Book of Abstracts

EUROINVENT
ICIR 2018

International Conference on Innovative Research

May 17th to 18th, 2018
Iasi – Romania
Palace of Culture

Organized by:

- **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)**

With support of:

- **School of Fundamental Science, Universiti Malaysia Terengganu**
- **International Federation of Inventors' Associations - IFIA**
- **World Invention Intellectual Property Associations – WIIPA**

Editors:

Andrei Victor SANDU, Mohd Mustafa Al Bakri ABDULLAH,

Petrică VIZUREANU, Che Mohd Ruzaidi GHAZALI, Ion SANDU

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EUROPEAN EXHIBITION OF CREATIVITY AND INNOVATION
E U R O I N V E N T
IAŞI – ROMANIA
X^th Edition, 17th - 19th May 2018

Euroinvent is a joint event promoting creativity in European context, by displaying the contributions of consecrated schools from higher education and academic research and also of individual inventors & researchers.

Under the auspices of EUROINVENT we organize:

1. **Inventions and Research Exhibition**

http://www.euroinvent.org/

2. **International Conference on Innovative Research**

http://www.euroinvent.org/conference

3. **Technical-Scientifical, Artistic and Literary Book Salon**

http://www.euroinvent.org/events-2/book-salon/

4. **European Visual Art Exhibition**

http://www.euroinvent.org/events-2/art-expo/

Event purposes:

- Dissemination of research results;
- partnerships and agreements;
- Creating and developing new research ideas;
- Technology transfer;
- Implementation of inventions,
- Scientific recognition.

The exhibition welcomes you to display inventions (patented in the last 7 years or have patent application number). A special section is held for innovative projects.

EUROINVENT International Conference on Innovative Research (ICIR) will bring together leading researchers, engineers and scientists will present actual research results in the field of Materials Science and Engineering.

euroinvent@yahoo.com

Foreword

This volume contains the information of the ICIR Euroinvent 2018 Conference and the abstracts of selected peer-reviewed papers from the 2018 International Conference on Innovative Research, which was held in Iaşi, România from 17 to 18th of May 2018.

The ICIR Conference is organized under the auspices of EUROINVENT. Euroinvent is a joint event promoting creativity in a European context, by displaying the contributions of consecrated schools from higher education and academic research and also of individual inventors and researchers.

The EUROINVENT International Conference on Innovative Research (ICIR) brings together leading researchers, engineers and scientists who will present actual research results in the field of Materials Science and Engineering.

The conference aims to provide a high level international forum for researchers, engineers and scientists to present their new advances and research results in the field of materials science and engineering.

The volume covers all the aspects of materials science, from synthesis and characterization of materials to procedures and technologies for materials engineering, as well as materials application and their involvement in the life sciences.

All the papers have been reviewed by two expert referees in their relevant topic disciplines. The papers selected for the volume depended on their quality and relevancy to the conference.

The editors hope that this volume will provide the reader a broad overview of the latest advances in the field of materials science and engineering, and that they will be a valuable references source for further research.

The editors would like to express their sincere appreciations and thanks to all the committee members of the ICIR 2018 for their tremendous efforts. Thanks also to IOP Conference Series for producing the volume with full articles.

Finally, the editors would like to thank all the authors for their contribution to this valuable volume.

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JOINT EUROINVENT PROGRAM

EUROINVENT Exhibition		EUROINVENT ICIR Conference	
DAY 1 – THURSDAY MAY 17			
08.00	Stand setup for participants	8.00	Participants registration
10.30	**Artistic moment**		
11.00	**EUROINVENT Opening Ceremony**		
		12.00	**ICIR Opening Ceremony**
13.00	First Jury Meeting	12.30	Keynote Speaker
13.30	Jury evaluation (I)	13.00	Keynote Speaker
	Visiting	13.30	Keynote Speaker
	Demonstrations of inventions	14.00	Lunch
		15.00	Plenary Session1
17.00	End of exhibition day	17.00	Invited Speakers Session
		19.00	End of conference day
DAY 2 – FRIDAY MAY 18			
		09.00	Invited Speakers Session
10.00	Exhibition start	10.00	Plenary Session
10.30	Jury evaluation (II)	11.00	Invited Speakers Session
11.00	Media Interviews	12.00	Plenary Session
13.00	**Jury Final Decision**	13.00	Poster Session
		14.00	Break for lunch (individual)
15.00	**DEBATE INACO & FIR**		
17.00	**Book Award Ceremony**		
17.00	Exhibition Closure		
19.00	**Cocktail Dinner + Delegations Award Ceremony**		
DAY 3 - SATURDAY MAY 19			
10.00	Exhibition Start		
10.00	Workshop PCCDI60 - 2018		
12.30	Artistic moment		
13.00	**Euroinvent Award ceremony**		
14.00	**Exhibition teardown**		

THE „GHEORGHE ASACHI" TECHNICAL UNIVERSITY OF IASI
Faculty of Materials Science and Engineering

The "Gheorghe Asachi" University of Iasi is an excellent choice for the highschool graduates, who wish to embrace a carrier in the attractive field of engineering. The eleven faculties of the university are well equipped and have renowned specialists.

The Faculty of Materials Science and Engineering at the "Gheorghe Asachi" Technical University of Iasi has the mission to train specialists for the materials engineering, mechanical engineering and industrial engineering fields, through a 4-year programme (B.Sc.), Master Courses and Ph.D. Programmes. Also, our faculty is involved in the scientific research programmes, as well as in life-long education programmes for professionals that wish to extend their expertise. Besides the formative activity, research in various fields, focused to multi-disciplinary national and international co-operation is highly valued.

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ROMANIAN INVENTORS FORUM

Romanian Inventors Forum (FIR), as a professional association of dialog and representation, has the purpose to support, stimulate, develop and valorize the scientifically, technically and artistically creativity. Under the aegis of FIR, Romanian Inventors have participated at more than 50 World Invention Exhibitions, where their creations have been awarded with orders, prizes and medals. The performance of Romanian inventics is renowned in the whole world, that is the reason why FIR became member in different international clubs, associations and federations, with special contributions.

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Universiti Malaysia Perlis (UniMAP) is Malaysia's 17th public institution of higher learning. It was approved by the Malaysian Cabinet on May 2001. Originally known as Kolej Universiti Kejuruteraa Utara Malaysia (KUKUM), or Northern Malaysia University College of Engineering, it was renamed as Universiti Malaysia Perlis (UniMAP) in February 2007. The first intake consisted of 116 engineering students who started classes on June 2002. Currently, UniMAP has approximately 11,000 students and a workforce of more than 1,700 academic and non-academic staff members. It offers 21 undergraduate programs that lead to Bachelor in Engineering, one undergraduate programs that leads to an Engineering Technology degree and two undergraduate programs that lead to a Bachelor in Business. We also offer six Diploma in Engineering programs and 13 postgraduate programs that lead to the Master of Science in Engineering and PhD degrees.

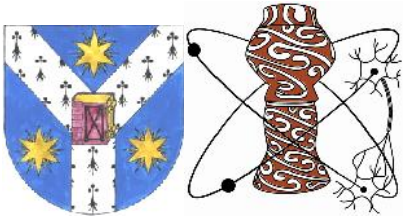
Center of Excellence Geopolymer & Green Technology (CEGeoGTech) lead by Vice Chancellor Universiti Malaysia Perlis (UniMAP), Professor. Dr. Kamarudin Hussin. CEGeoGTech located at the School of Materials Engineering, Kompleks Pusat Pengajian Jejawi 2, Taman Muhibbah, 02600 Arau, Perlis. CEGeoGTech has been established on July 2011 with the intention to induce innovation in green material technology among researchers in Universiti Malaysia Perlis. CEGeoGTech are able combining their expertise and skills in various fields to support the academic structure in the generation of human capital that contributes to the development of high quality research. This center also can become a pillar of academic activities, especially regarding research, development and innovation. CEGeoGTech have 8 fields of research includes:

- Geopolymer
- Polymer Advanced
- Electronic Packaging Materials
- Ceramic & Metallurgy
- Electrochemistry of Green Materials
- Green Environment
- Green Design and Manufacturing
- Green Advanced Computing & Technology
- Materials In Nanotechnology
- Green Materials for Electronic Applications

Laboratory of Scientific Investigation and Cultural Heritage Conservation
ARHEOINVEST Platform, Alexandru Ioan Cuza University of Iasi
„Alexandru Ioan Cuza" UNIVERSITY OF IASI

The Alexandru Ioan Cuza University of Iași is the oldest higher education institution in Romania. Since 1860, the university has been carrying on a tradition of excellence and innovation in the fields of education and research. With over 38.000 students and 800 academic staff, the university enjoys a high prestige at national and international level and cooperates with over 250 universities world-wide. The Alexandru Ioan Cuza University became the first student-centered university in Romania, once the Bologna Process was put into practice. Research at our university is top level. For the second year in a row, the University is placed first in the national research ranking. Striving for excellence, the university takes unique initiatives to stimulate research quality, to encourage dynamic and creative education and to attract the best students to academic life.

Platform of Training and Interdisciplinary Research in Archaeology involves Faculty of History, Faculty of Geography and Geology, Faculty of Biology and Faculty of Physics, opening new research lines in the field of materials and beyond.



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History of Universiti Malaysia Terengganu

Universiti Malaysia Terengganu began as Universiti Pertanian Malaysia's Centre for Fisheries and Marine Science, located at Mengabang Telipot, Kuala Terengganu. It provided facilities for both students and lecturers from the Fisheries and Marine Science programmes to conduct their practical sessions and also researches.

Eventually, the Faculty of Fisheries and Marine Science of Universiti Pertanian Malaysia (UPM) in Serdang was transferred to Kuala Terengganu, and the Centre transformed into a branch campus, being renamed Universiti Pertanian Malaysia Terengganu (UPMT) in June 1996. The name of the faculty was also changed to the Faculty of Applied Sciences and Technology. Also formed were the Faculty of Science and Professional Literature and the Matriculation Centre.

Later on, the Cabinet of Malaysia had approved the establishment of Terengganu University College (KUT) on 5th May 1999 as an associate campus of UPM. Then Terengganu Universiti College was given autonomy on 1st May 2001 and was renamed the Malaysian Science and Technology University College (KUSTEM) on 20th June 2001.

On 1st February 2007, KUSTEM was given the status of a full-fledged university, and with that elevation, it was renamed again and remain to this very day as Universiti Malaysia Terengganu.

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- Conference Proceedings Citation Index – Science (CPCI-S) (Thomson Reuters, Web of Science)
- Scopus
- Compendex
- Inspec
- INIS (International Nuclear Information System)
- Chemical Abstracts
- NASA Astrophysics Data System
- Polymer Library

http://iopscience.iop.org/1757-899X/

Keynote Speaker

Hanafi ISMAIL, PhD

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Dr. Hanafi is a professor of polymer engineering and Director of Innovation Office, Universiti Sains Malaysia, Malaysia. Previously, Prof. Hanafi served as Dean and Deputy Dean at School of Materials and Mineral Resources Engineering. He has 30 years of experience in the research, focused in the area of rubber and plastic technology. Prof. Hanafi won many awards, including Khwarizmi International Award 2000, APCTT (Asia Pacific) 2000 International Award and ISESCO Prize in Science & Technology 2001, UAE. He also won many Invention and Exhibition Awards in Germany, Switzerland, Belgium, United Kingdom, Korea, Kuwait and Romania. Professor Hanafi was listed as "The Most Cited Researchers 2016 by Shanghai Academic Ranking of World Universities (ARWU) in Chemical Engineering. He has published more than 400 research papers in various polymer ISI international journals and currently one of the Editorial Board for Polymer Plastic Technology & Engineering, J of Environmental and Earth Sciences, ASEAN Engineering J, Iranica J of Energy and Environment, Iranian Polymer J, Central European J of Engineering, J of Composites and Biodegradable Polymers, J of Vinyl and Additive Technology and Polymer Testing. Prof. Hanafi is Fellow of Academy Science of Malaysia and Top Malaysian Scientist 2012. Prof. Hanafi h-Index in Google Scholar is 53 and in Scopus is 44 with Total Citation Index, 12,270 and 8,709 respectively until Jan. 2018.

DEVELOPMENT AND PERFORMANCES OF BIO-FILLERS FILLED ECO POLYMER COMPOSITES

Synthetic polymers are non-biodegradable materials that have negative effects to the environment. There is a trend to substitute such polymers with polymers that undergo biodegradable processes. Currently, many research works have been intensified to develop the eco-friendly composite materials (eco-composites) manufactured from natural fillers and polymeric materials. Also, due to the increased price of the petroleum based polymers, a growing effort has emerged on the research, development and application of eco polymer composites. The use of bio-fillers in polymer composites are attractive due to cheap, ecological advantages, renewable resources, non-abrasive to processing equipment, biodegradable etc. Polymer composites are being used in various applications such as packaging, building and construction, automotive industries, furniture industries etc. In this presentation, developments and performances of various bio-fillers filled eco-composites from plants and animals in thermoplastic, thermoset and rubbers will be presented.

Keynote Speaker

Silviu GURLUI, PhD

Assoc. Professor
Head of Atmosphere Optics, Spectroscopy and Lasers Laboratory (LOASL)
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Silviu GURLUI, the head of Lasers Laboratory (**LOASL**) has extensive expertise focused mainly to the optics, plasma, lasers spectroscopy and environment (air pollution and global climate changes) and applied spectroscopy (methods and instrumentation). He is member of other several international scientific network: RADO/ ACTRIS/**ACTRIS PPP** and RADO/ **AERONET** networks, is member of the facility for antiproton and ion research (FAIR, Darmstadt, Germany), is founder member and in board of directors of **SNSIM** (National Society of Environmental Science). He coordinated 13 projects with a budget of 2.5 mil Euro (Satellite hybrid micro-thrusters; **LOASL**'s Earth Observatory; Extreme Light Induced Ablation Plasma Jet And Nano-patterning; Fast Laser Imaging, Detection and Ranging Of Aerosol Emissions in Aircraft Plumes; Dynamics of laser ablation plasmas: fundamentals and applications to pulsed laser deposition of thin films; The study of polymer-laser radiation interactions in controlled atmosphere. Laser ablation nanostructured thin films layers. Applications; Romanian Atmospheric Research 3D Observatory" funded by Innovation Norway; Romanian Network of LIDAR systems; etc. **Publications**: 83 ISI papers; H-index 16; Times Cited 680. **Website**: http://spectroscopy.phys.uaic.ro/

LASER SPECTROSCOPY TECHNIQUES IN NANO-TECHNOLOGY AND ENVIRONMENTAL SCIENCE

We developed for several years experimental and theoretical capabilities to study both the laser plasma ablation for nano-technology approach and developing our novel LIDAR for environment i.e. advanced optical remote sensors for airborne and spaceborne platforms. Fundamental studies on laser ablation plasma plume dynamics have been performed by various space- and time-resolved electrical and optical emission spectroscopy techniques to investigate both innovative materials of high interest, for nanotechnology field and to analyze the accelerated erosion of ceramic materials used in plasma space propulsion (Hall Effect Thrusters - HETs). Moreover, in order to better understanding the fundamental of some critical physico-chemical transformation of the atmosphere compounds but also for many applications point of view, a new LIDAR power instrument has been developed, too. This optical device is able to capture fast plume airborne image (2ns gate time) and based space-time resolved Raman spectroscopy it may used to investigate in real time several chemical compound behaviour at a given point of the free atmosphere (up to 15 km altitude).

Keynote Speaker

Andriana SURLEVA, PhD

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Dr. Surleva is associate professor in analytical chemistry and a Head of the department of Analytical chemistry of the University of Chemical Technology and Metallurgy, Bulgaria. In 2017 she served a Director of the Science and Innovation department of the North Kazkhstan State University. Since 2015 she is invited researcher at Center of Excellence Geopolymers and Green Tehnologies, University of Malaysia. Member of editorial board of the Acta Chemica Iasi, the International Journal of Environmental Chemistry and the European Journal of Engneering Materials. Co-author of 40 publications with around 100 citations. Her research interests are in the field of the development of analytical methods and chemical sensors, method validation, flow injection analysis, toxic substances determination, environmental monitoring, and material characterization. prof. Surleva has h-index 5 in Web of Science and 6 in Google Scollar.

INNOVATION IN TECHNOLOGY AND MATERIALS BASED ON ANALYTICAL CHEMISTRY DATA

Nowadays the industry is focused in development of new green technologies to ensure sustainable development of our modern society, as well as in maintaining and optimizing the operational conditions of existing technologies in order to avoid problem operation of the units and even accidents. Usually, factories laboratories have highly qualified experts and modern analytical instruments. However, our practice has showed that the routine laboratories face some problems when non-routine samples should be analyzed. Additionally, a great number of laboratories even scientific ones are specialized in given analytical method and provide only partial analytical information to the industry. A validated analytical strategy for full chemical characterization is highly demanded. Currently analytical chemists are facing new challenges. New molecules are synthesized, novel materials are developed. It is related to determination of new analytes in known matrix or well-known analytes in a new matrix. The need of validation of method for chemical analysis is well recognized. Obtaining fast and accurate analytical data is an important step to maintain the chemical technology in a green manner. Some examples of our collaboration with industry in their efforts to prevent irregular operation of units or improve their technologies are presented.

Invited Speaker

Noorhafiza MUHAMMAD, PhD

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Noorhafiza Muhammad holds a Phd in Mechanical Engineering specializing in Laser Processing from The University of Manchester, United Kingdom. She is an associate professor and a Dean of the School of Manufacturing Engineering, Universiti Malaysia Perlis, Malaysia. She is a fellow researcher at the Centre of Excellence Geopolymer & Green Technology (CeGeoGTech). She has published a quite number of publications in renowned international conferences and scientific journals. Her research interests are in the field of manufacturing processes (laser processing), materials characterization, biodegradable polymer and materials. She has displayed outstanding reseach work and has obtained local and international scientific recognition through her research to the . She has introduced different approaches/techniques to aid cut quality improvement in laser cutting processes for stent applications.

HIGH PERFORMANCE AND AFFORDABLE CORONARY STENT

The use of coronary stent is subjected to its compatibility and integration with the biological environment where it is implanted. The compatibility refers to material and tissue interactions. These characteristics have to be tested and appraised in an array of in vivo and in vitro experiments. There are three main rationales: 1. **Laser surface texturing:** By far, the vast majority of coronary stents are produced by laser processing. The advantage of using lasers against conventional methods is the ability to manufacture stents with the highest speed, precision and quality in order to meet the stringent requirements for implantation in the human body. 2. **Surface modification on stents surface to modulate the cells response and enhance biocompatibility**: Coronary artery disease is the leading cause of death, for both men and women worldwide. The suffering from the disease and the death would give social and economic impact to the country. It is crucial to establish a high biocompatibility implant device which require optimal after implant medical therapy. The ideal stent surface has to be established to enhance the biocompatibility and reduce the risk of restenosis and late thrombosis. **3. Low cost (affordable) stent with high performance**: It is found that the endothelialisation is partially growth at the stents strut after the implantation. The endothelial dysfunction failed to serve as anticoagulant to prevent blood clot. The risk of restenosis after implantation of bare metal stents (BMS) encouraged the emergence of drug eluting stents (DES). However, high cost of DES (3 to 4 times expensive than bare metal stents) make it less favorable compared to BMS. Thus, the motivation is to facilitate faster endothelialisation on bare metal stent which could generate an appropriate response with the tissue in the biological environment with superior performance compared to DES.

Invited Speaker

Cătălin POPA, Dr.Eng.

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Dr. Cătălin Popa is a Professor in the Department of Materials Science and Engineering in the Technical University of Cluj-Napoca, Head of Biomaterials Research Group and President of Advanced Materials, Micro and Nanotechnologies – ADMATECH Cluster. Dipl. Engineer since 1986, he worked at the beginning of the career as a design engineer in several companies, bringing the acquired expertise to the Biomaterials research field. Doctor of Engineering since 1997, he benefited of a NATO / Royal Society Fellowship in the University of Nottingham (2000) and was involved in numerous research projects in the UK, some of them in IRC in Biomedical Materials, QMUL, and Rutherford Appletopn Laboratory, together to the 27 research contracts with Romanian public funding bodies. He published more than 115 papers, 7 books and patented 4 inventions. The Biomaterials Research Group he leads focuses on Tissue Engineering scaffolds, drug delivery systems and medical implants / devices.

APPLICATION – TAILORED DRUG DELIVERY SYSTEMS

Drug delivery systems are suitable for numerous medical applications where the classical administration methods lead to either excessive stressing of kidneys / liver / heart or to ineffectiveness due to degradation, poor water solubility or lack of membrane permeability for the active agent. By an appropriate design of multilayered microcapsules, application – tailored delivery systems can be obtained, showing optimal characteristics both from the drug nature and concentration point of view, as well as for the release triggering mechanism / time profile. We have developed microcapsules with a BSA gel core and natural polyelectrolites (chitosan and k-carrageenan) complex multilayer shell using the layer-by-layer (LbI) deposition method. Their architecture was tailored for applications such as Tissue Engineering of hard / soft tissues, smart dressing for healing of difficult wounds or targeted chemotherapy of non – resecable cancerous tumors. Interesting results were obtained by loading the microcapsules with Curcumin (anti-oxidant, anti-cancer and anti-inflammatory agent), Tetracyclin (antibiotic with wide spectrum against many gram-negative and gram-positive bacteria, contributing also to a faster regeneration of osteoblasts, fibroblasts and other types of cells for Regenerative Medicine), Growth factors (to promote the growth, organization, and maintenance of cells and tissues) and Doxorubicin (well established for chemotherapy, but reported potentially harmful for heart in the classical therapeutic approach).

Invited Speaker

Georgi CHERNEV, PhD

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Dr. Chernev is an Associate Professor in Department of Silicate Technology of the University of Chemical Technology and Metallurgy, Bulgaria. Member of editorial board of the Research and Reviews in Materials Science and Chemistry and the European Journal of Materials Science and Engneering. Co-author of 60 publications with around 200 citations. His research interests are in the field of the materialis science, binding materials, chemical admixtures for concrete, geopolymers, application of waste products, low temperature method for synthesis, hybrid materials, iotechnolgy, immobilization of microorganisms.. Prof. Chernev has h-index 7 in Web of Science and 8 in Google Scollar.

STRUCTURE AND PROPERTIES OF SOL-GEL MATERIALS SYNTHESIZED ON THE BASE OF SILICON PRECURSORS AND HETEROPOLYSACHARIDE

A new field in the sol-gel technology is the synthesis of nanocomposite hybrid materials simultaneously containing organic and inorganic components. Such kind of materials are subject of intensively investigations because they represent significant interest for the structural chemistry and for studying their physics and chemical properties and possibilities for their applications in electronics, optics, microbiology, medicine, dentistry and pharmacology. The results from the XRD - analysis prove that all the studied hybrids have an amorphous structure. It can be see that the surface appears to be smooth and possesses no micro cavities in the samples. The results from the BET revealed that introduction of polysaccharide leads to a decrease in the surface area, but to an increase in the pore size. The surface of obtained hybrids was structurally investigated with Atomic Force Microscopy. The presence of a hybrid nanostructure with well-defined nanounits and their aggregates, with different design formed by self-organizing processes, is observed and the average size of nanoparticles is from 8 to 12 nm. The rheological characteristic of the synthesized sol gel hybrids with participation of algal polymer suggests its potential for different industrial applications, immobilization of algae and bacteria, biosorption of heavy metals and other.

Invited Speaker

Anca Daniela RAICIU, PhD.Pharm.

Marketing, Sales, Logistics & Distribution
Director HOFIGAL
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Ms. Chim. Anca Daniela Raiciu is a Marketing, Sales, Logistics & Distribution Director at HOFIGAL since 2007. She is also Ph.D. in Pharmaceutical Sciences, Vice President of the Romanian Society of Chemists Cosmetology Chemists, lecturer at "TITU MAIORESCU" Pharmacy. He has proudly been HOFIGAL since 2002 and has been actively involved in the creation of new products and their promotion on the domestic and foreign markets. She also has a vast experience in the pharmaceutical and cosmetic industry since 1988, and she pass through all stages of research and production.
"The fact that nothing is more important in life than health is an old wisdom, the truth of which we convince the passing day. What we need to do to acquire and maintain this precious health is a question that has marked my meaning and course of life. That led me to use my time and energy in-depth studies of chemistry, biochemistry and pharmacy and led me to get my doctorate in an increasingly interdisciplinary field."

Gemotherapy – A Modern Medicine

Gemmotherapy, also known as Phytoembryotherapy, is a modern homeopathic method of biotherapeutic drainage using the extracts of various trees and shrubs. The raw material of the buds, emerging shoots, seeds, rootlets and saps is taken at the peak time of the plant's annual germination. Plants are harvested in the spring, throughout the period of cellular division and plant growth. During this stage they contain the highest concentration of active growth factor hormones, auxins, and gibberellins. These specific hormonal agents contain valuable informative matter required for the drainage of various organs and tissues at the cellular level. In order to extract the embryonic substance from the fresh buds, the complex remedies are macerated for increased patient compliance. Gemmotherapy is very popular in European countries such as France, Belgium, Italy, Germany and in some areas of Eastern Europe. It works great for skin conditions, seasonal allergies, chronic ENT's, asthma, UTIs, migraines, digestive disturbances, sleep difficulties, menstrual irregularities, fertility issues, high blood pressure and many more.

Invited Speaker

Professor **Dan ELIEZER,** D.Sc., FASM

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Dan Eliezer received his PhD in Materials Science and Engineering from the Technion Institute of Technology in Israel. He was a Research Associate at the University of Illinois at Urbana-Champaign and shortly after joined the NASA-AMES Research Center. He was a National Research Council Senior Associate at the Air Force Base in Dayton, Ohio. He was the Head of the Department of Materials Engineering and part of highly ranked administrative committees at Ben-Gurion University. He was a Senior Visiting Scientist at BAM, the Federal Institute for Materials Research in Berlin, Germany and received the prestigious Oswald Fellowship. Professor Eliezer is especially known for his research in the field of hydrogen interaction in materials. His research work also covers physical metallurgy and environmental behavior of materials. Prof. Eliezer has published over 500 papers, written numerous collective volumes, and edited 9 scientific books. Prof. Eliezer has a h-index of 37 and a RG of 44.15. He is an active member in a variety of academic, research, and institutional committees. He is also active in international advisory boards for scientific, academic, and insutrial institutions. He is the recipient of many awards and fellowships.

MATERIALS PERFORMANCE IN HYDROGEN ENVIRONMENTS

Development and validation of a lifetime prediction methodology for failure of materials used for hydrogen containment components is of significant importance to the planned hydrogen economy. With the prospect of transitioning to a hydrogen-based economy, many engineering components will be exposed to hydrogen environments. Hydrogen embrittlement is a severe environmental type of failure; when hydrogen is present, materials fail at load levels that are very low compared with those that a hydrogen free material can sustain. We will review recent contributions to the understanding of mechanisms of hydrogen embrittlement. The role of hydrogen in different structural materials with an emphasis on steels, titanium, and magnesium alloys will be discussed in detail. The residual stress state in a material has an important role in the mechanism of cracking, induced or assisted by hydrogen. The hydrogen interaction with residual stresses is studied by synchrotron x-ray diffraction. ToF-SIMS analyses have been optimized by achieving a spatial resolution below 100 nm. Thermal desorption spectroscopy (TDS) was used to identify and quantify the types and strengths of the hydrogen trapping sites. TDS results support the notion that only the diffusible hydrogen through the lattice sites or the hydrogen residing at the traps with the lowest binding energy contributes to material embrittlement. We present a model for hydrogen transport that accounts for trapping of hydrogen at microstructural defects and address the interaction of hydrogen solute atoms with material.

Invited Speaker

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Dr. Nor Aida is a senior lecturer in chemical engineering and head of Hybrid Nanomaterials, Interfaces & Simulation (HYMFAST) research group at Faculty of Chemical Engineering, Universiti Teknologi MARA (UiTM), Malaysia. Previously, Dr Nor Aida served as Head of Centre at the Faculty of Chemical Engineering. She has receved Doctor of Philosophy in Chemical Engineering from The University of Queensland Australia. She has an experience of 6 years in research, focusing in the field of catalysis (advanced oxidation processes and materials) for waterwater remediation. She has published over 20 research papers in various national and international journals including Chemical Communications, Scientific Reports, Journal of Membrane Sciences and as well as conference proceedings. Dr Nor Aida h-Index in Google Scholar is 9 and in Scopus is 7 with Total Citation Index of 472 and 363, respectively until Jan. 2018.

GRAPHENE OXIDE-IRON OXIDE NANOCOMPOSITES FOR DYE CONTAMINATED WASTEWATER REMEDIATION

Development of active and stable heterogeneous Fenton-like catalysts have emerged as an alternative to overcome the practical limitations related to the homogeneous Fenton catalyst, where various iron species and/or iron oxides are immobilised within the structure of different catalyst supports. Clay, alumina, zeolite and carbonaceous materials such as activated carbon and carbon nanotubes have been used as catalyst supports of choice by the scientific community. However, there is a knowledge gap associated with using high aspect ratio 2D (dimension) graphene oxide (GO) as an alternative catalyst support. Of particular interest, it is postulated that the structure and functionalities of GO as a support confers to the resultant catalyst overall catalytic activity beyond the conventional Fenton catalysts. Hence, in this presentation, development of graphene oxide-iron oxide nanocomposites as promising heterogeneous Fenton-like catalysts for wastewater remediation will be presented.


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SECTION 1

SYNTHESIS AND CHARACTERIZATION OF MATERIALS

Effects of Sm^{3+} on Luminescent Properties of $LiEu_{(0.55-x)}Y_{0.45}(WO_4)_2Sm_x$ Red Phosphor

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Abstract. Phosphor materials have been widely applied in lighting and displays. Rare earth elements are amongst important elements in giving luminescent properties to the phosphor. The needs to reduce rare earth element in phosphor is of interest due to cost and environmental issue. The red phosphor $LiEu_{(0.55-x)}Y_{0.45}(WO_4)_2$ were synthesized by substituting Sm^{3+} in the lattice using solid-state reaction. The effect on the substitution of Sm^{3+} which acts as an activator will be analyzed using X-ray powder diffraction (XRPD), scanning electron microscope (SEM) and photoluminescence spectra (PL). The structure of the compound was found to be as a monoclinic which referred to the reference patterns. The optimum amount was recorded for the activator to be obtained in the host lattice for replacing the Eu^{3+} place as well as enhancing the intensity of the emission. The findings reveal that $LiEu_{(0.55-x)}Y_{0.45}(MoO_4)_2Sm_x$ can be a more efficient red phosphor candidate used white light emitting diodes (WLEDs) applications.

Keywords: tungstate phosphor, red phosphor, photoluminescence, crystal structure, LED

Corrosion Behavior of Cr–Mn–N and Cr–Ni Stainless Steels, Suggested as Implants

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Abstract. The most important requirement for any material used as an implant is to be biocompatible and not to cause undesirable effects in the human body. Corrosion of implants is included in the topic of biocompatibility because it is a determining factor in their sustainability and seamless fulfillment of their functional purpose. The proposed article presents the results obtained in the comparative study of two austenitic stainless steels (Cr18Ni9 and Cr18Mn12N) in four physiological solutions, accepted as model environments for testing the corrosion behavior of metal implants. The nature of the corrosion attack, the composition of the corrosion products at 37 °C and the pH 7 of the model media were determined using different electrochemical and physical methods of investigation and analysis. It was found that Cr18Mn12N steel, nitrated with 0.16% N exhibits higher corrosion resistance.

Keywords: corrosion, alloys, steel, medical products, electrochemical metods, passivity, body fluids.

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Effect of Interfacial Reaction on the Tensile Strength of Sn and Cu-Ti Alloy (C1990HP)

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Abstract. This study investigates the effect of interfacial reaction on the mechanical strength of Sn/C1990HP at 240, 255, and 270°C. The joints about tensile strength and fracture behavior under different soldering temperatures and thermal aging conditions have been studied. It is observed that the tensile strength decreases with increasing aging time. However, the tensile strength increases with increasing soldering temperatures. Decreasing tensile strength associated with the transition of failure modes from the bulk solder in the as-soldered condition toward failures at the interface. At 270°C temperature joint as-soldered, the Sn/C1990HP fractures in the IMC layers in a brittle mode under tensile testing. It has highest ultimate tensile strengths compared with other temperatures, because of the strengthening effect of the dissociative Cu_6Sn_5 particles. This study revealed the content of Ti in the substrate could improve the mechanical properties of the solder joints.

Keywords: lead-free solder, liquid/solid reaction couples, intermetallic compound, tensile strength.

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Synthesis and Functionalization of Self-Bonded Pellets of ETS-4 Phase by New Methodology of Preparation

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Abstract. This paper presents the results of a research that had a dual purpose: to prepare self-bonded pellets of ETS-4 phase by a new methodology of preparation and to confer to the prepared self-bonded pellets ETS-4 the ability to change color depending on the pH of the environment in which they are used. In particular, the pellets were prepared by kneading crystals of ETS-4 phase and a dry gel, this last one being the precursor for the synthesis of the same ETS-4 phase crystals. One of the many innovative aspects that is proposed and highlighted by this work is represented by the fact that to acting as "binder", is dry-gel, that is characterized by the same chemical composition of crystals, thus avoiding contamination with other elements. In addition, dry-gel allows, during the pellets baking phases, the promotion of nucleation phenomena and thus the formation of new crystals of ETS-4. The second purpose, not least, was to functionalize the pellets by giving them the function, in addition to the classic ones, the ability to change color, by adding an indicator, providing rapid information on the pH of chemical environment in which pellets are used. The pellets were charcacterized by X-ray diffraction (XRD), Electron microscopy (SEM) and mechanical strength by hardness tester.

Keywords: ETS-4, titanosilicate, indicators, microporous materials, self-bonded pellets

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Corrosion Behaviour in Human Stimulation Media of a High Entropy Titan-Based Alloy

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Abstract. The paper presents results on the corrosion behavior of high entropy alloys, commonly called BIOHEA in human physiological simulating media, respectively in the NaCl infusion solution and Ringer's lactate infusion solution. Corrosion tests were performed by potendiodinamic test using AUTOLAB type potentiostat equipped with specialized corrosion software including the PGSTAT302N, BA and SCAN250 modules. Three entropy alloy systems were investigated: FeTa0.5Nb0.5Ti1.5Zr0.5 (BIOHEA 1), FeMnNb0.5TiZr0.5 (BIOHEA 3), FeTa0.5Nb0.5TiZr0.5 (BIOHEA 4), and BIOHEA alloy 2 was obtained by remelting BIOHEA 1. A comparison of the results obtained in the present tests and the data from the literature shows, on the one hand, that the global results can be compared with the different results from the literature, and, on the other hand, the results are new, in the sense that in any work there are no combinations of alloys studied here or human simulating medians used for testing. The conclusion of the experimental investigations in the present paper is the fact that regardless of the simulation test environment, all the alloys experimental alloys have similar behaviors, there is a difference between the chemical composition of the experimental alloy and the displacement of the corrosion potential values at electropositive values, decreasing of corrosion current, and corrosion rates. The experimental results allow the corrosion resistance of the investigated alloys, alloy BIOHEA 2 having the best corrosion behavior in both test media, with very low corrosion rates (respectivelly 0.067 μm / year in NaCl infusion solution, and 0.021 μm / year in Ringer's lactate infusion solution).

Keywords: high entropy alloy, titanium based alloy, simulated body fluids.

Thermal and Electrical Investigation of Conductive Polylactic Acid Based Filaments

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Abstract. Printed electronics gain momentum as the involved technologies become affordable. The idea to use a general-purpose 3D printer to manufacture the electrical interconnections for a circuit is very attractive. The advantage of using a 3d printed structure over other technologies [1] [2] are mainly the lower price, less requirements concerning storage and use conditions, the capability to build thicker traces while maintaining flexibility. The main element allowing this to happen is a printing filament with conductive properties. The paper shows the experiments that were performed to determine the thermal and electrical properties of polylactic acid (PLA) based conductive filament and presents the quantitative results regarding its resistance, large current handling capabilities and thermal behavior.

Keywords: printed electronics, polylactic acid, current capabilities, track resistance, thermal imaging.

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Influence of Alloying on the Thermal Stability of Model Heat Resistant Compositions

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Abstract. We studied the phase transformations at high temperatures in the carbonless heat-resistant nickel alloys by the differential thermal analysis and we calculated their thermal stability. For a relatively low alloyed compositions the greatest positive effect is achieved when it were alloyed by γ' -forming elements such as the niobium and titanium. The greatest thermal stability at temperatures below 1100°C is achieved for these alloys in the low alloyed composition. Multi-component carbonless heat resistant nickel alloys have the best characteristics when compositions contain the rhenium and a small amount of the tantalum. However, the most thermal stability at temperatures up to 1200°C has a composition that includes only 6% of tantalum.

Keywords: carbonless heat resistant nickel alloy, alloying, phase transitions, thermal stability

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Researches on Antiphonic Characteristics of AlMg10-SiC Ultralight Composite Materials

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Abstract. The paper presents the results on the absorption sound testing of an ultralight cellular composite material AlMg10-SiC, obtained by sputtering method. We have chosen this type of material because its microstructure generally comprises open cells (and relatively few semi-open cells), evenly distributed in the material, a structure that, at least theoretically, has a favorable behavior in relation to sound damping. The tests were performed on three types of samples, namely P11 – AlMg10 – 5%SiC, P12 – AlMg10 – 10%SiC şi P13 – AlMg10 – 15%SiC. The 15% SiC (P13) cellular material sample has the best sound-absorbing characteristics and the highest practical absorption degree.

Keywords: cellular materials, composites, ultralight materials, sounds absorption, antiphonic characteristic

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Functionalized Calixarenes used as Coupling Agents for Inorganic/Organic Substrates

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Abstract. This work focuses on properly functionalized calixarenes, at the lower or upper rim, for their use as coupling agents between different inorganic or organic substrates. The synthesis and characterization of functionalized calix[4]-, calix[6]- and calix[8]arenes as well as preliminary studies for their coupling to different inorganic/organic materials (e.g. short glass fibers, silica, hydroxylapatites, organic resin) is discussed. The role of the functionalized calixarenes as coupling agent as well as the connection at the inorganic/organic interface were assessed by means of TGA, TEM, SEM, etc.

Keywords: calixarenes, coupling agents, inorganic/organic substrates.

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Study of the Dependence of Bending Resistance in Corelation to Temperature of a Conductive Material

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Abstract. In special applications it is necessary to correlate the obtained data about the state of a process in which the Joule effect is involved by passing an electric current through a conductive material. The multiplier effect due to increased resistance with temperature may require particular attention in monitoring the process, thus requiring automatic decision-making processes so that the modification of the conductive material properties does not affect the entire chain of the process. We propose a system for monitoring and correlation of temperature with modification of bending resistance of a conductor, information obtained from sensors and transducers in analog format, but transformed in binary format to facilitate the processing of the obtained information. With a contactless infrared temperature sensor and a force sensor we will detect state changes on the considered conductor and the microcontroller system will transmit the data obtained to a PC for processing and analysis. The embedded software in the microcontroller will assess the data provided by the sensors and give the possibility to make the decisions according to specific informations.

Keywords: temperature, electrical current, resitance, microcontroller, sensor, force.

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Influence of Mechanical Parameters on the Dielectric Characteristics of Rigid Insulating Materials

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Abstract. Rigid insulating materials are used in the manufacture of work equipment with electric safety function, being mainly intended for use in the energy sector. The paper presents the results of the research on the identification of the technical and safety requirements for rigid insulating materials that are part of the insulating work equipment. The paper aims to show the behavior of rigid insulating materials under the influence of mechanical risk factors, in order to check the functionality and to ensure the safety function for the entire life time. There were tested rigid insulating equipment designed to be used as safety means in electrical power stations and overhead power lines (OPL).

Keywords: mechanical characteristics, insulating material, rigid material, safety.

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Investigation of Woven Characteristics on Electromagnetic Shielding Behavior

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Abstract. Textiles have been highly applied for electromagnetic shielding purposes due to the increasing concern about health issues caused by human exposure to radiation. Properties of conductive yarn, fabric structure, and garment design have extreme effects on the electromagnetic behavior and comfort of the final product. Lots of electromagnetic shielding textiles are made of metallic yarns regarding their high electrical conductivity. Therefore, some researchers have worked on electromagnetic shielding textiles made of metals. For example; the shielding effectiveness of woven fabrics made of hybrid yarns containing stainless steel wire was investigated in. As discussed earlier, the fabric structure has significant effects on electromagnetic protection. Consequently, woven samples were produced using two different commercial electroconductive yarns (PA12 coated with Ag and Inox) to investigate the effects of the fabric structure. The main purpose was to define the best pattern among three basic woven patterns leads to the highest electromagnetic shielding. Moreover, the different weft yarn densities were applied to examine the effects of yarn density on the level of electromagnetic shielding. The electromagnetic shielding effectiveness of all the 2-layer samples was evaluated in the frequency range from 0.8 to10 GHz in an anechoic chamber. The woven sample with higher yarn density of PA12 coated with Ag yarns shows higher protection against radiation. To conclude, the results show that the yarn properties play the main role in shielding as well as yarn density and fabric pattern.

Keywords: Electromagnetic shielding effectiveness, woven fabric, metallic yarn, electrical conductivity

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Influence of Selective Laser Melting Processing Parameters of Co-Cr-W Powders on the Roughness of Exterior Surfaces

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Abstract. Selective Laser Melting (SLM) represents an Additive Manufacturing method widely used in medical practice, mainly in dental medicine. The powder of 59% Co, 25% Cr, 2.5% W alloy (Starbond CoS Powder 55, S&S Scheftner C, Germany) was processed (SLM) on a Realizer SLM 50 device (SLM Solution, Germany). After laser processing and simple sanding with Al_2O_3 or two-phase sanding (Al_2O_3 and glass balls), measurements of surface roughness were conducted. This paper presents the influences exercised by laser power (P = 60 W, 80 W and 100 W), the scanning speed (vscan = 333 mm/s, 500 mm/s and 1000 mm/s) and exposure time (te = 20 μs, 40 μs and 60 μs) on the roughness of surfaces obtained by SLM processing. Based on the experimental results obtained for roughness (R_a), some recommendations regarding the choice of favorable combinations among the values of technological parameters under study in order to obtain the surface quality necessary for subsequent applications of the processed parts (SLM) have been made.

Keywords: selective laser melting, Co-Cr-W powder alloy, roughness Ra.

Optical Metamaterials for Decontamination of Translucent Liquids and Gases

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Abstract. Metamaterials with periodical structures like quartz or glass small granules were investigated under the action of UV-C radiation acting against microbial contamination of translucent liquids and gases. Studis were performed on modification of individual metamaterial when UV evanescent waves are dispersed into optical contact zone, in function of granule geometry. Quartz (SiO_2), glass or black (plastic) materials with dimension of about 0.5 - 3 mm were separately placed inside a quartz tube of about 2.7 cm diameter and 90 cm length. Quartz transmits within the (240-400 nm) region of the Hg lamp and ensure an effective decontamination of translucent liquids and gases. Our approach is based upon the increased transfer of UV radiation via evanescent waves in case of unordered metamaterials present in contaminated fluids. One should stress upon that the energy in evanescent waves is usually lost, while our approach allows for valorizing it via an efficient antimicrobial action. We carried out a series of estimations of the decontamination rate of metamaterials vs. ordered metamaterials consisting of spherical elements. Experiments convincingly demonstrated that quartz and glass metamaterials can effectively annihilate Coliform or Enterococcus bacteria, yeast and Kombucha cultures.

Keywords: microbial contamination, evanescent waves, metamaterials.

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Microstructure, Friction and Wear of Aluminum Matrix Composites

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Abstract. MMCs are made by dispersing a reinforcing material into a metal matrix. They are prepared by casting, although several technical challenges exist with casting technology. Achieving a homogeneous distribution of reinforcement within the matrix is one such challenge, and this affects directly on the properties and quality of composite. The aluminum alloy composite materials consist of high strength, high stiffness, more thermal stability, more corrosion and wear resistance, and more fatigue life. Aluminum alloy materials found to be the best alternative with its unique capacity of designing the materials to give required properties. In this work a composite is developed by adding silicon carbide in Aluminum metal by mass ratio 5%, 10% and 15%. The composite is prepared by casting technique. Mechanical tests such as hardness test, microstructure test are conducted.

Keywords: Metal Matrix composite, Al-SiC composite, microstructure, friction and wear, mechanical alloying.

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Evaluation of Sealing Process on the Surface Properties of Nanoporous Aluminum Oxide Layers Electrochemically Growth on 1050 Aluminum alloy Surface

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Abstract. Thanks to its low density, aluminum and its alloys are extensively used in the transport and construction industries. The improving of aluminum and its alloys corrosion resistance is an extensively studied topic. Different methods are applied to improve the corrosion resistance of aluminum and its alloy: painting, waxing, zinc-chromate priming, conversion coatings and also anodic oxidation. The anodic oxidation is the most used method to fabricate nanoporous aluminum oxide layers, with controlled thickness and pores diameters, on aluminum and its alloys surfaces. The aim of this work is to evaluate the influence of the sealing process of the nanoporous aluminum oxide layers obtained by anodic oxidation on 1050 aluminum alloy surface. Scanning electron microscopy (SEM) was used to observe the morphological structure of untreated and modified surfaces. Corrosion behavior of oxidized 1050 aluminum alloy, sealed oxide layer and untreated 1050 aluminum alloy were investigated using electrochemical methods such as open circuit potential (OCP), electrochemical impedance spectroscopy (EIS) and potentiodynamic polarization (PD). The experimental results show that the anodic oxidation process improve the corrosion resistance of 1050 aluminum substrate and the sealing process improve even more the anticorrosive properties.

Keywords: aluminum, anodic oxidation, sealing procedure, corrosion

Surface modifications of materials by electrochemical methods to improve the properties for industrial and medical applications

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Abstract. There are two applied electrochemical methods in our group in order to obtain advanced functional surfaces on materials: (i) direct electrochemical synthesis by electro-codeposition process and (ii) anodization of materials to form nanoporrous oxide layers followed by electrodeposition of hydroxyapatiote or other bioactive molecules and compounds into porous film. Electrodeposition is a process of low energy consumption, and therefore very convenient for the surface modification of various types of materials. Electrodeposition is a powerful method compared with other methods, which led her to be adopted and spread rapidly in nanotechnology to obtain nanostructured layers and films. Nanoporous thin oxide layers on titanium alloys as support for hydroxyapatite or other biomolecules electrodeposition in view of biomedical applications could be obtained by electrochemical methods. There are two electrochemical steps for surface modification of titanium or titanium alloys to improve the biocompatibility or osseointegration, the first is controlled growth of oxide layer folloed by second being biomolecule electrodeposition into nanoporous formed titanium oxide layer. The main goal of the present study is to make a summary on the results obtained from applying electrochemical surface modification methods in obtaining advanced functional surfaces and their properties characterization.

Keywords: electrodeposition, anodization, nanocomposite coatings, particles, biocoatings, microhardness, roughness, corrosion, tribocorrosion.

Optical and Morphological Properties of P3HT and P3HT: PCBM Thin Films used in Photovoltaic Applications

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Abstract. This work is focused on the study of some physical properties of poly(3-hexylthiophene-2,5-diyl) (P3HT) and poly(e-hexylthiophene-2,5-diyl): Methanolfullerene Phenyl-C61-Butyric-Accid-Methyl-Ester (PCBM) blend thin films. Knowing the polymer advantages, such as ease of processing, high thermal stability, strong interaction with light, its properties have captured the attention regarding the changes that can occur in a polymer:fullerene blend in term of them [1]. Polymer and polymer:fullerene blend (1:0.1, 1:0.2, 1:0.4 and 1:0.8 ratios) were deposited by spin coating on glass and SnO2:F (FTO) coated glass. The optical properties were emphasized using spectrophotometry (1300 – 2200 nm wavelength range) and spectroscopic ellipsometry models, to obtain the refractive index, extinction coefficient and the transmission (found higher than 80%). According to X-ray diffraction analysis, as-obtained layers are amorphous. Investigation of the surface morphology of thin-film samples using atomic force microscopy revealed a crystallite-like surface morphology with crystallite size in the nanometer rang.

Keywords: organic solar cells, polymer, ellipsometry, spectrophotometry,

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Aspects Regarding Instantaneous Corrosion of Nodular Iron in Household Wastewater

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Abstract. Waste water pumps operates under high corrosion and wear conditions due to the working environment containing sand particles, suspension particles, sulfuric acid and various dissolved salts, etc. Because of the operating conditions, the rotor and sometimes the pump stator (especially immersion ones) suffer various aggressions, such as material avulsion, corrosion, etc. This paper represents a study on the nodular cast iron samples corrosion from the rotor of a single-chamber pump, which were tested in synthetic corrosion environments that mimic the characteristics of natural environments.

Keywords: waste water, pump, rotor, electrochemical corrosion, Evans diagram.

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Researches on the Improvement of the Bioactivity of TiO_2 Deposits, Obtained by Magnetron Sputtering - DC

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Abstract. In this paper, porous layers of TiO_2 were deposited, by magnetron sputtering, on a glass support. The parameters of the deposition process, respectively the working pressure in the enclosure and temperature of the substrate varied on three levels. The physical and mechanical properties of the obtained layers were investigated by optical microscopy (OM), electronics, AFM and X-ray diffraction. The bioactivity of TiO2 surfaces has been investigated by apatite formation on their surface after an immersion in a simulated body fluid (SBF) solution - for a period of time. Increasing the pressure in the enclosure determines the deposition porosity to increase by over 14%. The temperature of the substrate influences the amount of rutile or anatase phase present in the layer. Research has shown that after an immersion in the SBF - for 2.5 weeks the apatite layer deposited on the surface of the porous deposits is 17% thicker. Increasing the amount of apatite on the surface of the TiO_2 layer is favoured by the anatase phase present in the layer.

Keywords: magnetron sputtering, TiO_2 - coating, bioactivity.

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Increasing the Photocatalytic Properties of TiO2 Layers Obtained by Magnetron Sputtering on Glass Support

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Abstract. In this paper it is studied the effect of the introduction of Fe particles in the TiO2 layers - on their photocatalytic activity. The TiO2-Fe layers were obtained by magnetron sputtering in vacuum, using targets made of TiO2 and Fe powders by pressing. The parameters of the deposition process varied as follows: the concentration of the Fe particles in the targets varied on three levels and the working pressure varied on two levels. The obtained layers were researched by optical and electronic microscopy (SEM), AFM analysis and X-ray diffraction. Photocatalytic activity was assessed by degradation of the methylene blue solution (MB) under irradiation with UV light. Experimental results indicate that by doping the TiO2 layer with Fe, the photocatalytic activity and sunlight absorption rate increase by up to 12%. The TiO2-Fe film has superior hydrophobic properties with the contact angle of 9,820 and a reduction in optical band to 3,36eV.

Keywords: magnetron sputtering, TiO_2 - coating, photocatalytic.

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Mechanical and Microstructural Characterization of a New Corrosion Resistant Stainless Steel

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Abstract. In the paper are studied how the chemical composition and delivery status of a new type of stainless steel, high alloyed with Ni and Cr, affect the mechanical properties, microstructure and corrosion resistance. The results obtained during the mechanical test (tensile, compression, Charpy test and micro-hardness) have reveal a promising values. During corrosion test, preferential attack of the reagent (aqua regia) located on the grain boundaries, inclusions or polyhedral precipitates have been observed. On the corroded surfaces, some localized pitting effects on grain boundaries have been revealed. Analyses on the parameters values registered during corrosion test revealed that the corrosion current density had a low value, comparable to that of other specific types of stainless steels. Real value of Icorr (1.089 μA/cm^2) measured for experimental alloy, proves a good resistance to corrosion in saline solution of 3% NaCl. The estimated rate of corrosion presented acceptable values (0.011 mm/year).

Keywords: corrosion, stainless steel, mechanical properties, microstructure.

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Studies about Carbo-Nitriding Thermochemical Treatment of Steel

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Abstract. The paper presents a study about the modifications of resistance properties for a medium alloyed steel (0.23% carbon, 0.8% manganese, 1.1% chrome), subjected to carbo-nitriding thermochemical treatment. In the carbo-nitriding case, the carbon and nitrogen diffuses simultaneously in the thermochemical treated steel. Are subjected to carbo-nitriding the construction steels with low and medium carbon content, tools steels, stainless steels. Is followed to increase the superficial hardness, usage resistance and fatigue resistance limit.

Keywords: steel, carbon, nitrogen, properties, termochemical treatment

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Microstructuring of Paint-Finishing Coatings in the Presence of Polyethylenepolyimines

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Abstract. One of the ways to improve the quality of paint coatings is the targeted adjustment of the microstructure of the protective film. The adjustment may be implemented by introducing in the existing brands of paint and varnish materials small amounts of surfactants (up to 5% by weight of the pigment). As a result micro- and nanostructured films with improved decorative (color, gloss), protective (anticorrosive) and structural-mechanical (hardness, strength) properties are formed. This project is aimed at studying the influence of polyethylenepolyimines (PEPI) on the processes of microstructuring of various paint coatings. Polysiloxane resin and pigment (aluminum powder) were used. Paint-and-lacquer suspension samples were subjected to a continuous computer-micro-optical scanning on the entire surface of the paint film. An intensified process of disaggregation of pigments was observed even at low amount of PEPI. Depending on dispersion conditions the average particle diameter of the pigment decreased by 10-30%, and the number of particles increased by 20-50%. This study showed that, the introduction of polyethylenepolyimines in the paint and varnish compositions allowed fine control of the microstructure of the heterogeneous system (polymer-pigment). As a result microstructured paint coatings with improved operational characteristics are formed.

Keywords: coatings, polysiloxane, characteristics, particles

Geopolymers and Their Uses: Review

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Abstract. Outlining the past-present history of the study of alumino-silicate materials. It is well known that geopolymers are inorganic polymers obtained from chemical reaction, also known as geopolymerisation, between a alkaline solution and a solid reach in aluminium and silicone. There is still some controversy surrounding the alkaline activators used to create geopolymer concrete, because homogeneous mixture composed of two (NaOH and Na_2SO_3) or more chemical in varying proportions are usually highly corrosive and hard to handle. In order to overcome Portland cement many wastes have been used in recent studies to create "friendly" cements by geopolymerisation. In this short review we present basic information's about how to create and use geopolymers, alkaline activators and raw materials that can be used and conclusions. One question that needs to be asked is can thus materials replace on large scale Portland cement?

Keywords: geopolymers, alkaline activators, raw materials, applications, geopolymerisation.

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Aluminum Coating Influence on Nitride Layer Performance Deposited by MO-CVD in Fluidized Bed on Stainless Steel Substrate

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Abstract. The modification of surface properties by duplex treatments, involving the overlapping of two surface treatment techniques, has been established as an intelligent solution to create new applications for the substrate metallic material. There are driveline components operating under very tough wear and corrosion conditions, with high temperature and humidity variations. Such components are usually made of high Cr and Ni stainless steel and for the hardening of surfaces it is recommended a thermochemical treatment. Since stainless steels, especially austenitic stainless steels, are difficult to nitride, experimental studies focus on increasing the depth of the nitride layer and surface hardness. Achieving the goal involves changing active layer chemical composition by introducing aluminium in the surface layer. In order to find a solution, a new surface treatment technique is produced by combining aluminum thin films by MO-CVD in a fluidized bed using a triisobutylaluminum precursor with a thermochemical nitriding treatment.

Keywords: MO-CVD, TIBA, fluidized-bed, plasma nitriding, austenitic steel.

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Obtaining of Light Biocompatible Magnesium Alloys Using Levitation Equipment under Controlled Argon Atmosphere

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Abstract. The use of resorbable materials to make orthopedic implants is a new direction, with major benefits for both the patient and the surgeon. Magnesium is a natural element of the human body, the magnesium-based implant having the ability to be fully resorbed without inducing local or systemic toxic effects. Experimental alloys were obtained from 99.5% pure magnesium powders in which alloying elements (Ca) or microalloying (La, Ce) were added in the 0.5-5% range to identify the best bio-compatible alloy recipes. The metallurgical process was conducted in an induction melting equipment under a controlled atmosphere of argon, through levitation. The samples obtained were characterized in terms of chemical composition, microstructure and micro-hardness. The microhardness values was ranging from 49 to 87.4 HV0.2.

Keywords: Mg alloys, melting, furnace by levitation, microstructure

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Advances in Biomaterials for Dental Applications

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Abstract. Dental biomaterials offer the clinicians a powerful set of clinical tools for patient treatment and are found in virtually every instrument, device, implant, or piece of equipment. This paper focuses on some newly developed dental biomaterials as well as the novel technologies used for dental biomaterials processing and characterization. New trends in metallic dental alloys, surface modification, and characterization techniques will be reviewed and discussed with particular reference to their relevance in dental biomaterials-tissue interactions phenomena. Because the advanced microscopically techniques such as scanning electron microscopy and atomic force microscopy are used now to determine the interfacial structure/ property/biofunctionality relationships of synthetic dental biomaterials with human tissues, different practical examination of some relevant dental biomaterials will be presented in order to show the advantage given by this techniques. In conclusion, future research and studies on some promising dental biomaterials are essential in terms of biocompatibility, structure and properties in order to make them clinically viable.

Keywords: dental biomaterials, metallic alloys, composites, SEM, AFM.

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Magnetic Properties of Rapid Cooled FeCoB Based Alloys Produced by Injection Molding

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Abstract. The paper presents the results of investigations of the structure and magnetic properties of massive rapid cooled $Fe_{50-x}Co_{20+x}B_{20}Cu_1Nb_9$ alloys (where x = 0, 5). Massive alloys were made using the method of injecting a liquid alloy into a copper mold. Samples were obtained in the form of 0.5 mm thick plates. The structure of the obtained samples was examined using an X-ray diffractometer equipped with a CuKα lamp. The phase composition of the alloys formed was determined using the Match program. By using Sherrer's dependence the grain sizes of the identified crystalline phases were estimated. Using the Faraday magnetic balance, the magnetization of samples as a function of temperature in the range from room temperature to 850K was measured. Magnetization of saturation and value of the coercive field for the prepared alloys were determined on the basis of magnetic hysteresis loop measurement using the LakeShore vibration magnetometer.

Keywords: bulk metallic glasses, VSM, Curie temperature, properties.

Thermal Analysis of a New Glass Fiber-Reinforced Bismaleimide Composite Material Used for Firefighter Protection

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Abstract. Safety helmets represent essential Personal Protection Equipment (PPE) used in firefighter protection and emergency situations. They protect firefighter's face and eyes against flames, heat and flying debris. When temperature levels are high, user's thermal comfort is affected. A glass fiber-reinforced bismaleimide composite material has a number of improved properties in terms of mechanical and thermal characteristics, as compared to the materials that are currently used. The present paper aims to comparatively analyze the thermal behavior of an injection molded polypropylene helmet and the newly developed hot modeling material, under the form of a glass fiber-reinforced bismaleimide composite material. TGA, DSC and DMA thermograms were corroborated and discussed, from the point of view of the consecutive solid state transitions occurring during heating, mostly in the second heating-cooling cycle. The isothermal behavior of glass fiber-reinforced bismaleimide composite material, during strain sweeps performed by DMA, enabled the determination of internal friction and storage modulus, under vibratory loads, at different temperatures. The advantages of the newly developed glass fiber-reinforced bismaleimide composite material were hightlighted.

Keywords: thermal gravimetry analysis, differential scanning calorimetry, dynamic mechanical analysis, solid state transition, vibratory loading, fire protection.

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Preliminary Tests for Ti-Mo-Zr-Ta Alloys as Potential Biomaterials

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Abstract. Nowadays, there is a continuing concern for the research and development of alloys for medical and biomedical applications. In order to check the biocompatible character of new Ti-Mo-Zr-Ta alloys, it is necessary to carry out preliminary laboratory tests to follow how a biomaterial surface would interact with the host. The paper presents tests for Ti-Mo-Zr-Ta alloys like contact angle and DSC test to identify biocompatible character. Contact angle measurement is an experimental technique used to assess the hydrophilic or hydrophobic character of surfaces by reference to the 90º contact angle value and to characterize the thermal behavior, for temperature range between 36.5-37.2ºC, interval which a biomaterial works inside the healthy human body, was used DSC test.

Keywords: contact angle, DSC, Ti-Mo-Zr-Ta alloys, orthopedic applications

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Preliminary Results on Thermal Shock Behavior of CuZnAl Shape Memory Alloy Using a Solar Furnace as Heating Source

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Abstract. It is highly accepted that martensitic transformation can be induced by temperature variation and by stress solicitation. Using a solar concentrator, we manage to increase the material surface temperature (till 573 respectively 873 K) in very short periods of time in order to analyze the material behavior under thermal shocks. The heating/cooling process was registered and analyzed during the experiments. Material surface was analyzed before and after thermal shocks by microstructure and chemical composition points of view. The experiments follow the material behavior during fast heating and propose the possibility of activating smart materials using the sun heat for aerospace applications.

Keywords: solar furnace, shape memory alloy

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Characteristics of Thermoplastic Potato Starch/Bentonite Nanocomposite Film

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Abstract. The aim of this study is to investigate the effect of bentonite towards thermoplastic potato starch nanocomposite films on the mechanical, microstructure and physical properties. The nanocomposite films were prepared using bentonite nano filler (0, 1, 5, 10, 15 and 20%) through solution casting technique. Obtained result indicate that, tensile strength increased significantly with increasing bentonite content and the highest tensile strength was recorded for nanocomposite film with 20% bentonite content. Meanwhile, elongation at break increased as the bentonite content increased from 0 to 15%, however significantly decreased at 20% bentonite content due to ductile structure and anti-plasticizing effect. Besides, good dispersion between bentonite nano filler and starch matrix with slightly remaining anglomerates was evident in scanning electron microscopy (SEM) image. Overall result shows that the addition of bentonite nano filler in potato starch film significantly influenced the properties of the films.

Keywords: potato starch, biodegradable polymer, nanocomposite, tensile strength, microstructure.

Synthesis and Luminescent Properties of $LiEu_{(0.50-x)}Gd_{0.50}(WO_4)_2Sm_x$ Red Phosphor

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Abstract. Red phosphor is widely used in enhancing white light emitting diodes. Recent trends show there are several efforts in improving the efficiency of lighting particularly using Europium (III) as activators in Gadolinium tungstate phosphors. In this work, $LiEu_{(0.50-x)}Gd_{0.50}(WO_4)_2Sm_x$ red phosphor was synthesized using solid-state reaction. The crystal structure, morphology and photoluminescence properties of the sample were analyzed. The structure of the phosphor was found to be tetragonal with space group I41/a by characterizing the phosphor using the X-ray powder diffraction (XRPD) application. The morphologies present the angular-shaped particles. The highest emission peak occurred at 615 nm corresponding to the $^5D_0 \rightarrow {}^7F_2$ transition under near-UV region. The optimum amount of Sm^{3+} that enhanced the intensity of the host lattice at x = 0.15 mol. The improvement on the photoluminescence properties of these phosphors without any changes on the structure and crystal symmetry shows a good potential of the red emitting phosphor to be used in the light emitting diodes (WLEDs) applications.

Keywords: tungstate phosphor, red phosphor, photoluminescence, crystal structure, LED

Preliminary Results on the Corrosion Behavior of a New Biodegradable Metallic Material Based on Zinc

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Abstract. The class of biomaterials (metallic, polymer or ceramics) has applications as implants with a temporary function. Among magnezium (high corrosion rate) and iron (slow corrosion rate) based biodegradable alloys a new class based on zinc try to fullfill the gap between the first two alloy systems concerning the degradation rate. The role of these alloys is to provide some specific characteristics for a limited period of time. In this article preliminary results based on microstructural and chemical characteristics of a Zn-Mg alloy are presented. The results were obtained using optical and electronic microscopy (MO and SEM) and dispersive energy spectroscpy (EDS) and X-ray difraction (XRD).

Keywords: biodegradable, biocompatible, corrosion resistance

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Corrosion Resistance of a Cast-Iron Material Coted with a Ceramic Layer Using Thermal Spray Method

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Abstract. Cast-iron 250 used for breake systems present many corrosion signs after a mean usage time based on the environment conditions they work. In order to improve them corrosion resistance we propose to cover the active part of the material using a ceramic material. The deposition process is an industrial deposition system based on thermal spraying that can cover high surfaces in low time. In this articol we analyze the influence of a ceramic layer (12-25 μm) on the corrosion resistance of 250 cast iron. The results were analyzed using scanning electron microscopy (SEM), X-ray energy dispersive (EDS) and linear and cyclic potentiometry.

Keywords: thermal spray, thin layer, ceramic cover

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Noninvasive Evaluation of Special Alloys for Prostheses using Complementary Methods

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Abstract. Ti-Mo-Si alloys have gained the attention of biomedical industry due to specific strength and corrosion resistance and the best biocompatibility among metallic materials used in medical prostheses. In order to characterise the material, the experimental determination of elastic matrix, mechanical wear and the probability of appearance and propagation of thin cracks are imposed. Thus, resonant ultrasound spectroscopy, acoustic emission [3] as noninvasive methods and complementary methods as SEM, EDX are involved, to choose the best concentration of elements with aim of improvement of mechanical properties.

Keywords: biomaterials, titanium alloys, noninvasive evaluation, SEM, EDX.

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SECTION 2

PROCEDURES AND TECHNOLOGIES FOR MATERIALS ENGINEERING

Oxidative Degradation of methyl orange solution by Fe-MKSF catalyst: Identification of radical species

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Abstract. Iron–immobilized montmorillonite KSF (Fe-MKSF) has been recognized as promising catalyst in degrading persistence organic contaminants. However, detailed mechanistic insight during the catalysis which involving the formation and identification of radical species were remained indeterminate due to complex reaction. Inspiring by this gap, iron-immobilized clay (Fe-MKSF) was synthesized and used as heterogeneous catalyst in the oxidative degradation of methyl orange (MO) solution. Identification of radical species was determined through the inclusion of different types of radical scavenging agent during the Fenton-like reaction at optimum condition. Interestingly, dominant radical species were found to be hydroperoxyl radicals (•OOH) which subsequently followed by hydroxyl radicals (•OH) during the catalysis. Based on the percentage of MO removal, it was suggested that approximately 88% of the •OOH radicals existed at the interface of catalyst while 39% presence in bulk solution. Meanwhile, the interface •OH radicals promoted 38% of MO removal, whilst 4% by the bulk •OH radicals. Hence, these findings have conveyed novel insight on detailed radicals' identification as well as its' interaction during the catalysis.

Keywords: nanocomposites, catalysis, Fe-MKSF, oxidative degradation, radical species

Effects of Partial Replacement of Eggshell Powder by Halloysite Nanotubes on the Properties of Polyvinyl Alcohol Composites

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Abstract. Polyvinyl alcohol (PVA)/eggshell powder (ESP) were prepared via solution casting method. The effects of gradual replacement of ESP by halloysite nanotubes (HNTs) were investigated based on tensile properties, physical properties and biodegradability. The main objective is to study the effect of hybrid fillers and also to compare the properties of PVA/ESP composite with conventional filler, HNT. The tensile properties decreased with increasing HNT loading. Scanning electron microscopy (SEM) studies showed that agglomeration of filler were present throughout the composites. Due to the presence of hydroxyl group on the outer and inner surface of HNT, the water absorption and water vapor transmissibility were found to increase with increasing HNTs loading. The biodegradability of film filled with HNT is lower compared to the film filled with ESP.

Keywords: polyvinyl alcohol, eggshell powder, hybrid, composite, halloysite nanotubes, solution casting.

The Influence of pH and Temperature on the Recovery Process of Active Paste from Spent Li-ion Batteries

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Abstract. In the past ten years, the characteristics of Li-ion batteries had improved continuously in order to keep up with the market requirements and their recycling methods had to update also. The recycling technologies of Li-ion batteries have come a long way from pyrometallurgical methods to nowadays technologies, which use ultrasounds and microorganisms. The ultrasound recycling has many advantages, from the short time of the operation till the best recovery percentage of the materials. The study includes research on Li-ion batteries aiming at recovering cobalt from the active cathode paste. After the complete discharge and component separation, removal of the active slurry from the aluminum foil was accomplished using ecologically acidic solutions in an ultrasonic bath.The optimal separation parameters were monitored by measuring the concentration of solutions, pH and temperature, using a pH meter equipped with a temperature probe.

Keywords: active cathode paste, pH meter, spent Li-ion batteries, Co recovery.

Phosphating of Carbon Steels in Solutions Containing Zinc and Zinc – Manganese Phosphates

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Abstract. The formation of phosphating coatings on carbon steels by novel baths containing zinc and zinc-manganese phosphates has been investigated. By gravimetric, chemical, electrochemical and physical methods are determined the characteristics of preparations (density, pH, conductivity, total and free acidity) and those of the produced coatings (thickness, phase and chemical compositions, structure, protection ability).The concentration range has been varied from 5 to 20% vol., while the temperature effects have been studied in the range from 20 to 80°C. The thicknesses of the coatings and the amount of the substrate dissolved have been determined. It is proved that Mn- phosphate presence decreases the coating thickness for all working solution concentrations and temperatures, at the same time increases the mass of dissolved metal of the substrate. The results obtained indicate that the coatings developed in zinc and zinc-manganese baths contain the following phases: hopeite, phosphophyllite, quasihopeite, strunzite and mixtures of them.

Keywords: zinc and zinc-manganese phosphating, carbon steels.

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Approach to Quantification of Trace Hazardous Metals in Barite Mine Wastes with ICP-OES

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Abstract. The deposited waste from Tarnita-Suceava, Romania barite mine is a continual source of contamination of surrounding soils, ground and surface waters. High concentrations of iron, arsenic, copper, lead and zinc have been found in the sterile dump material. Sample matrix and spectral influence is expected to interfer the ICP-OES quantification of trace metals as cadmium, nickel and chromium. This study is aimed at estimation of matrix influence, detection limits, and precision of ICP-OES determination of Cd, Ni and Cr after wet aqua regia sample digestion. Boumans Q conception for LOD and LOQ determination was used. The results from analysis of real samples are also presented.

Keywords: envinronmental trase analysys, ICP-OES, spectral interferences, limit of detection, limit of quantification

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Technical Parameters Modeling of a Gas Probe Foaming Using an Active Experimental Type Research

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Abstract. The present paper deals with a current and complex topic, namely - a technical problem solving regarding the modeling and then optimization of some technical parameters related to the natural gas extraction process. The study subject is to optimize the gas probe sputtering using experimental research methods and data processing by regular probe intervention with different sputtering agents. This procedure makes that the hydrostatic pressure to be reduced by the foam formation from the water deposit and the scrubbing agent which can be removed from the surface by the produced gas flow. The probe production data was analyzed and the so-called candidate for the research itself emerged. This is an extremely complex study and it was carried out on the field works, finding that due to the severe gas field depletion the wells flow decrease and the start of their loading with deposit water, was registered. It was required the regular wells foaming, to optimize the daily production flow and the disposal of the wellbore accumulated water. In order to analyze the process of natural gas production, the factorial experiment and other methods were used. The reason of this choice is that the method can offer very good research results with a small number of experimental data. Finally, through this study the extraction process problems were identified by analyzing and optimizing the technical parameters, which led to a quality improvement of the extraction process.

Keywords: foaming, technical parameters, process and product, experimental research, quality assurance.

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Paramenters Affecting the Mechanical Properties of Fly Ash Based Geopoymer Binders – Experimental Results

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Abstract. As the demand for concrete and the needs to satisfy development of infrastructure facilities increase, it is esential to find alternatives to create environment-friendly concrete. The particular procedure of alkaline activation of fly ash - in which ash resulting from a power plant is combined with a specific alkaline activator in order to create a solid material, then dried at a certain temperature - opened new oportunities for this new material to get attention worldwide. To obtain a material with similar properties of ordinary Portland cement concrete and to obtain desirable compressive strengths, the parameters that affect these type of binders should be fully understood. The aim of this paper is to study the main parameters affecting the mechanical strength of the fly ash-based geopolymer paste and their interactions. Parameters such as molarity of sodium hydroxide (from 8M to 12M), alkaline activators ratio (from 0,5 to 2,5), curing of geopolymer paste specimens (set at 70°C for 24 hours) and water content of succesive mixes were analysed in order to observe how they affect the mechanical properties of the geopolymer paste. Experimental results show that the compressive strength of the fly ash-based geopolymer paste increases with the increase of the concentration of sodium hydroxide and decreases with higher ratios of water to geopolymer solids in the mixtures as the water content plays an important role in both the geopolymerisation process and in obtaining the desired compressive strength.

Keywords: fly ash, geopolymer, environment friendly, compressive strength

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Experimental Characterization of Aluminum-Based Hybrid Composites Obtained Through Powder metallurgy

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Abstract. The paper presents some experimental results concerning fabrication through powder metallurgy (P/M) of aluminum-based hybrid composites - Al/Al_2O_3/Gr. In order to understand the mechanisms that occur during the P/M processes of obtaining Al/Al_2O_3/Gr composite, we correlated the physical characteristics with their micro-structural characteristics. The characterization was performed using analysis techniques specific for P/M process, SEM-EDS and XRD analyses. Micro-structural characterization of the composites has revealed fairly uniform distribution this resulting in good properties of the final composite material.

Keywords: P/M, hybrid composites, aluminum, characterization.

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Spinning Disc Technology - Residence Time Distribution and Efficiency in Textile Wastewater Treatment Application

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Abstract. The spinning disc technology (SD) has received increased attention in the last years due to its enhanced fluid flow features resulting in improved property transfers. The actual study focuses on characterization of the flow within a spinning disc system based on experimental data used to establish the residence time distribution (RTD) and its dependence on the feeding liquid flowrate and the disc rotational speed. To obtain these data, an inert tracer (sodium chloride) was injected as a pulse input in the liquid stream entering the disc and the salt concentration of the liquid leaving the disc was continuously recorded. The obtained data indicate that an increase in the liquid flowrate from 10 L/h to 30 L/h determines a narrower RTD function. Also, at a rotational speed of 200 rpm, the residence time distribution is broader than that for 500 rpm and 800 rpm. The RTD data suggest that depending on the needed flow characteristics, one can choose a certain flowrate and rotational speed domain for its application. Also, the SD technology was used to process textile wastewater treated with bentonite (as both coagulation and discoloration agent) in order to investigate whether the quality indicators such as the total suspended solid content, turbidity and discoloration, can be improved. The experimental results are promising since the discoloration and the removals of suspended solids attained values of over 40%, and respectively, 50 %, depending on the effluent flowrate (10 l/h and 30 L/h), and the disc rotational speed (200 rpm, 550 rpm and 850 rpm) without any other addition of chemicals, or initiation of other simultaneous treatment processes (e.g., advanced oxidative, or reductive, or biochemical processes). This recommends spinning disc technology as a suitable and promising tool to improve different wastewater characteristics.

Keywords: spinning disc technology, residence time distribution, textile wastewater, treatment efficiency, quality indicators

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Influence of Nanostructuration on the Sound Velocity in Aluminum Al_99.50

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Abstract. The paper proposes is a multidisciplinary study on the influence of nanostructured material obtained by severe plastic deformation, in this case the aluminum with a purity of 99.50% (Al_99.50), on the sound velocity. The study of nanomaterials is a branch of material science on the basis of which nanotechnology can be approached, [1]. Severe plastic deformation (SPD) is a generic term describing a group of metal and alloy processing techniques involving very high stresses without including significant changes in the overall dimensions of the model or workpiece, [2]. The sample is of a regular quadrangular prism shape with the side square of a = 10 mm and the height of h = 16 mm, so with a dimensional factor h / a = 1.6. For each sample, a number of 7 determinations were performed to establish a mean value for the sound velocity. As a result of the microstructural analysis, it is observed that at the deformation cycle 4 the grains have an average size between 250 and 500 nm.

Keywords: aluminum, severe plastic deformation, sound velicity

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The effect of heat treatment and corrosion behavior of AISI420

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Abstract. The present paper shows the effect of heat treatments applied to AISI 420 steel. The characterization of corrosion behavior of AISI 420 steel, in 0.5M NaCl aqueous solution, was made in an electrochemical cell with 3 electrodes, connected at PG STAT 302N Autolab Potentiostat, at laboratory temperature. The medium used was a NaCl 0.5M solution with a pH of 6.26 and an electro-conductivity by 49.9 mS/cm.

Keywords: corrosion, steel, chemical composition, Bode representations.

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Structural Analysis of Carabiners Materials Used At Personal Protective Equipments

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Abstract. The safety system used at rope rescue, climbing, construction, caving, arboriculture, whitewater rescue, window cleaning, sailing, industrial rope work etc. includes carabiners that secure the harness components and safety ropes. A carabiner is a small size metal clip with an inward opening gate. The main used materials for carabiners manufacturing are aluminium alloys and steel. Due to its lightweight, aluminium alloys are used especially in climbing, while steel is used in applications where the weight is not a important parameter, such as firefighting or construction. Thus specialized shackle is used in severe environment condition, such as: temperature variation (firefighters, mountain climbers), highly corrosive (construction, caving, sailing), etc. so it must be manufactured from materials with good corrosion resistance and refractoriness. Because the carbiners are used at height, besides the properties already exposed, they must possess properties of resilence. This paper presents a metallographic analysis using Scanning Electron Microscope and Energy Dispersive Analysis X-ray to highlight the structural characteristics in order to increase resilience and improve the wear and corrosion resistance properties. For this study we analyzed one X type carabiner used for low loads, attaching the boom to the anchor point.

Keywords: carabiners, EDAX , protective equipments, SEM, wear

Dynamic Impact Behavior of High Entropy Alloys Used in The Military Domain

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Abstract. High entropy alloys in the AlxFeCrCoNi system have important compressive strength characteristics, being usable for severe impact applications with military applications. In the research paper are presented the results obtained by testing the impact resistance by perforation with incendiary armor-piercing bullet with 7.62 mm caliber. Starting from the results obtained in the dynamical test polygon, modeling with finite elements of dynamical behavior was performed, which allowed the development of more efficient high entropy alloys, to be used in collective/individual protection domain.

Keywords: high entropy alloys, impact resistance, modelling, ballistic protection.

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Research Regarding Membrane Filtration Capacity of Water Collected from Siret River

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Abstract. In the past decade, the high demand and strict legislations regarding production and quality of pure and potable water require finding novel treatment technologies with higher effectiveness. Membrane technology is a viable option in water and wastewater treatment due to high performance, ease in implementation, cost-efficiency among other advantages, when compared with conventional treatment technologies, leading to a rapid expansion in use in all areas of the industry. Polymeric ultrafiltration membranes have been successfully used in various industries since 1969 and in later years they were studied in the water purification sector, mainly as a pre-treatment step to reduce severe fouling that could occur in reverse osmosis filtration modules. Polysulfone (PSf) was the polymer of choice in this study with two concentrations (25 wt.% and 30 wt.%). Surface SEM morphology, roughness and water affinity were analyzed for the studied membranes. Water from Siret river was used in the permeation tests in order to analyze the retention capacity and anti-fouling ability. Results have revealed higher retention for 30 wt.% PSf membranes, from the physico-chemical and microbiological point-of-view as well as lower fouling, also.

Keywords: membrane, polysulfone, retention, fouling, water treatment.

Protection of Tempered Aluminum Alloy in Contact With the Environment

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Abstract. In many service applications an increasing temperature or inadequate protections often give rise to localized forms of corrosion in an initially free and unprotected system. This research understudy the corrosion chemistry, the effect of chromium as the inhibitor, Vickers hardness test, and weight loss on tempered aluminium alloy 7075 in corrosive mediums. The tempers of the aluminium alloy used are T6 and T73 where obtained by solution heat treatment at 470 ^{o}C and quenched before immersion test in acidic (pH3), and slightly alkaline (pH7.5) solutions. The results obtained were characterized by conventional weight loss process and morphology observation with a microscope. The surface morphology shows exfoliation form of corrosion and the weight loss analysis shows the as received sample experience more weight loss when compared with the other heat treated samples.

Keywords: Aluminum alloy; Corrosive solution; Heat treatment; Inhibitor.

The Effect of Aggressive Corrosion Medium on the Microstructure and Properties of Mild Steel

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Abstract. Mild steel is known to be one of the major construction materials and have been extensively used in most chemical and material industries due to its interesting properties which can be easily altered to suit various application areas. In this research, mild steel is exposed to different aggressive mediums in order to observe the effect of these interactions on its surface morphology and properties. The mild steel used was cut into dimensions of 7 cm length and width of 3 cm. The aggressive mediums used are 100 mls of aqueous solution of hydrochloric acid, sodium hydroxide (40 g/L), and sodium chloride (35 g/L) at room temperature. The characterizations performed are the hardness test with the Rockwell hardness tester, the surface morphology by optical microscope, surface roughness and the weight loss from the immersion test. It was observed that the hardness value and the weight loss for the different cut samples of mild steel immersed in the different aggressive mediums reduces with prolong exposure and severe pitting form of corrosion was present on its surface.

Keywords: aggressive mediums, corrosion, mild steel, weight loss.

Effect of Solid to Liquid Ratio Geopolymer Adsorbent on Heavy Metal Removal

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Abstract. Microstructure of three-dimensional alumino-silicate which similar to zeolite cause geopolymer based adsorbent accepted in the treatment of wastewater. This paper presents an investigation on the copper removal from the wastewater by varying the solid to liquid ratio in the fly ash, kaolin and sludge-based geopolymer adsorbent. The adsorption test was conducted to study the efficiency of the adsorbent and the copper concentration was examined by using Atomic Adsorption Spectrometry (AAS). The optimum solid to liquid ratio with the highest percentage removal were 1.0, 0.5 and 0.8 for fly ash-based geopolymer, kaolin-based geopolymer and sludge-based geopolymer adsorbent.

Keywords: Geopolymer adsorbent; Solid to liquid ratio; Heavy metal removal.

The Influence of Pre-Heated Treatment to Improve Adhesion Bond Coating Strength of Fly Ash Based Ceramic

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Abstract. The study focus on effect of pre-heated ceramic surface on the adhesion bond strength between geopolymer coating and ceramic substrates. Ceramic substrate was pre-heated at different temperature (400°C, 600°C, 800 °C and 1000 °C). Fly ash geopolymer coating material potential used to protect surface used in exposure conditions after sintering at high temperature. Fly ash and alkali activator (Al_2O_3/Na_2SiO_3) were mixed with 2.0 solids-to-liquid ratios to prepare geopolymer coating material at constant NaOH concentration of 12M. Adhesion test was conducted to determine the adhesion bond between ceramic substrates and fly ash coating material. The results showed the pre-heated ceramic substrates effect the adhesion bond of coating compared with untreated substrates with increasing of strength up to 20 % for temperature 600 °C

Keywords: geopolymer coating, pre-heated ceramic substrate and adhesion bond

Degradation of Organic Matter from Stabilized Leachate by Using Zinc Sulphate as Coagulant Agent: A Comparative Study

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Abstract. Stabilized landfill leachate often contains higher organic fractions than the young one. The organics require several sequential treatments to render the leachate parameters concentrations to permissible discharge limits before being discharged to receiving water. This study focused on the application of Zinc Sulphate ($ZnSO_4$) as coagulant agent followed with microfiltration of 0.45 µm pore size under different condition of landfill leachates. The results indicated that sludge volume index (SVI), soluble COD and turbidity concentrations were inter-related to each other when compared under different $ZnSO_4$ dosages. However, that was not the case when correlation between stabilized and young leachate were compared side by side. To conform the finding, one-way analysis of variance (ANOVA) was conducted and the results were further explained by the adequacy and significant of confidence interval. Finally, it was proven that, soluble and particulate COD had significant CI of 95% applicable for stabilized leachate alone.

Keywords: leachate, landfill, stabilized, zinc sulphate, organic matter, SVI.

Enhancement of Energy Conversion Efficiency for Dye Sensitized Solar Cell Using Zinc Oxide Photoanode

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Abstract. Dye sensitized solar cell (DSSC) is a third generation solar cell that is well known for its low cost, simple fabrication process and promised reasonable energy conversion efficiency. Basic structure of DSSC is composed of photoanode, dye sensitizer, electrolyte that is sandwiched together in between two transparent conductive oxide (TCO) glasses. Each of the components in the DSSC contributes important role that affect the energy conversion efficiency. In this research, the commonly used titanium dioxide (TiO_2) photoanode that reported to have high recombination rate and low electron mobility that leads to efficiency loss had been compared with the zinc oxide (ZnO) photoanode with high electron mobility (155 $cm^2V^{-1}S^{-1}$). Both of these photoanodes had been deposited through doctor blade technique. The electrical performance of the laboratory based DSSCs tested using solar simulator demonstrated that ZnO is a better photoanode compared to TiO_2 with the energy conversion efficiency of 0.34% and 0.29% respectively. Nanorod shape morphology was observed in ZnO photoanode with average particle size of 41.60 nm and average crystallite size of 15.95 nm. This research proved that the energy conversion efficiency of conventional TiO_2 based photoanode can be improved using ZnO material.

Keywords: solar cell, dye sensitized solar cell, zinc oxide, titanium dioxide


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SECTION 3

MATERIALS APPLICATION

Sulphated Electric Arc Furnace Slag As Fenton-Like Catalyst For Degradation of Reactive Black 5

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Abstract. Sulphated electric arc furnace slag (S-EAFS) was obtained through a facile chemical and thermal treatment method. The S-EAFS was evaluated as a Fenton-like catalyst for the oxidative degradation of reactive black 5 (RB5). The S-EAFS was characterized by XRD, SEM-EDX and nitrogen adsorption analysis. The highest RB5 degradation efficiency obtained in this study was above 90% which was maintained across seven successive cycles with minimum iron leaching. This was achieved at a RB5 concentration of 0.15 gL^{-1} (50 ppm) with 8 mM of H_2O_2 and a pH of 4.5. Characterization revealed that the presence of sulphated groups (SO_4^{2-}) within the EAFS improved the surface acidity of the material and corresponded to an increase in the catalytic activity for the degradation of RB5 at mild pH.

Keywords: nanocomposites, catalysis, fenton - like catalys, reactive dye, sulphated group, electric arc furnace slag.

Method of Analysis of the Topic of Doctoral Thesis in the Field of Cast Parts Production. A Case Study on the Situation in Romania

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Abstract. The paper presents a method of analysis of doctoral thesis in the field of manufacturing cast parts in Romania, the period of analysis being between 1918 and 2016. Based on the evolution of the problem analyzed, the method consists in the following stages: establishing a coding system for the domains and subdomains determined in the thematic characterization of the PhD thesis; establishing the institutions which organize doctoral studies, doctoral specialties, doctoral supervisors and the time frame for analysis; selecting the doctoral thesis that will be included in the analysis; establishing the key words for the characterization of doctoral theses, based on their title; the assignment of the PhD thesis to the domains and subdomains, according to the meaning of the keywords, to the existing groups of the coding system; statistical processing of results and determination of shares for each domain and subdomain; conclusions on the results obtained and their interpretation in the context of economic and social developments. The case study is carried out at the specific level of castings manufacturing, the territory of the analysis refers to the institutions of doctoral studies and the analysis period is between 1918 - 2016.

Keywords: cast parts manufacturing, doctoral thesis, analysis method, Romania, case study.

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Critical Thinking on the Introduction of Digitization within Engineering Training Systems in the Manufacturing Stage of Cast Parts

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Abstract. The paper aims to present a methodology for the analysis of the engineering training systems at the manufacturing stage of castings through critical engineering thinking. Its use (Paul & Elder, 2008) requires the development of procedures capable of responding to the problems faced by engineering training in terms of acquiring the tools and procedures. The structure of the analysis took into consideration the following aspects: the motivation to use the proposed procedure, considerations on the engineering behavior, the design of the reasoning adapted to the analysis of the engineering training systems, the determination of the correlations in the processes of obtaining the cast products, the definition and calibration of the digital experiment, the definition and analysis of the factors influencing the last solidification area (the nature of the alloy, the shape of the mold and the casting geometry).

Keywords: engineering critical thinking, computer application, solidification of alloys, areas of last solidification, engineering training programs

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Optical Measuring Setup and Its Applications for State Diagnostics of Construction Materials

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Abstract. A new optical measuring setup, based on the use of modern laser technologies and new optical interference methods, is described. Moreover, its applications for studying physical and mechanical properties and state diagnostics of the construction materials by acoustic active methods of nondestructive testing in engineering, aircraft building, shipbuilding, instrument making, etc. are shown.

Keywords: laser interferometer, interference pattern, measurement of small displacements, object of control.

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Metal Material Cleaner by Applied High Frequency Ultrasonics

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Abstract. This research article presents metal material cleaner by applied high frequency ultrasonics is one choice to utilize the sound energy. This method is to transfer ultrasonic energy to the cleaning unit. In this research, the IC# SG3525A is used to generate frequency at 28 kHz. The IC#TLP250 is a optocoupler which is used to interface between the output of the IC#SG3525A and the input of the isolated drive circuit. The high frequency circuit is used to drive the gate of Power MOSFETs#IRFP450 in half-bridge Inverter circuit. Then, the output signal is tranfered to high frequency transformer to step up the voltage. After that,the receiving A/C 350 watt drives the seven ultrasonic transducers in order to transfer electric energy to mechanical vibrating energy by the frequency of ultrasonic. In addition, there is a timekeeper to control the work duration. This metal material cleaner by ultrasonic can increase the ability of cleaning for the huge material parts and it can be used in another cleaning industry.

Keywords: cleaner, metal material, high frequency, ultrasonic, electric energy

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Liquid Chlorine Generator from Sea Water for Swimming Pool Using Cell Stainless Plates Coated Platinum Based on Electrolysis

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Abstract. This research paper presents the liquid chlorine generator from the sea water for swimming pool using the principle of ion exchange in cell electric based on electrolysis theory. For the data used in the study and experiment with the prototype and use of stainless plates coated platinum electrode. The power supply is direct current (DC) voltage 12 volt 95 ampere 1140 watts to plates as a stimulus reaction and oxidation reduction on electrode terminal each polarity. By the experiment of measuring conductivity, which is a value used in the detection of water with liquid chlorine. To compare both before and after the reaction by measuring the conductivity. And the data from this experiment will be used to create and develop the real machine to be used better in the future.

Keywords: liquid chroline, electrolysis, swimming pool, high power source, conductivity

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Use of Thermoelectric for Reducing Temperature of Cell Electric Field Corona of Smell Eliminator

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Abstract. This research article presents use thermoelectric for reduce temperature of cell electric field corona of smell eliminator as this eliminator using intensity electric field force on principle of (plasma) corona discharge and pulse high voltage switching power supply. The power supply is based on a mini converter. The converter is designed to operate high frequency more than 30 kHz and Power MOSFET is switching device through high voltage high frequency switching transformer #TLF14690. The circuit is capable of electric field intensity at 15 kV/cm for electric field cell. The problem incurred is heat come up in electric field cell resulting high consumption rate of efficiency eliminate smell (smell is Hydrogen Sulfide : H_2S). Therefore researcher tries to find a way to reduce temperature of electric field cell by using cool air producing from thermoelectric to observe temperature, ozone gas quantity and H_2S gas quantity. Therefore in testing we measure temperature, ozone gas quantity and H_2S gas quantity at cell electric field before and after installation of cool air production system from thermoelectric. The testing result appears that before installation cool air production system from thermoelectric temperature is 29°C, ozone gas quantity is 1.5 ppm and H_2S quantity is 150 ppm. And after installation cool air production system from thermoelectric temperature is 23°C, ozone gas quantity is 2.95 ppm and H_2S quantity is 25 ppm. Therefore it is conclude that cool air production system from thermoelectric can reduce temperature, increase ozone gas quantity and decrease H_2S quantity. And in the future researcher will develop application of cool air system from thermoelectric to reduce temperature in other industrial system and commercial innovations application.

Keywords: temperature, cell electric field, corona, thermoelectric, ozone gas, hydrogen sulfide, smell eliminator, cool air

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Validation of Ion Chromatographic Method for Determination of Eight Inorganic Anions in Waters

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Abstract: An ion chromatography method for determination of 8 ions (F^-, BrO_3^-, Cl^-, NO_2^-, Br^-, NO_3^-, PO_4^{3-}, SO_4^{2-}) in natural waters samples was described. An automated IC 850 IC Professional, Metrohm system equipped with conductivity detector and Metrosep A Supp 7 – 250/4.0 column was used for all analysis. The validation of the method was perfomed for simultaneous determination of all studied analytes and the results has showed that the validation fits the requiremets of current water regislations. The main analytical characteristics according to Eurachem guide 2014 were estimated for each of studied analytes: limits of detection (LOD), limits of quantification (LOQ), working and linear ranges, sensitivity and resolution, accuracy and precision. To cover all the studied range of analytes, accuracy of the method was estimated by analysis of natural water CRM spiked with BrO_3^-, NO_2^-, Br^-, PO_4^{3-} and spiked real samples. An uncertainty budget was presented. The method was applied to analysis of natural waters before and after chlorination, as well as to river waters.

Keywords: Ion chromatography, Method validation, Anions, Water quality

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The Taguchi Method Application to Improve the Quality of a Sustainable Process

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Abstract. Taguchi's method has always been a method used to improve the quality of the analyzed processes and products. This research shows an unusual situation, namely the modeling of some parameters, considered technical parameters, in a process that is wanted to be durable by improving the quality process and by ensuring quality using an experimental research method. Modern experimental techniques can be applied in any field and this study reflects the benefits of interacting between the agriculture sustainability principles and the Taguchi's Method application. The experimental method used in this practical study consists of combining engineering techniques with experimental statistical modeling to achieve rapid improvement of quality costs, in fact seeking optimization at the level of existing processes and the main technical parameters. The paper is actually a purely technical research that promotes a technical experiment using the Taguchi method, considered to be an effective method since it allows for rapid achievement of 70 to 90% of the desired optimization of the technical parameters. The missing 10 to 30 percent can be obtained with one or two complementary experiments, limited to 2 to 4 technical parameters that are considered to be the most influential. Applying the Taguchi's Method in the technique and not only, allowed the simultaneous study in the same experiment of the influence factors considered to be the most important in different combinations and, at the same time, determining the each factor contribution.

Keywords: quality assurance, Taguchi's Method, sustainable process, experimental modeling and statistical optimization.

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Investigating Tensile Behaviours Of Multi-Layer 3D Warp Interlock Fabrics For Technical Applications

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Abstract. Tensile behaviours is one the most important mechanical behaviour of textile material that should be exploited based of different parameters before using for different technical applications. This paper particularly tried to investigation the influence of weft and warp density toward tensile behaviour of different 3D warp interlock fabrics. Different types of 3D warp interlock fabrics with different warp and weft yarn density made of Kevlar yarn with linear density of 168tex were produced. The rectangular samples with 200 X 50 mm dimension were cut from the long panel of the four different 3D warp interlock fabrics using an electric cutter dedicates for high performance fabrics.The experimental investigations were tested based on ASTM D3039 standard using an Instron 500 tensile testing machine with a 250 KN load cell. The results depict that the warp and weft yarn density of 3D warp interlock woven fabrics shows a great impact on tensile properties. As the yarn density increases, the higher tensile strength of the preform in the particular yarn direction has been achieved. In general, the yarn density should be considered carefully while applying the 3D warp interlock fabrics for technical application which needs tensile strength.

Keywords: tensile behaviours, 3D warp interlock fabric, fabric density, technical applications, and high performance fibre.

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Tactile Comfort Evaluation of Conductive Knitted Fabric Using KES-FB

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Abstract. Tactile comfort has a strong relation with low-stress mechanical properties of textile fabrics having close contact with the human skin. In this work, we attempt to analyze the low-stress mechanical properties of the functional knitted fabric obtained using Kawabata's fabric evaluation system (KES-FB). The measured results were compared with those of the controlled polyester fabric. The bending ability of the product increased from 0.2448 to 0.8010 gf.cm2/cm and hence the rigidity influenced when copper yarn is introduced. However, the compressibility increased from 0.173 to 0.449 gf.cm/cm2 and hence the compressibility slightly boosted. The surface roughness (SMD) highly increased from 7.196 to 14.258 μm. It was observed that the incorporation of conductive copper yarn during knitting brought an effect on the tactile comfort of the fabrics. The overall comfort properties of the conductive textile fabric were reduced due to the introduction of copper yarn during knitting operations. Focus should be given when functional fabric developed which has close contact to the human skin.

Keywords: tactile comfort, KES-FB, low-stress, mechanical properties, functional fabric.

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The use of Semiconductor Materials in the Construction of Modern Equipment for Adjustable Drive of Power Equipment from a Lignite Open Pit

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Abstract. In modern electric drive systems, regardless of the speed control method used, the asynchronous motor power supply tends to be generally made from static frequency converters that can change the amplitude and frequency of the supply voltage.In order to achieve the static converters in which semiconductor materials are used, the latest generation technologies are used. For Silicon Quality Control in industrial processes CryoSAS (Cryogenic Silicon Analysis System) or SiBrickScan (SBS) Silicon Ingot Analyzer are used.The use of diode rectifiers for supplying inverters has as a major negative consequence the increase of "harmonic pollution". The energy system can function properly in the presence of a limited amount of harmonics.The presence of harmonics in the power supply system can generate a wide range of unwanted effects. For example, harmonics can cause signal interference, overvoltage, loss of data in data transmission lines. Harmonics can also cause overheating, inadequate operation, or even electrical equipment failure.The paper explores the effect of the use of electric drives with static converters on the quality of electric power. A series of measurements are made using a Hioki 3197 type equipment. Following the study, there are proposed measures to improve the quality of electricity and reduce energy losses.

Keywords: Speed control, static converters, quality, electric power, measures.

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Iot-Based Foucault Pendulum Automation and Oscillation Amplitude Control

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Abstract. The Foucault Pendulum was invented in 1851 by Leon Foucault, in order to demonstrate the theory of Earth rotation. The aim of this Erasmus+ student project is to design a small Foucault pendulum that is able to continuously oscillate with the help of an actuator that does not affect its relative rotation in respect to the Earth, the so-called Coriolis force. The causes of not achieving a constant amplitude movement are the loss of energy mainly due to the resistance force acting on the pendulum, on the bending cable and the frictional losses at the point of suspension. As a consequence, a possible smart system should be able to compensate for all energy losses that cause pendulum oscillation, thus making it move like a “perpetuum-mobile” over time. Therefore such a system should be designed to minimize energy consumption and maximize oscillation time. To do this, a Faraday force generated by a coil driven by a micro-controller and a sensor at the pendulum rest point to calculate the oscillation period are used, creating a micro-smart-system that later on could be connected to another devices such as a computer, a mobile phone etc, thus to the Internet of Things. Furthermore, the pendulum should be self-initiated with a little disturbance and absorb any disturbance on its own. After analysis and calculations related to these parameters, results show the pendulum angle can be indeed achieved through use of a coil that behaves as induction sensor and as actuator. A proportional–integral–derivative (PID) controller is also designed in Matlab/Simulink for correctly driving the timing so that the required energy may counteract all losses.

Keywords: Sensors, Actuators, IoT, Foucault’s Pendulum, Coil, Microcontroller, Faraday Force, Coriolis Force, Oscillation.

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Research on the Use of Aqueous Systems in the Physical Modeling of Interface Processes from Refining of Liquid Steel Through Vacuum Recirculation

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Abstract. In the case of production of liquid steels, a series of physicochemical processes with mass and energy transfer takes place with an accelerated kinetics in a very short time. These processes produced at the solid/liquid, liquid/liquid and solid/gas interfaces at all stages of steel production can be optimized for consumption if we may visually observe them. Thus, the paper aims to emphasize with a colored liquid (blue pigment) a number of aspects related to stirring and mixing. The test was performed on a physical model of a model of the DH plant with vacuum recirculation of a modeling liquid (distilled water) by which we modeled the flow regime and other aspects related to it.

Keywords: steel, physical modeling, DH plant, aqueous systems

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The Best Position of Partition Disk Research on the Energy Saving 2nd Generation Solar Water Heating Tank

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Abstract. In the recent time, because of global warming caused by the growing environmental disaster, government and non-government agencies around the world are actively involved in the implementation of energy saving and carbon reducing products and plans. Our team has targeted and improved the problem of water getting colder as it is being used. It can, as well, effectively improve the efficiency of the consumption of heat and electricity. And this solves the problem of solar water-heaters. In order to solve the weakness of the first generation water-heating tank. The second generation water-heating tank, which put a partition disk in the tank has been invented. The partition disk likes partition wall, separating two room inside the tank. There is a aqueduct between the left room and right room. When cold water flows in the tank, it flows in right room first, and flows in left room slowly by aqueduct. This research is willing yo find the best position to set partition disk, and make it bring into maximum affect.

Keywords: green power, Solar Energy, water- heating tank

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The Effect of Some Key Changes in the Chemistry of Water in Relation to Copper and Brass Corrosion Control

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Abstract. Corrosion means the degradation of the metals or their alloys, under the action of chemical or electrochemical agents from the environment. The complex corrosion phenomenon has a destructive action, generating undesirable economic consequences: metals and labor losses, appreciable reduction in the lifetime of various metal constructions, insecurity in the operation of industrial machinery. Under the current conditions of accelerated growth in the production of material goods, one of the most important issues is the economy of raw materials and materials, energy and labor force. Copper, having a purity of over 99%, is used in the manufacture of gas and water pipes, roofing materials, utensils and ornamental objects.Brass is used in the manufacture of flexible tubes, pipes, coils, cartridges, various electrotechnical parts, jewelery, etc. The aim of this research work was to evaluate the corrosion resistance of copper and brass in various solutions: with different chloride ions as NaCl 3.5%, waste water and tap water. The corrosion behavior of copper and brass was analyzed by electrochemical methods, such as: open circuit potential (OCP), electrochemical impedance spectroscopy (EIS) and cyclic voltammetry (CV). Pure copper exhibits more noble potential values than its alloy (brass), according to the evolution of free potential in all tested solutions. From the evaluation of the polarization resistance by long term measurements and the dimensional losses (mm / year) the same tendency is observed. After performing the electrochemical assays, ex-situ investigations, by optical microscopy, were made and the results confirm that the chloride ions affect the corrosion behavior of copper and brass. Corrosion of materials is a very important process to consider when choosing a material that has to operate in a specific environment.

Keywords: copper, brass, corrosion, waste water

The Synergistic Effect of Proteins and Reactive Oxygen Species on Electrochemical Behavior of 316L Stainless Steel for Biomedical Applications

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Abstract. The stainless steels, especially 316L type is the most used metallic biomaterials for biomedical applications due to their good biocompatibility, low price, excellent corrosion resistance, availability, easy processing and high strength.Due to these favorable properties 316L stainless steel has become the most attractive biomaterial for dental implants, stents and orthopedic implants. However an implant material in the human body is exposed to an action effect of other molecules, including proteins (such as albumin) and reactive oxygen species (such as hydrogen peroxide - H_2O_2) produced by bacteria and immune cells. In the literature there are few studies to follow the effect of proteins and reactive oxygen species on 316L steel used as implant material and are still unclear. The degree of corrosion resistance is the first criterion in the use of a metallic biomaterial in the oral or body environment. The aim of this research work is to investigate the influence of proteins (albumin) and reactive oxygen species (H_2O_2) in combination, taking into account the synergistic effect of these two factors on 316L. Albumin is present in the body near implants and reactive oxygen species could appear in inflammatory processes as well.The study shows that the presence of albumin and reactive species influences the corrosion resistance of 316L stainless steel in biological solutions.In this research work the corrosion behavior of 316L stainless steel is analyzed by electrochemical methods such as: Open circuit potential (OCP), Electrochemical Impedance Spectroscopy (EIS).It was found that, the electrochemical results are in a good agreement with micro photographs taken before and after corrosion assays. The albumin and reactive oxygen species have influence on 316L stainless steel behavior.

Keywords: electrochemical methods, proteins, reactive oxygen species, biological solution, 316L stainless steel.

Research on hydrophilic nature of polyvinylpyrrolidone on polysulfone membrane filtration

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Abstract. The membranes used in wastewater filtration are obtained from polymers, this technique is widely applied because of the small instalations and low costs as against conventional systems. The polymeric membranes have high mechanical strength and flexibility, but is a challenge to improve in the same time the permeability and retention capacity of the membranes. A process that can improve the membrane properties is the addition of additives to the polymer solution, resulting in noticeable changes in the resulting membrane structure. Polyvinylpyrrolidone (PVP) is a highly hydrophilic polymer, used as a food additive that acts as stabilizer and thickening agent, which brings improvements in membrane properties. This study analyzes the effect of polyvinylpyrrolidone (PVP) on the casting solution of the prepared membranes. The polymer solution was prepared from polysulfone (PSf) and N-methyl-2-pyrrolidone (NMP) at different concentrations. The membranes were obtained by phase inversion method. The PSf/PVP/NMP membranes with different concentrations were characterized by contact angle measurements, surface roughness, morphological structure and permeation tests. The results show that the hydrophilic nature of PVP improve the pure water flux, the contact angle and exhibit a higher anti-fouling property.

Keywords: polyvinilpyrrolidone, polysulfone, hydrophilicity, ultrafiltration.

"In vitro" Implantation Technique Based on 3D Printed Prosthetic Prototypes

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Abstract. In this paper, Rapid Prototyping ZCorp 310 system based on high-performance composite powder and on resin-high strength infiltration system and three-dimensional printing, as a manufacturing method, are used to obtain, directly from the 3D CAD data, physical prototypes of orthopedic implants and of complex functional prosthetic systems. These prototypes are useful for 'in vitro' experimental tests and measurements to optimize and obtain final physical prototypes. Using a new elbow prosthesis model prototype obtained by 3D printing, the surgical technique of implantation is established. Surgical implantation was performed on male corpse elbow joint.

Keywords: Rapid prototyping, 3D-printing, orthopedic prototypes**,** elbow prosthesis.

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Wastewater Sludge Used As Material for Bricks Fabrication

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Abstract. Current world trends related to wastewater sludges are: reuse in agriculture, utilization as retaining material for petroleum products or utilization in construction. Bricks from sand-cement or autoclaved cellular concrete are commonly used in construction. The authors propose innovative receipts for bricks and plasters based on textile wastewaters sludge. Centrifuged sludge is mixed with cement to obtain bricks and plaster. For bricks, the mixture is represented by 45% cement and 55% sludge. The paper presents the obtained results and the new materials used for bricks fabrication.

Keywords: cement, wastewater sludge, bricks, constructions

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Synthesis and Technological Innovation of Applying Oxide Nanomaterials in Wastewater Treatment by Flotation

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Abstract. The appearance and development of nanotechnology gave new and efficient modalities for pollutants removal from wastewaters by using new compounds called nanomaterials which possess unique structural and morphological properties. In this paper we investigated the application of $CoFe_2O_4$ nanomaterial for increasing the efficiency of oily wastewater treatment by flotation. $CoFe_2O_4$ nanomaterial was prepared by precipitation method. Prior testing their application in wastewater treatment by flotation, the oxide nanomaterial was structural and morphological characterized by XRD and TEM analyses. The influence of $CoFe_2O_4$ nanomaterial on oily wastewater depollution by flotation process was investigated by measuring the following parameters: treatment efficiency [%] and the stability of froth.

Keywords: cobalt ferrite, wastewater treatment, flotation.

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Melt Electrospinning – Characteristics, Application Areas and Perspectives

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Abstract. Electrospinning is one of the most used processes for the production of nanofibers, due to its simplicity and versatility. This paper presents the current state of the melt electrospinning, which is less used than the solution electrospinning but which is the only way of electrospinning polymers with very limited solubility and high electrical resistivity such as polyolefins. The advantages of melt electrospinning, as well as the constraints of this method, are reviewed, and the factors that influence the process are described. The paper is presented the main applicability domains of nanofibers obtained in this way and the prospects of future development.

Keywords: melt electrospinning, advantages and constraints, influence factors, applications, perspectives.

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Application of FT-IR Classification Method in Silica-Plant Extracts Composites Quality Testing

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Abstract. Our present work is related to the validation and quality testing efforts of mesoporous silica - plant extracts composites, in order to sustain the standardization process of plant-based pharmaceutical products. The synthesis of the silica support were performed by using a TEOS based synthetic route and CTAB as template, at room temperature and normal pressure. The silica support were analyzed by advanced characterization methods and loaded with *Calendula officinalis* and *Salvia officinalis* standardized extracts, further desorption studies were performed in order to prove the sustained release properties of the final materials.

Keywords: silica, composites, plant extracts, calendula, salvia.

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Nanoencapsulated Eugenol Advanced Compounds with Addressability in Dental Medicine

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Abstract. The demand for new product to be used in the local treatment of acute and chronic wounds is increasing in the last years. Based on various research performed previously, it was established that a combination between the biopolymer and the plant extract will have an improvement in wound healing properties [1, 2]. The aim of this paper is to characterize and evaluate various products type gels used in wound treatment, comparatively with one innovative product, which contains encapsulated eugenol. The methods used for characterization were Fourier-Transform Infrared Spectroscopy (FTIR) and Scanning Electron Microscopy (SEM-EDS). Also, a wettability property was analyzed by contact angle measurements. FTIR analyses were made on an FTIR spectrometer JASCO 6200, equipped with the device Attenuated total reflection (ATR) type Golden Gate. SEM analysis was made using a scanning electron microscope QUANTA INSPECT F. According the results obtained, it was observed that the gels properties are influenced by the chemical bondings established. The results obtained by evaluating the wettability properties show that the surface obtained has a poorly hydrophobic character.

Keywords: eugenol, wound healing, biopolymer,

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Potential Antimicrobial Activity Of Some New 3,5-Dimethyl Pyrazole Derivatives

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Abstract. The study presents original contributions to the researches developed in the class of heterocyclic derivatives with potential biological activity. The objective of this study is to evaluate antibacterial activity of new derivatives sinthetized. Synthesis was done by obtaining new molecules with pyralozone structure which combine two pharmacore entities: the amidosulfonyl – R1, R2 phenoxyacetil with the 3,5 - dimethyl pyrazole which can have potential biological properties. The microbial properties were confirmed by the microbiological tests. The synthetized compounds were evaluated by measuring zone diameters of bacterial growth inhibition on different types of strains microorganisms: Staphylococcus aureus, Escherichia coli and Candida Albicans.

Keywords: potential biological, pyrozole, properties

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Research on Recycling Mixed Wastes Based on Fiberglass and Organic Resins

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Abstract. In the area of recycling, according to principles of the *Directive 2008/98/EC of the European Parliament and Council,* research is upheld for achieving new technologies for reuse and keep as long is possible, in economic chain, a waste. The aim of this research is to study and test a composite material based on fiberglass waste mixed with organic resins with large application in the industry. Fiberglass is a material widely used for reinforcement of composite materials. As waste, fiberglass was less studied for ways to be reused. Filling fiberglass mixed with organic resins as PMMA and epoxy resins possess proper physical features for thermoforming. Three mixes are studied: fiberglass with PMMA, fiberglass with PMMA and rubber granules or sawdust. Samples were tested for mechanical and chemical behaviour in order to have a complete characterization of the material. Analyzing the results we can conclude that mixes are suitable for board production, with improved features, compared with similar products on the market.

Keywords: composite materials, waste fiberglass, thermoplastic resins.

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3D Printer- Manufacturing of Complex Geometry Elements

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Abstract. In the last 5-10 years the process of 3D printing has an incredible advanced in all the fields with a tremendous number of applications. Plastic materials exhibit highly beneficial mechanical properties while delivering complex designs impossible to achieve using conventional manufacturing. In this article the printing process (filling degree, time, complications and details finesse) of few plastic elements with complicated geometry and fine details was analysed and comment. 3D printing offers many of the thermoplastics and industrial materials found in conventional manufacturing. The advantages and disadvantages of 3D printing for plastic parts are discussed. Time of production for an element with complex geometry, from the design to final cut, was evaluated.

Keywords: 3D printer, plastic parts, educational equipment

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Hydraulic Physical Model Of Debris Flow For Malaysia Case Study

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Abstract. In the recent decade, several debris flow events occurred and caused hundreds of deaths, missing or injury and damaged many facilities. In addition to causing significant morphological changes along riverbeds and mountain slopes, these flows are frequently reported to bring about extensive property damage and loss of life. Debris flow phenomena occasionally occur in Malaysia and numbers of death reported cause by this event. In order to investigate the debris flow and its deposition process, experiments were conducted at the School of Civil Engineering Laboratory, Universiti Sains Malaysia. The models consists of three main parts which are water tank, rectangular flume and deposition board. A high speed video camera (HSVC) had been placed nearly downstream of the rectangular flume to capture the movement characteristics of particle grain. From this study, the characteristics of particle routing segregation can be understand clearly, therefore this input will be a very useful information to other researchers for further investigation in terms of knowledge sharing between researchers. Catastrophic cause by debris flow event can be minimized therefore in term of economy losses can be reduce and human life can be safe.

Keywords: Debris flow; Hydraulic physical model; Particle routing.

Influence of Kaolin in Fly Ash based Geopolymer Concrete: Destructive and Non-Destructive Testing

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Abstract. Development of geopolymer concrete is mainly to reduce the production of ordinary Portland cement (OPC) that adverse the natural effect. Fly ash is a by-product collected from electrical generating power plant which resulted from burning pulverized coal. Since fly ash is waste materials, it can be recycled for future advantages particularly as pozzolanic materials in construction industry. This study focused on the feasibility of fly ash based geopolymer concrete to which kaolin has been added. The main constituents of geopolymer production for this study were class F fly ash, sodium silicate and sodium hydroxide (NaOH) solution. The concentration of NaOH solution was fixed at 12 Molar, ratio of fly ash/alkaline activator and sodium silicate/NaOH fixed at 1.5 and 2.5, respectively. Kaolin was added in range 5% to 15% from the mass of fly ash and all the samples were cured at room temperature. Destructive and non-destructive test were performed on geopolymer concrete to evaluate the best mix proportions that yield the highest strength as well as the quality of the concrete. Compressive strength, flexural strength, rebound hammer and ultrasonic pulse velocity (UPV) result have been obtained. It shown that 5% replacement of kaolin contributed to maximum compressive strength and flexural strength of 40.4 MPa and 12.35 MPa at 28 days. These result was supported by non-destructive test for the same mix proportion

Keywords: Geopolymer, Koalin, Destructive, Non Destructive Testing

Durability of Fly Ash based Geopolymer Concrete Infilled with Rubber Crumb in Seawater Exposure

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Abstract. Geopolymer is an alternative binder to replace Ordinary Portland Cement (OPC) in construction industry. Source materials that rich in silica (Si) and alumina (Al) were activated by using alkaline solution. Production of tires keep increasing every year and due to its non-biodegradable properties it causes problems for disposal purpose. In current scenario, waste materials should be used or recycled so that the existing natural resources can be saved and at the same times it can protected environment. In this paper, the effect of rubber crumb on fly ash based geopolymer concrete have been investigated by immersing the samples in seawater for 28 and 60 days. The rubber crumb was used to replace coarse aggregates from range 5% until 20%. The ratio of fly ash/alkaline activator and sodium silicate/sodium hydroxide(NaOH) ratio were fixed at 2.0 and 2.5. It has been shown that the compressive strength decreased when the content of rubber crumb increased. The highest compressive strength (39.6 MPa) was obtained at 5% replacement of rubber crumb when exposure to seawater for 28 days. The density of geopolymer samples also increased when immersed in seawater for all samples. The lack of bonding between rubber crumb and geoplymer paste cause increasing in porosity hence reduced the strength, increment in density and changes in weight of geopolymer samples

Keywords: Geopolymer, Aggressive mediums; Corrosion; Mild steel; Weight loss.

Enzyme Biosensing Based on Zinc Oxide Nanostructures as Active Surface

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Abstract. The integration of desired biomolecules has recently led to increased possibility to provide specific, sensitive, selective, accurate, and reliable biosensing systems. Among the various metal oxides (TiO_2, SnO_2, Fe_2O_3, etc). ZnO nanostructures have good conductivity, which provide many transport channels in nanoscale, thus enhancing the direct electron transfer between the active sites of enzyme and the electrode. This paper presents the results obtained of the ZnO deposited on different substrates used as bioactive surface immobilized enzymes. Also, in this study, in order to confirm the availability of ZnO nanoparticles for convenient high-efficiency biosensing material, glucose/cholesterol biosensing element using ZnO nanoparticles were realized and its performance via the electrical properties to be measured in air was investigated.

Keywords: electromagnetic sensor, zinc oxide nanostructures, biosensitive, enzymes

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SECTION 4

MATERIALS & LIFE SCIENCE

Assessment of Physical-Chemical Characteristics of Surface Water from a Key Gates of Mesta River: State and Environmental Implications

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Abstract. The anthropogenic source pollution of the Mesta River's estuary (very important in central Bulgaria) was assessed during 2011 and 2016 in terms of pH, conductivity, chemical oxygen- demand (COD), anions and heavy metals in key gates of Mesta river pointed as: S1 (the Mesta River before the East River); S2 (the East River before the Mesta River); S3 - River Mesta after the East River); S4 - River Mesta at Momina Klisura near Bukovo) and S5 - River Mesta before the border after the Matnitsa River. The application of multivariate clustur analysis (CA) for the interpretation of a large and complex data matrix obtained during a monitoring program of surface waters in Mesta River is presented in this study. The dataset consists of analytical results from a 6-yrs survey conducted in selected points of the river system. In water, concentrations (mg L^{-1}) during monitoring period of NO_2^- (0.006 to 0.052), NO_3^-(0.01 to 1.33), soluble PO_4^{3-}(0.01 to 1.5), dissolved oxygen (7.0 to 12.2) and total contents (mg L^{-1}) in 2017 of Cd (<0.002), Cu (<0.002), Pb (<0.003), Co(<0.002), Ni(<0.003), S(<0.050) and Zn(<0.02), pH (5.60 to 8.00), and electrical conductivity (0.12 to 88.60 mS.cm^{-1}) were agreed with environmental standards.

Keywords: water quality, pollution, statistical assessment

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Preparation and Optimization of Natural Glues Based on Laricio Pine Resin

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Abstract. The main purpose of this work was to prepare and optimize glues consisting primarily of natural components. The fundamental component was the laricio pine resin to which different additives were added, varying their nature and quantity. The additives used were: charcoal, activated carbon and carbon nanotubes (MWCNTs). The optimization of the systems continued by identifying and selecting suitable solvents, to improve dispersion and solubilization of the phases and to obtain glues in the fluid phase at room temperature. The best results have been obtained with ethyl alcohol which, moreover, represents a solvent with a limited environmental impact. The evaluation of the adhesive capacity of the glues was carried out by shear, tensile and flexural strength tests on specially prepared wooden specimens. Furthermore, the specimens and the same glue were subjected to thermal cycles and to observations by scanning microscope (SEM). The carbon nanotubes, used in very low percentages (1%) in a system consisting mainly of natural origin products and in the presence of an adequate solvent, such as ethyl alcohol, allow to obtain a cold glue that is easy to apply and with an excellent adhesive capacity.

Keywords: laricio pine resin, glue, green building, carbon nanotubes

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Preparation and Characterization of Plasters with Photodegradative Action

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Abstract. Aim of this work is to investigate the behavior of several special plasters specifically designed to degrade the most common pollutants present in the atmosphere. In particular, in order to obtain a broad spectrum of active and synergic response, specific additives have been added to plasters, each of them with peculiar functions: microporous materials, such as clinoptilonite, a natural zeolite, that promotes the adsorption of air pollutants thanks to their porous nature; nano-fillers, such as carbon nanotubes, that behave both as reinforcing agents and as adsorbent materials; photochemical agents, such as titanium oxide, that degrade air pollutants, previously adsorbed on carbon nanotubes and zeolites, thanks to the action of light that activates photodegradation reactions. All the samples were also characterized in terms of mechanical properties, adhesion to supports and water absorption. Furthermore, photodegradation tests were carried out by exposing plaster surfaces, wetted with a Rodamine solution, to UV rays for different times. Plasters photodegradative capacity has been evaluated and the results highlight that the designed admixtures show an important photodegradative action, strictly dependent on the types and specific ratios of the selected additives.

Keywords: carbon nanotubes, clinoptilonite, photodegradation, plasters, titanium oxide

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Production of Morphinan Alkaloids in Hairy Root Culture of Papaver Orientale L.

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Abstract. This research article presents use thermoelectric for reduce temperature of cell electric field corona of smell eliminator as this eliminator using intensity electric field force on principle of (plasma) corona discharge and pulse high voltage switching power supply. The power supply is based on a mini converter. The converter is designed to operate high frequency more than 30 kHz and Power MOSFET is switching device through high voltage high frequency switching transformer #TLF14690. The circuit is capable of electric field intensity at 15 kV/cm for electric field cell. The problem incurred is heat come up in electric field cell resulting high consumption rate of efficiency eliminate smell (smell is Hydrogen Sulfide: H_2S). Therefore researcher tries to find a way to reduce temperature of electric field cell by using cool air producing from thermoelectric to observe temperature, ozone gas quantity and H_2S gas quantity. Therefore in testing we measure temperature, ozone gas quantity and H_2S gas quantity at cell electric field before and after installation of cool air production system from thermoelectric. The testing result appears that before installation cool air production system from thermoelectric temperature is 29°C, ozone gas quantity is 1.5 ppm and H_2S quantity is 150 ppm. And after installation cool air production system from thermoelectric temperature is 23°C, ozone gas quantity is 2.95 ppm and H_2S quantity is 25 ppm. Therefore it is conclude that cool air production system from thermoelectric can reduce temperature, increase ozone gas quantity and decrease H_2S quantity. And in the future researcher will develop application of cool air system from thermoelectric to reduce temperature in other industrial system and commercial innovations application.

KEYWORDS: elicitation, morphinan alkaloids, papaver orientale L.

Antioxidant, Anti-inflammatory, and Antibacterial Potential of Different Drinks Based on Matcha Tea

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Abstract. The aim of this research was to present *in vitro* and *ex vivo* biological activities for two different Matcha teas and a juice based on Matcha tea, lingonberry and bacterial probiotic strain (as a control). The results demonstrated a strong correlation between major bioactive compounds and three biological activities. Antioxidant potential was correlated with epicatechin levels and with a significant amount of caffeine. The level of these compounds was influenced by tea samples. Matcha tea (M1) was presented in the finest particles size and corresponded with obtaining the highest value of antioxidant potential. Chromatographic (qualitative) analysis has demonstrated a characteristic distribution, and epicatechin and rutin have been identified as major bioactive compounds. Correlation of the anti-inflammatory potential with the antibiofilm-inducing inhibition is a significant feature in the biological synthesis of new innovative products (eg, nanobiosystems) with antibiofilm effects.

Keywords: free radical, catechin, antioxidant, *ex vivo*, chromatogram.

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Arheometric Concepts and Methods of Protective Treatments for Historical Monument Buildings

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Abstract. The nanotechnologies, as a new and revolutionary area in Cultural Heritage, can improve both the diagnosis methods and the conservation and restoration solutions for different Romanian historical monuments. New products have been used for consolidation and protection of natural and artificial stones, wood, paper and mural paints. Some nanomaterials as hydroxyapatite (HAp) or mineral clays, have been characterized by appropriate analytical techniques, patina/polychromy analysis and mechanical resistence/compatibility of the treated surface. In this review, some diagnosis, preservation and restoration procedures of stone or wood surfaces from different monuments: Churches Ensemble -Basarabi-Murfatlar, Nanu Muscel house-Bucuresti, Fîntineanu house- Slatina, Cioflea house-Targoviste, or Corvins'Castle, Hunedoara, will be discussed. The study of the effectiveness, compatibility and durability of these new nanomaterials are necessary in order to avoid the use of inadequate treatments, which modify the aesthetic, physical and chemical properties of stone or wood materials, causing new pathologies. This knowledge is crucial when designing and implementing the interventions and materials for the safeguard of cultural heritage.

Keywords: consolidant, nanomaterial, hydroxyapatite, diagnosis, conservation, restoration.

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Risk Identification in a Smart Monitoring System Used to Preserve Artefacts Based on Textile Materials

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Abstract. Exhibited textile-materials-based artefacts can be affected by the environmental conditions like temperature, relative humidity, light intensity variations or pollutants . Near-constant environment parameters must be ensured according to Martens . Standards for indoor air-quality are applied aiming to ensure the optimal climate in museums and other exhibition spaces. A smart monitoring system that commands the environment control system is proposed for indoor exhibition spaces containing textile artefacts like old pieces of clothing, carpets, tapestry etc. The materials used for these items can be various such as hemp, linen, silk, satin, canvas, wool or jute . The monitoring system is composed by a wireless sensor network, a communication system and a processing unit. A cluster head collects data from all inside sensors and sends it to the central communication node that transfers it to the processing unit. Arduino boards with RHT-03 sensors and Li-ion batteries are used to implement the sensor node prototype. A set of data is collected from each sensor-node for each environment parameter. Based on the class of risk, a decision is made concerning the environment control unit that should be started in order to prevent the degradation process of exhibited objects. Gathered data is statistically processed. Average values, standard deviation, amplitude, variation coefficient, Kurtosis, skewness, and variation rate are calculated for each parameter. These values are compared to the recommended parameter values called thresholds. For example, temperature must be around 21 Celsius degrees, relative humidity should be around 55 % and light intensity recommended value is 50 Lux. Risks are identified when the measured values are outside the optimum range. Parameter variation can be graphically represented in order to observe the critical events when extreme values occur. The parameter variation trend is analyzed on short time periods in order to detect ascending or descending variations and identify the risks.

Keywords: indoor environment risk, smart monitoring system, textile materials, preservation.

Determination and Analysis of Distance with Ultrasound Sensor in Gas Environment

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Abstract. Many industrial applications need different approaches of the problematic of determination of distance in gas environment with different gas concentrations. Due to the technological limitations caused by environment conditions like temperature, pressure, corrosive factors, there is a narrowing of the range of sensor types capable of measuring in specific circumstances of a certain industrial process. In this paper we propose a technical solution with a high potential of providing the necessary information in real time concerning distance, level, length, etc. with the help of a digital system that uses a device based of ultrasound phenomenon. The system ensures analog signal processing and transformation into a numerical signal that can be viewed, processed, stored or transmitted to a master supervisor PC. Adaptation of the system to different types of gases is made by modifying a series of parameters that the device uses in determining the measurement.

Keywords: sensor, distance, gas, microcontroller, digital

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Modern Concept and its Application for Energetically Security Requirement at Different Connected Sources

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Abstract. The install capacity of the power generation may be increased due to renewable energy sources, but cannot supply the power at any time. A drawback, common to wind and solar options, is their unpredictable nature and fluctuating energy generation. Power system operators keep the balance of electricity source and load within geographic limits known as balancing areas. A static VAr generator becomes a static VAr compensator when is achieved with an external control which determine the value of different measurements necessary to realize the compensation on the transmission line, based on the functional requires and system variables. The only way to prevent the occurrence of voltage collapse is either to reduce the reactive power load or to provide the system with additional supply of reactive power before the system reaches the point of voltage collapse. This can be done by connecting sources of reactive power, i.e., shunt capacitors and/or Flexible AC Transmission System (FACTS) controllers at appropriate locations in the system. In the last years, some mechanical switchers of parallel capacitors/inductances were being replaced by static switchers with thyristors. Nowadays the most used parallel devices are SVC. These devices can control the important parameters of energy as line voltage, impedance, angle or active power flow and reactive power flow.

Keywords: Power, energy sources, measurements, voltage, generator, system, thyristors

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Evaluation of the Environmental Impact of the Activities Carried out in the Area of Murighiol Channel Tulcea County

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Abstract. The Murighiol Channel area is a part of the Danube Delta Biosphere Reserve, a protected area in which economic activities of the type of tourism can have a negative significant impact if they are not carefully monitored. Thus, knowing the level of pollution in the area, and especially near the boarding house Blue Lagoon, helps us to pay a special attention to the fauna and flora by protecting the environment and giving nature enthusiasts a special area. For this, a series of measures have been taken in the preparation of samples taken from important places near the boarding house. Specific analysis for water, soil and noise were performed.

Keywords: Danube Delta Biosphere Reserve, Murighiol Channel, impact assessment, environmental factors.

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Simple Detecting System of Sleep Apnea

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Abstract. Nowadays, all the people are pursuing health for longevity. Thus, well sleeping is the extremely important physical need in our life time; however, there are 6 million people who have suffered from the Sleep Apnea. The research shows that Sleep Apnea has the relation between cause and effect to many diseases such as metabolic disease, obesity, and cardiovascular disease. Sleep Apnea has to be diagnosed by Polysomnography in some specific hospital sleep center; however, the testing equipment is expensive and not widespread currently. Therefore, the simple Sleep Apnea detector is highly convenience and low cost should be expend on all the market directly. Our design takes the HT66F70A from Holtek Semiconductor Company as the overall control core; equipped with perfect functional user interface, assemble infrared sensor, temperature sensor and triaxial accelerometer to detect breathing, heartbeat, and blood oxygen saturation, according to all these data to inspect the symptom of Sleep Apnea. This product which possesses advantages of high convenience and low cost is good to be promoted especially in the county side which is lack of medical resources.

Keywords: Sleep Apnea, triaxial accelerometer

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Metallographic Study of XIX Century Oklads Belonging to Russian Icons

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Abstract. Many icons from the XIX and XX centuries can be found on the territory of Romania, with oklads made of Cu, Ag or Cu alloys. This paper analyzes by means of optical and electronic microscopy the samples taken from two oklads belonging to Russian icons of the XIX century: one dated and the other undated but attributed to the XIX century by Florin Colonas - an expert in handicraft of artistic significance. Based on the pins on the surface of one of the oklad and the scientific literature, we tried to identify the manufacturer, the verification mark, with the date of manufacture, the Ag title mark, the mark with the city icon in which the oklad was made, and identifying the technique of realization. The chemical compositions of the oklads were determined by EDX and found to be made of Ag alloys of different chemical composition: the dated oklad is made of Ag-Cu alloy, while the undated one is made of Ag-Cu-Zn alloy.

Keywords: oklad, silver alloy, chemical analysis, microscopy.

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Metabolic Albumin and Its Effect on Electrochemical Behavior of Titanium Implant Alloy

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Abstract. Human albumin is a protein made by the liver. It is the most abundant circulating protein, accounts for 50-60% of total protein in the blood and plays many roles. The most important are the oncotic and non-nociceptive properties. The albumine is part of the family of globular proteins, the most common of which are the serum albumins. All the proteins of the albumin family are water-soluble, moderately soluble in concentrated salt solutions, and experience heat denaturation. Albumin is commonly found in blood plasma and differs from other blood proteins because it is not glycosylated. Titanium and Titanium alloys have many uses. Their applications include dental implants and parts for orthodontic surgery; replacement parts for hips, knees, shoulders, spine, elbows and wrist joints; bone fixation devices such as nails, screws and nuts; housing parts for pacemakers and artificial heart valves; surgical instruments and components in high-speed blood centrifuges. In SITU electrochemical measurements are: open circuit potential (OCP), polarization resistance (Rp), potentiodynamic polarization (PD) and cyclic voltammetry polarization (CV) were performed to monitor the corrosion process. The optical images of the tested samples have been observed before and after corrosion experiments using an optical microscope (Optika) in order to understand the nature of corrosion and the damages produced by this process.

Keywords: human albumin, titanium alloy, implant.

Mixed Wooden - Concrete Piles: A Solution for Structures Located Near Saltwater Lakes

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Abstract. This paper aims to present an ecological solution for creating a long-living structure using wood and eco-friendly concrete. Nowadays, it is an imminent need to reduce the use of non-renewable natural resources and, at the same time, to minimize the negative impacts of waste production from the construction sector. As a result, the option of reusing and reintroducing materials in production cycles in order to form totally different products becomes more common day by day. Even if wood is a hugely capable civil engineering material, the area of untreated pile situated above ground water level is vulnerable. A proper solution for solving this problem could consist of using an already patented concrete that has in composition recycled glass aggregates and, moreover, has outstanding durability properties. This mixed piles structure can be a sustainable alternative benefiting from two commonly used materials and local resources.

Keywords: pile, eco-friendly concrete, wood, saltwater

Materials and Technologies Used in Wastewater Treatment

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Abstract. The biological wastewater treatment is based on biofilms activity. The biofilms can be fixed on biofilm carriers, that are made from varied materials, but most of them are mare from high density polyethylene. The authors propose other mixtures of varied materials to obtain an increased load of microorganisms on biofilm carriers. During the experiments the load of microorganisms was increased up to 250% compared to the load on polyethylene biofilm carriers. Also, for the aerated biological tanks an innovative aeration system, from stainless steel pipes with fine pores (<1 mm) realized by electro-erosion, is proposed.

Keywords: high density polyethylene, polypropylene, biofilm carriers, diffusers, stainless steel, aeration system.

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Polyethylene Based Materials for Biofilm Carriers Used in Wastewater Treatment

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Abstract. The moving bed biofilm technology is based on biofilm carriers on which consortia of micro-organisms attaches, develops and grows. Around the world are known many biofilm carrier variants made of varied materials. The most common materials are based on polyethylene since this material has a close to water density. The authors propose a novel biofilm carrier to be used in tertiary treatment for tannery and paper-mill wastewaters. The biological treatment is based on fungal activity. The selected fungal strain will be grown on innovative polyethylene carriers containing cellulose. The carrier will be designed to be exploited in a moving bed bioreactor and to favor fungal growth in the presence of competing bacteria.

Keywords: high density polyethylene, cellulose, biofilm carriers, fungi, wastewater treatment

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Electrospun Membranes for Environmental Protection

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Abstract. Electrospinning is a much-used process for making nano-sized fibers as a result of its simplicity and versatility and of unique mechanical and thermodynamic properties of the obtained nanofibers. Electrospun membranes, which have a porous structure characterized by high uniformity and porosity, find applications in many membrane processes, ranging from membrane distillation to reverse osmosis. The paper reviews electrospun membranes applications in environmental protection, focusing on water and wastewater treatment and air purification. Recent progress and prospects for future development are highlighted.

Keywords: electrospinning, membranes, water and wastewater treatment, air purification, perspectives.

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Simulation of Propagation of Compartment Fire on Building Facades

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Abstract. The façade fire simulation of buildings is carried out with Pyrosim numerical fire modeling program, following the implementation of a fire scenario in this simulation program. The scenario that was implemented in the Pyrosim program by researchers from the INCERC Fire Safety Research and Testing Laboratory complied with the requirements of BS 8414. The results obtained following the run of the computational program led to the visual validation of effluents at different time points from the beginning of the thermal load burning, as well as the validation in terms of recorded temperatures. It is considered that the results obtained are reasonable, the test being fully validated from the point of view of the implementation of the fire scenario, of the correct development of the effluents and of the temperature values

Keywords: external cladding elements, vertical fire propagation, recordings, simulation, validation.

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Wireless Medical Care based on RFID Positioning System

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Abstract. More attention is now being paid to patient safety and medical quality improvement. This paper will establish a set of wireless medical care systems for medical care environment simulation. The RFID positioning system permits medical staff to always observe patient's health and location positioning. If a sudden emergency situation should occur, medical staff can arrive in time to solve the medical problems.

Keywords: wireless, medical care, active RFID, positioning.

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Effect of Mixing Temperature on Characteristics of Thermoplastic Potato Starch Film

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Abstract. This study presents the preparation of potato starch film with glycerol as a plasticizer through a solution casting technique. The effect of mixing temperature (80°C, 85°C, 90°C and 95°C) on the tensile and microstructure properties of potato starch film was investigated. Results show that the increase of temperature from 80°C to 85°C caused the increase in tensile strength. Nevertheless, as the temperature increase to 95°C, the tensile strength and elongation at break decreased, with the highest value of 2.6 MPa and 15.7mm respectively. Both of tensile strength and elongation at break were recorded for starch film prepared at 85°C. Besides, the microstructure of the starch films showed gradual smoother surface, homogenous and grain growth, as the mixing temperature increased. Overall result shows that mixing temperature significantly influenced the properties of the potato starch films.

Keywords: potato starch, biodegradable polymer, mixing temperature, tensile strength, microstructure.

Preparation of heat treated titanium dioxide (TiO_2) nanoparticles for water purification

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Abstract. Photocatalysis using the semiconductor titanium dioxide (TiO_2) has proven to be a succesful technology for waste water purification. The photocatalytic treatment is an alternative method for the removal of soluble organic compounds in waste water. In this research, titanium dioxide nanoparticles were synthesized by sol-gel method using titanium tetraisopropoxide (TTIP) as a precursor. The sol was dried in the oven at 120 °C after aging for 24 hours. The dried powder was then calcined at 400 °C and 700 °C with a heating rate of 10 °C/minute. The phase transformation of the heat treated titanium dioxide nanoparticles were characterized by X-Ray Diffraction (XRD). The surface morphology and composition were examined by Scanning Electron Microscopy (SEM) and Energy Dispersive X-Ray Spectroscopy (EDS). The photocatalytic activity of the heat treated titanium dioxide nanoparticles in the degradation of methyl orange (MO) dye under ultraviolet (UV) light irradiation has been studied. At calcination temperature of 400 °C, only anatase phase was observed, as the calcination temperature increases to 700 °C, the rutile phase was present. The SEM images show the irregular shape of titanium dioxide particles and the agglomeration which tends to be more significant at calcined temperature of 700 °C. Degradation of methyl orange by 5 mg heat treated titanium dioxide nanoparticles gives the highest percentage of degradation after irradiation by UV lamp for 4 hours.

Keywords: Titanium dioxide, Sol-gel method, Photocatalytic degradation,

Variation of Ground-level Ozone Concentration in Urbanized Area in Malaysia

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Abstract. The study focused on ground level ozone concentration in 3 selected urbanized areas that are Shah Alam, Ipoh, and Malacca. Statistical Package of Social Science (SPSS) and Microsoft Excel were used in order to determine the correlation between ozone concentration, air pollutant and meteorological parameters. The method carried out is descriptive statistic, box plot, time series plot, diurnal fluctuation, Pearson correlation and backward trajectories. The result show that ozone concentrations are below the limit (0.1 ppm) of Malaysian Ambient Air Quality Guideline permissible level. The diurnal variation of ozone in all selected urbanized area is characterized by low concentration during early morning and late night and high concentration during day time. The correlation coefficient between ozone and the various meteorological parameters were weak except for certain pollutant in all selected urbanized area.

Keywords: Ground level; ozone; air pollution; air quality

Spatial and Temporal Characteristics of Air Pollutants Concentrations in Industrial Area in Malaysia

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Abstract. Quantification of the spatial and temporal variations of ambient air pollutant concentrations provides the information for epidemiological and other air-pollution studies. Particulate matter (PM_{10}), nitrogen oxides (NO), sulfur dioxide (SO_2), carbon monoxide (CO), ozone (O_3) were measured at 3 monitoring sites around a densely populated industrial zone in the peninsular Malaysia, which is at Nilai, Petaling Jaya and Seberang Perai. The observations were obtained over five year period from 2008 to 2012. The descriptive statistics show that the peak concentration of PM_{10} occurs during the dry season; which is coincided with the southwest monsoon and also due to direct-influence of southwest winds and had caused a slightly moderate haze in Southeast Asia. From the Pearson correlation analysis, among the meteorological parameters, ambient temperature indicates the strongest positive correlation to the PM_{10} concentration and proves that the ambient temperature tent to contribute significantly to higher PM_{10} concentrations. The backward trajectories of atmospheric pollutants were determined to indicate the potential sources contributing to the pollutant during the high concentration days.

Keywords: PM10; surface ozone; air pollution modelling

The Effect of Baggase Ash on Fly Ash-based Geopolimer Binder

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Abstract. Geopolymer concrete is an environmentally friendly concrete. However, the geopolymer binder has a problem with setting time; mainly the composition comprises high calcium fly ash. This study utilized bagasse ash to improve setting time on fly ash- based geopolymer binder. The characterization of bagasse ash was carried out by using chemical and phase analysis, while the morphology characterization was examined by scanning electron microscope (SEM). The setting time test and the compressive strength test used standard ASTM C 191-04 and ASTM C39 / C39M respectively. The compressive strength of the samples determined at 28 days. The result compared the requirement of the standards.

Keywords: binder geopolymer; baggase ash; setting time; compressive strength.

Effects of Prevulcanization Time of Natural Rubber Latex on Kenaf filled Natural Rubber Latex Foam

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Abstract. The objective of this study was to determine the effects of prevulcanization time of natural rubber latex (NRL) on properties of kenaf filled natural rubber latex foam (NRLF). The prevulcanization time of NRL was set at 24 hours. The tensile properties, hardness, compression set and morphological properties of kenaf filled NRLF after 24 hours of prevulcanization time were compared with samples without prevulcanized. The tensile strength, modulus at 100% elongation (M100), hardness of prevulcanized samples was higher but lower in elongation at break as compared with without prevulcanized samples. The results from thermal gravimetric analysis (TGA) revealed that the thermal stability of prevulcanized samples was higher than without prevulcanized samples. The prevulcanized samples found to have higher elasticity compared with without prevulcanized samples based compression set test. The morpholgy of both samples were also compared using scanning electron microscope (SEM). From the micrograph of SEM, it was found that prevulcanized samples exhibited uniform and smaller size of pores compared with unvulcanized samples at 0 phr kenaf loading. Prevulcanized kenaf filled NRLF samples show better interfacial bonding compared with kenaf filled NRLF without prevulcanized. This proved that prevulcanized natural rubber latex enhanced the properties of kenaf filled NRLF.

Keywords: Prevulcanization, Natural Rubber Latex, Foam, Kenaf

Theoretical and Experimental Aproach Towards P-Cyano Stilbene Schiff Base as a Potential Linker in E-DNA Sensor

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Abstract. This research aim to synthesis and characterize several p-cyano stilbene Schiff base molecules as a potential linker in electrochemical DNA sensor. Schiff base reaction is form from condensation reaction between primary amine and aldehyde at 79 °C using ethanol as solvent. All compounds are investigated and discussed by Fourier transform-infrared spectrometer (FTIR) and Uv-vis spectrophotometer. For computational study, structure drawings were constructed using GaussView 5.0. Geometry optimization has been carried out using density functional theory (DFT) at bB3LYP/6 31G and performed using Gaussian09 software. FTIR showed formation of C≡N stretching vibrations at 2224 cm^{-1} also another important stretching at 1604 cm^{-1} and 1249 cm^{-1} which represent C=N and C-O mode respectively. In UV-vis, absorbance of C=N (imine) group can be observed at peak range 363 nm and transition of aromatic C=C can be seen at 238 nm. Theoretical and experimental results obtained are comparable and p-cyano stilbene Schiff base compounds were successfully synthesised and can be further applied as a linker in E-DNA sensor.

Keywords: DNA sensor, Density functional theory, Schiff bases, Stilbene.

Sodium Alginate/Ageratum Conyzoides Film for Wound Dressing Materials

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Abstract. This study focusses on the effect of Ageratum conyzoides extract (ACE) in Sodium Alginate (SA) films to their mechanical, physical, and thermal properties. The tensile strength results show that the addition of ACE into the SA film improved the stress of the SA-ACE6 film to 5 ± 1 MPa compared to 4 ± 1 MPa for blank SA film. Water Vapor Transmission Rates (WVTRs) of SA incorporated Ageratum conyzoides extract (SA-ACE) were decreased, while swelling rate values of all films were increased upon addition of ACE. It was found that the thermal stability of the SA film also improved after the addition of ACE. Overall, the addition of ACE enhances the properties of SA film. This makes the SA-ACE film is suitable to be applied as wound dressing materials.

Keywords: Sodium alginate; mechanical; film; wound dressing

Innovative Uses of Recycle Waste Materials as an Artificial Concrete Reef for Estuarine Ecosystem

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Abstract. This study enveloped an innovative uses of banana peel particles (BPP) incorporated with recycle aggregate concrete (RAC) from construction waste as an artificial concrete reef for estuarine ecosystem. An artificial reef concrete composites were made of using BPP reinforced RAC as a matrix. The conretes composite cube were prepared in a percentages of 10%, 20% and 30% of BPP to RAC respectively. The concrete cubes without BPP was used as control cubes. The compressive strength of an artificial reef concretes composite were carried out at 28 days. The total nutrient dispersed were determined using total nitrogen (TN), phosphorus (TP) and organic carbon (TOC) test of the water samples in 6 days. It also reported that the amount of nutrients leached from an artificial reef increased gradually with time as more percentages of BPP added to concrete composites and on the contrary, the compressive strength indicated decreases with the increased of BPP. It can be concluded that, BPP from the agriculture wastes could be used as potential nutrient sources of nitrogen, phosphorus and organic carbon for an artificial concrete reef in estuarine ecosystem with some further study on mechanical properties to increase the compressive strength of an artificial reef composite concretes.

Keywords: mechanical properties; recycle wastes materials; artificial reef.

Investigation on Properties and Leachability of Sewage Sludge from Wastewater Treatment Plant Incorporated in Fired Clay Brick

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Abstract. Sewage sludge is produced from wastewater treatment plant that often dumped into landfill sites, lagoons or together with municipal waste. Apart from this, the disposal of this sewage sludge becoming a problem for environment. Thus, an alternate method is needed to overcome the issue. Therefore, the objective of this study is to determine the possibility of incorporating sewage sludge in fired clay brick and to compare with normal fired clay brick. The characteristics of sewage sludge were determined by using an X-ray Fluorescence. The mixing percentage used was 0%, 1%, 5%, 10%, 20% and 30%. The physical and mechanical properties were determined as to obtain the condition according to it mixing percentages. Based on physical and mechanical properties, the sewage sludge brick complies with the standard except for SSB30% where the compressive strength does not meet the minimum requirement limit of compressive strength. However, in terms of leachability of this sewage sludge brick also resulted that the heavy metals leach out comply according to USEPA standard. The development of fired clay brick by using sewage sludge can reduce the dependency towards land use and will reduce the impact of the sewage sludge to the environment.

Keywords: leachability, properties, sewage sludge, sludge brick

A Theoretical Framework for Evacuation Capacity Assessment of Egress Facilities in Rail Transit Terminal Malaysia by Understanding Pedestrian Behaviour Attributes Based on Spatial Interaction

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Abstract. Under the National Sustainable Development agenda (RMK 11), Malaysia had created a movement towards low carbon mobility (Strategy B4), causing walking and using transit services are among the most appropriate options as transportation mode. Current trend shows there is an exponential increase in rail traffic passenger volume in Malaysia, causing more attention to the crowd safety in rail transit terminal (RTT) especially during emergency evacuation. Due to that circumstance, authorities need to be aware towards improving the pedestrians' facilities and safety. Kuala Lumpur Sentral Station (KLSS) is the largest transportation hub in Malaysia and, as of May 2017, the user reaches up to 180,000 users daily according to The Star Online (2017). In this article, a theoretical framework is presented to understand the pedestrian's behaviour attributes at RTT based on pedestrians' spatial interactions in order to assess the evacuation capacity of egress facilities. A case study of evacuation capacity assessment of egress facilities is proposed for KLSS through modelling the dynamics of pedestrian's crowd behaviour. The Distinct Element Method (DEM) will be employed to model the dynamics of pedestrian's crowd behaviour. Then, the validated crowd dynamics model is demonstrated in evacuation capacity estimation of egress facilities in KLSS. Evacuating people quickly and safely can greatly reduce casualty and economic losses. As for this article, more concern is on the spatial interaction of pedestrian at the RTT and the framework propose.

Keywords : pedestrians attributes, rail transit, evacuation capacity

The Influence of Saliva on Gingival Marginal Microleakage of Class II Cavities when Using Universal Bonding Agent in Direct Composite Restoration

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Abstract. The aim of the study was to evaluate by microleakage assessment the effect of saliva contamination during bonding procedure when a universal bonding agent applied in two different strategies was used in direct restoration using composite resins. Standardized box-only Class II cavities were prepared on the mesial and distal surfaces of twenty extracted teeth. A hybrid composite resin (Gaenial Posterior, GC Corporation) and a universal bonding agent (G Premio Bond, GC Corporation) applied in two different strategies: etch-and-rinse and self-etch were used for restoration, with or without saliva contamination of the gingival margin of the cavity. Lower leakage was recorded in the cervical area apically than CEJ when universal bonding agent was applied in self etch strategy when compared to etch-and-rinse strategy. On enamel margins (1 mm upper than CEJ) universal bonding agents applied in etch-and-rinse technique leaded to lower microleakage. Irrespective of etch-and-rinse or self-etch strategy of applying, the presence of saliva impaired the enamel or dentine leakage of universal bonding agents.

Keywords : pedestrians attributes, rail transit, evacuation capacity

Assessment of Hydrophobic Coating on Porous Calcareous Rocks Surface Exposed in Urban Ambient Air Pollution

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Abstract. Urban air quality has changed rapidly in recent years, that requiring new research focused on the effects of pollution, both on the environment and on human health, as well as on apparent changes in building surfaces, including historical ones. As is known, permanent exposure to the atmosphere in the urban environment causes degradation processes on the surfaces of natural stone monuments, especially on porous stone surfaces. In these investigations were used samples of porous calcareous rocks similar to the natural stone from the many historical monuments of the Iasi city - Romania. These samples were coating with various commercially hydrophobic solutions. Further, these sample were exposed in the immediate vicinity of a historic monument and an intense road traffic junction. After about six months of exposure, apparent changes in the treated surfaces were compared with untreated control surfaces but subjected to the same environmental conditions over the same time period in order to evaluate the effectiveness of the hydrophobic treatment.

Keywords: urban air pollution, porous stone, hydrophobic

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Topical notions about in vivo analysis for degradable biomaterials with utility in human body

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Abstract: Based on the biodegradable biomaterial development, there are numerous studies demonstrating partial or total aspects that have ultimately led to their use in many fields, especialy in medicine. This study summarizes the latest information on the development of degradable biomaterials based on magnesium, especially used in *in vivo* tissue compatibility assessment. The biomaterial compatibility assessment combines with the development of medical devices, this study following evolutionary parameters and integration of implants for human use. One of the most important parameters is the efficiency with which the medical device works near to the maximum potential. In conclusion, our study aims to broadly present the in vivo analysis of biodegradable biomaterials based on magnesium.

Keywords: in vivo, degradable biomaterials, compatibility, body response, tissue reactions.

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