matrix (sugar) is abundantly available on the market, and the spongy structures can be reused, which represents an important advantage. |

| **RO.206.** | |
|---|---|
| **Title EN** | **GeTe on Si,Ge and SiGe field effect transistor and split gate** |
| **Authors** | D.G. Popescu, M.A. Husanu |
| **Institution** | **National Institute of Materials Physics** |
| **Patent no.** | A 2024 00240 |
| **Description** | The invention defines a method for preparing split-gate field-effect transistor devices implemented in GeTe chalcogenides, deposited as thin films on semiconductors commonly used in modern electronics: Si, Ge, and GeSi alloys. More specifically, the invention relates to the method of fabricating a split-gate p-type field-effect transistor. The Source, Drain, and Gate1 and Gate2 contacts are lithographically defined on the surface of the GeTe layer using metals such as Au/Ti, Au, Pt, and Cu, in a configuration where both gates are framed by the Source and Drain electrodes. |

# National Institute for Research & Development in Chemistry and Petrochemistry – ICECHIM Bucharest

| RO.207. | |
|---|---|
| **Title EN** | **Composite Material for Organic Pollutants Removal Using Materials Based on Food Waste and Method of Obtaining it** |
| **Authors** | Roxana Ioana Brazdis (Matei), Irina Fierascu, Toma Fistos, Anda Maria Baroi, Ioana Silvia Hosu, Radu Claudiu Fierascu, Valentin Raditoiu, Monica Florentina Raduly, Maria Grapin |
| **Institution** | **National Institute for Research & Development in Chemistry and Petrochemistry – ICECHIM Bucharest** |
| **Patent no.** | **Patent application No. A00673/2024** |
| **Description** | The present invention refers to a material and procedure for the removal of organic pollutants. The procedure is based on the use of a phosphatic material (obtained from the valorization of food wastes-shells of Mya arenaria Linnaeus, 1758 - the most encountered edible clam on the Black Sea shore), decorated with metallic oxides (Cu or Ni) developed using a rapid approach, further formulated as an active coating. The material proved to be effective at low concentrations against the model organic pollutant (dye) Methylene Blue.<br>This work was carried out through the PN 23.06 Core Program (NUCLEU)- ChemNewDeal within the National Plan for Research, Development and Innovation 2022-2027, developed with the support of Ministry of Research, Innovation, and Digitization (Ministry of Education and Research), project no. PN23.06.01.01 (AQUAMAT). |

| RO.208. | |
|---|---|
| **Title EN** | **Method of Detection of Escherichia Coli Bacteria Through Electrochemically Coupled Surface Plasmon Resonance Using Electrodes Modified with Phytosynthesized Gold Nanoparticles and Procedure for their Preparation** |
| **Authors** | Camelia Ungureanu, Alexandra Constantinescu, Cristian Valeriu Pîrvu, Radu Claudiu Fierăscu, Irina Fierăscu, Anda- |

Maria Baroi, Roxana Ioana Brazdis (Matei), Toma Fistoș, Irina Elena Chican

**Institution** **National Institute for Research & Development in Chemistry and Petrochemistry – ICECHIM Bucharest/ National University of Science and Technology POLITEHNICA Bucharest**

**Patent no.** **Patent application no. A00549/2023**

**Description**

The present invention relates to a method for the detection of the bacterium Escherichia coli by electrochemically coupled surface plasmon resonance (EC-SPR) using an SPR disk electrode modified with gold nanoparticles obtained by phytosynthesis using broccoli leaves, which allows the development of portable devices for on-site detections, which is beneficial for testing at locations such as farms, food processing facilities or border checkpoints. The process of preparing the modified electrode is carried out in two stages, in the first stage Au nanoparticles are obtained from broccoli leaves, through green chemistry methods, and in the second stage the surface modification of the SPR electrodes is carried out with gold nanoparticles. In the first stage, the plant material (dried broccoli leaves) is ground to sizes below 100 μm (determined by sieving), then extracted using a water:ethanol mixture, with the help of a microwave extractor, resulting in the natural extract; after separating the obtained solution and cooling the extract to ambient temperature, add the metal precursor solution (tetrachloroauric acid) obtained in distilled water, thus obtaining the solution of metal nanoparticles. In the second step, the commercial SPR disk electrode is washed with the specific culture medium for E. coli and modified with the solution of gold nanoparticles obtained in the first step by dripping directly onto the electrode surface followed by immediate use of the modified electrode. The detection method involves the use of the electrode modified with gold nanoparticles obtained from broccoli leaves. To improve the detection efficiency, the SPR system was coupled with an electrochemical system.

This work was supported by a grant of the Ministry of Research, Innovation, and Digitization, CCCDI-UEFISCDI, project number PN-III-P2-2.1-PED-2021-0042, contract 652PED/2022, within PNCDI III.

| RO.209. | |
|---|---|
| **Title EN** | **Composite Material for Dental Restoration Based on Metal Oxide Nanoparticles and Phosphate Material with Improved Antimicrobial Properties and Method of Obtaining it** |
| **Authors** | Radu Claudiu Fierascu, Roxana Ioana Brazdis (Matei), Irina Fierascu, Toma Fistos, Anda Maria Baroi, Lia Mara Ditu |
| **Institution** | **National Institute for Research & Development in Chemistry and Petrochemistry – ICECHIM Bucharest** |
| **Patent no.** | **Patent application No. A00727/2024** |
| **Description** | The present invention relates to a composite material with improved antimicrobial properties, compared to the base material (glass ionomer cement) without negatively affecting the physical and mechanical properties, intended for use in dental applications, consisting of the solid phase - aluminofluorosilicate glass with particle size below 25 μm and a material with strong antimicrobial character, namely phosphate material as the hydroxyapatite type in which calcium is substituted with copper or zinc (in ratios Ca: substituted metal 1..5:0..4) previously decorated with phytosynthesized metal oxide nanoparticles using plant extracts from the Lamiaceae family.<br>This work was supported by the Ministry of Research, Innovation and Digitization, CCCDI—UEFISCDI, project number PN-III-P4-PCE-2021-0292, within PNCDI III. |

| RO.210. | |
|---|---|
| **Title EN** | **Procedure for Realization of a Multisensing Platform Based on Innovative Nanomaterials for Monitoring of Clinically Relevant Biomarkers** |
| **Authors** | Ana-Maria Gurban, Lucian-Gabriel Zamfir, Mihaela Doni, Iuliana Răut, Mariana Constantin, Cristina Firincă, Maria Luiza Jecu |
| **Institution** | **National Institute for Research & Development in Chemistry and Petrochemistry – ICECHIM Bucharest** |
| **Patent no.** | **Patent application No. A00687/2024** |
| **Description** | The invention relates to a procedure for the realization of a multisensitive, miniaturized and portable electrochemical platform modified with an innovative electroconductive nanomaterial, Fullerenol-Prussian Blue type, functionalized with specific enzymes for the simultaneous, sensitive and selective detection of clinically important biomarkers from |

non-invasive biological fluids (sweat). The present electrosensitive multiplex platform of the invention and the analytical method can be used for the determination of hydrogen peroxide, glucose, and lactate content from different biological fluids (e.g. sweat, saliva, etc.) with a sensitivity as high as 177.86 $mA \cdot M^{-1} \cdot cm^{-2}$ for $H_2O_2$, 185.6 $mA \cdot M^{-1} \cdot cm^{-2}$ for glucose and 110.8 $mA \cdot M^{-1} \cdot cm^{-2}$ for lactate, respectively, being operated at low values of applied potentials, such as 0.04 V vs Ag/AgCl, thus decreasing the influence of the potential interfering compounds.

The integration of these nanostructured (bio)materials into a portable multisensory system coupled with miniaturized and portable opto-electrochemical detectors for real-time monitoring of parameters of clinical interest represents an important contribution in the field of functional materials, both at national and European level.

These multisensory, flexible and portable bioanalytical platforms can be used for a series of other important compounds from food, the environment or of clinical importance, such as drug residues, hormones, pesticides, etc., allowing the control and monitoring of quality of life.

This work is supported by the Ministry of Research, Innovation and Digitization, CNCS/CCCDI – UEFISCDI, project COFUND-M-ERANET-3-FULSENS-GEL, within PNCDI III, project no. 318/2022

**RO.211.**

| | |
|---|---|
| **Title EN** | **Catalytic System with the Structure of Metal Oxides and Humic Acids for the Treatment of Contaminants Traces from Wastewaters and Method of Obtaining** |
| **Authors** | Cristina Emanuela Enăşcuţă., Elena Emilia Sîrbu, Radu Claudiu Fierăscu, Grigore Pşenovschi |
| **Institution** | **National Institute for Research & Development in Chemistry and Petrochemistry – ICECHIM Bucharest** |
| **Patent no.** | **Patent application No. A00283/2024** |
| **Description** | The invention refers to a process for obtaining a catalytic system with the structure of metal oxides, under an ultrasound field, used in the advanced treatment of contaminants traces from wastewater resulting from the pharmaceutical industry and those from agriculture. The invention belongs to the technical field of treating contaminated water by photocatalytic oxidation. The |

catalytic system with magnetic properties, which contains $Fe_3O_4$ oxide components and humic acids (HA) synthesized by the utilization of vegetable waste, is obtained by the co-precipitation-drying method. Iron oxide ($Fe_3O_4$) is used as an intermediate coating, over which a layer of synthesized humic acids is deposited. The magnetic photocatalyst can be activated in the presence of sunlight being used to treat water impure with contaminants.

The proposed catalytic system has the following advantages: it is relatively cheap; it has photocatalytic activity; it is used to treat contaminated water in a relatively short time; it can be quickly recovered and reused repeatedly and its preparation in the ultrasound field favors the homogeneous dispersion of iron oxide.

This work was carried out through the PN 23.06 Core Program (NUCLEU)- ChemNewDeal within the National Plan for Research, Development and Innovation 2022-2027, developed with the support of Ministry of Research, Innovation, and Digitization (Ministry of Education and Research), project no. PN23.06.01.01 (AQUAMAT).

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**RO.212.**

| | |
|---|---|
| **Title EN** | **Innovative MXene-Peptides for Electrochemical Miniaturized Platforms Dedicated to Tumor Biomarker Detection** |
| **Authors** | Lucian-Gabriel Zamfir, Ana-Maria Gurban, Mihaela Doni, Ioana Cătălina Gîfu, Cristina Firincă, Mariana Constantin, Anda Maria Baroi |
| **Institution** | **National Institute for Research & Development in Chemistry and Petrochemistry – ICECHIM Bucharest** |
| **Patent no.** | **Project 58TE/2025** |
| **Description** | The main goal of the MXEPEPMIN project is the development of miniaturized and portable bioanalytical devices, such as electrochemical biosensors, for the rapid, sensitive and specific detection of lung cancer biomarkers from saliva. By functionalizing MXene-type nanomaterials with specific bioreceptors, namely peptides for carcinoembryonic antigen (CEA) and for the epidermal growth factor receptor (EGFR), new electroconductive and stable biomaterials will be obtained that will allow the early detection of biomarkers of interest, through non-invasive methods, with very high sensitivity and selectivity. This |

project will have a major impact both in the field of clinical applications for the early detection of lung cancer, but also academically and economically, the developed biosensors being able to be adapted for applications in various other fields (agri-food, military, environment, etc.).

The work is supported by the Ministry of Education and Research (Ministry of Research, Innovation and Digitization), CCCDI - UEFISCDI, through project number PN-IV-P2-2.1-TE-2023-1281 within PNCDI IV, MXEPEPMIN – Innovative MXene-peptides for electrochemical miniaturized platforms dedicated to tumor biomarker detection, contract no. 58TE/2025

**RO.213.**

| | |
|---|---|
| **Title EN** | **Hybrid Membranes Based on Chitosan and Silanes Bearing Functional Groups and Process for Obtaining Them** |
| **Authors** | Teodor Sandu, Marinela Victoria Dumitru, Tanța-Verona Iordache, Ana-Mihaela Gavrilă, Andrei Sârbu, Anita-Laura Chiriac, Anamaria Zaharia, Andreea Miron, Sorin Viorel Dolana, Iulia Elena Neblea |
| **Institution** | **National Institute for Research & Development in Chemistry and Petrochemistry – ICECHIM Bucharest** |
| **Patent no.** | **Patent application No. A00661/2024** |
| **Description** | The present invention relates to sandwich membranes with thicknesses of 300...500 μm, based on chitosan and silanes with functional groups, that have applications in water purification, and the process for obtaining them. Thus, an organosilicate structure is elaborated following the sol-gel reaction of 3-mercaptopropyltrimethoxysilane (MPTES) and tetraethoxysilane (TEOS), under alkaline catalysis, on the surface of a chitosan membrane.<br>The sandwich membranes developed according to the invention can be used for water purification due to functional groups of chitosan and organosilane, which can capture various pollutants. At the same time, the functional groups introduced following the modification with silane moieties can participate in subsequent chemical modification reactions, which further broadens the field of use.<br>This work was carried out through the PN 23.06 Core Program (NUCLEU)- ChemNewDeal within the National Plan for Research, Development and Innovation 2022-2027, |

developed with the support of Ministry of Research, Innovation, and Digitization (Ministry of Education and Research), project no. PN23.06.01.01 (AQUAMAT).

| RO.214. | |
|---|---|
| **Title EN** | **Partial Desulfurization Process of Rubber Powder for Bitumen Modification** |
| **Authors** | Gabriel Vasilievici, Simona-Bianca Ghimiș, Andreea-Luiza Mîrț, Mihaela Cîlțea-Udrescu, Alexandru Vlaicu, Alin Cristian Nicolae Vintilă |
| **Institution** | **National Institute for Research & Development in Chemistry and Petrochemistry – ICECHIM Bucharest** |
| **Patent no.** | **Patent application No. A00333/2024** |
| **Description** | The invention relates to a process for the partial desulfurization of crumb rubber in the presence of a reactive desulfurization adsorbent, aimed at improving the compatibility of the partially desulfurized crumb rubber with bitumen, for applications in formulations intended for use in road infrastructure.<br>The technical problem addressed by the invention consists of the partial desulfurization of crumb rubber derived from end-of-life tires in a continuous horizontal reactor of the extruder type, in the presence of a reactive adsorbent. This process ensures the homogeneity of road bitumen modified with this partially devulcanized crumb rubber.<br>The partial desulfurization process involves the preparation of the reactive adsorbent, followed by the desulfurization of the crumb rubber in the presence of the reactive adsorbent, resulting in a partially desulfurized crumb rubber intended for use in road bitumen modification.<br>This work was supported by a grant of the Ministry of Research, Innovation and Digitization, CCCDI - UEFISCDI, project number PN-III-P2-2.1-PTE-2021-0552, ctr. no. 111PTE/2022, within PNCDI III. |

| RO.215. | |
|---|---|
| **Title EN** | **Process for Converting Spent Substrate from the Cultivation of Pleurotus Mushrooms** |
| **Authors** | Gabriel Vasilievici, Florin Oancea, Diana Constantinescu Aruxandei, Simona-Bianca Ghimiș, Mihaela Cîlțea Udrescu, Alexandru Vlaicu, Alin Cristian Nicolae Vintilă, Mălina Deşliu Avram, Daria Gabriela Popa, Eliza Gabriela Brettfeld |

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|---|---|
| **Institution** | **National Institute for Research & Development in Chemistry and Petrochemistry – ICECHIM Bucharest** |
| **Patent no.** | **Patent application No. A00715/2024** |
| **Description** | The invention refers to an integrated approach with multiple directions for superior utilization of the exhausted substrate resulting from the cultivation of lignocellulosic fungi of the genus Pleurotus - Spent Pleurotus Substrate, by carrying out an initial anaerobic digestion process to obtain biogas, followed by parallel processing of the solid digestate fraction resulting from thermal processes, pyrolysis, to obtain biochar, and of the liquid digestate fraction for nutrient recovery, usable as a controlled-release fertilizer in agriculture. This integrated system process for the superior multidirectional valorization of the depleted Pleurotus substrate presents a series of advantages in that: it eliminates the need to manage significant amounts of residues and environmental problems associated with long-term storage; the production of biomethane during the anaerobic digestion process leads to an energy flow that can be used to generate electricity and heat or as fuel; the versatility and adaptability of the proposed integrated system allows the use of the SPS in combination with other types of substrates and waste.<br>This work was carried out through the PN 23.06 Core Program - ChemNewDeal within the National Plan for Research, Development and Innovation 2022-2027, developed with the support of Ministry of Research, Innovation, and Digitization (Ministry of Education and Research), project no. PN 23.06.02.01 (InteGral) |

# National Research and Development Institute for Cryogenic and Isotopic Technologies - ICSI Rm. Valcea

| RO.216. | |
|---|---|
| **Title EN** | **Carbon nanofibers decorated with nickel particles obtained by electrospinning** |
| **Authors** | Marin Elena, Marinoiu Teodora Adriana, Borta Elena Simona, Carcadea Elena |
| **Institution** | **National Research and Development Institute for Cryogenic and Isotopic Technologies – ICSI Rm Valcea** |
| **Patent no.** | Patent application No. |
| **Description** | The invention relates to a process for obtaining carbon fibers decorated with nickel nanoparticles by electrospinning and consists of: (i) the production of polyacrylonitrile filaments impregnated with the nickel precursor, (ii) the carbonization of the filaments in a single step, in a tubular furnace with linear temperature variation in the range of 700-1500° C in an inert environment. The carbon nanofibers produced are made up of carbon fibres in a mass proportion of 90-97% and nickel in a mass proportion of 0.7-3.5%, the final product having, depending on the amount of precursor used, a BET specific surface area ranging between 3 and 46 $m^2 g^{-1}$, a total pore volume ranging between 0.005 and 0.08 $cm^3 g^{-1}$. |

| RO.217. | |
|---|---|
| **Title EN** | **Carbon fibers decorated with gold and the process of obtaining** |
| **Authors** | Iordache Mihaela, Oubraham Anisoara, Borta Simona Elena, Marin Elena, Capris Ioan-Catalin, Marinoiu Teodora-Adriana |
| **Institution** | **National Research and Development Institute for Cryogenic and Isotopic Technologies – ICSI Rm Valcea** |
| **Patent no.** | Patent application No. |
| **Description** | The invention refers to a process of obtaining carbon fibers decorated with gold, by electrofiling, which is a versatile and viable technique for generating ultra-thin fibers, with application as filter materials in various fields. The process, according to the invention, has been applied to successfully produce nanofibers with controllable diameters, a specific surface and a larger porosity, which makes them play a key role in many areas. The carbon fibers produced are formed in mass proportion of 6.97 – 15.82 % gold, have a specific area |

of 4.817 $m^2$ $g^{-1}$ and a total volume of pores of 0.014 $cm^3$ $g^{-1}$, and the product, diffusion layer, has characteristics of hydrophobic material with contact angle ranging from 106.7°-107.9°.

| RO.218. | |
|---|---|
| **Title EN** | **Process of obtaining carbon fibers decorated with Pd nanoparticles, with application in fuel cells** |
| **Authors** | Marinoiu Adriana, Raceanu Mircea, Iordache Mihaela, Borta Simona, Oubraham Anisoara, Carcadea Elena |
| **Institution** | **National Research and Development Institute for Cryogenic and Isotopic Technologies – ICSI Rm Valcea** |
| **Patent no.** | Patent application No. |
| **Description** | The invention relates to a process of obtaining carbon fibers decorated with palladium and their use for the manufacture of composite materials, with application in the production of diffusion layers for fuel cells. The process, according to the invention, leads to nonwoven carbon fiber decorated with palladium nanoparticles, which, with the addition of carbonic materials, can be used in obtaining diffusion layers with improved properties, in terms of hydrophobicity, electrical resistivity and porosity. The carbon fibers produced are formed in mass proportion of 0.52 - 2.79 % palladium and have a total volume of pores between 0.029 and 0.037 $cm^3$ $g^{-1}$, and the product diffusion layer has characteristics of hydrophobic material with contact angle between 101.8°C and 144.8 °C. |

| RO.219. | |
|---|---|
| **Title EN** | **Process of obtaining functionalized iron graphene materials** |
| **Authors** | Marinoiu Adriana, Carcadea Elena, Marin Elena, Capris Ioan Catalin, Varlam Mihai |
| **Institution** | **National Research and Development Institute for Cryogenic and Isotopic Technologies – ICSI Rm Valcea** |
| **Patent no.** | Patent application No. |
| **Description** | The invention refers to a process of obtaining functionalized iron graphene materials in the microwave field, through an environmentally friendly, fast and inexpensive method. Iron-functioning carbon materials possess high chemical activity and are recognized for the possibility of use as electrocatalytic materials in the manufacture of electrodes for |

various electrochemical devices (fuel cells, batteries or electrolyzers). The process, according to the invention, leads to functionalized iron graphene materials by chemical synthesis in a single reaction stage, as to allow the industrial manufacturing of functionalized iron graphene materials. The materials produced are made up of 7.25 - 47.12 % iron and a specific surface ranging from 112 to 159 $m^2 g^{-1}$ and the electrodes produced from one of the functionalized graphene materials possess electrochemical characteristics in the potential range of 0.36 V and 0.847 V, having a maximum current of 970 μA and an electric charge of 1.827 mC.

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**RO.220.**

**Title EN** **Enhanced filter for a solid waste pyrolysis process**

**Authors** Ionete Elena-Roxana, Ionete Eusebiu Ilarian, Spiridon Stefan Ionut, Constantinescu Marius, Bucura Felicia, Roman Antoaneta

**Institution** National Research and Development Institute for Cryogenic and Isotopic Technologies

**Patent no.** Patent application CBI no. A/00475/12.08.2024

**Description** This invention refers to a Filter, part of a pyrolysis plant, designed for the energy recovery of agro-industrial solid waste (manure, plant residues); plastics, but also other types of waste (sewage sludge, meat and bone meal), as a result of which various products are developed (pyrolysis oil, pyrolysis gas, solid residue, but also suspended powders and tars resulting from the condensation process that takes place in the equipment downstream of the plant and which can influence its lifespan). The filter, constituting a mechanism of retaining powders and tars, according to the invention, is made of stainless steel and consists of a series of elements: an external support of cylindrical shape (1), containing on the inside stainless steel plate type elements (2), on the surface of which retaining and storage grooves are printed, being arranged in succession at distances fixed by means of spacer rings (3), interspersed with catalytic bed elements (4) of stainless steel mesh, and which are configured by means of tie rods (5) in a common block with the possibility of extraction in the event of mechanical regeneration, chemical or thermal. The cylindrical outer support element has semicircular cleaning slots (6), to allow the cleaning of the accumulated dust by shaking or washing.

# National Institute for Chemical - Pharmaceutical Research and Development, Bucharest, Romania ICCF

| RO.221. | |
|---|---|
| **Title EN** | Antimicrobial agents with quinolone structure |
| **Authors** | Lucia Pintilie, Adela Staras |
| **Institution** | National Institute for Chemical - Pharmaceutical Research and Development, Bucharest, Romania |
| **Patent no.** | **Patent application No. RO 137326 A2 / 30.03.2023** |
| **Description** | The invention refers to derivatives with a quinolone structure :1-ethyl-6-(substituted/unsubstituted)-7-substituted-1,4-dihydro-quinolin-3-carboxilic acid, with antimicrobial activity against gram-positive and gram-negative microorganisms, in which $R_6$ is fluorine, chlorine, hydrogen, methyl, and $R_7$ is piperazinyl, 3,5-dimethyl-piperazinyl, homopiperazinyl, 4-methyl-piperazinyl. Derivatives with quinolone structure are used in the treatment of infections caused by gram-positive and gram-negative microorganisms. The synthesis of the novel quinolones followed a Gould-Jacobs cyclization process. Appropriate unsubstituted aniline is reacted with diethylethoxymethylenemalonate (EMME) to produce the resultant anilinomethylenemalonate. A subsequent thermal process induces Gould-Jacobs cyclization to afford the corresponding 4-hidroxy-quinoline-3-carboxylate ester. The following operation is the alkylation of the quinolone which is usually accomplished by reaction with dialkyl sulphates to produce the qinolone-3-carboxylate ester. The final manipulation is basic hydrolysis to cleave the ester generating the biologically active free carboxylic acid. The displacement of 7-chloro group with a heterocyclic, yielded compounds. From the synthesized compounds, FPQ55, shows the best antibacterial activity : CMI against E. coli ATCC 8739 < 0.25 µg/ml and CMI against St.aureus ATCC 6538 : 0.5 µg/ml. |

| RO.222. | |
|---|---|
| **Title EN** | **Oxazolidinone derivative with antimicrobial activity** |
| **Authors** | Pintilie Lucia, Stefaniu Amalia, Nicu Alina Ioana, Negut Catalina, Tanase Constantin, Caproiu Miron Teodor |
| **Institution** | National Institute for Chemical - Pharmaceutical Research and Development, Bucharest, Romania |

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|---|---|
| **Patent no.** | **RO 133274 B1 /29.11.2024** |
| **Description** | The invention relates to oxazolidinone derivatives and a process for their preparation, used as substances with antimicrobial activity against Gram-positive microorganisms (including MRSA), Gram-negative, anaerobic and Mycobacterium tuberculosis, or as intermediates in the synthesis of other antimicrobial oxazolidinone drugs. Oxazolidinones, according to the invention, are (R)-[N-3-(3-fluoro-4-(substituted-3-methyl-piperidinyl-phenyl)-2-oxo-5-oxazolidinyl]methanol where the substituted-phenyl is: 4-(3-methyl-piperidinyl)-phenyl, 4-(4-methyl-piperidinyl)-phenyl, 4-piperidinyl-phenyl, 4-morfolinyl-phenyl, show antimicrobial activity, being used in the treatment of infections caused by gram-positive microorganisms.It was obtained some oxazolidinone compounds 3,4-Dfluoro-nitrobenzene with excess piperidine or morpholine selectively gave the p-substituted nitrobenzene (3). Reduction of (3) compounds was followed by attachment of a carbobenzoxy activating group to the arylamines (4). Carbamate (5) was deprotonated with n-Bu-Li and then (R)-glycidyl butyrate was added to give the alchools (6). The oxazolidinone compounds was characterized structurally and pharmacologically. Among the synthesized compounds, the compound (R)-[N-3-(3-fluoro-4-(3-methyl-piperidinyl-phenyl)-2-oxo-5-oxazolidinyl]methanol (Alcohol 4) shows better antibacterial activity than St.aureus ATCC 29223 (MIC: 64μg / ml). |

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|---|---|
| **RO.223.** | |
| **Title EN** | **Multifunctional cream-type product with emollient, regenerating, and moisturizing effects for xerotic skin** |
| **Authors** | Fawzia Sha'at, Ramona-Daniela Pavaloiu, Cristina Hlevca, Georgeta Neagu, Radu Albulescu, Adela Staras, Lucia Camelia Pirvu |
| **Institution** | National Institute for Chemical - Pharmaceutical Research and Development, Bucharest, Romania |
| **Patent no.** | **Patent application No. RO 137952 A2/28.02.2024** |
| **Description** | A multifunctional cream with emollient, regenerating, and moisturizing effects for xerotic skin contains a blend of natural ingredients including 30-40% lanolin, 10-20% white wax, 5-7% cocoa butter, 9-13% shea butter, 2-5% standardized quince extract (Cydonia oblonga), 9-20% grape seed oil (Vitis vinifera), 9-20% sweet almond oil (Prunus |

amygdalus dulcis), 0.5% magnolia oil (Michelia alba), and 0.5% patchouli essential oil (Pogostemon cablin), expressed as mass percentage. The cream preparation process involves creating the cream base by heating the fat phase in a water bath at 60-70°C, then cooling it to 30°C, at which point the oils and extract are added under continuous stirring until a homogeneous mixture is formed. Essential oils are then incorporated, and the final product has a pale yellow color and a semi-solid texture.

The cream can be used in **both cosmetic and therapeutic skincare routines**. It helps treat **dry or xerotic skin** by restoring moisture, improving texture, and reducing discomfort. Designed for **sensitive skin**, it hydrates without irritation, thanks to soothing almond and magnolia oils. It aids in **healing minor abrasions, insect bites, and chapped lips or hands** by preventing moisture loss. For **foot care**, it softens cracked heels and dry skin. Additionally, the cream enhances skin elasticity, making it beneficial **for scar healing and stretch marks**. Its multi-functional formula ensures deep nourishment and protection for various skin concerns.

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**RO.224.**

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| **Title EN** | **Composite membranes based on bacterial cellulose and PVA, used as a substrate for OLED'S and process for obtaining** |
| **Authors** | Angela CASARICA, Cristiana Nicol ZONIA, Iulia Corina CIOBOTARU, Constantin Claudiu CIOBOTARU |
| **Institution** | National Institute for Chemical-Pharmaceutical Research & Development, Bucharest, Romania |
| **Patent no.** | **Patent application No. RO138203 A2/30.05.2024** |
| **Description** | The invention relates to obtaining bacterial cellulose/PVA (polyvinyl alcohol) nanocomposite membranes, with improved transparency, as a substrate for flexible displays with organic light-emitting diodes (OLED), with use/applications in the electronic and optoelectronic fields. The Nanocomposite membranes, based on bacterial cellulose obtained by exploiting renewable resources (BC) and polyvinyl alcohol (PVA), following research, it was found that at a wavelength of 500 nm, an increase in optical transmission was observed by 33% for BC-PVA 5%, and up to 50% for BC-PVA 25%, by in situ functionalization of the |

bacterial cellulose membrane with polyvinyl alcohol, compared to native bacterial cellulose membranes.

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| **RO.225.** | |
| **Title EN** | **Nasal anti-inflammatory solution based on plant extracts and silver nano-particles and procedure for obtaining it** |
| **Authors** | Cornelia Nichita, Georgeta Neagu, Sultana Nița |
| **Institution** | National Institute for Chemical-Pharmaceutical Research & Development, Bucharest, Romania |
| **Patent no.** | **Patent application No. RO133397A2/28.06.2019** |
| **Description** | The invention relates to a new phytotherapeutic product anti-inflammatory nasal solution standardized, based on selective plant extracts and Ag nanoparticles, and to a process for its formulation. According to the invention the process consists of solid-liquid extraction, filtration, vacuum concentration, resulting in four selective extracts which by combining and homogenizing in an ultra turex system, and addition of eco-synthesized silver nanoparticles and ultrasonication of the mixture, in sterile physiological serum, stages that lead to a product, with free of toxicity and anti-inflammatory activity. The phytotherapeutic product anti-inflammatory nasal solution contains active plant principles of the type - flavonoid derivatives, polyphenolic carboxylic acids, total polyphenols extracted from the plant species Ocimum basilicum L., Rosmarinus officials L., Mentha piperita L., Eucalyptus globulus Labill L., and silver nanoparticles, with standardized size and stability over time, determined by dynamic light scattering. The phytotherapeutic product anti-inflammatory nasal solution is free of toxicity, the results of in vitro testing highlighting the absence of cytotoxicity on both the murine fibroblast line and the human monocyte line. The phytotherapeutic nasal solution shows a significant anti-inflammatory activity demonstrated in vitro, by evaluating the production of nitric oxide in macrophages stimulated with LPS and by determining the level of pro-inflammatory cytokines IL-1beta and TNF-alpha released by monocytes/macrophages stimulated with LPS.<br>Anti-inflammatory nasal solution has applications in the therapy of ORL diseases, as an adjuvant in the treatment of acute and chronic rhinitis and rhinopharyngitis, in sinusitis and in simple atrophic chronic rhinitis. |

| RO.226. | |
|---|---|
| **Title EN** | **Anti-inflammatory hydrogel with natural active vegetable compounds** |
| **Authors** | Bubueanu Elena Corina, Ducu Catalin Marian, Moga Sorina Georgian, Matei-Donciu Roxana, Grigore Alice Elena, Pirvu Lucia Camelia, Iuksel Rasit, Panteli Minerva |
| **Institution** | National Institute for Chemical-Pharmaceutical Research & Development, Bucharest, Romania<br>Global Research SME |
| **Patent no.** | **Patent application No. RO135037 A2 /2021** |
| **Description** | This invention presents a **controlled-release therapeutic system designed for topical pharmaceutical applications**, incorporating natural plant-derived active compounds with potent anti-inflammatory properties. The hydrogel formulation ensures targeted delivery and prolonged action, making it an effective solution for managing inflammation, pain, and skin irritation. The hydrogel contains oleoresins extracted from Arnica montana (arnica) and Capsicum annuum (hot peppers), two well-known botanicals with synergistic anti-inflammatory and analgesic effects:<br>✓ Arnica montana – rich in sesquiterpene lactones, flavonoids, and phenolic acids, arnica helps reduce swelling, bruising, and muscle soreness.<br>✓ Capsicum annuum – contains capsaicinoids, which exhibit analgesic and anti-inflammatory properties by modulating pain receptors and improving blood circulation. |

# National Institute for Research and Development in Microtechnologies - IMT Bucharest

| RO.227. | |
|---|---|
| **Title EN** | Chemiresistive ethanol sensor based on graphene and metal oxide nanocomposites and process for obtaining it |
| **Authors** | Cornel Cobianu, Bogdan- Catalin Serban, Octavian Buiu, Niculae Dumbravescu, Maria Roxana Marinescu, Narcis-Octavian Ionescu, Viorel Avramescu |
| **Institution** | National Institute for Research and Development in Microtechnologies - IMT Bucharest |
| **Patent no.** | Romanian Granted Patent No 134143 RO OSIM, 30.01. 2025 |
| **Description** | The invention presents a chemiresistive ethanol sensor and the new process for its manufacturing based on sensitive layers synthesized from zinc oxide (ZnO) and graphene nanocomposite. The nanocomposite was prepared by aqueous sonochemical synthesis of high acoustic radiation density. An original element of the method is the use of sodium hydroxide (NaOH), both as a reducing agent in the formation of ZnO from zinc nitrate Zn $(NO_3)_2$ and as an initiator of nanostructuring, thus obtaining hierarchically organized ZnO-graphene powders of nano-flower type (high porosity powders) for pH values equal to 14.<br>The method of manufacturing the sensitive layer consists of depositing the ZnO-graphene paste on a dielectric substrate by drop casting, followed by the subsequent heat treatment of the paste necessary for the thermal consolidation of the sensitive layer. On the opposite side there is an electrical heating resistor of the sensitive structure. Functionalization of ZnO with graphene allows increasing the sensitivity and reducing the electrical resistance of the sensitive layer and thus an easier measurability of the ethanol sensor.The sensor substrate is made of $Si/SiO_2$ and has a size of 5 mm, the electrodes being made of gold. They can be linear or have an interdigitated configuration. The monitoring capacity of ethanol is investigated by applying a constant current between the two electrodes and measuring the voltage at different values of the ethanol concentration to which the sensitive layer is exposed. |

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| **RO.228.** | |
| **Title EN** | Resistive humidity sensor |
| **Authors** | Bogdan- Catalin Serban, Octavian Buiu, Marius Bumbac, Cristina Nicolescu |
| **Institution** | National Institute for Research and Development in Microtechnologies - IMT Bucharest |
| **Patent no.** | Romanian Patent application A/00622, RO OSIM, 21.10. 2024 |
| **Description** | The technical problem solved by the invention consists in the synthesis of new conductive polyanilines, in the form of nanofibers, sensitive to the variation of the relative humidity value, by doping emeraldine (insulating polyaniline) with oxysulfonated carbon nanohorns (ox-CNHs-$SO_3H$,) and oxysulfonated onion-type carbon nanomaterials (ox-CNOs-$SO_3H$).<br>The synthesis of ox-CNHs-$SO_3H$ and ox-CNOs-$SO_3H$ is achieved by treating simple carbon nanohorns, as well as onion-type carbon materials in Ar-$O_2$ plasma and subsequent sulfonation.<br>The sensor substrate is made of PET and has a size of 5 mm, the electrodes being made of gold. The width of the electrodes is approximately 200 microns, with a separation of 6 mm between them. They can be linear or have an interdigitated configuration.<br>The relative humidity monitoring capacity is investigated by applying a constant current between the two electrodes and measuring the voltage at different values of the relative humidity level to which the sensitive layer is exposed.<br>The use of the claimed conductive polyanilines as sensitive layers provides several significant advantages:<br>- the presence of oxygenated functions ensures the degree of hydrophilicity necessary for interaction with water;<br>- ox-CNHs-$SO_3H$ and ox-CNOs-$SO_3H$ contain carboxylic and sulfonic groups that can protonate the iminic nitrogen atoms in the emeraldine structure, with the formation of conductive and stable polyanilines.<br>- due to the large counterion, conductive polyanilines synthesized by doping emeraldine with ox-CNHs-$SO_3H$ and ox-CNOs-$SO_3H$ are less susceptible to the dedoping phenomenon;<br>- chemical and thermal stability;<br>- superior mechanical properties;<br>- detection at room temperature. |

| RO.229. | |
|---|---|
| **Title EN** | Surface acoustic wave sensor for relative humidity monitoring |
| **Authors** | Bogdan- Catalin Serban, Octavian Buiu, Marius Bumbac, Cristina Nicolescu |
| **Institution** | National Institute for Research and Development in Microtechnologies - IMT Bucharest |
| **Patent no.** | Romanian Patent application A/00623, RO OSIM, 21.10. 2024 |
| **Description** | The present invention relates to the RH sensing response of a surface acoustic wave sensor employing a sensing layer based on new ternary nanocomposite matrices of the polyvinylpyrrolidone type / oxysulfonated onion-type nanocarbon materials (ox-CNOs-$SO_3H$)-carbon black. The oxysulfonated onion-type nanocarbon materials used are found in the ternary nanocomposite in a mass percentage ranging between 60-70%, while carbon black is found in a mass percentage ranging between 5-10%.<br>The sensor used is of the "delay line" type, dual, made on a piezoelectric quartz substrate. The sensor has a double delay line to compensate for thermal drift. Thus, one delay line is covered with the ternary nanocomposite sensitive to RH variation, the second delay line being the piezoelectric substrate without a sensitive layer. The sensitive films are deposited on the piezoelectric quartz substrate by the "spin coating" method.<br>The use of the previously described ternary nanocomposite presents several notable advantages:<br>• the presence of ox-CNOs-SO3H confers a high specific surface area/volume ratio, affinity for water molecules ("mass loading"), as well as a variation in the resistance of the sensitive layer upon contact with them ("electric loading");<br>• excellent mechanical properties;<br>• detection over a wide temperature range;<br>• the hydrophilic character of PVP and ox-CNOs-SO3H facilitates the interaction with water molecules;<br>• carbon black improves the dispersion of ox-CNOs-SO3H in the polymer matrix and modulates the conductivity of the moisture-sensitive layer, being an excellent filler.<br>• rapid response of the sensor to variations in RH levels;<br>• reversibility; |

| RO.230. | |
|---|---|
| **Title EN** | Propanol resistive sensor |
| **Authors** | Bogdan- Catalin Serban, Octavian Buiu, Marius Bumbac, Cristina Nicolescu |
| **Institution** | National Institute for Research and Development in Microtechnologies - IMT Bucharest |
| **Patent no.** | Romanian Patent application A/00624, RO OSIM, 21.10. 2024 |
| **Description** | The technical problem solved by the present invention consists in obtaining new layers sensitive to the variation of the n-propanol concentration, used in the design of resistive sensors. The sensitive film described in this invention, which is used to obtain resistive n-propanol sensors, is a binary nanohybrid of the fluorinated carbon nanohorns(F-CNHs)/$Cu_2O$ at 1/1 w/w ratio. From the point of view of the detection principle, the resistance of the sensitive film increases with the level of the n-propanol concentration. The decrease in conductivity is explained by the fact that n-propanol donates electrons to the sensitive layer, decreasing the concentration of holes.<br>The sensor substrate is made of $Si/SiO_2$ and has a size of 5 mm, the electrodes being made of gold. The width of the electrodes is approximately 200 microns, with a separation of 6 mm between them. They can be linear or have an interdigitated configuration.<br>The use of this binary nanohybrid as sensitive layer presents advantages such as:<br>- F-CNHs provide a high specific surface/volume ratio, affinity for n-propanol molecules as well as a significant percentage variation in the resistance of the sensitive layer upon contact with them;<br>- the presence of fluorine atoms reduces the hysteresis through their hydrophobic effect;<br>- copper(I) oxide is a p-type semiconductor and exhibits a synergistic effect with fluorinated carbon nanohorns, also p-type semiconductors, upon contact with n-propanol molecules;<br>-$Cu_2O$ changes the pore distribution at the interface with the F-CNHs, increasing their specific surface area; |

| RO.231. | |
|---|---|
| **Title EN** | Chemiresistive ethanol sensor |
| **Authors** | Bogdan- Catalin Serban, Octavian Buiu, Marius Bumbac, Cristina Nicolescu |
| **Institution** | National Institute for Research and Development in Microtechnologies - IMT Bucharest |
| **Patent no.** | Romanian Patent application A/00644, RO OSIM, 30.10. 2024 |
| **Description** | The sensitive films described in this invention, which are used to obtain resistive ethanol sensors, are binary nanohybrids of the type of onion-type nanocarbon materials functionalized with trifluoromethyl groups (CNO-$CF_3$) - Ni oxide (NiO) and carbon nanohorns functionalized with trifluoromethyl groups (CNH-$CF_3$) - NiO. From the point of view of the detection principle, the conductivity of the sensitive layer decreases with the level of ethanol concentration. The increase in the resistance of the film sensitive to ethanol vapors can be explained taking into account the physicochemical properties of the two components, as well as the mutual interaction between them.<br>The use of binary and ternary nanohybrids as sensitive films presents several advantages:<br>- nanocarbon materials functionalized with trifluoromethyl groups present a high specific surface/volume ratio, affinity for ethanol molecules (by forming hydrogen bonds) as well as a variation in the resistance of the sensitive film upon contact with them;<br>- NiO nanopowder is a p-type semiconductor with a wide conduction band, large specific surface area. It presents a synergistic effect with oxidized nanocarbon materials such as CNO-$CF_3$ and CNH-$CF_3$, also p-type semiconductors, upon contact with ethanol molecules;<br>- the metal oxide modifies the pore distribution at the interface with the oxidized onion-type nanocarbon materials, increasing their specific surface area;<br>- trifluoromethyl groups, through their marked electron-withdrawing effect, increase the number of carriers in CNO-$CF_3$ and CNH-$CF_3$. Conduction is achieved by holes (p-type carriers), the sensitivity of the material for ethanol molecules increases;<br>- room temperature detection; |

| RO.232. | |
|---|---|
| **Title EN** | Trimethylamine resistive sensor |
| **Authors** | Bogdan- Catalin Serban, Octavian Buiu, Marius Bumbac, Cristina Mihaela Nicolescu |
| **Institution** | National Institute for Research and Development in Microtechnologies - IMT Bucharest |
| **Patent no.** | Romanian Patent application A/00645, RO OSIM, 30.10. 2024 |
| **Description** | The sensitive film described in this invention, which is used to obtain resistive trimethylamine sensors, is a binary nanohybrid of the type of oxidized onion-type nanocarbon materials functionalized with trifluoromethyl groups /CuO.<br>From the point of view of the detection principle, the resistance of the sensitive film increases with the level of trimethylamine concentration. The increase in resistance is explained by the fact that trimethylamine donates electrons to the sensitive layer, decreasing the concentration of holes.<br>The sensor substrate is made of $Si/SiO_2$ and has a size of 5 mm, the electrodes being made of gold. They can be linear or have an interdigitated configuration. The monitoring capacity of trimethylamine is investigated by applying a constant current between the two electrodes and measuring the voltage at different values of the trimethylamine concentration to which the sensitive layer is exposed.<br>The use of the described sensing film presents advantages such as:<br>- onion-type oxidized nanocarbon materials functionalized with trifluoromethyl groups provide a high specific surface/volume ratio, affinity for trimethylamine molecules as well as a significant percentage variation in the resistance of the sensitive layer upon contact with them;<br>- trifluoromethyl groups, through their marked electron-attracting effect, increase the number of carriers in nanocarbon materials.<br>- the presence of fluorine atoms, through their hydrophobic effect, reduces the affinity for water molecules.<br>-CuO changes the pore distribution at the interface with oxidized onion-type nanocarbon materials functionalized with trifluoromethyl groups, increasing their specific surface area;<br>- room temperature detection;<br>- reversibility;<br>- fast response. |

| RO.233. | |
|---|---|
| **Title EN** | Quaternary oxidized carbon nanohorns -based nanohybrid for resistive humidity sensor |
| **Authors** | Bogdan-Cătălin Serban, Octavian Buiu, Cornel Cobianu, Viorel Avramescu, Niculae Dumbravescu |
| **Institution** | National Institute for Research and Development in Microtechnologies - IMT Bucharest |
| **Patent no.** | ES2958943T3, Spain, 16. 02. 2024 |
| **Description** | The present invention relates to the RH sensing response of a resistive sensor employing a sensing layer based on quaternary nanohybrid composition comprising or consisting of CNHOX/SnO2/ZnO/PVP at 1.5/1/1/1 w/w ratio to 3/1/1/1 w/w ratio. When employed as RH sensing layers, these quaternary nanohybrid compositions exhibit several significant advantages: -Oxidized carbon nanohorns (CNHOX) have high specific surface area/volume ratio, water molecules affinity and show rapid electrical resistance variation when RH varies from 0% to 90%. -The nanometric tin (IV) oxide (SnO2) nanopowder exhibits good RH sensitivity. CNHOX have p-type electrical conduction (through holes), while SnO2 is a n-type metallic oxide semiconductor (through electrons). By adding SnO2 to CNHOX, one will obtain islands of p-n semiconductor heterojunctions embedded in PVP (a dielectric material) that increase the sensitivity of the sensitive layer. EUROINVENT 2024 NATIONAL 422 - Zinc oxide (ZnO) nanopowder exhibits good RH sensitivity. Both ZnO and SnO2 are n-type electrical conductors. The ZnO – SnO2 nanocomposite has sensing properties superior to each of the single oxides, because each of the oxides interacts differently with the oxidized carbon nanohorn material, leading to alterations in the pore distribution, which increase the specific surface area; - Polyvinylpyrrolidone (PVP) is a hydrophilic polymer with excellent binding properties, which enables its employment in sensing structures with either flexible or rigid substrate; - Detection at room temperature, -fast response time, low cost, small size, simplicity in manufacture. |

# Victor Babeş National Institute of Pathology

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| **RO.234.** | |
| **Title EN** | **THE IMPLEMENTATION OF BIOMEDICAL RESEARCH EXPERTISE THROUGH THE TRANSFER OF KNOWLEDGE TO THE PRIVATE SECTOR FOR THE VALIDATION OF PRODUCTS AND SERVICES IN THE FIELDS OF MEDICAL BIOTECHNOLOGY AND HEALTH, INTELBIOMED** |
| **Authors** | C Tănase, G Manda, M Neagu, E Codrici, ID Popescu, S Mihai, AM Enciu, M Dudau, C Constantin, S Pop, E Manole, E Codorean, LC Ceafalan, A Arghir, M Leabu, M Gherghiceanu, L Necula, R Albulescu, L Albulescu |
| **Institution** | **Victor Babeş National Institute of Pathology** |
| **Patent no.** | COP G, SMIS: 105631 Research project European Funding |
| **Description** | The general objective of the project was the transfer of knowledge and technology from INCD ”Victor Babeş” to private enterprises in the production and development sector of bioproducts for health care, in order to increase their economic and scientific competitiveness on a national and international level. The beneficiaries of the project represented commercial companies with activities in the field of bioproducts, interested in developing the products and services using new medical and pharmaceutical research and innovation technologies (-omics technologies). New opportunities were created to establish structures dedicated to knowledge transfer, Center for Technology Transfer, in partnership with partner companies. |

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| **RO.235.** | |
| **Title EN** | **New procedure for obtaining and characterizing sapropelic mud extract** |
| **Authors** | Zainea E, Harasim I, Zainea C, Dragomir S, Ponta CC, Virgolici M, Pintilie CA, Zorila F, Cutrubinis M, Albulescu RNA, Grigore AE, Neagu G, Niţă S, Albulescu A, Panteli IM, Raşit I, Bâzdoacă C, Rusu N, Codrici E, Tanase C, Popescu ID, Mihai S, Enciu AM |
| **Institution** | **Victor Babes National Institute of Pathology** |
| **Description** | **RO133249B1/2024**<br>The invention relates to an improved process for obtaining an active product from sapropelic mud, used in the treatment |

of rheumatoid arthritis and other chronic inflammatory diseases. The process according to the invention consists in preparing the aqueous mineral extract of sapropelic mud, filtering the extract and bringing the filtered extract to a solid state by lyophilization in two stages: in a main lyophilization stage, under pre-freezing conditions at -20 ºC, pressure of 0.04 mbar, temperature of -40 ºC, and a final lyophilization stage, under pressure conditions of 2.6 mbar and temperature of -10 ºC, followed by sterilization of the extract, by irradiation with gamma radiation, between 10 and 25 kGy, resulting in a product having microbiological and pharmacological characteristics suitable for use as an anti-inflammatory product.
The composition of the obtained extract has 2 components: mineral (dominant, at least 95% by mass of the dry extract, containing macroelements such as Na, S, Mg, K, Cl; as well as oligoelements such as Ca, B, Sr, Li, P, Mn) and organic (minor, maximum a few percent by mass).

| **RO.236.** | |
|---|---|
| **Title EN** | **Method of establishing a set of biomarkers for diagnosis or prognosis in cervical cancer patients**. |
| **Authors** | Codrici E, Tanase C, Albulescu RNA, Stănculescu R, Popescu ID, Mihai S, Neagu AI, Necula LG, Mambet C |
| **Institution** | **Victor Babes National Institute of Pathology** |
| **Patent no.** | **RO 130591B1/2022** |
| **Description** | The invention relates to a method of identifying a set of biomarkers useful in the diagnosis and prognosis of cervical cancer. According to the invention, the method comprises the analysis of the proteomic profile in a tumoral - pathological tissue in relation with a peritumoral - normal tissue from which a set of protein biomarkers was identified, where the molecular weight varies in the range of 15...50 kDa, with pI 5.5...7.5, namely: CDK4 with a molecular weight of 33 kDa and pI 6.66, cycline B1 with a molecular weight of 48 kDa and pI 7.1, p16 with a molecular weight of 16 kDa and pI 5.5 intended to be used as an instrument of prognosis and diagnosis for cervical cancer at the molecular level. |

| RO.237. | |
|---|---|
| Title EN | **Identifying native amyloid precursor protein used in Alzheimer's disease pathology involves separating cell membranes, extracting and separating protein complexes by gel electrophoresis, and identifying protein with specific antibodies** |
| Authors | Enciu AM; Codrici E; Mihai S; Popescu ID; Dudau M; Anghelache LI; Tanase C |
| Institution | **Victor Babes National Institute of Pathology** |
| Description | **RO132970B1/2024**<br>The process involves (i) separating the cell membranes from the other cell components and extracting protein complexes with 0.5-1 % detergent Triton-X 100 (RTM: Octylphenol ethoxylate) in 50-75 mM imidazole buffer, and (ii) separating protein complexes by polyacrylamide gel electrophoresis for 2-4 hours at a constant amperage of 10 mA/gel on ice in electrophoresis buffer with pH of 8-10, transferring complexes on transfer membrane for 20-22 hours at a constant amperage of 100 mA on ice and performing protein identification with specific antibodies. |

| RO.238. | |
|---|---|
| Title EN | **Method of identification of a soluble set of biomarkers for diagnosis, prognosis and monitoring of glioblastoma, and method for diagnosis, prognosis or monitoring of glioblastoma based on the use of said set.** |
| Authors | C Tanase, RNA Albulescu, E Codrici, S Mihai, L Albulescu, ID Popescu, S Constantinescu |
| Institution | **Victor Babes National Institute of Pathology** |
| Patent no. | **RO130590B1/2018** |
| Description | The invention relates to a method of identification of a set of biomarkers to be used in prognosis and diagnosis of brain tumours. According to the invention, the method comprises the simultaneous determination of serum and plasma concentration in samples taken from patients suffering from glioblastoma versus the control of a complex of cytokines and angiogenic factors IL-1β, IL-6, TNF alpha and VEGF, the values of which are 1.5...10 times higher than the average normal values, and the simultaneous use thereof as a set of biomarkers for monitoring brain tumours. |

| RO.239. | |
|---|---|
| **Title EN** | **Method for setting a protein biomarkers set for diagnosing glioblastoma.** |
| **Authors** | ID Popescu, RNA Albulescu, C Tanase, E Codrici, L Albulescu, S Mihai, AM Enciu, MT Neagu, S Constantinescu |
| **Institution** | **Victor Babes National Institute of Pathology** |
| **Description** | **RO130589B1/2022**<br>The invention relates to an assay for identifying biomarkers by analyzing the protein profile in serum samples from patients with glioblastoma. The method according to the invention consists in the preparation and acquisition of the chips, after which the measurement protocol is applied to the protein samples, and analyzes from which a group of relevant serial clusters is identified, selecting a set of 4 biomarkers S100A8, S100A9, CXCL4, CXCL7 showing statistically significant differences between brain tumor patients and healthy subjects. |

# National Institute of Research and Development in Mechatronics and Measurement Technique – INCDMTM Bucharest

**RO.240.**

**Title EN** **DEVICE FOR REAL-TIME MONITORING AND ACTIVE POSTURAL AUTOCORRECTION**

**Authors** BADEA CRISTIAN RADU

**Institution** **I N C D M T M - Bucharest**

**Patent no.** EP3760170A1·2021-01-06 / EP20465535A·2020-06-12

**Description**

The invention relates to a device used by a human user for maintaining a posture as correct as possible considering the physiological curvatures of the spine, as well as the shoulders positions during the bending/straightening movements of his torso and/or while performing weight lifting, during physical training, physiotherapy, or while performing the movements required in various lucrative chores, as well as during normal household chores and walking. It is also used to perform active postural autocorrections, by the user, from the point of view of the physiological curvatures of the spine, as well as from the point of view of the shoulders position. The device performs a real-time monitorisation of the spine posture and the user's shoulders positions and signals any changes in relation to a previously established standard posture. The device according to the invention, related to the suggested constructive version comprises a central electronic unit, fastened on an adjustable abdominal belt, with two electrodes, a right one and respectively a left one, connected to its outside, a thoracic- lumbar wire, flexible and inextensible, which bifurcates sideways on the left respectively on the right, resulting into a left shoulder wire and respectively a right shoulder wire, with the ends opposing the bifurcation point, fastened on a left shoulder strap-type support and respectively on a right shoulder strap-type support, with the thoracic-lumbar wire, continuing on the upper side from the bifurcation point with a cervical-thoracic wire, whose terminal end is fastened on a cervical strap-type support and a fastening support.

| RO.241. | |
|---|---|
| **Title EN** | **Assembly elements for housing or containers** |
| **Authors** | Mărgăritescu Mihai, Brișan Cornel Mircea, Dumitriu Dan |
| **Institution** | National Institute of Research and Development in Mechatronics and Measurement Technique – INCDMTM Bucharest |
| **Patent no.** | OSIM / Patent application No. 134134/2024 |
| **Description** | The invention relates to a system of assembly elements obtained through a three-dimensional rapid prototyping technology, elements used in the manufacture of housings or containers of various shapes and sizes, having the advantage of rapid assembly, as well as the possibility of subsequent disassembly and assembly in another configuration. The system of assembly elements allows the assembly of two conjugate elements of the *plus* and *minus* type, respectively, by inserting the collar pins of the *plus plate* type element into the cutouts belonging to the conjugate elements of the *minus type*, of the minus plate, minus L plate, minus corner, minus half plate and *minus L half plate* type. Without excluding other materials, these assembly elements are best suited to be made of plastics, such as polyamide or the acrylonitrile butadiene styrene polymer (ABS).<br>The advantages of the invention are:<br>1) a certain type of housings or containers of various shapes and sizes is quickly manufactured, at low cost;<br>2) elements from a dismantled assembly are reused to obtain a new assembly, different in shape and dimensions. |

| RO.242. | |
|---|---|
| **Title EN** | **Procedure for monitoring rotating machines** |
| **Authors** | Popescu Theodor, Manolescu Mariane Veronica, Cioboată Daniela, Stanciu Dănuț-Iulian |
| **Institution** | National Institute of Research and Development in Mechatronics and Measurement Technique – INCDMTM Bucharest |
| **Patent no.** | *133003 / 2024* |
| **Description** | The invention relates to a procedure for detecting changes in vibration signals, with applicability in the monitoring of rotating machines, based on the analysis of vibration signals using 3 processing techniques, as follows:<br>• “Blind” separation of the independent vibration sources; |

• Measuring time-frequency information content using the Rényi entropies;
• Detecting changes in Rényi entropy through its segmentation.

The solution allows the monitoring of rotating machines by separating vibration sources under conditions of greater uncertainty regarding the machine dynamics, the working environment and the effect of high-intensity noise, generally unknown.

The advantages of the solution compared to the currently known solutions, are:

• Working on independent vibration sources, simplifies the detection problem (the smaller number of analyzed signals, and the analysis are performed on one-dimensional signals);
• The detection/segmentation procedure will be applied to a one-dimensional signal, the Rényi entropy, which allows an easier understanding of the behavior of non-stationary signals and leads to more robust detection of changes in the dynamics of vibration signals.
• The procedure allows a fusion of the information resulting from the 3 processing techniques abovementioned, with the purpose of efficient monitoring of the machine, avoiding false alarms and providing additional information for diagnostic purposes.
• This procedure performs a pre-processing of the measurement data, by “blind” separation of the independent vibration sources, in order to highlight the changes produced in the machine's operation, but also a post-processing of the detection results, by calculating the Rényi entropy and detecting changes in the model parameters and in the noise dispersion.

# National Institute for Research and Development of Isotopic and Molecular Technologies INCDTIM

**RO.243.**

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|---|---|
| **Title EN** | **Procedure for differentiating wines through the corroboration of spectroscopic data with machine learning methods** |
| **Authors** | Ariana Raluca Hategan, Dana Alina Magdas, Ana Camelia Grosan |
| **Institution** | **National Institute for Research and Development of Isotopic and Molecular Technologies** |
| **Patent no.** | Patent application No. a 2024 00131/25.03.2024 |
| **Description** | The invention refers to the identification of an efficient procedure for discriminating wines by associating machine learning algorithms with spectroscopic techniques, such as NMR or Raman. The proposed data processing workflow allows the classification of wine based on several criteria, namely, grape variety, geographical origin (i.e., country or region of production), and vintage. The principle behind the procedure refers to the determination of the optimal input space for the construction of the machine learning models by selecting the spectral regions of interest, scaling the variables, and identifying the spectral markers relevant to the investigated classification in a supervised manner, as well as to the automatic optimization of the differentiation model through a grid-search strategy.<br>While most of the widely recognized techniques for wine authenticity control are costly and require specialized knowledge, the developed procedure is based on experimental data sets acquired through the application of different spectroscopic techniques, allowing the implementation of rapid methods for wine fingerprinting. Another advantage of the invention lies in the possibility of developing wine recognition models based on advanced data processing methods in an intuitive manner, which does not require specific computer science knowledge and allows for easy customization to the user's needs or interests. Considering all these factors, the suggested approach serves as a valuable instrument in food and beverage authentication, accessible to those without significant expertise in experimental data processing. |

| RO.244. | |
|---|---|
| **Title EN** | **Portable cold plasma microreactor for fast processing of the liquid samples** |
| **Authors** | Maria Coroș, Cristian Tudoran, Gabriela Blaniță, Diana Lazăr |
| **Institution** | National Institute for Research and Development of Isotopic and Molecular Technologies |
| **Patent no.** | Patent application A 00712/2024 |
| **Description** | The portable microreactor described in this invention has been designed and built for treating liquid samples using cold plasma. Its purpose is to provide users with a versatile, simple, and robust device that can efficiently activate, disinfect, or chemically process a variety of liquid samples in the shortest possible time.<br>The reaction cell of the microreactor consists of a coaxial arrangement of two tubes, positioned vertically. The liquid sample, in the form of a film, passes through an electrical discharge (plasma) that is initiated between the active cylindrical electrode (inner) connected to a high-voltage source and the ground electrode (outer). A peristaltic pump recirculates the liquid sample through the reaction cell during the processing within the electrical discharge.<br>This microreactor is intended for use in chemistry laboratories and chemical processing centers, particularly for processing glycerin waste produced during the production of biodiesel fuels. |

| RO.245. | |
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| **Title EN** | **Method and device for storing free atoms, molecules and ions in a contact-less, albeit well-defined near surface arrangement** |
| **Authors** | Thomas Jung, Aisha Ahsan, Sk Rejaul, Mehdi Heydari, Lutz H Gade, **Luiza Buimaga-Iarinca, Cristian Morari** |
| **Institution** | National Institute for Research and Development of Isotopic and Molecular Technologies |
| **Patent no.** | US12041864B2/16.07.2024 |
| **Description** | The method and device for storing free atoms, molecules, and ions in a contactless yet well-defined near-surface arrangement involves the patenting of a method for the stable storage of atoms, molecules, or molecular clusters in well-defined spaces (confinement) near metallic surfaces. |

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| | Depending on the physico-chemical conditions during the capture and manipulation process, the degree of occupancy, the temperature of the solid substrate, and/or the history of external stimuli, such as the electromagnetic field, these atoms, molecules, or clusters acquire unique configurations. The atoms or molecules will remain coupled to the electronic state specific to the confinement area and will thus exhibit quantum entanglement. |

| **RO.246.** | |
|---|---|
| **Title EN** | **Ecological procedure for obtaining nitrogen/fluoride co-doped graphenes applicable in the sulfamethazine detection** |
| **Authors** | Lidia Magerusan, Florina Pogacean, Stela Pruneanu |
| **Institution** | National Institute for Research and Development of Isotopic and Molecular Technologies |
| **Patent no.** | Patent application No. A/00301/06.06.2024 |
| **Description** | The abusive use of sulfamethazine as a growth promoter in the veterinary sector has led to numerous public health problems associated with the accumulation of antibiotic residues in the environment, and the existence of worrisome amounts in edible animal origin products. The present invention refers to the ecological process for nitrogen-fluoride co-doped graphenes obtaining, without the use of organic solvents or chemical precursors, by direct exfoliation of graphite in instant coffee and improvment of sulfamethazine electrochemical detection method. The developed experimental model proved increased efficiency and selectivity, with low detection and quantification limits (9.24nM), over a wide range of concentrations (0.0028 – 100 μM).<br>Applications: food safety, environmental monitoring, health-medicine-cosmetics sectors |

| **RO.247.** | |
|---|---|
| **Title EN** | **Template-directed electrodeposition of plasmonic micro/nanostructured interconnected hemisphere-voids lattice on gold electrodes for (EC-)SERS applications** |
| **Authors** | Toșa Nicoleta Ioana, Falamaș Alexandra, Cuibus Denisa Corina, Tripon SeptimiuCassian, Milenko-Kuszewska Karolina, Vereshchagina Elizaveta, Moldovan Rebeca, Iacob Bogdan-Cezar, Bodoki Ede, Farcău Cosmin Adrian |
| **Institution** | National Institute for Research and Development of Isotopic |

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| | and Molecular Technologies |
| **Patent no.** | A00225/29.04.2024 |
| **Description** | The invention addresses the challenge of the directed electrodeposition, on gold electrodes, of plasmonic micro/nanostructures with the aspect of negative hemispheres interconnected in the network, for use as sensitive substrates for analytical investigations based on enhanced Raman scattering and electrochemical potential modulation (EC)-SERS. The gold electroplating process takes the advantage of using polystyrene spheres matrix, at 30°C, exclusively in the presence of electric current, in galvanostatic configuration, with low energy consumption. The electroplating presents uniformity at a distance, and nanostructured appearance. The process can be used in laboratory as well as on a large scale for the development of macroelectrodes. |

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| **RO.248.** | |
| **Title EN** | **Non-metallic bioelectrode based on electroconductive polymers** |
| **Authors** | Cristian Sevcencu, Izabell Crăciunescu |
| **Institution** | **National Institute for Research and Development of Isotopic and Molecular Technologies** |
| **Patent no.** | Patent application No. A/00635/2024 |
| **Description** | The present invention relates to using materials with mechanical properties similar to the mechanical properties of living tissues in order to fabricate bioelectrodes for bioelectronic medicine applications. In such applications, the bioelectrodes are used to both record biological signals, and stimulate body organs. Based on successful experiments with recording of cardiac signals and heart stimulation using experimental electrodes made from the polymer polypyrrole, we claimed in Patent application No. A/00635/2024 a number of polymer-based bioelectrodes configurations. |

# National Institute for Research - Development of Machines and Installations designed for Agriculture and Food Industry - INMA Bucharest, Romania

| RO.249. | |
|---|---|
| **Title EN** | **SEMI-AUTOMATIC MACHINE FOR TRANSPLANTING VEGETABLE SEEDLINGS ON TWO ROWS** |
| **Authors** | Voicea Iulian, Vlăduț Valentin, Olan Mihai, Matache Mihai |
| **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-00032 / 2025** |
| **Description** | The invention presents an innovative, high-performance solution of a semi-automatic machine for transplanting vegetable seedlings in two rows, with improved handling of seedlings and high-precision planting capacity. |

| RO.250. | |
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| **Title EN** | **DEVICE MOUNTING AND SECURING SYSTEM FOR A ROTATING DISC WITH BLADE KNIVES FOR MOWING** |
| **Authors** | Marin Eugen, Dumitru Dragoș Nicolae, Manea Dragoș |
| **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-00755 / 2024** |
| **Description** | The invention relates to a system for mounting and securing a rotating disc with blade knives for mowing, intended for grass cutting machines on flat land, as well as in the interval between rows of trees or vines. |

| RO.251. | |
|---|---|
| **Title EN** | **COMMAND AND CONTROL PROCESS SYSTEM FOR SORTING, STORAGE AND IDENTIFICATION OF SOIL SAMPLES** |
| **Authors** | Cristea Mario, Constantinescu Mihai, Sorică Cristian, Cristea Robert, Vlăduț Valentin, Matache Mihai, Ionescu Alexandru |
| **Institution** | National Institute for Research - Development of Machines and Installations Designed for Agriculture and Food Industry -INMA Bucharest, Romania - |

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| **Patent no.** | **Patent application No.: A-00699 / 2024** |
| **Description** | The invention relates to a command and control system for the sorting, the temporary storage and the identification process of soil samples, for use in various agricultural, geological and environmental applications, with the possibility of implementation on various electrically driven equipment. |

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| **RO.252.** | |
| **Title EN** | **EQUIPMENT FOR COLLECTING SEAWEED** |
| **Authors** | Voicea Iulian, Olan Mihai, Vlăduț Valentin, Matache Mihai, Zaica Alexandru, Cujbescu Dan |
| **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-00631 / 2024** |
| **Description** | The invention presents an innovative and efficient solution of an equipment used for harvesting the seaweed which periodically invade most of the beaches and, besides the discomfort for people, if not removed, creates the favorable environment for the development of microorganisms, that can lead to various infections. |

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| **RO.253.** | |
| **Title EN** | **INTEGRATED HOMOGENIZATION AND AERATION MECHANISM FOR BIOFERTILIZER PRODUCTION IN AEROBIC BIOREACTORS** |
| **Authors** | Nenciu Florin, Mircea Costin, Vlăduț Valentin, Nae Gheorghe, Constantinescu Mihai |
| **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-00626 / 2024** |
| **Description** | The invention refers to an integrated homogenization and aeration mechanism intended for aerobic bioreactors used in the production of biofertilizers, which ensures a high performance in operation due to the optimized design. Thanks to the innovative shape of the vanes, which facilitates an efficient homogenization of the compounds and the aeration system integrated in the vanes of the vanes, the mechanism simultaneously improves both the aeration and the mixing of the materials in the bioreactor. |

| RO.254. | |
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| **Title EN** | **EQUIPMENT FOR SOIL TILLAGE AND SOWING GRASS PLANTS DIRECTLY INTO THE STUBBLE** |
| **Authors** | Marin Eugen, Vlăduț Nicolae-Valentin, Manea Dragoș, Boruz Sorin-Petruț (University of Craiova), Popa Lorena-Diana (SCDA Secuieni-Neamț), Matei Gheorghe (University of Craiova) |
| **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-00562 / 2024** |
| **Description** | The invention refers to an equipment for processing the soil and sowing creeping plants, intended for the establishment of spring crops, by sowing directly in the stubble or on land prepared by minimal work. |

| RO.255. | |
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| **Title EN** | **PLANT GROWTH SIMULATION SYSTEM** |
| **Authors** | Găgeanu Iuliana, Persu Cătălin, Cujbescu Dan, Gheorghe Gabriel, Ionescu Alexandru, Tăbărașu Ana-Maria |
| **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-00252 / 2024** |
| **Description** | The invention refers to a plant growth simulation system, intended to simulate the growth of crop plants (vegetables, leafy plants, bulbous vegetables) under different conditions, from optimal to extreme, in order to open up new ways of crop management and growth of plants in the current and predicted climate conditions for the near future, taking into account the increase in the resilience of agriculture to climate change. |

| RO.256. | |
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| **Title EN** | **INTELLIGENT SYSTEM FOR HIGH PRECISION APPLICATION OF SOLID FERTILIZERS** |
| **Authors** | Gheorghe Gabriel-Valentin, Mateescu Marinela, Dumitru Dragoș-Nicolae, Cismaru Elena-Melania, Cristea Oana-Diana |
| **Institution** | National Institute for Research - Development of Machines and Installations Designed for Agriculture and Food Industry -INMA Bucharest, Romania - |

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| **Patent no.** | **Patent application No.: A-00211 / 2024** |
| **Description** | The invention refers to a system for high precision application of solid fertilizers mounted on an agricultural drone for carrying out treatments with plant protection products in field crops, in order to apply them with precision and reduce the amount of solid fertilizers. |

# National Institute for Research and Development in Mine Safety and Protection to Explosion - Insemex Petroșani

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| **RO.257.** | |
| **Title EN** | **STAND FOR IGNITION TEST OF SMALL COMPONENTS THAT ARE PART OF THE EQUIPMENT INTENDED FOR USE IN EXPLOSIVE ATMOSPHERES** |
| **Authors** | Adriana Andriș, George Artur Găman, Constantin Lupu, Emilian Ghicioi, Constantin Sorin Burian, Marius Darie. Tiberiu Atila Csaszar, Iosif Lucian Moldovan, Ioan Cosmin Colda, Botar Daniela, Dănuț Nicolae Grecea, Dan Gabor, Pupăzan Gabriela |
| **Institution** | **NATIONAL INSTITUTE FOR RESEARCH AND DEVELOPMENT IN MINE SAFETY AND PROTECTION TO EXPLOSION - INSEMEX** |
| **Patent no.** | BI 132397/30.01.2023 |
| **Description** | The invention relates to a stand for ignition test of small components that are part of the equipment intended for use in explosive atmospheres, a stand in which an explosive test mixture consisting of air and flammable gas is used, whose concentration must fall between the lower flammable limit and the upper flammable limit, a mixture that may be ignited by the hot surface of the small components subjected to the test, either during their normal operation or in fault conditions. |

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| **RO.258.** | |
| **Title EN** | **FIELD METHOD FOR ASSESSING THE IMPACT OF VOLATILE ORGANIC COMPOUNDS ON HUMAN HEALTH** |
| **Authors** | Găman Angelica Nicoleta, Găman George Artur, Ghicioi Emilian, Pupazan Daniel, Toth Lorand, Prodan Maria, Kovacs Marius, Simion Sorin, Simion Alexandru, Șuvar Niculina Sonia |
| **Institution** | **NATIONAL INSTITUTE FOR RESEARCH AND DEVELOPMENT IN MINE SAFETY AND PROTECTION TO EXPLOSION - INSEMEX** |
| **Patent no.** | CBI A 2022 00606 |
| **Description** | The mobile real-time measurement system of volatile organic compounds (BTEX) consists of applying a method to determine the concentration of benzene and organic compounds (BTEX) in |

the surrounding environment (emissions) using high-performance gas chromatography with FID detector in ambient air from areas classified as rural and urban zones, traffic locations, and locations influenced by industrial sources, through a mobile unit that allows continuous measurements during movement.

Understanding the concentrations of volatile organic compounds in a triaxial system of coordinates (concentrations / space / time) makes it possible to characterize / quantify the impact generated by BTEX pollutants on human health by measuring the pollution level, managing / processing data, and integrating them into an active mapping system using GIS computational environment.

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**RO.259.**

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| **Title EN** | **MOBILE TRAINING GROUND FOR THE PRACTICAL TRAINING OF INTERVENTION AND RESCUE PERSONNEL IN TOXIC / EXPLOSIVE / FLAMMABLE ENVIRONMENTS** |
| **Authors** | Nicolescu Cristian, Găman George Artur, Ghicioi Emilian, Pupăzan Daniel, Găman Angelica Nicoleta, Ilie Cosmin, Irimia Alin, Gireadă Andrei, Toth Lorand, Kovacs Marius |
| **Institution** | **NATIONAL INSTITUTE FOR RESEARCH AND DEVELOPMENT IN MINE SAFETY AND PROTECTION TO EXPLOSION - INSEMEX** |
| **Patent no.** | CBI A 2022 00640 |
| **Description** | In order to carry out the activity of intervention and rescue personnel in toxic / explosive / flammable environments in conditions of safety and health at work, and for the efficiency of the actions taken, a good physical training of the rescuers is necessary, which can be achieved by using a modern training infrastructure (mobile polygon) that can be made available to any economic agent regardless of the place and nature of the activity they carry out.<br>The mobile training polygon of rescuers allows the realization of a training route of rescuers in closed spaces with different degrees of difficulty, high temperature, low visibility, high humidity, as well as the training of rescuers in the fitness equipment area with the monitoring of the physiological parameters of the rescuers. All these factors lead to the selection of rescuers in order to form rescue teams that can intervene in the event of fires / explosions / releases of toxic gases, etc.. |

| RO.260. | |
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| **Title EN** | **SYSTEM FOR DETERMINING THE DYNAMICS OF EXPLOSIVE ATMOSPHERE FORMATION** |
| **Authors** | Cioclea Doru, George Artur Găman, Ghicioi Emilian, Gherghe Ion, Ianc Nicolae, Rădoi Florin, Boantă Corneliu, Chiuzan Emeric, Tomescu Cristian, Matei Adrian, Drăgoescu Răzvan, Cămărășescu Alexandru, Vlasin Nicolae-Ioan, Șimon Marinică Adrian |
| **Institution** | **NATIONAL INSTITUTE FOR RESEARCH AND DEVELOPMENT IN MINE SAFETY AND PROTECTION TO EXPLOSION - INSEMEX** |
| **Patent no.** | CBI A 2023 00336 |
| **Description** | The invention is based on a system that allows the determination of the dynamics of the formation of explosive atmospheres, respectively that takes into account the variation of gas concentrations in relation to time, by choosing a closed enclosure that meets the safety conditions, several pulleys with supporting role, more equipment for measuring gas concentrations, an explosive gas source, a pressure reducer, a rotameter-type explosive gas flow control system, a hose for introducing explosive gas into the enclosure closed, a directed gas purge system, a ventilation system for the evacuation of the created atmosphere, the data resulting from the measurements are collected, finally the dynamics of the formation of explosive atmospheres are determined graphically and numerically. |

| RO.261. | |
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| **Title EN** | **COMPLEX SYSTEM FOR DETERMINING THE IGNITION AND BURNING BEHAVIOR OF SOLID MATERIALS IN ATMOSPHERES WITH HIGH OXYGEN CONCENTRATIONS** |
| **Authors** | Ghicioi Emilian, Gaman George Artur, Suvar Marius Cornel, Daniel Pupazan, Florea Daniel, Simon- Bogdan Marinica, Prodan Maria, Vass Zoltan, Burian Sorin, Nicolescu Cristian, Șuvar Niculina Sonia Gabor Dan, Nalboc Irina, Jurca Adrian, Colda Cosmin, Vlasin Nicolae, Pasculescu Vlad, Manea Florin, Pupăzan Gabriela, Păun Florin, Tuhut Ligia, Munteanu Laurentiu |
| **Institution** | **NATIONAL INSTITUTE FOR RESEARCH AND DEVELOPMENT IN MINE SAFETY AND PROTECTION TO EXPLOSION - INSEMEX** |

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| **Patent no.** | CBI A 2022 00607 |
| **Description** | The complex system for determining the ignition and burning behavior of solid materials in atmospheres with high oxygen concentrations is provided with a closed enclosure, gas sensors, temperature transducers, analytical balance, video recording cameras, for studying samples similar to those involved in fires, in order to study the combustion characteristics, ignition capacity, burning speed, mass loss, developed temperatures, self-extinguishment, depending on the value of the oxygen concentration. Through this complex system it is possible to obtain valid data on the ignition and burning behavior of solid materials in atmospheres with initial oxygen concentrations between 21%vol. and 100% vol., these being useful both for establishing the causes of fires in the intensive care rooms of hospitals where oxygen treatment is carried out for patients with respiratory deficiencies, as well as for selecting the types of materials used to equip the production, storage, transport facilities and use of oxygen, either industrially or medically, the results highlighting the possibility that some materials that do not ignite or burn in normal atmosphere, with 21%vol. oxygen, become flammable and burn violently at higher oxygen concentrations. |

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| **RO.262.** | |
| **Title EN** | **STAND FOR STUDYING THE IGNITION OF EXPLOSIVE GAS MIXTURES BY CORONA EFFECT** |
| **Authors** | Emilian Ghicioi, Irina Nalboc, Artur George Gaman, Daniel Pupazan, Maria Prodan, Nicolae Vlasin, Doru Cioclea, Sorin Burian, Robert Laszlo , Cristian Nicolescu, Daniel Florea, Adrian Jurca, Adrian Simon, Dan Gabor, Vlad Pasculescu, Sonia Suvar, Andrei Szollosi, Florin Manea, Ligia Tuhut, Cosmin Colda, Marius Suvar, Emeric Chiuzan, Zoltan Vass |
| **Institution** | **NATIONAL INSTITUTE FOR RESEARCH AND DEVELOPMENT IN MINE SAFETY AND PROTECTION TO EXPLOSION - INSEMEX** |
| **Patent no.** | CBI A 2022 00706 |
| **Description** | Currently, both nationally and internationally, there are several activities and processes in the industry that use flammable gases under pressure, the most well-known being natural gas and hydrogen. There have been technological incidents involving such flammable gases, which were released from pressurized containers or pipelines, escaped into the atmosphere (air), and |

self-ignited, apparently without any external ignition source. The invention allows for obtaining the following specific information regarding the mixture of flammable gas with air: the formation of the ion channel (corona effect), the induction time for ignition, and the propagation of the flame front in the unburned mixture.
The data obtained with the help of the stand designed for studying the ignition of explosive gas mixtures through the corona effect are useful for evaluating the explosion hazards and risks associated with industrial facilities where flammable gases under pressure are processed, stored, or used. These findings can help develop preventive measures against corona effect ignitions in the event of accidental gas leaks.

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**RO.263.**

**Title EN** **NEUTRALIZATION DEVICE WITH LIQUID JET OF IMPROVISED EXPLOSIVE DEVICE (DNJLDEI)**

**Authors** Ghicioi Emilian, Artur George Găman, Daniel Pupăzan, Robert Laszlo, Sorin Burian, Adrian Jurca, Dan Gabor, Angelica Nicoleta Găman, Alexandru Simion, Alin Irimia, Doru Cioclea, Maria Prodan Emeric Chiuzan, Irina Vasilica Nalboc, Andrei Szollosi, Sonia Șuvar, Edward Jan Gheorghiosu, Gabriel Dragoș Vasilescu, Attila Kovacs, Daniela Carmen Rus, Cristian Rădeanu, Ilie- Ciprian Jitea, Vlad Păsculescu, Marius Șuvar, Nicolae Vlasin, Bușoi Bogdan Garaliu, Daniel Florea, Adrian Șimon Bogdan, Ligia Tuhuț

**Institution** **NATIONAL INSTITUTE FOR RESEARCH AND DEVELOPMENT IN MINE SAFETY AND PROTECTION TO EXPLOSION - INSEMEX**

**Patent no.** CBI A 2023 00178

**Description** The invention relates to a neutralization device with liquid jet of improvised explosive device (DNJLDEI), by propelling a quantity of liquid at high speeds, over 500 m/s, in the direction of the target, DEI explosive device with the help of low-explosive charges, detonated remotely. The device, consists of an assembly consisting of a reinforced metal base (mortar), provided with a carrying handle, a base that has an adjustable frame, with perforated arms and fixing screws to various degrees of inclination (from horizontal to vertical working position), having a centrally positioned cylindrical plug (reinforced around the perimeter and at the bottom) for mounting the specially shaped plastic container (cylinder equipped with legs and fixing disc with both flat closing

surfaces or with one flat end and one hemispherical end), removable container, with a threaded cap, in which there is a volume of liquid, as well as a reduced charge of plastic explosive, moulded on the lower surface of the dry compartment intended for it, into which an electric detonating staple is inserted for initiation, connected to a detonator operated by an operator from a safe distance.

| **RO.264.** | |
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| **Title EN** | **SOURCE AND METHOD FOR TESTING SAFETY BARRIER COMPONENTS IN LOW-CURRENT INSTALLATIONS IN POTENTIALLY EXPLOSIVE ATMOSPHERES** |
| **Authors** | Darie Marius, Sorin Constantin Burian, Jeana Ionescu, Tiberiu Csaszar, Lucian Moldovan, Ioan Cosmin Colda, Adriana Andriş, Daniela Botar |
| **Institution** | **NATIONAL INSTITUTE FOR RESEARCH AND DEVELOPMENT IN MINE SAFETY AND PROTECTION TO EXPLOSION - INSEMEX** |
| **Patent no.** | BI 130444/30.06.2022 |
| **Description** | The invention relates to the development of a programmable, rectangular, short-pulse current source for testing safety barrier components in low-current installations in premises at risk of explosive atmospheres and to the method of calculating its operating parameters. The technical problem which the invention solves consists in verifying the suitability of components for use in safety barriers in low-current installations in potentially explosive atmospheres. The solution to this problem is a programmable rectangular short pulse current source and a method for testing the components of safety barriers in low current installations in hazardous areas. |

| **RO.265.** | |
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| **Title EN** | **STAND FOR DETERMINING PRESSURE VARIATIONS WHEN CHANGING THE DIRECTION OF PROPAGATION OF GASEOUS EXPLOSIONS IN INTERCONNECTED SPACES** |
| **Authors** | Vlasin Nicolae Ioan, Găman George Artur, Ghicioi Emilian, Pupăzan Gheorghe Daniel, Găman Angelica Nicoleta, Păsculescu Vlad Mihai, Simon-Marinică Adrian Bogdan, Florea Gheorghe Daniel, Tuhuț Ioan Ligia, Prodan Maria, Șuvar Marius Cornel, Vass Zoltan, Munteanu Laurentiu, Chiuzan Emeric, Nicolescu Cristian, Manea Florin |
| **Institution** | **NATIONAL INSTITUTE FOR RESEARCH AND** |

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| | **DEVELOPMENT IN MINE SAFETY AND PROTECTION TO EXPLOSION - INSEMEX** |
| **Patent no.** | CBI A 2022 00705 |
| **Description** | The invention provides the possibility of recording and complex analysis of gas explosion phenomena on geometries with interconnected and volumetrically individualized spaces through different configurations of obstacle arrangements with membrane openings, the analysis of pressure and velocity variations with the modification of the direction of gas explosion propagation, and the study of chain explosions in atmospheres containing the same combustible gas or different combustible gases at different concentrations. The obtained data are useful both for explaining the phenomenon of rapid combustion in interconnected spaces and as a basis for validating computer simulations conducted on the same topic. |

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| **RO.266.** | |
| **Title EN** | **SMALL-SCALE EXPERIMENTAL STAND FOR RESEARCHING EXPLOSIONS OF FLAMMABLE GAS-IN-AIR MIXTURES** |
| **Authors** | Păsculescu Vlad Mihai, Ghicioi Emilian, Găman George Artur, Pupăzan Gheorghe Daniel, Vlasin Nicolae Ioan, Șuvar Marius Cornel, Prodan Maria, Șuvar Niculina Sonia, Florea Gheorghe Daniel, Tuhuț Ligia Ioana, Șimon – Marinică Adrian Bogdan, Vass Zoltan |
| **Institution** | **NATIONAL INSTITUTE FOR RESEARCH AND DEVELOPMENT IN MINE SAFETY AND PROTECTION TO EXPLOSION - INSEMEX** |
| **Patent no.** | CBI A 2022 00731 |
| **Description** | The invention refers to a small-scale experimental stand for researching explosions of flammable gas-in-air mixtures, consisting of a transparent, inflatable explosion chamber equipped with an intake valve for volumes of flammable gas-in-air mixtures at pre-established concentrations within the explosive range of the substance. It includes a spark ignition system, with the chamber enclosed inside a transparent case for studying explosion pressures and their propagation using shadowgraph techniques with a light source. An obturator disc with a central orifice allows the divergent conical light beam to pass through the transparent chamber for study, and the resulting projection is captured on a projection screen. |

The system is equipped with a recording system for the generated explosion pressure values.

The problem that the invention solves consists of using shadowgraph visualization techniques for laboratory research of flammable gas-in-air mixture explosions, with the purpose of analyzing the shock wave and the flame front of the explosion, from the point of initiation in the inflatable transparent explosion chamber, the propagation in the transparent chamber for studying explosion pressures and their propagation, and up to the release into the atmosphere.

The recording of the pressures developed by the explosion provides data that are useful for understanding explosion phenomena in flammable gas-in-air mixtures, contributing to the elucidation of the causes that generate such events and to the development of measures to prevent the occurrence of similar gas explosion phenomena.

# National Research & Development Institute for Welding and Material Testing – ISIM Timisoara

| RO.267. | |
|---|---|
| **Title EN** | **Research on submerged friction stir processing of rolled and cast aluminum alloys** (Part 1 of the project "Research on the properties modification of metallic materials by using the ecological and innovative method of submerged friction stir processing") |
| **Authors** | Lia-Nicoleta Boțilă, Ion-Aurel Perianu, Iuliana Duma |
| **Institution** | **National Research and Development Institute for Welding and Material Testing – ISIM Timisoara** |
| **Patent no.** | Project PN 23 37 01 02 / 2023-2026 (part 1/2023-2024), Program Nucleu ISIM Timișoara PN ISIM 2023-2026, PN 23. 37, Advanced research on the industry of the future - InnoSIM |
| **Description** | Research on underwater friction processing (SFSP) of rolled and cast aluminum alloys represent the first part of the project PN 23 37 01 02, carried out in the period 2023-2024. Research on SFSP processing addressed rolled aluminum alloys EN AW 1200, EN AW 5754, EN AW 6082 and EN AW 7075 with a thickness of 3-5mm, as well as cast alloys EN AC 5083 with a thickness of 5-6mm. SFSP processing of aluminum alloys was carried out in a single pass or in multiple passes and aimed at changes in their microstructure (grain refinement), hardness and mechanical properties, as well as changing the degree of deformability of the material in the processed area. The research results show the possibility of obtaining favorable results in SFSP processing of aluminum alloys. |

| RO.268. | |
|---|---|
| **Title EN** | **Modular tool for friction stir welding and processing** |
| **Authors** | Lia-Nicoleta Boțilă |
| **Institution** | **National Research and Development Institute for Welding and Material Testing – ISIM Timisoara** |
| **Patent no.** | A/00557/12.09.2022 (publication number RO 138013 A2), OSIM Bucharest, Romania |
| **Description** | The invention refers to a modular welding and processing tool required for the development and application of friction stir welding and processing processes (FSW, FSP) to similar |

and dissimilar metallic materials (lightweight alloys, metallic materials with high plasticizing temperatures, steels, copper alloys, etc.), having 1.5-10 mm thicknesses.
Considering that a damaged tool made in monobloc construction must be fully replaced, the modular FSW welding / FSP processing tool has a special construction made of interchangeable and reusable elements for various applications, which eliminates the disadvantages related to the consumption of material, labor and time required for the production of tools in monobloc construction. The invention thus allows for faster and lower cost obtaining of sets of elements that make up the modular tool, from various materials, with different geometries and dimensions. Through the diversity of possible combinations of these elements, a multitude of constructive variants of modular tools with interchangeable and reusable elements can be generated, quickly and at low cost, for various FSW welding / FSP processing applications.

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**RO.269.**

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| **Title EN** | **Process for sintering powders used in the manufacture of electrical contacts** |
| **Authors** | Sorin Vasile Savu, Ionel Dănuț Savu, Nicușor-Alin Sîrbu |
| **Institution** | **National Research and Development Institute for Welding and Material Testing – ISIM Timisoara** |
| **Patent no.** | A/00448/30.07.2024, OSIM Bucharest, Romania |
| **Description** | The sintering process of powders used for the fabrication of electrical contacts, as described in the invention, consists of the following: calcination in a unidirectional microwave field of the raw composite material through the application of a high-frequency electromagnetic field in continuous mode, after the material has been preheated using argon plasma in a microwave field. The plasma is generated by ionizing the space between the raw material and a tungsten electrode with a diameter of 3 mm, with the process carried out in an argon protective atmosphere.<br>The sintering process of powders used for the fabrication of electrical contacts, according to the invention, offers the following advantages:<br>• The maximum power simultaneously absorbed from the power supply network is reduced by 70% compared to that used in conventional calcination electric furnaces, |

representing a significant reduction in the investment costs for the power supply circuits of the installation.
- The electrical energy consumed is reduced by 78% due to the high heating speed in the microwave field, resulting in a significantly lower production cost.
- The total sintering time is decreased by 36% as a consequence of the high heating speed, leading to considerably lower labour costs and increased productivity.

The sintered material exhibits physical and mechanical properties similar to those obtained through conventional sintering processes.

| **RO.270.** | |
|---|---|
| **Title EN** | **Signalling kit for the position of a lost or distressed person in nature** |
| **Authors** | Nicușor-Alin Sîrbu, Aurelia-Ioana Biholar |
| **Institution** | **National Research and Development Institute for Welding and Material Testing – ISIM Timisoara** |
| **Patent no.** | A/00455/01.08.2024, OSIM Bucharest, Romania |
| **Description** | The invention pertains to a portable kit designed to be attached to a belt or backpack strap, intended for individuals who are lost or in distress due to exhaustion, disorientation, or injury (in mountainous areas, valleys, hard-to-access ravines, deltas, or thicket regions) and who need to signal their location for assistance. The kit is characterized by its simple, lightweight, versatile, and cost-effective construction, and includes various signalling means: visual signals using an inflatable balloon, smoke signals, loud sound signals, repetitive sound signals, and luminous signals for nighttime use.<br>The signalling mechanism utilizing the inflatable balloon is based on an expandable cartridge that facilitates inflation and elevation with a simple press. |

| **RO.271.** | |
|---|---|
| **Title EN** | **Ultrasound activation device for flowing or limited volume liquid media** |
| **Authors** | Nicușor-Alin Sîrbu |
| **Institution** | **National Research and Development Institute for Welding and Material Testing – ISIM Timisoara** |
| **Patent no.** | A/00456/01.08.2024, OSIM Bucharest, Romania |

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| **Description** | The ultrasonic activation device for flowing liquid media, as described in the invention, is a simple functional-constructive assembly that can be attached either to limited-volume containers containing the liquid to be activated or to an installation where the device is introduced into the continuous flow path of the liquid as an adjacent subassembly. There is also the possibility of connecting the device to multiple containers that hold liquids intended to be mixed and activated together, which can then be collected in a single container.<br>The device according to the invention ensures efficient and rapid activation of liquids by simultaneously superimposing the effects of ultrasonic activation, mechanical activation, and heating. |

| **RO.272.** | |
|---|---|
| **Title EN** | **Retractable and pivoting car rearview mirror** |
| **Authors** | Nicușor-Alin Sîrbu, Gabriela-Victoria Mnerie |
| **Institution** | **National Research and Development Institute for Welding and Material Testing – ISIM Timisoara** |
| **Patent no.** | A/00484/21.08.2024, OSIM Bucharest, Romania |
| **Description** | The invention pertains to an accessory that is essential in the construction of automobiles, specifically related to the vehicle's safety during circulation, namely the side mirrors that ensure visibility of traffic behind the vehicle in conjunction with the main interior rearview mirror.<br>The invention is based on the inventive concept that the automobile's rearview mirrors, positioned at the edges of the hood, provide direct and quasi-permanent visibility (immediate) as they are located within the driver's normal field of view. This enhances traffic safety, and during stationary periods, the rearview mirror is fully retracted and concealed under the hood, thereby preventing accidental collisions or damage due to vandalism. |

| **RO.273.** | |
|---|---|
| **Title EN** | **Telescopic retractable car rearview mirror** |
| **Authors** | Nicușor-Alin Sîrbu, Gabriela-Victoria Mnerie |
| **Institution** | **National Research and Development Institute for Welding and Material Testing – ISIM Timisoara** |
| **Patent no.** | A/00485/21.08.2024, OSIM Bucharest, Romania |
| **Description** | The invention relates to a mandatory accessory in the |

construction of land vehicles related to their traffic safety, namely the side mirrors that ensure the visibility of traffic behind the vehicle together with the main living mirrors.
The invention is based on the inventive concept of fitting the rearview mirrors of the vehicle placed on the edges of the hood, in front, ensuring direct and immediate visibility, being placed in the driver's normal field of vision. Traffic safety is improved, and during parking the rearview mirror is completely retracted, masked and protected under the hood, eliminating its accidental collision or damage by vandalism.

# National institute for Research and Development URBAN-INCERC

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| **RO.274.** | |
| **Title EN** | **Implementation of Data Quality Assurance Criteria within a Large Distributed Seismic Infrastructure of National Interest in Romania** |
| **Authors** | Iolanda-Gabriela CRAIFALEANU, Claudiu-Sorin DRAGOMIR, Daniela DOBRE, Emil Sever GEORGESCU, Alexandra-Marina BARBU |
| **Institution** | **National Institute for Research and Development in Constructions, Urbanism and Sustainable Spatial Development, URBAN-INCERC** |
| **Patent no.** | - |
| **Description** | The National Network for the Seismic Monitoring and Protection of Building Stock, RNMPSPC, an infrastructure of the National Institute for Research and Development in Constructions, Urbanism and Sustainable Spatial Development, URBAN-INCERC, was granted recently the status of Special Installation / Objective of National Interest. Among other infrastructures, RNMPSPC operates at present a seismic network of 64 accelerometers, covering all earthquake-prone areas of Romania. Some of the highest-performance seismic stations of RNMPSPC are permanently connected, through the EIDA node of the National Institute for Earth Physics, to the European Plate Observing System (EPOS), a European Research Infrastructure Consortium, in which RNMPSPC is a member. Providing accurate and timely seismic data represents an essential responsibility for RNMPSPC, given its national and international roles. Seismic data must comply with recognized standards and quality criteria in the field; to achieve this objective, a coordinated set of measures was taken for restructuring and upgrading of the entire set of activities. Among these, one of the most important was the implementation within the Seismic Network Data Center of the SeisComP software system, designed for data acquisition, processing, distribution and interactive analysis. The system, largely used worldwide, is compatible with EPOS and allows providing real-time ground motion record transmission to its data portal, integrating RNMPSPC into the circuit of European infrastructures in the field. Its implementation was |

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| | a challenging process, as it imposed complying with superior requirements on equipment setting, software configuration and ground motion database organization and archiving. At present, the system is fully connected and functional. |

| **RO.275.** | |
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| **Title EN** | **FROM NATURE TO CITY: GREEN-BLUE SOLUTIONS FOR URBAN SUSTAINABILITY AND RESILIENCE IN ROMANIA** |
| **Authors** | **Andreea Cătălina POPA, Teodora UNGUREANU, Antonio Valentin TACHE** |
| **Institution** | **The National Institute for Research and Development in Constructions, Urbanism and Sustainable Spatial Development URBAN-INCERC** |
| **Patent no.** | - |
| **Description** | Green and blue infrastructure (GBI) is vital for sustainable urban development, addressing climate change and biodiversity loss while enhancing quality of life. By integrating natural elements like parks and water bodies, GBI provides ecological, social, and economic benefits. Urban planning ensures effective GBI implementation by protecting green spaces, integrating GBI into new developments, creating networks, setting clear goals, engaging communities, and ensuring long-term management. As a pillar of future cities, GBI balances green spaces and water features, fostering resilient and sustainable urban environments. |

| **RO.276.** | |
|---|---|
| **Title EN** | The evaluation of damage in Structural Health Monitoring using measured time-series data from a system's output. |
| **Authors** | Daniela Dobre, Claudiu-Sorin Dragomir, Iolanda-Gabriela Craifaleanu, Emil-Sever Georgescu, Cornelia-Florentina Dobrescu, Marta-Cristina Zaharia |
| **Institution** | NIRD URBAN-INCERC |
| **Patent no.** | - |
| **Description** | The primary goal of Structural Health Monitoring (SHM) is to assess how a structure behaves and to identify potential damage by analyzing changes in its dynamic characteristics, such as natural frequencies, damping ratios, mode shapes, modal assurance criterion etc. In this context, the ambient and seismic vibration analysis includes an algorithm for detecting damage based on measured time-series data of the |

system's output. The measured response of the system is decomposed into subspaces that correspond to different dynamic modes within a state-space framework. The information about the physical modes derived from measurements is compared over time, contrasting data from a reference state with information obtained in a potential damage state. In the software ARTeMIS Modal Pro, when the structure's dynamic performance is stable, the bar representation appears green. However, if the structure begins to deteriorate and exceeds predetermined thresholds, the bars turn red. This method's applicability is demonstrated through the advancements made in the project PN 23 35 01 01, which focuses on an integrative approach to digitally analyze data from large-scale seismic monitoring across the national territory and built environment. This project aims to enable the rapid identification of the destructive potential of seismic events occurring in Romania and its surrounding regions.

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**RO.277.**

**Title EN**

**Composite thermal insulation panels with sheep wool core and production methods**

**Authors**

Andreea Hegyi, Henriette Szilagyi †, Carmen Dico, Vasile Meiță

**Institution**

**National Institute for Research and Development in Construction, Urban Planning and Sustainable Spatial Development URBAN-INCERC, 266 Sos. Pantelimon, District 2, Bucharest, Romania**

**Patent no.**

**RO 133842 B1**

**Description**

The invention concerns composite heat-insulating panels with a core of sheep's wool, including the method of making. The innovative nature of this patent derives from the elimination of the disadvantages of non-woven mattress type products, through a principle of incorporating the core of the sheep wool mattress into an inorganic binder-based composite housing.

The purpose of composite thermal insulation panels made of wool is to increase the thermal insulation properties and thermal comfort in buildings, enclosed spaces for industrial or agro-zootechnical activities. In addition, by the method of laying which indicates the placement of strips of mineral wool between two adjacent panels, the reuse of mineral wool waste is carried out, with a positive impact on the

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| | environment.<br>Claim no. 1: Composite thermal insulation panels with sheep wool core.<br>Claim no. 2: Production methods of the composite thermal insulation composite panels.<br>The invention is the result of an interdisciplinary program of experimental research that addresses specialists in the fields of construction, building materials, environmental engineering and even zootechnics, offering the possibility of exploiting a natural, renewable resource, which currently has a low exploitation. At the same time, the invention offers the possibility of reducing energy consumption while ensuring indoor thermal comfort. |

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| **RO.278.** | |
| **Title EN** | **Wall Construction System Based on Unfired Clay** |
| **Authors** | Gabriela Călătan, Andreea Hegyi, Henriette Szilagyi†, Vasile Meiță |
| **Institution** | **National Institute for Research and Development in Construction, Urban Planning and Sustainable Spatial Development URBAN-INCERC, 266 Sos. Pantelimon, District 2, Bucharest, Romania** |
| **Patent no.** | **RO 134241 B1** |
| **Description** | The purpose of this invention is to provide a complete and environmentally friendly solution for making unfired clay-based walls, harnessing the contextual knowledge of vernacular architecture.<br>The novelty of this invention consists in reducing, until eliminated, the risk of poor jointing between bricks, masonry mortars, plastering or finishing, while also providing the advantage of increased durability and reducing the environmental impact of pollutants.<br>The outcome is the optimal mixtures for: elements of full brick and mortar for masonry; binder.<br>The unfired clay wall system is used in order to obtain new types of structures, that have a low impact on the environment.<br>Claim no. 1. Bricks based on unfired clay 200x100x50 mm.<br>Claim no. 2. Mortar for masonry and plaster for unfired clay surfaces.<br>Claim no. 3. Finishing plaster based on unfired clay.<br>Claim no. 4. Wall construction system based on unfired clay. |

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| | The invention is the result of an interdisciplinary program of experimental research that is addressed to specialists in the fields of construction, building materials, architecture and environmental engineering. At the same time, the invention offers the possibility of ensuring the air quality of the interior thermal space as a result of the ability of the wall materials to regulate the humidity and the water vapor permeability. |

| **RO.279.** | |
|---|---|
| **Title EN** | **Modelling the performance characteristics of natural soils and stabilized using binders with ecological benefits by developing parametric correlations** |
| **Authors** | **Cornelia-Florentina Dobrescu, Claudiu-Sorin Dragomir, Daniela Dobre** |
| **Institution** | **NIRD URBAN-INCERC** |
| **Patent no.** | |
| **Description** | The behavior assessment of natural and stabilized soils using binders with ecological benefits like lime is based on modeling of performance characteristics related to bearing increase of infrastructure works by developing parametric correlations. The influence of compaction characteristics on CBR value depending on index obtained during tests and derived index expressed by correlation coefficients has been reflected by good correlations of analyzed statistical variables. The calibration modeling of data for a simple linear regression has been performed by using comparative analyzes of experimental and predictable parameters.<br>Through this approach, the study will lead to improvement of soil stabilization methodology by using material with ecological benefits for further use in design and execution of infrastructure works. |

| **RO.280.** | |
|---|---|
| **Title EN** | **Innovative coatings based on rice husks and synthetic polymers and their potential for use in construction** |
| **Authors** | Irina Popa, Cristian Petcu, Vasilica Vasile, Alina Dima |
| **Institution** | **NIRD URBAN-INCERC** |
| **Patent no.** | |
| **Description** | At international and national level, agriculture is one of the main sectors generating significant quantities of vegetable waste, such as husks, stalks, straw, etc. Many of these are practically natural agro-industrial by-products that, based on the principles of the circular economy, can be transformed |

into new materials and/or products with added value. The experimental research presented in the paper aims at the superior valorization of such a by-product, namely rice husks, resulting from the food industry, proposing the obtaining of innovative construction materials in the form of coating products. Due to its thermal conductivity, fire behavior and low water absorption capacity, rice husks have a good potential for valorization in various construction materials. The experimental results demonstrate the possibility of obtaining innovative coatings by embedding rice husks in an acrylic binder, with or without the addition of polymer adhesives. The coatings are characterized by average thicknesses between 3 – 6 mm, good adhesion to concrete, according to the specific requirements provided at national level for plaster coatings, and thermal insulation properties. 24-hour monitoring of VOC emissions of the obtained coatings indicated high initial emission values in all analyzed cases, followed by a downward trend, with or without a plateau area. These results indicate the need to continue research with monitoring VOC emissions over a longer period. Further research on monitoring TVOC emissions of such coatings could improve the potential for the use of rice husks in construction as exterior or even interior plasters.

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**RO.281.**

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| **Title EN** | Acoustic and atmospheric pollution on two major traffic arteries in Bucharest, Romania. Current research |
| **Authors** | Marta Cristina ZAHARIA, Vasilica VASILE, Irina POPA, Stefania Cristina PANĂ |
| **Institution** | **NIRD URBAN-INCERC** |
| **Patent no.** | - |
| **Description** | Acoustic and atmospheric studies were carried out on two types of street profiles in Bucharest, Romania, on which there is urban traffic,that constitutes an important source of noise pollution, especially in large cities. On these street profiles, the acoustic and atmospheric measurement points were located after studying and determining their noisiest areas, in which to highlight: a) very busy traffic, b) noise from vehicle acceleration and/or from driving at very high speed, between two stoplights, c) complex traffic composition (many types of vehicles each having specific noise spectra), d) noise that depends on the conformation and |

finishing with absorbent or reflective materials/products of the facades of the delimiting buildings, e) noise received by pedestrians walking on the sidewalks of street profiles, f) time period of the day, in the morning, with very intense traffic. The findings of these research highlighted that on the two street profiles studied in the capital Bucharest, during the 1-hour measurement period, between 7.00 and 8.00 in the morning, there was very congested and noise-polluting urban traffic. Also, the acoustic results indicate that the measured noise level values, respectively $L_{Aeq}$ = 76.3 dB, are the same on each of the two traffic arteries, even the number of vehicles is different. Regarding the monitoring of atmospheric parameters in the two street profiles, through the levels of two relevant pollutants of ambient air, carbon dioxide ($CO_2$) and nitrogen oxide ($NO_2$), the importance of green areas on urban air quality was once again emphasized.

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**RO.282.**

**Title EN**

**Identification of Cement-Based Mortars Prototypes with Spent Garnet (SG) Residues as Aggregate Partial Replacement - Preliminary Results Validation**

**Authors**

Baeră Cornelia, Vasile Ana-Cristina, Gruin Aurelian, Bolborea Bogdan, Ion Alexandru

**Institution**

**NIRD URBAN-INCERC Timisoara**

**Patent no.**

**Description**

This research project explores the innovative use of Spent Garnet (SG) residues, generated by Abrasive Water Jet (AWJ) cutting processes, as a partial substitute for fine aggregates (sand) in cement-based mortars. AWJ cutting, widely used in industrial applications, produces SG waste, which poses environmental challenges. The current research builds on preliminary studies conducted by NIRD URBAN-INCERC Timisoara, which demonstrated promising results regarding the incorporation of SG waste into construction materials. The objective is to validate these initial findings by extending the scope of the research towards the SG mortar prototype identification, based on validation of material performance with respect to preliminary testing and resulting conclusions. The experimental methodology involved replacing fine aggregates (regular, natural sand, 0/4) with 10-50% SG waste in mortar mixes, focusing on mortar mixes mechanical properties at 7 and 28 days.

Hardened state determinations and comparative performance evaluation lead to the identification of SG 30% and SG 50% compositions as prototype SG Mortars. These findings support further research into using SG in construction products, such as paving blocks and concrete.

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.

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**RO.283.**

**Title EN**

**Investigating Lignosulfonate-Modified Earth Mixtures: Shrinkage, Strength, and Maturation Effects**

**Authors**

Gruin Aurelian, Baeră Cornelia, Bolborea Bogdan, Vasile Ana-Cristina, Ion Alexandru, Barbu Alexandra Marina

**Institution**

**NIRD URBAN-INCERC Timisoara**

**Patent no.**

**Description**

This research investigates the use of lignosulfonate as a sustainable additive in poured earth construction materials, with the aim of improving mechanical strength and hygrothermal behavior. The study focuses on shrinkage reduction, compressive strength evolution, and the role of lignosulfonate in forming a cohesive polymeric network. Samples were tested at three curing intervals (13, 21, and 42 days) to evaluate the impact of maturation on performance. Results indicate that lignosulfonate contributes to water retention, reduces internal collapse during drying, and enhances compressive strength over time. SEM and FTIR analyses confirm improved microstructural cohesion, while thermogravimetric data support the material’s water-binding capacity. These findings highlight the potential of lignosulfonate-stabilized earth mixtures as a viable low-carbon alternative to conventional materials in sustainable construction.

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.284.**

**Title EN**

**A novel approach for assessing clay soils for application in adobe brick production**

**Authors**

Alexandra Csapai, Carmen Florean, Andreea Hegyi, Gabriela Călătan, Cristian Petcu, Stefan Bakos

**Institution**

**National Institute for Research and Development in Construction, Urban Planning and Sustainable Spatial Development URBAN-INCERC**

**Patent no.**

**Description**

Throughout history, various approaches have been explored to meet the challenge of creating sustainable living spaces that provide thermal comfort and good indoor air quality. One of the most widely used methods has been the construction of buildings using clay-based materials. However, this technique is still not sufficiently regulated by widespread standards. The main challenge lies in the variability of raw material properties, which requires numerous preliminary tests and a considerable amount of time. This research proposes an interdisciplinary approach to the analysis of clayey soils with the aim of identifying the potential applications of this material in the production of adobe brick masonry elements and plaster mortars for vernacular construction. The research methodology involved a pedological analysis of 30 clay soil samples collected from the Mârgău and Ciucea regions of Cluj, followed by an evaluation of their suitability for construction applications. The experimental results indicate the possibility of establishing limiting conditions for clay, sand and dust content, as well as for pH, humus and carbonate content. The proposed methodology for assessing clay soils for adobe brick production offers potential benefits, including

improved understanding of soil capacity, reduced evaluation time compared to traditional methods, and minimized risk of selecting unsuitable soils. By integrating current knowledge with rapid data from laboratory tests or field evaluations, resource inefficiencies and waste can be reduced.

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**RO.285.**

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| **Title EN** | **An innovative method for the treatment of clay surfaces using coating/impregnating solutions based on natural oils and recycled non-food household products** |
| **Authors** | Alexandra Csapai, Andreea Hegyi, Cristian Petcu, Claudiu-Sorin Dragomir, Gabriela Călătan |
| **Institution** | **National Institute for Research and Development in Construction, Urban Planning and Sustainable Spatial Development URBAN-INCERC** |
| **Patent no.** | |
| **Description** | One of the major challenges faced by traditional buildings constructed from vernacular materials is the influence of climatic factors and microorganisms, which also affect the surfaces of structures made from unfired clay elements. This research investigates the production of plasters composed of clay, lime and other additives, examines their behavior in relation to mold growth and evaluates the potential of coating treatments to improve their resistance to harmful microorganisms. The antifungal treatment was carried out to investigate the possibility of recycling expired non-food household and medical products. The experimental results showed initial mold growth, with colonies of Penicillium notatum and Aspergillus niger, and demonstrated the potential to improve mold resistance through pellicular treatment and/or surface impregnation. The results indicate that the development of clay-based plasters with improved performance is not only feasible but also provides an innovative contribution to the application of the circular economy concept. Based on the results of the research, there is potential to formulate new research hypotheses that could focus on the use of liquid beeswax as a dispersion matrix. In addition, further research and identification of new expired non-food household products may offer opportunities to reuse these materials in the development of surface treatment solutions for unfired clay surfaces in construction, with the aim of improving their resistance and durability. |

| RO.286. | |
|---|---|
| **Title EN** | **Optimizing the durability and resistance of smart-eco-innovative geopolymer materials - performance and valorisation** |
| **Authors** | Adrian-Victor LĂZĂRESCU, Andreea HEGYI, Alexandra CSAPAI, Brăduţ Alexandru IONESCU, Mihail CHIRA, Mircea-Iosif RUS |
| **Institution** | **NIRD URBAN-INCERC Cluj-Napoca Branch** |
| **Patent no.** | Project no. PN 23 35 05 01 |
| **Description** | This research focuses on the development and optimization of smart, eco-innovative geopolymer materials with enhanced durability and resistance properties. The study explores the influence of raw material selection, mix design parameters, and curing regimes on key performance indicators (such as compressive strength, etc.).<br>Advanced characterization techniques were used to evaluate the resilience of optimized geopolymer composites. Particular attention was given to microstructural evolution and its correlation with mechanical and durability-related properties.<br>The findings highlight the feasibility of tailoring geopolymer formulations to achieve high-performance outcomes while maintaining a low environmental footprint. This work contributes to the growing body of knowledge supporting the transition towards smart and sustainable construction materials that align with circular economy principles. |

| RO.287. | |
|---|---|
| **Title EN** | **The influence of external risks in the sensitivity analysis of construction works** |
| **Authors** | Mircea-Iosif RUS |
| **Institution** | **NIRD URBAN-INCERC Cluj-Napoca Branch** |
| **Patent no.** | Project no. PN 23 35 05 01 |
| **Description** | Sensitivity analysis in construction activity is an essential process for assessing the impact of different variables or factors on a construction project. This analysis is important to understand how changes in key parameters can influence the final results of the works such as costs, delivery times or construction quality. The assessment of external risks in construction sensitivity analysis is a crucial aspect of the construction planning and management process. External |

risks are factors which cannot be directly controlled by the project team, but which can significantly influence the success of construction works. These risks need to be identified and assessed to understand how they may affect the cost, schedule and quality of the works.
The assessment of external risks in the sensitivity analysis is essential to ensure the success of a construction project because by correctly identifying, assessing and managing these risks, project teams can reduce their impact and ensure that the project is delivered on time, on budget and to quality requirements. This approach contributes to a minimization of uncertainty and improved decision-making in construction project management.

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**RO.288.**

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| **Title EN** | **The effect of incorporating recycled waste aggregates and adding TiO2 nanoparticles on the corrosion resistance of steel reinforcement embedded in cementitious composites** |
| **Authors** | Carmen Teodora FLOREAN, Mihail CHIRA, Alexandra CSAPAI, Bradut- Alexandru IONESCU, Tudor Panfil TOADER |
| **Institution** | **NIRD URBAN-INCERC Cluj-Napoca Branch** |
| **Patent no.** | |
| **Description** | The aim of this work was to study the effects of the addition of TiO2 nanoparticles to cementitious compositions and the partial replacement of natural aggregates with recycled aggregates consisting of glass, brick, slag or textolite, and the ability of the material to resist corrosion under the action of chloride ions present in the environment and attacking the steel reinforcement. The results show that the changes in the cementitious composite in terms of composition and microstructure influence the formation of the oxide passivation layer on the reinforcement. The addition of TiO2 nanoparticles and recycled aggregates affects the kinetics and corrosion mechanism of the reinforcement. An addition of 3% TiO2 was found to be optimal for reinforcement protection. Electrochemical impedance spectroscopy confirmed the results obtained by open-circuit potential and linear polarization tests. The classification of favorable conditions indicates that compositions with recycled aggregates and 3% TiO2 are the most effective, with compositions in which the natural aggregates were partially replaced with slag being the most effective. Based on the |

information presented, future research can be conducted to further advance knowledge in this field. For example, the analysis of the kinetics and mechanism of steel reinforcement corrosion in cementitious composites containing recycled aggregates and/or nanomaterials can be extended to include new reinforcement types, new approaches to recycling aggregates and nanomaterials, and new corrosive environments.

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| **RO.289.** | |
| **Title EN** | **Application of accelerated carbonation in the realization of simple concrete prefabricated elements** |
| **Authors** | Tudor Panfil TOADER, Ioan Nicolae SCURTU, Călin G.R. MIRCEA, Andreea Terezia MIRCEA, Marta Ioana MOLDOVEANU, Brăduț Alexandru IONESCU, Carmen Teodora FLOREAN |
| **Institution** | **National Institute for Research and Development in Construction, Urban Planning and Sustainable Spatial Development URBAN-INCERC** |
| **Description** | A review of the extant literature reveals the application of accelerated carbonation technology in the production of simple concrete prefabricated elements as a sustainable solution for reducing the carbon footprint of the construction industry. In the current European context, where climate goals require concrete measures, this method is becoming increasingly relevant. The process entails the maturation of the vibropressed elements in a controlled medium with carbon dioxide, thereby promoting the formation of calcium carbonate (CO3) within the cement matrix.<br>The study underscores the substantial enhancement of the physico-mechanical properties of the concrete subjected to this treatment, manifesting in an augmented compressive strength of 15-30% and a concomitant reduction in porosity and water permeability. This enhancement in durability, particularly in scenarios involving freeze-thaw cycles and chemical degradation, underscores the efficacy of the method. It is noteworthy that this method requires less energy than conventional thermal hardening processes and contributes to the permanent sequestration of CO2.<br>The technological process under scrutiny encompasses several essential stages, including the storage of aggregates, |

the application of vibropressation, the execution of an accelerated carbonation treatment, and the delivery of the treated aggregate. The integration of this technology into the current production of sustainable prefabricated elements is supported by its industrial applicability and ecological advantages.

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**RO.290.**

**Title EN**

**Development of mountain areas in Romania in the context of the European Funds**

**Authors**

Tudor Panfil TOADER, Daniela - Mihaiela BOCA, Marta-Ioana MOLDOVEANU, Mihail CHIRA, Ion-Cristian CRĂCIUNESCU

**Institution**

**National Institute for Research and Development in Construction, Urban Planning and Sustainable Spatial Development URBAN-INCERC**

**University of Agronomic Sciences and Veterinary Medicine of Bucharest, Romania**

**Deutsche Schule Bukarest**

**Patent no.**

research project

**Description**

The Romanian mountain area has a specific peculiarity for depopulated areas, where natural resources offer a chance for family farms and small farmers to focus on activities in the area of animal husbandry and processing – a small processing of traditional high-quality products, such as certified products, which have a mountain area certificate. Investments are indeed few in relation to the potential of the mountain area, but, in the National Strategic Plan 2020–2027, there are support measures dedicated exclusively to the mountain area, which will generate an impact and reduce the population gap in the mountain area.

The objectives of this paper consist in analyzing the financial support of the mountain area, from the PNDR (2014-2020) and the PNS (2020-2027). For the mountain area, during these periods, considerable amounts were allocated through the European Agricultural Fund for Rural Development, according to a strategy on which the PNDR (2014-2020) was based. The attractiveness of these measures and the degree of interest from the beneficiaries (farmers, processors, UATs) were analyzed. The number of projects and their value, their dispersion at the national level, as well as the AFIR selection, contracting, and payment capacity were also analyzed.

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| **RO.291.** | |
| **Title EN** | **Legislative challenges in evaluating national research institutes** |
| **Authors** | Anca Nețulescu, Claudiu-Sorin Dragomir, Cristian Petcu, Andreea Hegyi |
| **Institution** | **National Institute for Research and Development in Construction, Urban Planning and Sustainable Spatial Development URBAN-INCERC** |
| **Patent no.** | |
| **Description** | This study sets out to compare the legislation governing the evaluation of national research institutes' activities in Romania. The analysis encompasses two pivotal legislative acts: HG 477/2019, which establishes the methodological framework for assessing the accreditation of national research and development institutes, and HG 138/2024 on the approval of the Methodological rules on performance evaluation for the integration of scientific research and technological development activities of research organisations, as well as for establishing the criteria for the selection of expert evaluators provided for in article 19 of Law no. 25/2023 on the voluntary integration of Romanian RDI organisations into the European Research Area and for amending OG 57/2002 on scientific research and technological development. The analysis identifies six evaluation criteria: management, capacity, performance, institutional aspects, human resources, economic-financial performance, and the quality of strategic development plans. A comparative analysis reveals that both legislative frameworks share common elements, particularly the need to balance available resources with the results achieved and future opportunities for growth. However, notable discrepancies emerge when attempting to apply a uniform evaluation framework to both pieces of legislation, hindering a comprehensive comparison between the institutes. One identified risk is the potential for uneven development within institutes, where certain evaluation criteria may be prioritized over others. Furthermore, alignment with HG 183/2024 on the status of research staff underscores the imperative for institutional management and strategic development to foster the multidisciplinary and interdisciplinary development of human resources, which are indispensable for mitigating the risk of disparate institutional progress. |

| RO.292. | |
|---|---|
| **Title EN** | **Masonry Elements From Local Sustainable Materials** |
| **Authors** | **Maria-Simona BLĂJUȚ, Aurelia BRADU, Alexandrina-Elena Andon, Marius MÂRȚ, Adrian-Alexandru CIOBANU, Cristian PETCU** |
| **Institution** | **National Institute for Research and Development in Construction, Urban Planning and Sustainable Spatial Development „URBAN - INCERC", Iasi Branch** |
| **Patent no.** | PN 23 35 03 01 |
| **Description** | Clay is one of the natural materials used since ancient times in the construction of homes. Constructions using this material have proven to be durable, clay being used even today. Also, adding a cohesive material to the mixture, which ensures the appearance is maintained, such as straw, hemp, sawdust, etc., forms an internal structure that improves the initial strength of the soil. Another traditional building material commonly used in eco-sustainable architecture is sand, which plays an important role in improving the consistency of adobe bricks. |

| RO.293. | |
|---|---|
| **Title EN** | Study of the stress states in which brittle materials provide strength, ductility, and stability against degradation |
| **Authors** | Alexandrina-Elena ANDON, Aurelia BRADU, Alexandru BUCĂLĂU, Tudor Panfil TOADER |
| **Institution** | **National Institute for Research and Development in Construction, Urban Planning and Sustainable Spatial Development „URBAN - INCERC", Iasi Branch, „G.M. Cantacuzino" Faculty , Iasi, Romania** |
| **Patent no.** | PN 23 35 03 01 |
| **Description** | Experimental studies could contribute to a better understanding of how self supporting walls respond to seismic actions. The hexagonal shape of the self supporting elements stands out due to the uniform distribution of mechanical stresses, providing high stability through the interlocking of elements and minimizing weak points against lateral forces. Research conducted over time has demonstrated that the vulnerability of unburnt clay structures can be reduced through a combined approach between |

improving the base materials, using appropriate reinforcement, and optimizing the structural design.

| RO.294. | |
|---|---|
| **Title EN** | **Characteristics of Self-Supporting Structural Elements from Traditional Sustainable Materials** |
| **Authors** | Marius MÂRȚ, Aurelia BRADU, Alexandrina-Elena ANDON, Maria-Simona BLĂJUȚ, Adrian-Alexandru CIOBANU |
| **Institution** | **National Institute for Research and Development in Construction, Urban Planning and Sustainable Spatial Development „URBAN - INCERC", Iasi Branch** |
| **Patent no.** | PN 23 35 03 01 |
| **Description** | In order to develop experimental research, a recipe was designed based on traditional sustainable materials, namely clay, aggregates, natural fiber additives, and rabbit skin glue. The created recipe includes freshly extracted clay from the Moldova region, code AG2, in a proportion of 70%, and 30% natural aggregates (grain sizes 0–1 mm, 0–4 mm, and 4–8 mm). To determine the characteristics of the clay compositions, 9 recipes were prepared, with the main variable being the quantity of added wheat straw, sawdust, and hemp, in the following proportions: 10%, 20%, and 30% hemp of the total volume; 10%, 20%, and 30% sawdust; 3%, 4%, and 5% straw. Additionally, rabbit glue was used in a proportion of 1%, which enhances the clay with properties such as elasticity, flexibility, homogeneity, fine surface texture, good workability, and resistance to cracking during drying. These 9 recipes were tested for workability, compressive strength, thermal conductivity, and density. |

# National Institute for Research and Development in Environmental Protection – INCDPM

| RO.295. | |
|---|---|
| **Title EN** | **AI-based technology used to determine performance in ecological agriculture to reduce GHG emissions** |
| **Authors** | DEÁK György, MATEI Monica, LASLO Lucian, SADÎCA Isabela, ENACHE Natalia |
| **Institution** | **National Institute for Research and Development in Environmental Protection, Bucharest** |
| **Patent no.** | RO138721 |
| **Description** | The invention involves a complex technology based on artificial intelligence (AI) with the aim of determining both soil quality and climatic indicators for the study area, to determine and quantify performance in the field of agriculture, considering soil types, crops, and climate change, with the goal of reducing GHG emissions. The technology subject to this patent offers answers and solutions regarding the EU Missions on Soils (1) and Climate Change (2) and addresses the principles of Taxonomy, leading over time to the promulgation of feasible, Nature-based Solutions (NbS) with in situ applications, to support Romania in the process of transitioning to a sustainable agriculture. |

| RO.296. | |
|---|---|
| **Title EN** | **SUBMERSIBLE PLATFORM FOR MONITORING ICHTHYOFAUNA, PARTICULARLY STURGEON SPECIES** |
| **Authors** | **DEÁK György, RAISCHI Constantin-Marius, SADÎCA Isabela, GHEORGHE Petrache-Ionuț, MATEI Monica, HOLBAN Elena, TUDOR Georgeta, BOBOC Mădălina Georgiana** |
| **Institution** | **National Institute for Research and Development in Environmental Protection, Bucharest** |
| **Patent no.** | **A/00143/16.04.2025** |
| **Description** | The invention refers to a prototype for monitoring |

ichthyofauna, in particular wild sturgeons, by means of a durable submersible platform, which ensures both an optimal vital status of the captured specimens and the safety of the experts, considerably improving and streamlining research activities. This invention is both a national and international first and is currently the only system of its kind developed specifically for research activities related to the capture, tag and release of fish species, in particular sturgeon.

| **RO.297.** | |
|---|---|
| **Title EN** | **Hardware solution for monitoring wild sturgeons using communication poles** |
| **Authors** | DEÁK György, CLAPA Ion, MATEI Monica, HOLBAN Elena, TUDOR Georgeta, SADÎCA Isabela, ENACHE Natalia, BOBOC Mădălina |
| **Institution** | **National Institute for Research and Development in Environmental Protection** |
| **Patent no.** | RO138673 |
| **Description** | The invention refers to a hardware solution for monitoring wild sturgeons using communication poles, especially LORA-NET/GSM networks, being a system that monitors the signals emitted by ultrasonic tags used on sturgeons and the meteorological and water quality/level parameters, as well as the components that ensure the energy independence and stability of the communication poles: energy, vibrations, pole position, and GPS coordinates. The monitoring system will be installed on the communication poles of the LORA-NET network and it will be connected to wind turbines and solar panels to optimize energy production, storage, and optimal charging of batteries while protecting them against electrical surges. In Romania, there are monitoring, optimization, and automation systems for technological processes, specialized in energy production systems (micro-hydropower plants(1), hydrogen production(2), and solar panel systems(3)). However, the innovative character of this hardware solution is offered by its applicability in monitoring wild sturgeons through complex communication poles. |

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|---|---|
| **RO.298.** | |
| **Title EN** | **SturHabCons - Assessment of anthropogenic impact on migration routes and breeding habitats in order to develop complementary conservation measures and to expand the strictly protected areas boundaries for the sturgeon population monitored on the Danube according to the provisions of the EU Mission and the Biodiversity Strategy 2030** |
| **Authors** | TUDOR Georgeta, DEÁK György, RAISCHI Marius, SADÎCA Isabela, ZANFIR Alexandru, CARACHICIU Maria, HOLBAN Elena, MATEI Monica, BOBOC Mădălina, GHEORGHE Ionuț, |
| **Institution** | **National Institute for Research and Development in Environmental Protection – INCDPM Bucharest** |
| **Patent no.** | PN 23 31 02 01 |
| **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.<br>The addressed area for investigation of migration routes and breeding habitats used by anadromous sturgeons is represented by the coastal area and 1500 km along the Danube, approaching for the first time in a unified project, the sturgeons situation in Romania.<br>During the project activities implementation until the present, there were reached project tasks like swimming parameters and spawning habitats establishment for ultrasonic tagged sturgeons monitored in the coastal area and along 1500 km of the Danube River, identification and quantification of anthropogenic pressures affecting spawning habitat and migration of anadromous sturgeons (with special emphasis on poaching) and implementation of sustainable technologies for anadromous sturgeon species stress mitigation in the process of biometric parameters formulation by using digital techniques.<br>The data used as scientific base for the project activities is provided by the continuous scientific fishing and ultrasonic tagged sturgeons monitoring activities that are carried out throughout the coastal area and along 1500 km of the Danube River. |

| RO.299. | |
|---|---|
| **Title EN** | **Black Sea SIERRA- Project implementation progress** |
| **Authors** | TUDOR Georgeta, DEÁK György, SADÎCA Isabela, HARABAGIU Alexandra, CHIULAN Ioana, HOLBAN Elena, MATEI Monica, BOBOC Mădălina, CARACHICIU Maria, GHEORGHE Ionuț, ZANFIR Alexandru |
| **Institution** | **National Institute for Research and Development in Environmental Protection – INCDPM Bucharest** |
| **Patent no.** | 101124670 |
| **Description** | The Black Sea SIERRA project aims to prepare and adapt decision-makers' response capacity to current/emerging marine pollution, by coordinated cross-border response to armed conflict contamination in the Black Sea basin.<br>The project 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 (Romania, Ukraine, Bulgaria and Turkey), as scientific base for a comprehensive handbook on marine pollution assessment methodology, complementary sustainable management plan in response to civil and military marine pollution and complementary training curricula that will be disseminated through training courses and workshops to authorities and organizations involved in decision-making related to reaction and management of marine pollution.<br>During the implementation of the Black Sea SIERRA activities, there were developed common methodologies to set the base for the planned field work and laboratory analysis: Consortium methodological guide for sampling and laboratory analysis of particular and/or specific pollution types, Methodology for bioaccumulation assessment in the Black Sea coastal areas and its tributary rivers and lagoons for significant biodiversity components and Assessment methodology for historical pollution occurrence and trends.<br>The in situ campaigns targeted sampling of water, sediments and biota from the coastal areas, rivermouths and lagoons located in the 4 Black Sea basin partner countries. |

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| **RO.300.** | |
| **Title EN** | **DALIA - Danube Region Water Lighthouse Action Pilot Site 6 Sturgeon migration by-pass Iron Gate I and II Project implementation progress** |
| **Authors** | DEÁK György, TUDOR Georgeta, HOLBAN Elena, MATEI Monica, BOBOC Mădălina, SADÎCA Isabela, GHEORGHE Ionut, ZANFIR Alexandru, CARACHICIU Maria, LASLO Lucian, BUGEAC Larisa |
| **Institution** | **National Institute for Research and Development in Environmental Protection – INCDPM Bucharest** |
| **Patent no.** | 101094070 |
| **Description** | Under the 'Restore our Ocean, seas and waters by 2030' EU Mission and financed through HORIZON programme, DALIA project reunites 22 expert organizations from 8 different Danube countries. INCDPM Bucharest implements the activities of **DALIA Pilot Site 6 - Sturgeon migration by-pass Iron Gates I and II** that tackle the challenge to provide a technical & scientific solution in order to ensure the connectivity of the historical migration routes for the ultrasonic tagged sturgeon specimens upstream of the Hydropower System.<br>From the results obtained until the present, the most notable ones are represented by the detailed analysis of the presence of sturgeon species in the Lower Danube River, scientific fishing and ultrasonic tagged sturgeons monitoring activities for 5 seasons (2023-2025), the optimization for the design of the sturgeon specimens special transport innovative solution and for the by-pass strategies adapted for each hydropower plant of the Iron Gates I and II System, establishment of the optimal female to male specimens to be used for the by-pass solution implementation, in situ high-resolution multibeam and single-beam ADCP measurement campaigns.<br>Currently, there are determined 2 options for the configuration and placement of the ultrasonic tagged sturgeons monitoring system in the Bazias area, dependent on the involvement of the Serbian DALIA project partners. |

| RO.301. | |
|---|---|
| **Title EN** | **OBTAINING NANOMATERIALS AND DESIGNING SENSORS FOR THE REAL-TIME DETERMINATION OF PM10 AND $CO_2$ POLLUTANTS** |
| **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** |
| **Patent no.** | PN 23 31 03 01 |
| **Description** | The purpose of this project is to develop innovative nanomaterials that improve the filtration systems for air and water.<br>Two materials were chosen: hydroxyapatite and calcium titanate, whose synthesis methods (co-precipitation and attrition) allowed their cheap, easy and emerging production in the form of 0D nanomaterials. Both nanomaterials were obtained starting with eggshell as a calcite precursor, recovering thus agro-industrial waste into new materials. The two types of materials highlighted high adsorption capacities due to their nanostructured dimensions. Hydroxyapatite has demonstrated that it can be used in the field of water treatment, as it presents an ion exchange capacity, as well as an affinity for retaining heavy metals.<br>Calcium titanate with its perovskite structure, through electrical activation, causes surface and volume polarization, leading to the formation of reactive oxygen species that are capable of degrading organic pollutants in water. The particle size distribution highlighted a multimodal distribution for both powders – hydroxyapatite and calcium titanate. Using Mie scattering theory the specific surface area was calculated at 83,076 $cm^2/ cm^3$ for the hydroxyapatite powder and 77,043$cm^2/ cm^3$ for the calcium titanate. |

| RO.302. | |
|---|---|
| **Title EN** | **ALGINATE BASED HYDROGEL EMBEDDED WITH IDEONELLA SAKAIENSIS TO REDUCE MICROPLASTIC FROM WASTEWATER** |
| **Authors** | Ioana Chiulan, György Deák, Elena Holban, Monica Matei, Emil Pop, Sergiu Fendrihan, Andreea-Claudia Saltelechi, Diana Gheorghe |

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| **Institution** | **The National Institute for Research and Development in Environmental Protection (INCDPM) Bucharest, Romania)** |
| **Description** | PN 23 31 03 02 (44N/2023)<br>The goal of this study was to create novel bio-based materials embedded with live bacteria able to remove microplastics from wastewater treatment plants, in the biological treatment stage. Ideonella sakaiensis have the ability to break down polyethylene terephthalate (PET), a commonly used material in plastic bottle manufacturing.<br>In this study, alginate-based hydrogels embedded with I. sakaiensis, were developed as biodegradable and low-cost support and used for the treatment of water contaminated with bis(2-hydroxyethyl) terephthalate, an intermediate in the production of PET. Results showed that living cells have been immobilized in the alginate hydrogel and used BHET as nutrient source. Therefore, the alginate-I.sakaiensis system can be used to purify water from microplastic. |

| | |
|---|---|
| **RO.303.** | |
| **Title EN** | **Assessing ecosystem vulnerability, monitoring adaptation measures, and estimating GHG emissions, in compliance with the objectives of the EU Mission - ClimGES** |
| **Authors** | DEÁK György, LASLO Lucian, MATEI Monica, ENACHE Natalia, BOBOC Madalina, CHIRESCU Alexandra |
| **Institution** | **National Institute for Research and Development in Environmental Protection** |
| **Patent no.** | PN 23 31 04 02/2023 |
| **Description** | Experimental research on GHG effluxes and NbS integration in different land use scenarios, outline the impact of NbS on various types of land, using soil samples from forests, wetlands, agricultural lands, and abandoned lands, to present the methodology used to simulate different land use scenarios in a laboratory environment. $CO_2$ fluxes were measured using two techniques based on the closed chamber method for precise data at a given moment on the soil. Complementary mesocosms were created in the laboratory to simulate and evaluate carbon dynamics under controlled experimental conditions to determine the ecological causes and consequences of management practices and the effects of climate change at the local level, as well as to simulate conditions for sustainable land management through controlled tests. |

| RO.304. | |
|---|---|
| **Title EN** | **IMPLEMENTATION OF A MONITORING SYSTEM FOR WILD STURGEONS ALONG THE LOWER DANUBE** |
| **Authors** | **DEÁK** György, **BOBOC** Mădalina Georgiana, **MATEI** Monica, **HOLBAN** Elena, **RAISCHI** Constantin-Marius, **GHEORGHE** Petrache-Ionuț |
| **Institution** | **National Institute for Research and Development in Environmental Protection** |
| **Description** | C2/I4.4<br>The project is financed by the National Recovery and Resilience Plan "PNRR: Funds for modern and reformed Romania!", Investment 4. Integrated investments for ecological reconstruction of habitats and species conservation related to grasslands, aquatic and water-dependent areas, Component 2: Forests and biodiversity protection, Milestone 39 - Operationalized network for monitoring, communication and data transmission of wild sturgeons.<br>The **general objective** refers to investments in the improvement and expansion of environmental infrastructure and the increase of resilience in the field of biodiversity through the development of a monitoring system for wild sturgeons along the Lower Danube (1500 km), combined with Artificial Intelligence (AI), in order to implement a recovery reform against poaching in accordance with the **"ZERO-TOLERANCE FOR ILLEGAL FISHING"** target set by the European Commission (EC) in the European Green Deal and the effects of climate change affecting the sturgeon population. |

| RO.305. | |
|---|---|
| **Title EN** | **A NEW GENERATION OF METALLIC BIOMATERIALS AS HEALTH SOLUTION FOR A SUSTAINABLE LIFE (COOL&SMARTTIT) – STUDY ON TITANIUM ALLOYS** |
| **Authors** | DEÁK György, GHEORGHE Florina-Diana, VIZUREANU Petrică, MATEI Monica, BOBOC Mădălina, HOLBAN Elena, DUMITRESCU Cristina |
| **Institution** | **National Institute for Research and Development in Environmental Protection** |
| **Patent no.** | ERANET-ERAMIN-3-Cool&SmartTit-1 |

**Description**

Metallic biomaterials, such as stainless steels, cobalt alloys, precious metals, and titanium alloys, are crucial for biomedical applications, including implant devices for reconstructing damaged tissue. Due to their biocompatibility, high tensile strength, low density, flexibility, and high corrosion resistance, titanium and titanium alloys are attractive biomaterials. They can be used in implantable devices, such as artificial hip joints, knee joints, bone plates, screws, heart valve prostheses, pacemakers, and artificial hearts. However, recent studies have highlighted the toxic effects of different titanium alloys, leading to the study of implant-type alloys containing molybdenum, niobium, tin, zirconium, and gold. Understanding the behavior of different titanium alloys is essential for developing and improving biofunctional metallic biomaterials. This study focuses on titanium alloys applicable in the medical field, focusing on their history, properties, synthesis methods, and potential applications.

# National Institute of Research and Development for Optoelectronics - INOE 2000

| RO.306. | |
|---|---|
| **Title EN** | **Compositional gradient structures for protective coatings of cutting tools used in the woodworking industry** |
| **Authors** | Alina Dragomir, Catalin Vitelaru, Mihaela Dinu, Iulian Pana, Anca C. Parau, Lidia R.Constantin, Diana M.Vranceanu |
| **Institution** | [1]National Institute of Research and Development for Optoelectronics - INOE 2000;<br>[2]Drugon International SRL |
| **Patent no.** | Patent application No. A/00646/30.10.2024 |
| **Description** | The invention relates to obtain the compositional gradient structures formed by alternating layers of metal, nitrides and carbonitrides of transition metals (Ti, Cr), to be used as protective coatings of cutting tools such as milling cutters, knives, circular cutting discs and other critical equipment for woodworking subjected to a severe wear regime. |

# Horia Hulubei National Institute for R&D in Physics and Nuclear Engineering

**RO.307.**

**Title EN**

**The Impact of Silver Nanoparticles Functionalized with Spirulina Protein Extract on Rat**

**Authors**

**Inga Zinicovscaia [1,2]*, Ludmila Rudi[3], Liliana Cepoi[3], Tatiana Chiriac[3], Dmitrii Grozdov[2], Alexandra Kravtsova[2]**

**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

[3]Technical University of Moldova, Institute of Microbiology and Biotechnology, Chisinau MD 2028, Republic of Moldova

**Description**

The biocompatibility and physiological impacts of silver nanoparticles (AgNPs) functionalized with Spirulina protein extract (SPE) on laboratory rats was investigated. The objective was to evaluate the systemic distribution, organ accumulation, and potential toxicity associated with these biofunctionalized nanoparticles. AgNPs were functionalized with SPE. Adult Wistar rats were administered these nanoparticles to assess their distribution across various organs ICP-MS analysis. Hematological and biochemical markers were measured to evaluate systemic effects. Functionalized silver nanoparticles demonstrated preferential accumulation in the brain, liver, and testicles, with significant clearance observed post-administration. The persistence of AgNPs SPE in reproductive organs was established. Hematological analysis revealed moderate changes, suggesting mild immune activation. Biochemical tests indicated transient increases in liver enzymes, signaling reversible hepatic stress. The biofunctionalization of AgNPs with Spirulina protein extract modifies the nanoparticles' systemic behavior and organ distribution, enhancing their biocompatibility while inducing minimal physiological stress. These findings support the potential of Spirulina-based coatings to mitigate the toxicity and enhance the therapeutic efficacy of nanomedical agents.

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| **RO.308.** | |
| **Title EN** | **Impact of metal-containing industrial effluents on the leafy and root vegetables and potential health risk associated with their consumption.** |
| **Authors** | Inga Zinicovscaia [1,2,*], Alexandra Kravtsova [2], Alexandra Peshkova [2,3], Pavel Nekhoroshkov [2] |
| **Institution** | [1]Horia Hulubei National Institute for R&D in Physics and Nuclear Engineering, Magurele, Romania; [2]Joint Institute for Nuclear Research, Dubna; [3]Doctoral School of Natural Sciences, Moldova State University, Chisinau, Moldova |
| **Description** | In suburban areas industrial wastewater, contaminated with an appreciable amount of trace elements (including zinc and chromium), are commonly used for irrigation. Despite important biological role of zinc and chromium for humans, its chronic excessive intake can lead to various diseases. The accumulation of chromium and zinc, their effect on the biochemical parameters of lettuce, green onion and radish irrigated with untreated industrial effluents were assessed. To determine zinc and chromium concentrations in effluents, plants, and soils the ICP-OES technique was used. The concentrations of chromium and zinc in leafy vegetables varied widely from 7.36 to 200 mg/kg and from 59.8 to 3827 mg/kg, respectively. Roots accumulated metals more actively than leaves. Lettuce was found to translocate zinc from roots to edible parts more actively than onion, and reverse pattern was observed for chromium translocation. The concentration of zinc in radish was up to 5 times higher than the maximum permissible value (up to 589 mg/kg) and followed the order: non-edible roots of radish ≥ leaves ≥ edible roots. A significant reduction in the chlorophyll content of the lettuce leaves and the antioxidant activity of the onion leaves was observed when the plants were irrigated with the effluent containing high concentration of zinc. No non-carcinogenic health risk from the intake of chromium and zinc was identified through the consumption of vegetables, primarily due to low consumption rate (radish) and the fact that a smaller proportion of the total metal content was transferred to the edible parts (leafy vegetables). |

# „Petru Poni" Institute of Macromolecular Chemistry, Iasi

| RO.309. | |
|---|---|
| **Title EN** | **Uniaxial stretching device for polymer films adapted to atomic force microscope** |
| **Authors** | Iuliana Stoica, Daniel Timpu, Andreea Irina Barzic |
| **Institution** | **„Petru Poni" Institute of Macromolecular Chemistry, Iasi, Romania** |
| **Patent no.** | Patent application No. CBI a/00150/28.03.2024 |
| **Description** | This invention pertains to a uniaxial stretching device for polymer films, specifically designed for use in an atomic force microscope to analyze local morphological and nanomechanical parameters in real time, following each extension step. The uniaxial stretching device, according to the invention, consists of a central support upon which are mounted: a fixed component comprising metal plates for securing one end of the polymer film via a pair of screws, and a mobile component constituted by an assembly of metal plates for fastening the second end of the polymer film using another pair of screws, enabling the tensioning and stretching of the film through the assembly activated by the rotation knob of the orthogonally positioned screw. The configuration and measurements of the polymer film stretching apparatus, which is the focus of this invention, have been modified for its placement on the base unit equipped with a piezoscanner and sample holder of the atomic force microscope. |

| RO.310. | |
|---|---|
| **Title EN** | **Nanocomposite Materials with Multiple Thermoregulation Mechanisms - MatNanoTherm** |
| **Authors** | George Știubianu, Bianca-Iulia Ciubotaru, Alexandra Bargan, Mihaela Dascălu, Adrian Bele, Cristian Ursu, Roxana Solomon |
| **Institution** | Petru Poni Institute of Macromolecular Chemistry |
| **Patent no.** | PN-IV-P7-7-1-PED-2024-2073, (Contract 50PED/2025). |
| **Description** | We propose a laboratory scale technology for a nanocomposite material with excellent capability for thermal regulation. Taking inspiration from capabilities of mirror comb-footed spider (Thwaitesia sp.) to adjust very fast its shape, color, and light reflection, we propose the development of an innovative biomimetic platform as thermoregulatory composite material. Thus, the advantages of passive strategies for thermal comfort (low cost, straightforward implementation, and energy efficiency) will be brought together with the fast on-demand control capabilities of active strategies for thermal comfort. The new nanocomposite will take advantage of the flexibility |

of silicone chemistry as a cost-affordable approach to develop a laboratory technology for a thermoregulatory clothing which can significantly expand the temperature range for a comfortable thermal envelope for the user.

**RO.311.**

**Title EN**

**Silsesquioxanes-based materials obtained by photo-induced thiol-ene reaction, for environmental applications (CO2 capture)**

**Authors**

Alexandra Bargan[*1], Mihaela Dascalu[1], Bianca-Iulia Ciubotaru[1,2], Mirela Zaltariov[1], Adrian Bele[1], George Stiubianu[1], Muslum Demir[3,4], Alexandru Stoica [1], Maria Cazacu[1], Corneliu Cojocaru[1], Roxana Solomon[1]

**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.**

Project code: PN-IV-P8-8.3-PM-RO-TR-2024-0046

**Description**

The project aims to develop, through a cost-reasonable approach; a method for obtaining new silsesquioxanes based materials using photo-induced thiol-ene reaction in order to use them for environmental applications, as active materials with user-controlled adaptability for integrated management of the $CO_2$ gas separation. The efficient capture of $CO_2$ due to the logical design of new silsesquioxanes-materials with enriched functionality is an important step in diminished $CO_2$ emissions. The new materials synthesized in this project by using click photo-induced thiol-ene addition reaction between octavinyl-T8-silsesquioxane and thioalkylcarboxylic acids, and their transition metal complexes will be confirmed, characterized and applied as new hybrid materials for selective $CO_2$ capture. Then they will be analyzed in terms of thermal stability, morphology and moisture, $N_2$ and $CO_2$ sorption, for determining the best conditions for designing the POSS materials with the highest $CO_2$ adsorption performance. The possibilities of structural diversification are enhancing the application potential. The $CO_2$ capture property attributed to the materials' high microporosity and well-dispersed sulfur functionality throughout the carbon framework of the material can be improved. The new POSS-materials with heteroatom doping as efficient adsorbents for the selective capture of $CO_2$, represent a good solution for effective $CO_2$ mitigation.

# National Research and Development Institute for Textile and Leather Bucharest, Romania
# INCDTP

**RO.312.**

| | |
|---|---|
| **Title EN** | **Textile supercapacitors based on graphite and aluminium** |
| **Authors** | Aileni Raluca Maria, Sârbu Teodor, Marin Adrian Cornel |
| **Institution** | **National Research and Development Institute for Textile and Leather Bucharest, Romania** |
| **Patent no.** | Patent application no. A/00246/13.05.2024 |
| **Description** | The invention refers to developing textile supercapacitors using graphite and aluminium-based electrodes with electroconductive properties intended for powering wearable systems. These supercapacitors are designed for applications in electrical engineering and electronics.<br>The invention is characterised by the fact that the composite materials used for supercapacitors are obtained by ultrasound-assisted functionalisation of the textile substrate (fabric or knitwear made of 100% cotton). The ultrasonic bath is based on polymer dispersions containing polyvinylpyrrolidone (PVP), polyvinyl alcohol (PVA), graphite, and aluminium. To create the supercapacitor, two electrodes (an anode and a cathode) and a separation layer made of a nonwoven cellulose fibre material (with a thickness of 0.1 to 0.5 mm) are immersed in ethylene glycol.<br>The novelty of the invention consists of the following aspects:<br>- electrodes obtained by ultrasound-assisted functionalisation of the textile substrate in polymer dispersions based on PVP/PVA and aluminium microparticles, respectively graphite microparticles for 60...120 minutes, present the electroconductive properties necessary for electrodes for supercapacitors having the surface resistance values between $10^3$...$10^7$ Ω;<br>- the separation layer (nonwoven material) immersed in ethylene glycol separates the positive electrode (cathode) from the negative electrode (anode) and eliminates the risk of short circuit;<br>- using two flexible textile electrodes based on graphite (anode) and aluminium (cathode) separated by a nonwoven layer, a voltage of 1.4...1.5 V is obtained, which can be used to power a wearable device. |

| RO.313. | |
|---|---|
| **Title EN** | **Multi-Functional Harness/Container Assembly for Sport Parachutes - HCM** |
| **Authors** | Salistean Adrian, Niculescu Claudia Cornelia, Popescu Georgeta, Olaru Sabina |
| **Institution** | **INCDTP- National Research and Development Institute for Textile and Leather** |
| **Patent no.** | RO133271B1 30/09/2024 |
| **Description** | The invention relates to a multifunctional container assembly for a sports parachute.<br>The assembly according to the invention consists of two compartments, upper and lower, for the canopy of the reserve parachute and, respectively, for the canopy of the main parachute, having variable volumes; the variation of the volume of the first compartment for the reserve parachute is achieved by adjusting the length of a closing loop of the upper parachute compartment. The second compartment for the main parachute is made at the maximum volume; the volume variation of the lower compartment for the main parachute is made by using an additional filling, which completes the volume difference between the compartment and the parachute. Parachutes packing size volume: reserve parachute: min. 6769 $cm^3$, max.7752 $cm^3$; main parachute: min. 6785 $cm^3$, max. 9340 $cm^3$. |

# Agricultural Research and Development Station Secuieni – Neamț

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|---|---|
| **RO.314.** | |
| **Title EN** | **Conservation and utilization of genetic resources for the improvement of biodiversity in field beans** |
| **Authors** | Doru STANCIU, Simona - Florina ISTICIOAIA, Raluca REZI, Dumitru – Dorel BLAGA, Danela MURARIU, Andreea - Sabina PINTILIE, Lorena – Diana POPA, Cosmin MURARU, Adina – Cătălina DRUȚU |
| **Institution** | **Agricultural Research and Development Station Secuieni** |
| **Patent no.** | This work was supported by a grant of the Ministry of Agriculture and Rural Development, The National Research - Development Plan in the field of agriculture and rural development "Agriculture and Rural Development - ADER 2026", Project no. 1.3.3/19.07.2023. |
| **Description** | Biodiversity is essential for the balance of ecosystems, providing resilience and adaptability in the face of climate change. Loss of biological diversity affects the provision of essential resources and increases vulnerability to extreme events.<br>Field beans play an important role in this context due to their ability to fix nitrogen in the soil, contributing to soil fertility without chemical fertilizers. Its genetic diversity allows the selection of drought and disease resistant varieties, ensuring food security. Beans are also a valuable source of plant protein, fiber and antioxidants with health benefits.<br>In Romania, field bean genetic diversity has been insufficiently exploited, affecting both breeding and the food industry. SCDA Secuieni is striving to obtain dwarf, mechanizable varieties for grain consumption. To this end, 139 genotypes have been introduced in the breeding process: 86 from Romania, ensuring local adaptability, and 53 from international gene banks, contributing to diversity.<br>The large number of cultivars introduced in the breeding process proved extremely valuable, as it allowed a rigorous selection of genotypes with the greatest potential for adaptation to local conditions. Of the 139 cultivars tested, 29 failed to adapt to the specific climatic and soil conditions of the area, leading to their failure to bear fruit. This situation |

underlines the importance of genetic diversity and the need for careful selection to identify the most productive and resilient varieties capable of responding to the challenges imposed by climate change.

| RO.315. | |
|---|---|
| **Title EN** | **Sweet Sorghum – A resilient crop for sustainable agriculture in the face of climate change** |
| **Authors** | Simona - Florina ISTICIOAIA, Alexandra LEONTE, Paula - Lucelia PINTILIE, Andreea - Sabina PINTILIE, Lorena – Diana POPA, Doru STANCIU, Cosmin MURARU, Valentin VLĂDUȚ, Gheorghe MATEI, Ramona – Georgeta OLARU |
| **Institution** | **Agricultural Research and Development Station Secuieni** |
| **Patent no.** | „Complex system of integral capitalization of agricultural species with energy and food potential", Contract no. 9PCCDI/2018. |
| **Description** | **Sweet sorghum: A sustainable and resilient crop.** Sweet sorghum is a key crop for sustainable agriculture, offering resilience to harsh pedoclimatic conditions while serving as a versatile resource for biomass, biofuels, and animal feed. Its adaptability makes it essential for mitigating climate change effects, ensuring economic stability, and enhancing resource efficiency. Optimizing its cultivation improves soil health, supports renewable energy production, and ensures stable yields even in challenging environments.<br>**Sustainability and climate adaptation.** As a drought - and heat-tolerant species, sweet sorghum thrives in marginal lands with minimal inputs, improving soil health and reducing erosion. This makes it an eco-friendly alternative to other biomass crops. The ARDS Secuieni study refined agronomic practices to maximize sugar and biomass yields sustainably. Results showed that harvesting at physiological maturity significantly increased sugar content exceeding 17.0 Brix. While plant density had little effect, mineral fertilization boosted sugar levels, peaking at 17.0 Brix. Biomass production varied based on hybrid selection, sowing density, and fertilization, with yields ranging from 67.9 t/ha to 85.4 t/ha under optimal conditions.<br>**Resilience, food security and economic potential.** Sweet sorghum ensures stable yields despite climate variability, supporting food security and rural livelihoods. Its dual-purpose nature - grain for food and stalks for biofuel or |

fodder - diversifies farming systems and reduces economic risks. Its role in the circular bioeconomy strengthens sustainable development, with bioethanol and biogas production benefiting from optimized fertilization and sowing densities. Integrating sweet sorghum into sustainable agricultural systems enhances profitability, minimizes waste, and promotes environmental resilience.

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| **RO.316.** | |
| **Title EN** | **Carthamus tinctorius L. – specific technology cultivation for seed production under the conditions of the center of Moldova** |
| **Authors** | Mîrzan Oana, Naie Margareta, Stanciu Doru, Batîr Rusu Diana |
| **Institution** | **Agricultural Research - Development Station Secuieni** |
| **Patent no.** | ADER 6.2.1./2019 - Establishment and continuous diversification of the national collection of medicinal and aromatic plants, acclimatization and introduction into cultivation of new species and improvement of cultivation technologies in the mountain area. |
| **Description** | Safflower, Carthamus tinctorius L., cultivated mainly for its seed, which is used as edible oil and as birdseed. Traditionally, the crop was grown for its flowers, used for colouring and flavouring foods and making dyes, especially before cheaper aniline dyes became available, and in medicines.<br>Safflower is a highly branched, herbaceous, thistle-like annual or winter annual, usually with many long sharp spines on the leaves. Plants are 30-120 cm tall with globular flower heads (capitula) and, commonly, brilliant yellow, orange or red flowers.<br>The cultivation technology specific under the Central of Moldovia conditions includes:<br>-The basic soil works performed in autumn by cutting at a depth of 30 cm;<br>-Field fertilization with complex fertilizers of type 20: 20: 0 or 15:15:15 in the preparation of germination bed;<br>-Preparation of the germinating bed by means of a ride with adjustable grooves. In the sowing of the seed, a work with the combiner will be carried out;<br>-Sowing in early spring, at a distance of 70 cm between rows, depth of seed incorporation of 3-4 cm, distance |

between grains per row 10 cm, with a sowing rate of 15 kg / ha; -Maintenance work consists of controling weeds, diseases and pests;
-Harvesting occurs when 70-80% of the inflorescences are dry. Harvesting is carried out with the cereal harvester.

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| **RO.317.** | |
| **Title EN** | **Seed production strategies in alfalfa (Medicago sativa L.)** |
| **Authors** | **Margareta NAIE, Oana MÎRZAN, Doru STANCIU, Mihaela POPA, Mihai STAVARACHE, Diana BATÎR RUSU** |
| **Institution** | **Agricultural Research - Development Station Secuieni** |
| **Patent no.** | ADER Project 1.1.4/17.09.2019 - Creation of new alfalfa and red clover genotypes with increased perenniality and high protein content in different ecological conditions by obtaining protein varieties with resistance to drought and heat and with greater capacity for seed production |
| **Description** | In Romania, alfalfa seed production is carried out using two completely different technologies, traditional technology and intensive technology. Since there are major demands for seeds of this species in order to increase the cultivated areas, research was carried out to highlight the agronomic advantages on seed production, in order to establish a cultivation technology specific to the area of Central Moldova. The traditional technology is practiced on most areas, where sowing is done in spring, and the seed is produced in the 2nd - 4th years of vegetation. The main deficiency of this technology is conditioned by the phenomenon of shoot proliferation, which manifests itself especially in years when the water reserve from the spring and the spring precipitation are high, thus limiting seed production. In intensive technology, alfalfa and red clover sowing is done in early autumn and the seed is produced exclusively in the first year, at the first mowing (in 11 months), a situation in which the proliferation phenomenon manifests itself to a small extent; under these conditions, seed production is 2-3 times higher than with traditional technology. The purpose of this work is to analyze the behavior of some Romanian varieties and lines of alfalfa for seed, from the point of view of productive potential, based on multi-annual trials, under seasonal conditions, in order to make the results available to farmers, for its expansion in cultivation. |

| RO.318. | |
|---|---|
| **Title EN** | **Innovative and Sustainable Alternatives for Effective Pest Control in Sunflower and Corn Crops** |
| **Authors** | Pintilie Paula Lucelia[1], Amarghiolaei Roxana Georgiana[1], Zaharia Roxana[2], Mincea Carmen[2], Trotuș Elena[2], Pintilie Andreea Sabina[1], Leonte Alexandra[1] |
| **Institution** | [1]Agricultural Research and Development Station Secuieni–Neamt, Principala Street, No 371, 617415 Secuieni,Romania<br>[2]Research and Development Institute for Plant Protection, Ion Ionescu de la Brad Bvd, 8, Bucharest, 013813, Romania |
| **Description** | ADER sectoral research plan 2.2.1./2019 – "Research on the impact of the use of neonicotinoid insecticides on plants and agricultural products of melliferous crops, bees and hive products and the development of integrated soil pest control systems for melliferous crops"<br>https://madr.ro/cercetare-agricola/planul-sectorial-de-cercetare-ader/ader-2019-2022/ader-2-2019-2022/ader-221.html<br>This study aimed to identify alternative solutions for pest management in sunflower and maize crops. Neonicotinoid products provided good protection, but after their ban, other solutions were tested. In maize and sunflower, the main pests are the larvae of Agriotes, Tanymecus dilaticollis, and Opatrum sabulosum, which damage germinating seeds or consume leaves, reducing plant density and compromising the crop. Among the tested variants, seed treated with Langis (2.0 l/to), plus vegetation treatment with Mospilan + Vital (0.1 kg/ha), provided the best protection for corn and sunflower.<br>The results show that tested insecticides applied to the seed provide the most effective protection, being an economical and sustainable solution, while combined seed and vegetation treatments increase costs and their effect is short-lived. |

# Romanian Research & Development Institute for Gas Turbines COMOTI

| RO.319. | |
|---|---|
| **Title EN** | **Aircraft Engine with Mixed Combustion** |
| **Authors** | Panaitescu Costin, Secăreanu Rareș - Andrei, Burcioiu Ionuț - Răducu |
| **Institution** | COMOTI ROMANIAN RESEARCH & DEVELOPEMENT INSTITUTE FOR GAS TURBINES |
| **Patent no.** | No. RO 138385 A0 |
| **Description** | The invention relates to the construction of an aircraft engine with mixed combustion, equipped with a propeller reinforced with an aerodynamically designed ring, allowing the blades to rotate at their extremities at relative supersonic speeds. The engine features a three-stage compressor, consisting of one low-pressure stage and two high-pressure stages operating at different rotational speeds. |

| RO.320. | |
|---|---|
| **Title EN** | **Integrated Test Bench for Micro –Turbogenerators under Conditions Simulating their Application on UAVs with Remote Control via Wi-Fi** |
| **Authors** | Tiberius-Florian FRIGIOESCU, Gabriel-Petre BADEA, Mădălin-Constantin DOMBROVSCHI, Grigore CICAN, Maria CĂLDĂRAR |
| **Institution** | COMOT I- Romanian Research and Development Institute for Gas Turbines |
| **Patent no.** | Patent application No. A/00418 |
| **Description** | The invention relates to a testing bench for microturbogenerators integrated on UAVs (Unmanned Aerial Vehicles), in which a micromotor generates mechanical energy that is then converted into electrical energy by coupling it to a generator. The energy produced is then consumed by an Electric Ducted Fan, a component which simulates the actual UAV. The control of the entire system is based on implementing a specific control law for the microturbogenerator, tailored to the requirements and particularities of a UAV, ensuring precise and efficient control of the device's performance. Additionally, this testing stand for microturbogenerators with automatic control enables remote testing through an intuitive graphical |

interface of an application controlled via WI-FI. This functionality allows users to monitor.

| RO.321. | |
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| **Title EN** | **Fixed-Wing U.A.V. with Vertical Takeoff/Landing System with Tri-Rotor Propulsion System and Method of Intercepting the Specific Sound Emitted by Thermal Engine-Powered chainsaw** |
| **Authors** | Tiberius-Florian FRIGIOESCU, Gabriel-Petre BADEA, Victoraș-Florentin ANGHEL, Grigore CICAN, Mihaela-Raluca CONDRUZ, Marius-Adrian DIMA |
| **Institution** | • COMOT I- Romanian Research and Development Institute for Gas Turbines<br>Autonomous Flight Technology R&D |
| **Patent no.** | Patent application No. A/00305 |
| **Description** | The present invention refers to a fixed wing drone that incorporates an innovative tri-rotor system with vectorization capabilities, enabling both vertical takeoff and landing as well as forward flight propulsion. It has been designed as a flying wing, involving the elimination of the tail, which result in the transformation of ailerons into elevons, control surfaces serving the functions of both elevators and ailerons. To enhance the drone's stability, winglets have been introduced with the purpose of eliminating vortex production at the wingtips. The mission of this aircraft is to identify illegal deforestation by equipping it with an artificial intelligence system capable of detecting the specific noise of a thermal powered chainsaw. To achieve this, the drone has been equipped with sensitive microphones to detect the sound and a high-performance camera capable of capturing and recording the identified areas and transmitting to authorities. All of the mentioned functions can be performed autonomously with the assistance of the onboard autopilot. |

| RO.322. | |
|---|---|
| **Title EN** | **LIGHTWEIGHT ADDITIVE MANUFACTURING ABLATIVE HEAT SHIELD WITH AIR/VACUUM BUFFER FOR SPACE APPLICATIONS** |
| **Authors** | Authors: Teodor-Adrian BADEA, Alexa CRISAN, Raluca MAIER |
| **Institution** | **National Research and Development Institute for Gas Turbines COMOTI** |

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| **Patent no.** | Patent application No. Patent A/00073 |
| **Description** | This innovation is a lightweight ablative heat shield for space applications, produced via additive manufacturing. The design features a hexagonal shape and a multilayered internal structure using fire-retardant synthetic materials. This structure comprises rigid walls forming air/vacuum cushions, separated by additional walls. The system integrates clamping holes and a communication channel for each cushion. This approach simplifies existing systems by integrating structural concepts with air/vacuum cushions, achieving low thermal conductivity. Additive manufacturing allows versatile production, potentially in situ in space, and enables customization of shape and internal structure. This reduces manufacturing costs and facilitates individual component replacement, increasing system lifespan. The heat shield includes a mechanical attachment system for spacecraft integration. |

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| **RO.323.** | |
| **Title EN** | **Universal Test Bench for Gas Turbine Engines** |
| **Authors** | Catană Răzvan Marius, Dediu Gabriel, Șerbescu Horațiu Mihai |
| **Institution** | **Romanian Research & Development Institute for Gas Turbines COMOTI** |
| **Patent no.** | **Patent Application: RO 137713 A0** |
| **Description** | The invention refers to a gas turbines test bench, for testing different engine types as turboshafts and turboprops, with shaft powers of up to 3000 kW, using an aerodynamic dynamometer such as an aviation propeller with variable pitch. The propeller dynamometer measures the torque and power of the shaft power turbine, during the engine run, by adjusting the angular pitch of the propeller, which modify the aerodynamic load on propeller to perform the required torque and speed. Also, the technical solution of the test bench allows to test experimental aviation propellers and turbojet engines, without modifications of constructive configuration of test bench but with minor replacement of particular component assemblies, reported to the testing application. |

# National Institute for Research and Development in Electrochemistry and Condensed Matter Timisoara

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| **RO.324.** | |
| **Title EN** | Pressurized hydrolysis process integrated with the use of a superior inoculum for the generation of bio-hydrogen and bio-methane through two-stage anaerobic degradation of kitchen waste |
| **Authors** | Chakraborty Debkumar, Ghangrekar Makarand, Jadhav Gorakhanath, Anil Anil, Dușeanu Narcis Mihai, Sfîrloagă Paula |
| **Institution** | National Institute for Research and Development in Electrochemistry and Condensed Matter Timisoara |
| **Patent no.** | Patent application No. A00096/13.03.2025 |
| **Description** | The invention relates to a method for producing bio-hydrogen and bio-methane, using the hydrolysis process of kitchen waste, both by applying pressures in the gas capture space above the leachate, and by using a mixture of methane and carbon dioxide to control the pressures. The method for improving the production of bio-hydrogen and bio-methane is characterized by increasing the recovery rate of the two combustible gases, using kitchen waste as the primary raw material source, and employing a superior inoculum integrated with the pressurized hydrolysis process. |

# BioNEst
# Cluster of Organic Agriculture
# focused in the northeast of Romania

**RO.325.**

**NutriGold Spread**

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|---|---|
| **Title EN** | **A Functional Clarified Butter Cream Enriched with Sea Buckthorn Oleogel** |
| **Authors** | Genoveva Cojocaru, Catalina Sanduleanu; Andra-Sabina Neculai-Valeanu |
| **Institution** | SC ZORIAN EXPORT SRL; BioNEst – Cluster of Organic Agriculture focused in the northeast of Romania; |
| **Patent no.** | - |
| **Description** | This project introduces a novel, spreadable cream based on clarified butter and enriched with sea buckthorn oleogel, designed to deliver both superior taste and enhanced health benefits. Clarified butter, valued for its rich flavor and oxidative stability, is combined with Sea Buckthorn Oleogel Complex (SBOC)—a bioactive lipid matrix rich in essential fatty acids, antioxidants, and fat-soluble vitamins. This formulation supports immune function, skin health, and anti-inflammatory responses, making it a functional alternative to conventional spreads. By leveraging an advanced Lipid Bio-Structuring Technology (LBST), this innovative spread achieves a smooth, homogenous texture while preserving the bioactive integrity of its ingredients. The optimized ratio of clarified butter to oleogel ensures improved oxidative stability, prolonged shelf life, and enhanced nutritional value without the need for artificial additives.<br><br>With growing consumer demand for clean-label, functional foods, NutriSpread stands out as a versatile, health-oriented product suitable for a wide range of dietary applications. Its potential extends beyond culinary use, positioning it as an ideal ingredient for functional nutrition and wellness products. The proposed invention showcases an innovative approach to lipid-based food structuring, highlighting its potential for commercialization in the health-oriented food industry. |

# TAINA VIE

**RO.326.**

**BeeVita**

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|---|---|
| **Title EN** | **Innovative Whipped Honey Cream Enriched with Collagen and Turmeric: A Functional Superfood for Wellness and Longevity** |
| **Authors** | Dragos Iliescu; Oana Iliescu; Andra-Sabina Neculai-Valeanu; Catalina Sanduleanu |
| **Institution** | TAINA VIE; BioNEst – Cluster of Organic Agriculture focused in the northeast of Romania; |
| **Description** | The increasing demand for functional foods that combine natural ingredients with scientifically proven health benefits has driven the development of our innovative Whipped Honey Cream enriched with collagen and turmeric. This unique formulation leverages the exceptional properties of honey, hydrolyzed collagen, and curcumin-rich turmeric to create a product that promotes skin health, joint support, and immune function while offering a delightful taste and smooth texture. Honey serves as an ideal natural carrier due to its antimicrobial properties, enzymatic activity, and ability to preserve bioactive compounds. Through a specialized whipping process, we achieve a light and airy texture that enhances the sensory experience and improves the bioavailability of the added functional ingredients. Hydrolyzed collagen, known for its role in supporting connective tissue regeneration and skin elasticity, is seamlessly incorporated, ensuring optimal absorption. Turmeric, a powerful antioxidant and anti-inflammatory agent, is introduced in a carefully processed form to maximize curcumin stability and effectiveness. Our formulation avoids artificial additives and relies on a synergy of natural components to deliver a highly nutritious and versatile product. It can be consumed as a spread, a natural sweetener, or an ingredient in various culinary applications, catering to health-conscious consumers seeking a convenient and enjoyable way to incorporate functional ingredients into their daily diet. This innovative approach represents a significant step forward in the functional food industry, merging traditional apitherapy knowledge with modern nutraceutical advancements. We aim to highlight the potential of natural, bio-enhanced food formulations in promoting holistic well-being and longevity, while also exploring future opportunities for sustainable production and commercialization. |

# Vegetable Research and Development Station, Bacău

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| **RO.327.** | |
| **Title EN** | **MaSiMa _New Romanian Pepper Cultivars Matiușca, Silvioara, Marinică** |
| **Authors** | Brezeanu Petre Marian, Silvica Ambăruș, Creola Brezeanu, Andreea Antal-Tremurici, Mariana Calara, Claudia Bălăiță, Brumă Sebastian, Codrin Dinu Vasiliu |
| **Institution** | **Vegetable Research and Development Station, Bacău** |
| **Patent** | Patent 00694/2023 (for Silvioara), Certificates: 8372/2022 (Matiușca) and 8373/2022 (Marinică) – patent and certificates for new plant variety |
| **Description** | The invention presents a portfolio of three pepper varieties (bell, round, and long) developed in frame of the breeding program of Vegetable Research and Development Station, Bacău. Conventional breeding methods assisted by new breeding approaches, along with modern genomic tools speed up traditional breeding programs and allows development of new cultivars.<br>The presented varieties are distinguished by organoleptic and nutritional profile, that makes them attractive to consumers. Productivity, and resistance to pathogen attacks, specifically Verticillium dahliae, virosis, and Phytophthora capsici favor cultivation in both conventional and organic systems. The transfer to farmers is made by certified seeds produced for large cultivation areas in different systems such as open fields, greenhouses and plastic tunnels.<br>The invention ensures a multilevel impact at economic and environmental level.<br>The major benefits:<br>- Diversification of pepper assortment by creating new high-performance genetic resources, with desirable fruit color, shape and nutritional quality, in accordance with consumers expectance.<br>- Organic and conventionally certified seeds for national market.<br>- Autochthone cultivars (nutritional and tasty) are suitable for cultivation in multiple systems, highly requested by consumers.<br>The invention contributes to food security, consolidates Romanian germplasm reservoir, enhance production while |

limiting overexploitation of natural resources thanks to suitability to organic cultivation. In this manner the work aligns with The Agenda for Sustainable Development and the European Green Deal.

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**RO.328.**

**Title EN**

**Weed control through allelopathic species in organically cultivated climbing bean crop**

**Authors**

Mariana Calara[1], Neculai Munteanu[2], Dan Ioan Avasiloaiei[1], Creola Brezeanu[1], Claudia Balaita[1], Carmina Mihaela Benchea[1], Petre Marian Brezeanu[1], Andreea Antal-Tremurici[1], Ioan Sebastian Bruma[3], Codrin Dinu Vasiliu[3]

**Institution**

**Vegetable Research and Development Station Bacau (VRDS), 220 Calea Bârladului, Bacău, Romania;**

**Description**

This technology aims to implement natural weed control strategies by integrating allelopathic plant species into the organic cultivation of climbing bean (Phaseolus vulgaris) crop. Developed and tested at VRDS Bacău, the approach involves intercropping climbing bean with allelopathic species. The biological material used includes red clover (Trifolium pratense, 20 kg/ha), white clover (Trifolium repens, 12 kg/ha), sainfoin (Onobrychis viciifolia, 90 kg/ha), forage radish (Raphanus sativus var. oleiformis, 30 kg/ha), white mustard (Sinapis alba, 25 kg/ha), barley (Hordeum vulgare, 180 kg/ha), spring barley (Hordeum distichon, 200 kg/ha), and oats (Avena sativa, 120 kg/ha).These species are recognized for their allelopathic potential, releasing natural biochemicals (such as phenolic acids, flavonoids, and glucosinolates) that inhibit weed germination and growth. The allelopathic species are sown simultaneously with the climbing bean crop.

Two mowing interventions are recommended during the crop cycle, based on the level of weed infestation. The green biomass generated from mowing is left on the soil surface, contributing to weed suppression, soil coverage, and fertility improvement. This eco-friendly approach enhances biodiversity, reduces dependence on manual labor and chemical inputs, and supports long-term soil health—making it particularly suitable for organic horticultural systems seeking sustainable weed control alternatives.

# National Institute for Laser, Plasma and Radiation Physics

| RO.329. | |
|---|---|
| **Title EN** | **Tactical Warfare: Infrared Stealth Technologies (TWIST)** |
| **Authors** | Adrian Bercea, Mihaela Filipescu, Mariana Maria |
| **Institution** | **National Institute for Laser, Plasma and Radiation Physics** |
| **Patent no.** | PN-IV-P7-7_1-PED-2024-1371 (67PED/2025) |
| **Description** | The Tactical Warfare: Infrared Stealth Technologies (TWIST) project, spanning two years with a start date of February 2025, focuses on advancing infrared stealth technology. A multidisciplinary team of 12 researchers and engineers, led by Dr. Adrian-Ionut Bercea aims to develop a device that could effectively "hide" itself from thermal cameras while enabling encrypted and covert communication. The development process involves reaching key milestones, including the fabrication of vanadium dioxide active layers, the completion of device assembly, and the integration of communication modules. Deliverables such as laboratory samples, reports, technical datasheets, a project web page, articles, patents, and validated devices will be generated throughout the project. Identified risks, extending from delays to regulatory changes, are mitigated through contingency plans, collaboration, prioritization, and legal engagement. TWIST, a collaboration between INFLPR and Tehnooptoelectronica S.R.L, aspires to contribute to the efficient management of crime and terrorism and the improvement of the resilience and autonomy of physical and digital infrastructures, promising both scientific advancement and economic benefits. |

| RO.330. | |
|---|---|
| **Title EN** | **Process for obtaining structured metallic surfaces with lotus effect by laser ablation** |
| **Authors** | **Urzica Iuliana, Udrea Cristian ,Simon Agota, Gheorghe Petronela, Bojan Mihaela** |
| **Institution** | National Institute for Laser, Plasma and Radiation Physics, |
| **Patent no.** | ***: A/00285/13.08.2024*** |
| **Description** | Nanoscience and nanotechnology research is strongly encouraged and developed nowadays due to its positive impact on the development of new areas such as |

nano-biology, nano-electronics, nano-photonics and micro- and nano-fluidics. The requirements of these new scientific domains have prompted the emergence of innovative techniques conceived to obtain structures with dimensions under micrometer range. Recently, superhydrophobic surfaces, for which the water contact angle is higher than 150°, have received attention due to the many potential applications ranging from biological to industrial processes and usable even in daily life.

In this paper, an innovative, flexible and low-cost system for producing superhydrophobic metal surfaces modeled by nanosecond laser ablation will be presented. The main goal of this patterned superhydrophobic metallic surfaces is to obtain a fingerprint device to be used on polymeric materials such as: polydimethylsiloxane-PDMS and polyethylene terephthalate-PET. It should be mentioned that the polymeric structures have the same properties as those of the metal pattern and are used in a large number of remarkable applications, in biology, food industry, marine industry and textile industry.

**Keywords**: laser surface modifications, superhydrophobic surfaces, laser ablation, imprinting polymeric materials

**Acknowledgements**: The present research was supported by the Ministry of Research and Innovation -Nucleus Programme LAPLAS VI /30N/ 2023

**RO.331.**

| | |
|---|---|
| **Title EN** | **New flexible and textured composite membranes for applications targeting the treatment of periodontal diseases.** |
| **Authors** | L.N.Dumitrescu, A.Bonciu, L.Rusen, V.Dinca |
| **Institution** | National Institute for Lasers, Plasma and Radiation Physics |
| **Patent no.** | A00601/ 18.09.2024 |
| **Description** | The invention is based on the production of flexible composite membranes with micro- and nanostructured surfaces derived from ceramic nanoparticles and biodegradable synthetic polymers, which can be used to cover the root surfaces of teeth affected by periodontal |

disease. Their applications may target new treatments to halt and reverse bone resorption. These membranes were created through a replication process of composite materials, consisting of ceramic (Zirconia) and a biodegradable polymer (polylactic-co-glycolic acid, PLGA) in an optimal 30/70% ratio, using polydimethylsiloxane (PDMS) molds. The problem addressed by this invention is the development of large-area flexible composite membranes that can facilitate an improved cellular response based on topography and composition, while also leveraging ceramic nanoparticles to help stop and reverse bone resorption. The proposed solution involves creating flexible composite membranes with textured surfaces featuring hexagonal microcolumnar structures and nanogranular walls. These membranes are produced at room temperature via a replication method, covering areas of at least 4 $cm^2$, and possess a biocompatible composition stable in biological environments. They are capable of supporting enhanced attachment of murine MC3T3-E1 pre-osteoblastic cells.

The micro- and nanostructured composite membranes offer promising prospects for the use of such materials with controlled or tailored surface characteristics in designing future membranes for periodontal disease treatment. Additionally, they can improve epithelial tissue adaptation not only around affected teeth but also around screws, pins, plates, and other metal inserts placed in bone, such as dental implants in alveolar bone.

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**RO.332.**

| | |
|---|---|
| **Title EN** | **Procedure for obtaining three-dimensional interconnected metal nanoparticles** |
| **Authors** | Adrian-Ionuț Bercea, Mihaela Filipescu |
| **Institution** | **National Institute for Laser, Plasma and Radiation Physics** |
| **Patent no.** | A/00653/31.10.2024 |
| **Description** | The present invention relates to a method for obtaining three-dimensionally (3D) interconnected palladium (Pd) nanoparticles (NPs) in the form of a porous thin layer that can be integrated into fuel cells as a catalyst. The nanoparticles can function either on the anode to accelerate the hydrogen oxidation reaction, producing protons and electrons necessary for energy generation, or on the cathode |

to catalyze the oxygen reduction reaction, contributing to water formation and completing the electrochemical circuit.
The method is based on the pulsed laser ablation (PLD) technique and uses a pulsed ultraviolet (UV) laser.
The method according to the invention has the following advantages, allowing:

- operation at atmospheric pressure in synthetic air, thereby eliminating gas consumption;
- production of interconnected palladium nanoparticles forming a porous 3D layer with controlled and reproducible thickness;
- formation of a substrate-adherent layer with a high surface-area-to-volume ratio, leading to enhanced catalytic activity of the 3D Pd-NP-based electrode;
- Pd nanoparticles with a polycrystalline structure and crystallite sizes of approximately 20 nm;
- single-step fabrication of a 3D layer, simplifying the manufacturing process and eliminating contamination risks.

The problem solved by the present invention consists in replacing a complex multi-step procedure with a single-step synthesis of polycrystalline Pd-NP layers, featuring a high surface-area-to-volume ratio that enhances the catalytic activity of the 3D layer.

| **RO.333.** | |
|---|---|
| **Title EN** | **Extreme Light Infrastructure Target Engineering (ELITE)** |
| **Authors** | Mihaela, Filipescu, Victor Leca, Adrian Bercea |
| **Institution** | **National Institute for Laser, Plasma and Radiation Physics** |
| **Patent no.** | ELI-RO/RDI/2024_026 |
| **Description** | The development of high repetition rate free-standing targets (HRRFST) starts with assisting the state and functionality of the processing material systems used to meet the ELITE required objectives.<br>Two type of HRRFSTs are fabricated: carbon foam and oxygen free polymer on honeycomb structures.<br>Laser-based deposition systems (pulsed laser deposition – PLD and matrix assisted pulse laser evaporation – MAPLE) are adapted to obtain the optimal experimental conditions for the fabrication of inorganic (C) and organic components |

(PPy) of the high repetition rate free-standing targets.
The ELITE project is structured into four phases:
Configurations and preliminary experiments,
ELITE work-flow optimization and advanced characterization,
Manufacturing and advanced testing,
Validation of ELITE outcomes and perspectives in the framework of ELI-NP
Preliminary experiments to obtain HRRTs take different approaches:
i) uniform and compact polymers layers on silicon (Si) substrate;
ii) uniform and compact free-standing membranes;
(initially deposited on dissolvable substrate) by MAPLE;
iii) nanostructures (foam) of C as layers on Si by PLD;
iv) double-layer structure of C foam by PLD on compact PPy layer by spin coating;
v) C foam deposited by PLD on honeycomb structures.

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**RO.334.**

| | |
|---|---|
| **Title EN** | **Enhancing the Antitumoral Effect of Chlorpromazine through Laser Irradiation** |
| **Authors** | Ana-Maria Udrea, Angela Staicu, Florin Bilea, Mihaela Balas, Tatiana Tozar, Adriana Smarandache, Ionuț Relu Andrei |
| **Institution** | **National Institute for Laser, Plasma and Radiation Physics** |
| **Patent no.** | OSIM A/00409 din 22.08.2024 |
| **Description** | This invention introduces a novel method for enhancing the antitumoral effect of chlorpromazine (CPZ), a phenothiazine-class drug, through laser irradiation. The method involves using a 266 nm laser to alter CPZ, and obtaining photocompounds with specificity for breast cancer cells. Post-irradiation, UV–Vis absorption spectroscopy, Fourier Transform Infrared spectroscopy, and High-Performance Liquid Chromatography coupled with Mass Spectrometry were employed to identify the generated photoproducts. Molecular docking studies predicted the interaction of CPZ and its identified photoproducts with specific cancer targets. Several in vitro biological assays, including MTS, Live/Dead, and LDH validated the enhanced |

antitumoral activity of laser irradiated CPZ. The innovation lies in extending CPZ's use from mental health to cancer treatment by generating photoproducts via laser irradiation that target breast cancer cells. This breakthrough provides a new therapeutic approach with potential selectivity compared to standard therapies which may reduce side effects and combat drug resistance.

| RO.335. | |
|---|---|
| **Title EN** | **Procedure for controlling the polarization state in a scanning interferometer** |
| **Authors** | **Florin Garoi, Ionuț-Relu Andrei, Ionuț Nicolae, Petronela Garoi, Cristian Viespe** |
| **Institution** | **National Institute for Laser, Plasma and Radiation Physics, 409 Atomistilor Street, PO Box MG-36, Magurele 077125, Ilfov, Romania** |
| **Patent no.** | **Patent application No. a/00437/ 09.08.2023** |
| **Description** | The invention refers to a method of controlling the polarization of broadband radiation by manipulating the geometric phase in a polarizing interferometer. Traditional means of controlling phase shifts in the interferometer require fine translational motions on the order of nanometers. The invention solves this problem by means of a method that uses geometric phase control in a polarizing interferometer with collimated LED source and polarizing phase shifter. Thus, it is proposed to control rotations of the order of degrees of arc of a half-wave plate instead of translations of the order of nanometers of the mirror.<br>Applications: Industrial and laboratory equipments |

# CONTINENTAL Automotive Romania S.R.L.

**RO.336.**

| | |
|---|---|
| **Title EN** | **Simulator unit for a hydraulic braking device** |
| **Authors** | Mihaita-Florin **Siniuc**, Tudor **Ulian**, Razvan Simion **Cristea** |
| **Institution** | **Continental Automotive Technologies GmbH** |
| **Patent no.** | DE102023205385A1 |
| **Description EN** | The invention relates to a simulator unit optimized for production and assembly, designed to generate a counterforce acting against an actuating force for a braking device of a vehicle braking system. The unit comprises a chamber housing a hydraulically axially actuable piston, an elastomer member, a spring element, and an intermediate piece. In its unactuated rest position, the piston is positioned at a defined axial distance from the elastomer member, while the intermediate piece extends axially from the piston toward the elastomer member. The spring element is clamped between the intermediate piece and the piston, with the intermediate piece being restrained relative to the piston while remaining axially displaceable to a limited extent. According to the invention, the piston includes a blind hole-shaped inner bore, and the intermediate piece features restraining means on a radial outer edge, which interact with an undercut formed in the inner bore. |

**RO.337.**

| | |
|---|---|
| **Title EN** | **Automated control system and method for operating a multi-functional equipment, and multi-functional equipment thereof** |
| **Authors** | Ciprian Sluser |
| **Institution** | Continental Autonomous Mobility |
| **Patent no.** | EP4378292A1 |
| **Description EN** | The present invention relates to an automated control system and method for operating a multi-functional equipment, and multi-functional equipment thereof, designed for agricultural purposes. The automated control system may comprise: an automated driving control unit configured to receive a task comprising one or more specific operations, the automated driving control unit being configured to activate or deactivate generic vehicular functions (e.g. Corridor Follow Assist); and an implement control unit configured to activate or deactivate specific assisting functions (e.g. Harvesting Assist) that enable the task execution. |

| RO.338. | |
|---|---|
| **Title EN** | **Method for defrosting an electrically actuated vehicle door and defrosting device** |
| **Authors** | Florin Atasiei |
| **Institution** | **Continental Automotive Romania** |
| **Patent no.** | Patent application No. GB2595632A/2021 |
| **Description EN** | This invention addresses the issue of frost accumulation on the rubber seals of vehicle doors, which can cause difficulty in opening the doors and potentially damage the seals.<br>The method involves utilizing the soft-close motors to gently move the doors, which helps to break the bond between the frost and the rubber seals. This movement, combined with the inherent flexibility of the rubber, effectively dislodges any frost or ice that has formed.<br><br>One of the key advantages of this method is its efficiency. Traditional techniques for defrosting door seals, such as manual scraping or using chemical de-icers, can be time-consuming and may not always provide uniform results.<br>In contrast, the method described in this patent offers a rapid and consistent defrosting process, reducing the time required to clear the seals and enhancing overall convenience for vehicle owners.<br><br>This innovation not only improves the functionality of the door seals but also contributes to the overall durability of the vehicle. |

# Center for Study and Research for AgroForestry Biodiversity "Acad. David Davidescu" Romanian Academy

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|---|---|
| **RO.339.** | |
| **Title EN** | Research on the institutional capacity of the public-private partnership to actively contribute to the performance of agriculture |
| **Authors** | Gabriel Popescu, Ioana Corina Moga |
| **Institution** | Center for Study and Research for AgroForestry Biodiversity "Acad. David Davidescu", Romanian Academy |
| **Patent no.** | ADER 21.1.1/2023 |
| **Description EN** | In the spirit of increasing the role of local stakeholders in the management of public policies, it is necessary to strengthen, consolidate, and develop institutional relationships based on public-private partnerships in agriculture. In this context, institutions founded on public-private partnerships play a decisive role in the knowledge market, by promoting elements of progress, mitigating the effects of natural risk factors, and supporting the development of smart, resilient, and diversified agriculture in both crop production and livestock sectors. All these efforts will lead to increased yields, as well as enhanced economic, social, and environmental efficiency.<br>*The project aims to strengthen the institutional capacity of public-private partnership relations, as a foundation for enhancing competitiveness in the crop and livestock sectors, by developing and intensifying associative structures.* This will result in the revitalization of the livestock sector and the encouragement of land users to engage in sustainable agricultural practices.<br>Actions will be initiated and promoted to ensure the transfer of knowledge from institutions that generate and promote technical and technological progress in agriculture to local agricultural stakeholders. |

# DFR SYSTEMS

| | |
|---|---|
| **RO.340.** | |
| **Title EN** | **Development and validation of a combined tri-component integrated system for wastewater treatment** |
| **Authors** | Ovidiu Iordache, Ioana Corina Moga, Bogdan Cazan, Gabriel Petrescu |
| **Institution** | DFR Systems SRL<br>The National Research and Development Institute for Textiles and Leather |
| **Patent no.** | 62PED/2025 |
| **Description EN** | Textile and leather industrial activities are responsible for the generation of large quantities of processed waters that are characterized by high industrial chemicals content, that when discharged into public waters or refluxed into environment components, lead to ecosystemic hazards. The treatment of tannins containing wastewater is difficult, due to their high solubility in water, which is a limiting factor in conventional biological treatment methods, as it inhibits microbial growth in activated sludge.<br>The project scope is the development of a combined wastewater (specific to textile and leather industry) treatment method, coupled with the execution of a customized innovative treatment installation, with high efficiency and versatility, overcoming the disadvantages of currently used physical-chemical treatment. The proposed technology relies on complementarity between **three key components** for reduction and breaking down of main pollutants in the treated wastewater volume. The three components refer to **macromycetes strains, MBBR specific HDPE carriers and sonication treatment**.<br>Macoromycetes strains will be immobilized on biofilm carriers, for mechanical biomass fixation. High yields of biomass will be targeted, by macronutrients enhancement of growth rates. Several strains will be taken into consideration, such as: Trametes versicolor, Pleurotus pulmonarius, Pleurotus ostreatus, Morchella importuna, Pleurotus eryngii, Pleurotus djamor, Pholiota nameko, Pholiota adiposa, Lentinula edodes, Ganoderma lucidum,Ganoderma lingzhi, Flammulina velutipes, Fusarium oxysporum, Cerioporus squamosus etc.<br>Biotreatment will be closely followed by sonication process that will be used for destruction of both microbial load in the treated wastewater, yielding a post-sterilizing effect after the first treatment stage, and disruption of organic matrixes that are difficult to degrade. |

# A BETTER LIFE SOLUTIONS

**RO.341.**

**Title EN** ***iSentinel ROAD&RAIL***

**Authors** *Mircea MANOLESCU*

**Institution** ***A BETTER LIFE SOLUTIONS SRL***

**Patent no.** *Patent application No. A.003732020*

**Description EN**

**iSentinel® ROAD & RAIL** is a cutting-edge intelligent seismic protection and warning system designed to save lives and safeguard infrastructure during earthquakes. By detecting seismic waves seconds or even tens of seconds before the destructive shock hits, iSentinel® enables the activation of life-saving safety protocols with no human intervention.

One of its most critical functions is the automated control of traffic and railway safety systems. When a major earthquake is imminent, iSentinel® instantly turns traffic lights red to stop vehicles from entering vulnerable areas such as tunnels, viaducts, and bridges. Simultaneously, it slows down or stops trains and rolling stock, preventing derailments and avoiding catastrophic consequences.

iSentinel®'s modular, customizable architecture allows seamless integration across a wide range of environments—from urban roads and highways to national rail networks, as well as industrial and critical infrastructure zones. It is designed to function autonomously for up to 15 days during power outages, ensuring uninterrupted protection in post-earthquake scenarios.

The system has already been deployed in countries such as Romania, Peru, and Bulgaria, where it has proven its effectiveness in safeguarding both people and critical assets. Recognized globally, iSentinel® has received over 100 international awards and was ranked the number one seismic protection system, including winning the prestigious Grand Prize in the USA.

By combining early detection with automated protective actions, **iSentinel® ROAD & RAIL** delivers a vital layer of seismic safety—minimizing casualties, protecting infrastructure, and ensuring business continuity during earthquake events.

# SC Holistic Lounge SRL

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|---|---|
| **RO.342.** | |
| **Title EN** | **CO-TECH- test, measure, balance** |
| **Authors** | Oana Codruta Bacean Miloicov |
| **Institution** | **SC Holistic Lounge SRL** |
| **Patent no.** | 301240/29.12.2023 |
| **Description EN** | CO-TECH is an innovative and copyright-protected concept that brings a new perspective to patient evaluation and therapy. Using biofeedback, this system optimizes evaluation processes, improves therapies, and reduces execution times, resulting in a more efficient therapeutic approach. |

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|---|---|
| **RO.343.** | |
| **Title EN** | **QVibe frequency generating therapeutic device** |
| **Authors** | Oana Codruta Bacean Miloicov |
| **Institution** | **SC Holistic Lounge SRL** |
| **Patent no.** | 301243/29.12.2023 |
| **Description EN** | Hashimoto's thyroiditis is an autoimmune condition affecting the thyroid gland, leading to fatigue, weight gain, and hormonal imbalances. Thyroid nodules, often associated with this condition, can severely impact thyroid function and overall health. |

# Justin Capra Association

| RO.344. | |
|---|---|
| **Title EN** | LOGISTIC SUPPORT CONTAINER–MOBILE POWER PLANT FOR EMERGENCY |
| **Authors** | Popescu Emil, Rădoescu Petre, Stroe Danut, Guiman Daniela- Romanita, Jurbă Mihai- Emil |
| **Institution** | S.C. ELECTRO OPTIC COMPONENTS S.R.L. / ROMANIA |
| **Description EN** | MOBILE POWER PLANT FOR EMERGENCY with a power of 500 kVA is designed to be used in emergency situations.<br>The product is designed in a versatile, independent version with a whole range of distinct applications from: industry, telecom, oil&gas, emergency situation and can work as island power plant, back up, peak load for national grid etc.<br>Logistic Support Container allows the installation of a wide range of generator groups chosen and sized according to the energy supply needs of th evarious facilities.<br>It contains the fuel tank for a long time operation, command and control panel and cables and distribution boxes which can be used in various configurations. |

| RO.345. | |
|---|---|
| **Title EN** | **EN-Bioresonance devices for functional recovery through self-treatment** |
| **Authors** | Velcea Marian, Moldovan Ion Corneliu, Caracas Eugen, Hideg Catalin, Curta Ioan, Ene Ciprian, Mandrea Lucian, Plotog Ioan, Mihailescu Bogdan Velcea Alexandru, Chetan Mihai, Anca Aliz |
| **Institution** | **Asociatia Justin Capra,**<br>**Doctor TechSRL,** |
| **Description EN** | Patent application RO-132423 / WO2018037379<br>Qi-Polino EMCOPAD (Electro Magnetic Coherent Passive Polarised Pach Device) is a comfortable means of activating acupuncture points and important tissues in the process of functional recovery of joints and organs. Specialized devices/Ortheses appropriately equipped with patented devices allow the user to independently practice exercises recommended by our doctors, according to their functional recovery needs; Devices dedicated to the ankle, knees, radioulnar joint, elbow or cervical area are available and customized devices can be made upon request, following a specialist consultation. |

# Technological High School of Targu Ocna

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|---|---|
| **RO.346.** | |
| **Title EN** | **Upcycling plastic for 3D printing to create Braille language resources** |
| **Authors** | Nicoleta Vartolomei, Simina Tănasă, Andrei Pîrvu |
| **Institution** | **Technological High School of Targu Ocna** |
| **Description EN** | Braille is an incredibly important accessibility aid, and yet it is left out of our home projects simply because of a lack of knowledge. With the help of 3D printers, we can create different shapes, puzzles, objects and much more. But we can also use them for much better purposes. This project supports and gives blind children the chance to learn to read the "Braille" alphabet much easier, and not only, geometric shapes and much more. They are made with a tactile Braille system on the front surface, allowing blind people to read and interpret information by touch.<br>3D printers – initially only available to science labs and a small number of privileged designers – are becoming more affordable and useful for the general public, with one problem: the printing material is far too expensive.<br>The overall objective of the project is the creative use of collected unwanted plastic materials and reintroducing them into a new cycle, beneficial in protecting the environment by making filament for 3D printers and creating accessible resources for those who use Braille language. |

**Grigore Moisil**
**Computer Science High School Iasi, Romania**

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|---|---|
| **RO.347.** | |
| **Title EN** | **The Pickabot project** |
| **Authors** | Shaan Stefan SALIAN, Mark STRIMBU<br>Coordinator: Tibu Mirela |
| **Institution** | **Grigore Moisil Computer Science High School Iasi, Romania** |
| **Description EN** | The Pickabot project aims to develop an autonomous waste collection system capable of identifying, collecting, storing, and transporting waste in urban and industrial areas. By leveraging advanced technologies such as the YOLOv3 model for waste detection, ROS Melodic for robotic control, and a Jetson Nano development board for AI and robotics applications, the system is designed to operate autonomously across various terrains, including hard-to-reach areas. The robot features a tracked chassis, a 6-DOF robotic arm, and a waste storage container with a compaction mechanism, enabling efficient waste collection. |

# Vasile LUPU

**RO.348.**

| | |
|---|---|
| **Title** | **AERO HYBRID SUNSHADE** |
| **Authors** | Lupu Vasile |
| **Institution** | **INDIVIDUAL** |
| **Patent no.** | Dosar OSIM A 00113/2025 |
| **Description** | The invention AERO HYBRID SUNSHADE will be used especially for cooling the body of carsIs a mobile or fixed equipment used to remove the effect of hot air and ultraviolet rays.The problem is solved by a fan that directs the air taken from atmosphere above the exposed surfaces.. |

# Toader BUTINCU

**RO.349.**

**Title** **INERTIAL MECHANICAL TRACTION DEVICE**

**Authors** Butincu Toader

**Institution** **individual**

**Patent no.** A/00214/25.04.2024

**Description**

The device to be presented has as its main part a tubular-shaped housing (1) which, in cross-section, one one 180° side (sector CDEFG) is semicircular with radius $R_3$, and the other half of the contour (sector GHABC) is made of three arcs of a circle with different radii ($R_4$ and $R_5$) and two rectilinear portions ($MK_1$ and $K_2N$), arranged symmetrically with respect to the unique plane of symmetry of the housing (AOE). All portions, circular and rectilinear, have a common tangent at the junctions. In the two covers (2) of the device, a straight central shaft (3), coupled to a drive motor, is mounted on bearings, to which shaft are fixed three supporting disks (4), to which are connected, by means of washers (6) and bolts (5 and 7), eight roller-shaped working masses (8).

When the central shaft (3) is rotated by a motor, each roller (8) moves outward in the direction of the radius of revolution under the action of the centrifugal force, until it comes into contact with the housing (1), on which it then runs during operation. As the radii of revolution are of different sizes, it is obvious that the centrifugal forces will also be different: larger in the semicircular area and smaller on the opposite side, the masses and angular velocity of the rollers being constant. The orthogonal projection of all the centrifugal forces onto the plane of symmetry of the housing manifests itself as two antagonistic tractive forces, the difference of which gives a radial tractive force of the device, usable for different purposes.

**RO.350.**

| | |
|---|---|
| **Title** | **MECHANICAL GRAVITY MOTOR** |
| **Authors** | Butincu Toader |
| **Institution** | **individual** |
| **Patent no.** | A/00429/23.07.2024 |
| **Description** | The mechanical gravity motor are 16 working masses in the form of rollers (1), arranged equidistantly angularly and capable of revolving around a fixed central shaft (2).These rollers are supported by two fixed tubular housings (3 and 4), stiffened on the central shaft, and two disks (5) that can rotate freely around the central shaft. Both housings have the same shape and the same axis of simmetry but different dimensions and, together with the two disks, they ensure the circulation of the rollers' centre of mass on a trajectory that has an identical aspect to the shape of the housings, a trajectory formed by four circular portions (CC', A'A, BC and C'B') with different radii ($R_1$, $R_2$ and $R_5$- $R_6$) and two rectilinear portions (AB and B'A'), all six portions having a common tangent at the junction points. Each roller is mounted on a bolt (6) which can slide freely inside radial windows (7), identical and equidistantly located in the two supporting disks (5). The centre angle between the two adjacent rollers is 22°30'=360°/16 and represents the operating cycle of the motor. The change in the size of the radii $R_1$ and $R_2$ is made in two transition zones (ABC and C'B'A'), one at the top and one at the bottom, each consisting of a straight and a circular portion (AB+BC and C'B'+B'A'). The working position is unique, i.e. with axis CC' in the vertical plane.<br>Under the action of the weight of the rollers, the two disks are set in rotation with an angular velocity ($\omega$) limited by the Earth's constant gravitational acceleration (9.81m/s$^2$). This motion can be picked up from one of the two motor disks. The analytical study and the scaled graphical representation show that the motor can deliver usable torque for different purposes, after having decreased the torque in the opposite direction, which manifests itself in two transition zones. |

# Mihai Albert VLĂDESCU

**RO.351.**

| | |
|---|---|
| **Title** | **Passive protection in automotive communications** |
| **Authors** | **VLĂDESCU MIHAI ALBERT** |
| **Institution** | **National College Mihai Viteazul Ploiesti, 8th grade** |

**Description**

The Passive Protection in Automotive Communications computer application allows, after a first pairing of the mobile phone with the car's hands-free system, the connection of the two devices to be made automatically, without user intervention, even if the smartphone's Bluetooth and the car's hands-free system are deactivated, thus increasing traffic safety.

When the smartphone's accelerator detects that the speed of 30 km/h is exceeded, the Passive Protection computer application commands the phone's Bluetooth to switch to operational mode. In the same way, the car's hands-free system is activated, controlled based on a similar protocol (when the speed of 30 km/h is exceeded and the car's equipment is set to switch to pairing mode). Thus, mandatory and independent of the driver's concerns, the connection of the two devices will ensure that phone calls can be made without diverting attention from driving.

The application runs as a foreground service (Foreground Service) and constantly monitors the user's speed. When it detects that the speed exceeds 30 km/h, it automatically activates Bluetooth and connects to the car's system. In addition, the app only allows calls to be made via Bluetooth when driving at a speed greater than 30 km/h.

**Maria Sarah VLĂDESCU**

**RO.352.**

**Title**

**Optical Fiber Facades for Public Advertising Transforming Architecture into Dynamic Media**

**Authors**

Maria Sarah VLĂDESCU

**Institution**

Ion Mincu University of Architecture and Urban Planning, Romania

**Description**

Optical fiber facades represent a breakthrough in merging architecture with media technology. By integrating optical fibers into building exteriors, these facades turn static surfaces into luminous, animated displays for public advertising. Unlike traditional LED screens, optical fiber systems provide seamless, elegant illumination across entire facades, creating eye-catching visual effects while maintaining architectural aesthetics.

How It Works

Light sources, typically energy-efficient LEDs, are connected to networks of optical fibers embedded in materials like glass, polymers, or composites. The fibers distribute light evenly, enabling smooth animations, vivid text, and striking graphic designs to appear on the building surface.

**Advantages**

• Energy Efficiency: Lower power consumption and minimal heat generation.

• Durability: Resistant to weather and environmental factors.

• Low Maintenance: Reduced upkeep compared to traditional displays.

• Design Flexibility: Adapts to complex surfaces and architectural forms.

• Reduced Light Pollution: Enhances urban environments responsibly.

**Applications**

Optical fiber facades are used worldwide on commercial buildings, cultural landmarks, and public spaces to display advertisements, branding messages, and interactive content. These installations not only capture public attention but also contribute to the visual identity and modernization of cityscapes.

**Future Potential**

With ongoing advances in smart materials and integration with renewable energy, optical fiber facades are poised to play a major role in the development of sustainable, adaptive advertising in smart cities. Their ability to create immersive visual experiences makes them a powerful tool for the future of urban communication.

# Cristian ALBU

**RO.353.**

| | |
|---|---|
| **Title** | **High efficiency Windshield Wiper** |
| **Authors** | Albu Cristian |
| **Institution** | **SC One Tech GSM S.R.L.** |
| **Patent no.** | N/A |
| **Description** | Invention consists in a windshield wiper operating on a water film generated by an internal pressure nozzle. The system can be fitted with a filtered liquid recovery for maximum efficiency. |

# Gheorghe Asachi Technical University of Iasi
## Additional

**RO.354.**

| | |
|---|---|
| **Title** | **High Chemical Resistance in Environmentally Friendly Materials** |
| **Authors** | Mihaela Caftanachi, Mihai Vrabie, Maria Harja* |
| **Institution** | **Gheorghe Asachi Technical University of Iasi** |
| **Patent no.** | |
| **Description** | The depletion of natural resources and the increasing accumulation of industrial determined extensive research for waste recovery and reuse strategies. This study investigated the potential to develop eco-friendly materials with high chemical resistance, using fly ash type F and C, blast furnace slag, and metakaolin. The studied materials offer several advantages: the valorization of industrial waste as raw materials, the use of low-molarity alkaline activators (3–5 M), ambient-temperature curing, low $CO_2$ emissions, and a simple production process without other pollutant streams. Because the mechanical strengths complied with standard requirements, particular attention was given to enhancing the chemical resistance of the materials. In 3% and 5%, KOH solutions the fly ash/blast furnace slag-based samples exhibited minimal mass losses, up to 1.7%. Meanwhile, metakaolin/slab-based samples demonstrated good resistance in HCl, with maximum mass losses of 4.3% after 28 days of immersion in a 5% HCl solution. The experimental results confirm the feasibility of producing sustainable, durable construction materials from industrial waste, contributing to both environmental protection and resource efficiency. |

**RO.355.**

| | |
|---|---|
| **Title** | **Mobile Experimental Stand for Testing a Linear Structural Element Under the Action of High Temperatures** |
| **Authors** | BUNEA Georgiana, ALEXA-STRATULAT Sergiu-Mihai |
| **Institution** | **„Gheorghe Asachi" Technical University of Iasi** |
| **Patent no.** | EP4521092 A1 |
| **Description** | The invention refers to a mobile experimental stand for testing a linear structural element, with a length of approximately 1 ÷ 4 m, to temperatures of 600ºC÷800ºC. The stand, according to the invention, comprises a main body composed of three linear elements transversally arranged on two inferior guide rails positioned parallel to the linear structural element and placed on two runway beams, connected at the ends by a stiffener.<br>Each main body comprises:<br>- an inferior longitudinal element transversally placed on the two |

inferior guide rails and having installed a pair of inferior wheels, that are configured to run on the two inferior guide rails.
- a mobile element on which the burner is placed that connects a first end of the inferior longitudinal element with a first end of an extensible element with adjustable length, using a yoke. The extensible element is connected to the second end of the inferior longitudinal element, thus creating a triangular shape of the main body. By using the extensible element, the position of the burner can be adjusted in height and set to the working position needed for testing the linear structural element.
On the lateral surface of the main body, a subassembly is mounted with the purpose of supporting each body in a vertical position by using a superior guide rail supported at both its ends by a vertical supporting element. The stand presents versatility, the height of the burner and the distance between burners being set according to the user's needs.

**RO.356.**

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|---|---|
| **Title** | **Tuiasi Motorsport Rally Team** |
| **Authors** | Adrian Sachelarie, Alexandru Ciuperca, WINK |
| **Institution** | „Gheorghe Asachi" Technical University of Iasi, Faculty of Mechanical Engineering |
| **Description** | The rally team of the "Gheorghe Asachi" Technical University of Iași (TUIASI) is a dynamic group of students united by a shared passion for motorsport, engineering, and innovation.<br>Through collaboration, determination, and creativity, the TUIASI Rally Team designs, builds, and maintains competition-ready vehicles that participate in national motorsport events. The team members are involved in all stages of the process—from mechanical design and tuning to project management, logistics, and marketing—offering a complete educational experience beyond the classroom.<br>With each competition, the team not only tests their engineering skills but also represents the university with pride and ambition. Their participation contributes to promoting Romanian technical education on the international stage while inspiring future generations of students to pursue excellence in both engineering and motorsport.<br>Driven by innovation, teamwork, and a deep love for rallying, the TUIASI Rally Team continues to push boundaries and chase new challenges on and off the track. |

| RO.357. | |
|---|---|
| **Title** | **Interactive OOH Meets Road Safety – Billboard Gaming Experience** |
| **Authors** | Adrian Sachelarie, Alexandru Ciuperca |
| **Institution** | „Gheorghe Asachi" Technical University of Iasi, Faculty of Mechanical Engineering |
| **Description** | In response to alarming statistics—where pedestrians accounted for 30.6% of road fatalities in Romania in 2023—WINK, alongside ZOORK and TUIASI Motorsport, introduced an innovative interactive Out-of-Home (OOH) installation aimed at promoting road safety awareness.<br>The installation featured a digital billboard equipped with a camera and machine learning algorithms to track participants' body movements in real-time. Users engaged in a game simulating a pedestrian crossing, where they had to move forward when the virtual traffic light was green and stop when it turned red. The game's difficulty increased progressively, culminating in a simulated "crash" upon any misstep, thereby emphasizing the consequences of risky road behavior.<br>This project exemplifies the fusion of technology, public engagement, and social responsibility, utilizing interactive media to foster behavioral change and enhance public safety. |

| RO.358. | |
|---|---|
| **Title** | **Road Safety Awareness Through Realistic Impact Simulations** |
| **Authors** | Adrian Sachelarie, Alexandru Ciuperca |
| **Institution** | „Gheorghe Asachi" Technical University of Iasi, Faculty of Mechanical Engineering |
| **Description** | As part of our preventive driving campaign, we have designed and built two interactive simulators that realistically replicate the forces involved in car accidents — all aimed at raising awareness on the vital role of seat belts.<br>The first is a **frontal impact simulator** that mimics a collision at speeds of **20–25 km/h**, allowing participants to safely experience the jolt of a low-speed crash. It emphasizes the importance of wearing seat belts even at seemingly low speeds, where the risk of injury can still be significant.<br>The second is a **car rollover simulator**, which rotates a vehicle to replicate a real rollover situation. This stand is used to demonstrate how seat belts keep passengers secure and prevent serious injury or ejection during such events. We also offer **live demonstrations on how to exit a flipped vehicle safely**, an often overlooked yet critical survival skill.<br>These mobile simulators are presented at public events, schools, |

and driving education workshops to encourage **preventive driving behavior**. Through realistic, memorable experiences, we aim to shift public perception and habits regarding road safety.
The team is composed exclusively of **students from the Faculty of Mechanical Engineering**, passionate about automotive engineering and community safety. We believe that innovation, education, and youth energy can drive change — both on and off the road.

**RO.359.**

**Title** **Student-Engineered Off-Road Vehicle for National Competition and Education**

**Authors** Adrian Sachelarie, Alexandru Ciuperca

**Institution** „Gheorghe Asachi" Technical University of Iasi, Faculty of Mechanical Engineering

**Description**

At the crossroads of engineering excellence and competitive spirit, the TUIASI Motorsport off-road division proudly represents the **"Gheorghe Asachi" Technical University of Iași** in the **Romanian National Off-Road Championship**. Our vehicle is a fully modified off-road car, designed and upgraded by a dedicated team of **mechanical engineering students** from the **Faculty of Mechanical Engineering**.
This robust 4x4 machine has been re-engineered to meet the extreme demands of competitive off-road racing, including enhanced suspension, custom drivetrain components, reinforced chassis, and real-time telemetry systems. All modifications are the result of careful design, rigorous testing, and a strong foundation in automotive engineering theory — proving that student innovation can thrive even in high-performance motorsports.
More than a race team, TUIASI Motorsport acts as a **technical crew** throughout the championship season, with students managing everything from diagnostics and repairs to field data analysis and performance optimization. This hands-on experience allows them to apply academic knowledge in real-world conditions, promoting a **unique model of experiential learning**.
Our mission is to blend education with action — empowering the next generation of engineers to tackle challenges creatively and collaboratively. Through this off-road platform, we also promote **mechanical engineering, teamwork, and technological innovation** to younger audiences at educational events and exhibitions.

**RO.360.**

| | |
|---|---|
| **Title** | **R3GROUP – Resilient Rapid Reconfigurable technologies for production process chains** |
| **Authors** | Emil-Constantin Loghin, Dulgheriu Ionuț, Ionesi Savin Dorin, Manuela Avădanei |
| **Institution** | **"Gheorghe Asachi" Technical University of Iaşi** |
| **Project** | **HORIZON-CL4-2022-TWIN-TRANSITION-01, acronim R3GROUP** |
| **Description** | R3GROUP project aims to develop and demonstrate resilience strategies for manufacturing reconfiguration. The project addresses issues such as scaling, new suppliers, multiple product variants, and resilience to unforeseen events in various sectors, including automotive, fabricated metal products, rubber and plastics, wearing apparel, and home appliances. It follows six reconfigurability principles: modularity, integrability, customization, convertibility, diagnosability, and scalability. R3GROUP will release an AAS-enabled platform, reconfigurable production tools, a digital toolkit for reconfiguration impact evaluation, and innovative monitoring tools, emphasizing human-centered solutions and reskilling. The project involves 24 partners across Europe. |

**RO.361.**

| | |
|---|---|
| **Title** | **R3GROUP - Lanțuri de procese de producție rezistente, rapid reconfigurabile** |
| **Authors** | Emil-Constantin Loghin, Andreea Talpă |
| **Institution** | **"Gheorghe Asachi" Technical University of Iaşi** |
| **Project** | **PN-IV-P8-8.1-PRE-HE-ORG-2023-0039, acronim R3GROUP** |
| **Description** | This project, funded under the Horizon Europe Premiere call – Institutions, aims at the institutional development of TUIASI through the interdisciplinary research group from the R3GROUP project (researchers in computers, systems engineering, and industrial engineering). The project targets solutions for Industry 4.0 and digital technologies for the manufacturing of flexible materials. Activities support the strategic priorities of the group: (1) developing research and innovation capacity in advanced technologies, (2) skills for digital entrepreneurship and industrial modernization, (3) increasing TUIASI's excellence and visibility. http://www.r3group-project.tuiasi.ro/ |

# Paradis International College

| Class | Project |
|---|---|
| | |
| **IIIB** | **The Importance of Bees to Humanity.**<br><br>Bees are essential to humanity due to their crucial role in pollination. They contribute to the production of approximately one-third of our food, facilitating the cultivation of fruits, vegetables and other plants. Furthermore, bees support biodiversity and ecosystem health, being indispensable for the survival of many plant and animal species. |
| **VI B** | **PVC Drums – Musical Instrument from Recycled Materials**<br><br>A musical instrument made from PVC tubes is an ingenious and accessible creation, which produces sounds by hitting or blowing into tubes of different lengths. The length of each tube determines the tonality of the sound produced, which allows the construction of a musical scale.<br>At the same time, the students were asked to assimilate certain colors with the sounds of the C Major scale, thus illustrating their own creativity in the appearance of the created instrument. Of course, the students were instructed to play short melodies on this instrument. |
| **VII** | **Poisons & Potions in Shakespeare's Plays**<br><br>In Shakespeare's plays, potions and poisons often symbolize transformation and deception, while driving pivotal events in the story.<br>Shakespeare's use of these substances reflects both their literal toxic properties and their symbolic weight in themes of |

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| | fate and human frailty. It's fascinating how he intertwined drama with rudimentary chemistry knowledge of his era! |
| **VIII A** | **David Grigore- Pixelator**<br>Pixelator is Lego Scanner/ 3D Printer with the objective of replicating a given random mosaic positioned at bottom of the board, on the top side. The project was made and programed using the Lego Mindstorm EV3 platform and it is composed of 4 main modules:<br>-The storage unit with the capacity of 20 pixels for each of the 6 different colors.<br>-The scanner head composed out of a color sensor for scanning each of the individual pixels that compose the mosaic, with the ability to move on the X-axis.<br>-The printer head made of a flexible joint for easier disposal of the placed pixel, with the ability to descend and retract on the Y- axis and collection the pixels from the storage unit on the X-axis.<br>-And the printing board on which the 2 panels are positioned in their corresponding section, with the ability to move on the Z-axis. |
| **IX** | **Acid rain**<br>A school project on acid rain that explores the causes, effects and solutions related to this phenomenon. Acid rain occurs due to air pollution, mainly through emissions of sulfur dioxide ($SO_2$) and nitrogen oxides ($NO_x$), which react with water in the atmosphere to form acids.<br>The effects include damage to buildings and monuments, destruction of aquatic ecosystems and damage to plant and soil health. The project proposes solutions, such as reducing industrial emissions and using renewable energy sources. |
| **XI** | **Enlighten me/Lamp**<br>The goal was to create a product that is easy to manufacture with digital fabrication tools, such as vector design and a laser cutter. To create such a product, thorough research and analysis has been made in order to find the optimal ways of production. |

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| **Robotics** | **Mechabyte Robot First Tech Challenge**<br><br>With a simple but effective design, the Mechabyte Robot manages to meet many of the requirements of this season's FTC: Into the Deep competition. The dynamic intake, located on the front arm, helps it easily take the game pieces from the field, including from the submersible, and the vertical slide lifts the piece to the last level of the basket in the net zone. The mecanum chassis is built from four mecanum wheels that are set in motion independently by a motor. This configuration controls the speed of each wheel, so the robot is able to move in any direction, including sideways.<br>The Mechabyte robot also has some autonomy, in which it manages to collect pieces, put them in the upper basket and park itself next to the submersible.<br>All these features make the Paradis school robot an efficient and competitive robot, ready to face the challenges of the FTC: Into the Deep season.<br><br>**F1 car**<br><br>Formula 1 RC is an innovative Formula 1 car project, designed to be 3D printed and used as an RC (radio controlled) model. This car offers a realistic design, independent suspension, functional aerodynamic parts and a top speed of over 80 km/h. Several types of plastic are used for 3D printing the components, including flexible polymers. This model represents a perfect combination of 3D printing technology with mechanical parts and electronic components. |
| | |

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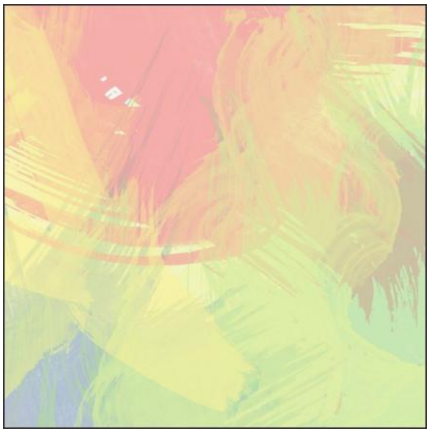

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| 4. | UNAGE Iași | *ARTISTORIA* / 2021 / 2022 | ISSN 2668-344X; ISSN-L = 2668-344X | 2021-2024 |
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| 8. | Diana-Beatrice Andron (îngrijire ediție) Popescu Maria Georgeta (coord.) | *Studii de Muzicologie*, vol. 17, 18, 19 | ISSN: 2972 – 1148; ISSN-L 2972 – 1148 | 2022-2024 |
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# EUROINVENT INTERNATIONAL WORKSHOP

17 th edition

**Scientific, Technological and Innovative Research in Current European Context**

(Cercetarea ştiinţifică, tehnologică
şi de inovare în actualul context european)

**Scientific Inquiries through Elective Elaborations**

( Cercetări ştiinţifice prin elaborări elective )

9 May 2025

Editors:
**Ioan Gabriel SANDU,**
**Ion SANDU**

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**Ioan Cristinel NEGRU**

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Iaşi

2025

**CERCETĂRI ȘTIINȚIFICE PRIN ELABORĂRI ELECTIVE**
**SCIENTIFIC INQUIRIES THROUGH ELECTIVE ELABORATIONS**

**Editors:**
Ioan Gabriel SANDU
Ion SANDU

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Volum editat sub egida
**Academiei Oamenilor de Știinta din România**



The authors assume full responsibility for the originality of their work.

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# P R E F A Ţ Ă

Brandul EUROINVENT, susținut de Forumul Inventatorilor Români şi de Europe Direct Iași, organizat sub egida **Academiei Oamenilor de Știinta din România** reprezintă un proiect modern, care a permis în ultimii 17 ani realizarea unei manifestări complexe, cu multiple implicații academice și ţinte, adresându-se tuturor creatorilor de bunuri materiale și spirirtuale (inventatori, universitari, cercetători ştiinţifici, artişti etc.). S-a dorit acest lucru, pentru a atrage atenţia guvernanţilor asupra faptului că inventica este un segment al creativităţii naţionale, care asemănător artei şi ştiinţei, trebuie să fie subvenţionată de stat, iar brevetarea să fie gratuită. Mai mult, proprietatea intelectuală și cea industrială să fie protejate prin legi diferite, să nu mai existe sistemul de rebrevetare a invenţiilor, ci doar cel de transfer tehnologic, sub formă de Patent (licenţa de aplicare).

O invenţie, o dată brevetată, trebuie să rămână în portofoliul inventatorului, respectiv a titularului (aplicantului) şi în zestrea unei naţiuni sub forma unui brevet de autor, respectiv patent ca licență industrială, din fondul personal sau public (Fondul Național de Invenții), de unde la cerere să fie transferată ca licenţă de aplicare

în baza unui contract, prin Oficiul de Stat pentru Invenții și Mărci (OSIM).

Juridic, pentru a proteja inventatorul este de preferat sistemul de re-pantentare şi nu cel de re-brevetare.

Această sărbătoare a ştiinţei, tehnicii şi artei româneşti, organizată sub sigla „Zilele Europei la Iaşi”, se desfăşoară prin implicarea tuturor actorilor şi vectorilor sociali: studenţi, cadre didactice universitare, cercetători, artişti, mass media, mediul de afaceri, autorităţi etc. Un aport deosebit în aceste manifestări îl au cele cinci universităţi de prestigiu ale Iaşului, care s-au remarcat prin performanţă și tradiție de-a lungul istoriei lor, fiind recunoscute atât în ţară, cât şi în străinătate ca principalii formatori de inteligență românească și susrse veridice ale cercetării fundamentale și tehnologice performante. Implicarea celor cinci universități în toate ediţiile de până acum a condus la formarea şi dezvoltarea de lideri ai creativităţii în domeniile lor de specializare.

Prin aceste manifestări se doreşte o participare activă, printr-o bună conlucrare şi dialog între inventatori, studenţi, specialişti din diverse domenii, artişti, mediul academic şi 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 17 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 instituțiilor de cercetare și de învățământ superior din ţările 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 14 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 XVII-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 titular al Academiei Oamenilor de Știință din România

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# ICIR 2025

## International Conference on Innovative Research

**May 8th to 9th, 2025**
Iasi – Romania

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- **Romanian Inventors Forum**
- **Faculty of Materials Science and Engineering, The "Gheorghe Asachi" Technical University of Iasi, Romania**
- **ARHEOINVEST Platform, Alexandru Ioan Cuza University of Iasi**
- **Centre of Excellence Geopolymer and Green Technology CEGeoGTech), Universiti Malaysia Perlis (UniMAP)**
- **Romanian Society of Oral Rehabilitation**
- **Department of Physics, Czestochowa University of Technology, Częstochowa, Poland**

**With support of:**

- **National Institute for Research and Development in Environmental Protection INCPDM**
- **International Federation of Inventors' Associations - IFIA**
- **World Invention Intellectual Property Associations – WIIPA**

**Editors:**

**Andrei Victor SANDU, Mohd Mustafa Al Bakri ABDULLAH, Petrică VIZUREANU,**

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# ICIR 2025 – Special Guests

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| **Keynote Speaker** | Seiji YAMAGUCHI, Associate Professor PhD<br>Department of Biomedical Sciences, College of Life and Health Sciences, Chubu University, Japan |
| **Keynote Speaker** | Anton FICAI, Professor PhD<br>Faculty of Chemical Engineering and Biotechnologies, National University of Science and Technology POLITEHNICA Bucharest Romania |
| **Keynote Speaker** | Joao NUNES-PEREIRA, Researcher PhD<br>Centre for Mechanical and Aerospace Science and Technologies Faculty of Engineering, University of Beira Interior, Covilhã, Portugal |
| **Invited Speaker** | Hasan GÖÇMEZ, Professor PhD<br>Department of Metallurgy and Materials Engineering, Faculty of Engineering Kutahya Dumlupınar University, TURKEY |
| **Invited Speaker** | Rozyanty RAHMAN, Associate Professor PhD<br>Universiti Malaysia Perlis |
| **Invited Speaker** | Cristina-Ileana COVALIU-MIERLA, Professor PhD.<br>National University of Science and Technology POLITEHNICA Bucharest, Romania |
| **Invited Speaker** | Dewi Suriyani Che HALIN, Associate Professor Ts. Dr.<br>Faculty of Chemical Engineering & Technology, University Malaysia Perlis (UniMAP), Perlis Malaysia. |

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| 36 | **„Petru Poni" Institute of Macromolecular Chemistry, Iasi** | 3 | 519 |
| 37 | **National Research and Development Institute for Textiles and Leather INCDTP** | 2 | 521 |
| 38 | **Agricultural Research and Development Station Secuieni – Neamț** | 5 | 523 |
| 39 | **Romanian Research & Development Institute for Gas Turbines COMOTI** | 5 | 528 |
| 40 | **National Institute for Research and Development in Electrochemistry and Condensed Matter Timisoara** | 1 | 531 |

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| 41 | BioNEst - Cluster of Organic Agriculture focused in the northeast of Romania | 1 | 532 |
| 42 | TAINA VIE | 1 | 533 |
| 43 | Vegetable Research and Development Station, Bacău | 2 | 534 |
| 44 | National Research and Development Institute for Laser, Plasma and Radiation Physics – INFLPR | 7 | 536 |
| | | | |
| | COMPANIES & NGOs | | |
| 45 | CONTINENTAL Automotive Romania | 3 | 542 |
| 46 | Center for Study and Research for AgroForestry Biodiversity "Acad. David Davidescu", Romanian Academy | 1 | 544 |
| 47 | DFR Systems | 1 | 545 |
| 48 | A BETTER LIFE SOLUTIONS | 1 | 546 |
| 49 | SC Holistic Lounge SRL | 2 | 547 |
| 50 | Justin Capra Association | 2 | 548 |
| 51 | Technological High School of Targu Ocna | 1 | 549 |
| 52 | Grigore Moisil Computer Science High School Iasi, Romania | 1 | 550 |
| | Independent inventors | | |
| | Vasile LUPU | 1 | 551 |
| | Toader BUTINCU | 2 | 552 |
| | Mihai Albert VLĂDESCU | 1 | 554 |
| | Maria Sarah VLĂDESCU | 1 | 555 |
| | Cristian ALBU | 1 | 556 |
| | Gheorghe Asachi Technical University of Iasi - Additional | 8 | 557 |
| | Paradis International College | 7 | 562 |

646 total registrations: 279 Registrations from 36 Countries
+ 369 Registrations from Romania