

Book of Abstracts

EUROINVENT

International Conference on Innovative Research

May 19th to 20th, 2016
Iasi – Romania

Organized by:

- ▲ **Romanian Inventors Forum**
- ▲ **Faculty of Materials Science and Engineering, The “Gheorghe Asachi” Technical University of Iasi, Romania**
- ▲ **Centre of Excellence Geopolymer and Green Technology CEGeoGTech), Universiti Malaysia Perlis (UniMAP)**
- ▲ **ARHEOINVEST Platform, Alexandru Ioan Cuza University of Iasi**
- ▲ **Malaysian Research & Innovation Society (MyRIS)**

With support of:

- ▲ **Ubudiyah University of Indonesia**
- ▲ **National Institute for Research and Development URBAN INCERC**
- ▲ **International Federation of Inventors' Associations - IFIA**
- ▲ **World Invention Intellectual Property Associations**

Editors:

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Petrică VIZUREANU, Norsuria MAHMED, Ion SANDU**



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EUROPEAN EXHIBITION OF CREATIVITY AND INNOVATION
EUROINVENT
IASI – ROMANIA
VIIIth Edition, 19th - 21th May 2016

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://euroinvent.org/book.html>

4. European Visual Art Exhibition

<http://euroinvent.org/art.html>

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

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JOINT EUROINVENT PROGRAM

EUROINVENT Exhibition	EUROINVENT ICIR Conference
DAY 1 – THURSDAY MAY 19	
Free program for participants at the Euroinvent Exhibition Visit at Palas of Culture	8.00 Participants registration
	10.00 ICIR Opening Ceremony
	10.30 Keynote Speaker 1
	11.00 Keynote Speaker 2
	11.30 Keynote Speaker 3
	12.00 Coffee break
	12.20 Plenary Session 1
	14.00 Lunch
	15.00 Plenary Session 2
	17.00 Plenary Session 3
	19.00 Dinner
DAY 2 – FRIDAY MAY 20	
8.00 Participants registration	10.00 Keynote Speaker 4
11.00 Opening Ceremony	10.30 Keynote Speaker 5
Welcoming Speeches	11.00 Keynote Speaker 6
12.30 First Jury Meeting	12.00 Plenary Session 4
Tour of exhibition	15.00 Conference Closure
16.00 Book Award Ceremony	
17.00 Visual Art Exhibition	
20.00 Jury Final Decision	
22.00 Exhibition closure	
DAY 3 - SATURDAY MAY 16	
10.00 Exhibition Start	
12.00 Demonstrations	
15.00 Artistic moment	
18.00 Euroinvent Award ceremony	
20.00 Cocktail dinner	
22.00 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 Kejuruteraan 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.

CEGeoTech

Center of Excellence Geopolymer & Green Technology (CEGeoTech) lead by Vice Chancellor Universiti Malaysia Perlis (UniMAP), Professor. Dr. Kamarudin Hussin. CEGeoTech located at the School of Materials Engineering, Kompleks Pusat Pengajian Jejawi 2, Taman Muhibbah, 02600 Arau, Perlis. CEGeoTech has been established on July 2011 with the intention to induce innovation in green material technology among researchers in Universiti Malaysia Perlis. CEGeoTech 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. CEGeoTech have 8 fields of research includes:

- Geopolymer
- Polymer Recycling
- Electronic Materials
- Ceramic
- Electrochemistry Materials & Metallurgy
- Environmental
- Manufacturing and Design
- Green ICT

**Malaysia Research & Innovation Society**

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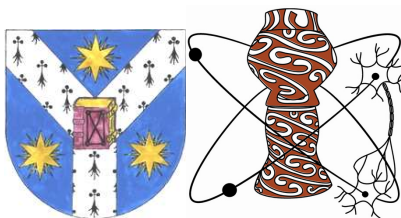
The MyRIS acronym it came from “Malaysia Research & Innovation Society”. We are solely a research & an innovation organization entity. Our goal is to create the research & an innovation environment among researchers & innovators to the high level standard thus international exposure. With various international mutual networks with several academic institutions & research & innovation entities, MyRIS able to bring up Malaysian innovation to high level standard recognition. The objectives of establishing of MyRIS are:-

1. Building research and innovation, networking between academic institutions and related societies.
2. Encouraging research and innovation activities, especially among young researchers.
3. Helping researchers in improving innovation in various aspects.

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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URBAN INCD INCERC

Even though recent, the 2009 foundation of the National Institute for Research and Development in Constructions, Urbanism and Sustainable Spatial Development URBAN-INCERC was meant only to join the over 60 years traditions and experiences in research focused on designing buildings and their constructive details, economy of buildings, urban and territorial planning, and habitat of three institutes – NRDI Constructions and the Economy of Buildings - INCERC, NRDI Urban and Spatial Planning - URBANPROIECT and the National Research, Development and Documentation Center in Constructions, Architecture, Urbanism and Spatial Planning CDCAS, with activities focused essentially on the human habitat and its sustainable development from the overall vision of spatial development (urban and territorial planning).

The process gave birth to the only national institute in its field, with over 100 researchers and designers and a substantial material basis and a vast portfolio of research projects, national (Nucleus Program, National Research, Development and Innovation Plan, research and studies funded by the central and local administration) and international (NATO, SEE, ESPON, FP7), resulting into its national and international recognition (IAFOR, IAESTE, RED, URBACT, ENBRI, UEAtc, WFTAO, EOTA, ECI-ICE, EUROPA Accord, Global Green Award).

As an organism under the coordination of the Ministry of National Education, NRDI URBAN-INCERC is the only organism habilitated to substantiate national public policies in its field of activity, from the Strategic Territorial Development Concept and sections of the National Spatial Plan and affiliated substantiation studies to technical regulations in constructions. The institute performs studies for substantiating national strategies, policies, and regulations in urban planning and spatial development, and research on housing, regional development, inter-regional competitiveness, development of the network of settlements, polycentricity, protection of built-up areas and natural areas, zonal rehabilitation and ecological reconstruction, areas undergoing social and economic decline, disadvantaged rural areas, and other issues.

NRDI URBAN-INCERC also ensures the technical secretariats of specialized technical committees and technical and professional attestation commissions for specialists in constructions, is an organism for certifying construction products and management systems, is a factory-inspection organisms, and habilitated to carry out continuous education activities, as well as commercial and production activities.

<http://www.incd.ro/>

IOP Conference Series

IOP Publishing provides a range of journals, ebooks, magazines, conference proceedings and websites for the scientific community. These products and services enable researchers and research organisations to reach the widest possible audience for their research. We combine the culture of a learned society with global reach and highly efficient and effective publishing systems and processes. With offices in the UK, US, China and Japan, and staff in many other locations including Mexico and Sydney, we serve researchers in the physical and related sciences in all parts of the world.

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

Keynote Speaker**Muhd Fadhil NURUDDIN, PhD. Eng.**

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Professor Ir. Dr. Muhd Fadhil Nuruddin is a professor of Concrete at Civil and Environmental Engineering Department, Universiti Teknologi PETRONAS, Malaysia. He is a registered Professional Engineer (PEng) and a Corporate Member of the Institution of Engineers Malaysia (MIEM). He is also a Fellow and a Council Member of the Concrete Society of Malaysia (FCSM). He also holds a position as the Vice President of the Malaysian Geopolymer Society. He was the founding Dean of Engineering at Umiversiti Teknologi PETRONAS Malaysia between 2011 and 2013. Prior to his appointment as Dean of Engineering he was task as the Director of Sustainable Resources Research Cluster, Head of Civil Engineering Programme, and Head of Industrial Internship Ptogramme at UTP. Amongst his research interests are geopolymer concrete, cement replacement materials, structural integrity and durability of concrete. To date, he has published / presented more than 200 papers at national and international levels conferences and journals.

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GEPOLYMER BINDERS: A REVIEW

Geopolymer binders are inorganic materials that can develop binding characteristics formed by the alkali activation of an aluminosilicate precursor. This binder buildup of a three-dimensional network, in which the aluminate and silicate species are covalently bonded by co-sharing of oxygen atoms. Geopolymer cement considered as a good alternative to OPC in the construction applications, pavement infrastructure applications, and offshore applications. Use of the geopolymer binder in the construction industry as a cement replacement material can be an ideal solution for solving different environmental problems. Many industrial companies produce massive amounts of waste materials which create a serious risk to the environment. Most of these wastes are disposed at landfills or being stockpiled in tailings dams. On the other hand, the cement industry is responsible for the production of huge amounts of the carbon dioxide emissions, where the production of each tone of cement will produce 0.8-1 tone of CO₂. Geopolymer binders are considered as green building materials that basically developed based on utilization of waste materials.

Keynote Speaker

Cătălin Ovidiu POPA, PhD.Eng.

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Prof.dr.eng. Studies in the “Emil Racoviță” College of Cluj-Napoca, then in the Technical University of Cluj-Napoca. Dipl. Engineer since 1986, he worked as design engineer in Unio Satu Mare and Abrazivul Cluj-Napoca. Doctor of Engineering, Materials Science, since 1997. Benefited of a NATO / Royal Society Fellowship in the University of Nottingham, in 2000 and was involved in numerous research projects in the UK. He published more than 110 papers, 21 ISI, and 7 books; 3 patented inventions. He was involved in 26 research contracts and led 13 as director. He joined the academic staff of the Technical University of Cluj-Napoca in 1990. At present, he is Professor in the Materials Science and Engineering Department, Faculty of Materials and Environmental Engineering and Head of the Biomaterials Research Group. The main focuses of the Group is on Tissue Engineering scaffolds, drug delivery systems and medical implants / devices.

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BEYOND "BIONIC MAN". TOWARDS ENGINEERED BODY

Today's Medicine is making the step forward from the Prosthetics stage to the Regenerative Medicine approach. Smithsonian's Bionic Man (2013) is the most advanced integrated example of the level reached by prosthetic organs – heart, microchip brain, limbs, spleen, etc. In a totally different paradigm, Regenerative Medicine aims at replacing / regenerating cells, tissue or organs in view of restoring their normal function. As one of the directions in this approach, Tissue Engineering employs cells seeded onto scaffolds containing biologically active molecules, leading to functional tissues. Scaffolds are usually made out of bioresorbable polymers – presented results with electrospun polylactic acid – with a bioactive coating, such as polydopamine or aminoacids sequences. Cells leading to engineered tissue were both stem cells and primary cells derived lines. Both the differentiation of cells and assistance of cellular processes are proposed by the drug delivery systems approach, using multilayer shell microcapsules of BSA / k-carrageenan/chitosan hydrogels loaded with growth factors or other bioactive factors. Another presented strategy refers to bone substitutions after major destructions and proposes hybrid materials composed of a main core made of porous titanium covered by stem cells derived live tissue. Porous titanium was either pressed with a space holder and sintered or made through selective laser melting. Prior to cells culturing, bioactive coating with biopolymers or aminoacids sequences was performed. The biological response of such structure refers to diminishing the mechanical mismatch implant – tissue, i.e. difference in Young's modulus, that may lead to further bone resorption. The obtained in vitro and in vivo results allow us to step to the next stage, looking towards integrated clinical applications.

Keynote Speaker

Norsuria MAHMED, PhD.

Senior Lecturer
School of Materials Engineering, UNIVERSITI MALAYSIA PERLIS

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Dr. Norsuria Mahmed is a senior lecturer in the School of Materials Engineering at Universiti Malaysia Perlis (UniMAP). Currently, she is holding a position as Deputy Director at Center for Industrial and Governmental Collaboration, UniMAP. Dr. Norsuria Mahmed received her PhD degree in 2013 from Aalto University, Finland in Materials Science with distinction. Her current research interest includes advanced and functional materials, nanomaterials, photocatalyst, synthesis of magnetic nanoparticles and their applications, where she published a quite number of technical papers in high impact journals and indexed conference proceedings. Dr. Norsuria was a fellow of Academy of Finland via the Graduate School of Advanced Materials and Processes at Aalto University from January 2010 until May 2013. From June 2013, she continued as a post-doctoral researcher on project grant under Aalto Energy Efficiency (AEF) research program at Aalto University that focused on synthesis of functional nanoparticles for heat transfer fluids applications until October 2013. In 2015, she becomes part of the research team of Nanomaterials Group under Center of Excellence Geopolymer and Green Technology (CeGeoGTech) at UniMAP which focused on application of functional nanomaterials for self-cleaning applications. Dr. Norsuria was appointed as an Honorary Associate Researcher for the Gheorghe Asachi Technical University of Iasi, Romania from April 2015 until April 2017 and also the member of Board of Engineers Malaysia (BEM).

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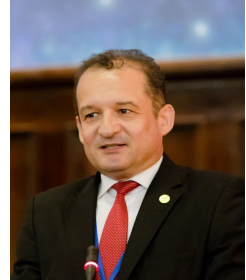
MULTIFUNCTIONAL MAGNETIC-CORE NANOPARTICLES

By bringing together various components, it is possible to produce magnetic nanoparticles that combines different properties. Bundling together the properties of particles creates a structure, which can be applied in many different ways, from cancer treatment to wastewater treatment. The structure consists of a magnetic nanoparticles coated with an insulating silica layer decorated with metallic nanoparticles or bioconjugates. Depending on the ratio of the particles used, it is possible to create applications for different needs. As examples, biomedical as well as photocatalytic applications, and magneto-optical studies. Silica-nanosilver hybrids having a magnetic core could be used for example as a carrier for protein structure/molecules, such as antibody, that can be used in cancer cell treatment. When also photocatalytic material such as titania or silver chloride particles became part of the making of nanoparticles, they can be used in photocatalytic applications, for example in biochemical treatment of wastewater. Moreover, by adjusting the amount of magnetic-core nanoparticles in relation to silica, it is possible to make transparent oxide ceramics with magnetic properties. These can be used for example in magneto-optical studies.

Keynote Speaker**Neculai Eugen SEGHEdin, PhD.Eng.**

Professor
ViceRector
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Prof. Neculai Eugen SEGHEdin is the Vice Rector with didactic affairs and quality assurance of the Technical University “Gheorghe Asachi” of Iasi, Romania. He graduated the Faculty of Mechanics of the same university in 1998. He worked, as design engineer, at SC AGMUS SA Iasi, until 1990. After that, he became member of the academic staff of the Technical University “Gheorghe Asachi” of Iasi. He obtained the PhD degree in Industrial Engineering in 1998. Prof. SEGHEdin was the Vice Dean of the Faculty of Machine Manufacturing and Industrial Management and the Director of the Quality Assurance Department. He published 17 books, 125 papers and 7 patents. Prof. Seghedin was involved in 28 grants/ research projects and coordinated 6 projects, as director or responsible. He is the holder of the following courses: Jigs and Fixtures, Technical creation Basis, Mechanical Bioengineering, Ethics in Scientific Research and Intellectual Property.

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CREATIVITY, UNIVERSITY, CITY

There are several cliches concerning the role and the place of inventors in society or in various entities. One of these, refers to the lonely inventor, out of the real world, and placed in the space of the ideas and of the creativity. On the contrary, the big creations, the big discoveries were realized as a result of the big idea’s confrontation, a very common situation in the academic area. Also, the big cities represent the areas in which the creativity is more powerful than in little and quiet cities, as we could believe. This is because the metabolism of the big cities is in inverse ratio with their dimension, concerning the creativity. This is not happen with other life indicators, because of Kleiber’s rule, that comes from the wild world (animal world). In accordance with this rule, the bigger organism is, the lower its metabolism is. On the other side, creativity saves, periodically, the society. It is demonstrated, nowadays, that the societies’ evolution is produced in waves, with different periodicities. In the crisis periods, or of economic recessions, a big gap in technical creation it is produced, through the number of inventions increasing and discoveries. These new inventions and discoveries produce a strange phenomenon, of the destruction of the old invention. This phenomenon was described by Schumpeter as “the creative destruction”. At least in technique, seems that creativity is a feature which can be learned, having a strong basis on practice. In this sense, it is presented the experience of Inventics school of Iasi, created by prof. Vitalie Belousov, 45 years ago.

Keynote Speaker

Cornel SAMOILA, PhD.Eng.

Professor Univ.
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Prof.Univ.Emerit.dr.eng., studies in the “Polytechnical Institute” of Brasov, and was selected for academic career in the same institution from graduation, since 1964. Doctor of Engineering, Materials Science since 1979. He published more than 230 papers, 21 ISI, and 11 books at national and international printing houses; 25 patented inventions. He was involved in 64 research contracts and grants at national and international level, led 22 as director or project responsible. At present, he is Professor in the Materials Science Department, Faculty of Science of Materials and Engineering and Head of the “Center of Valorization and Transfer of Competence” build in the frame of Tempus European projects. Is Vice-president of Materials science and engineering section of Technical Science Academy of Romania, was awarded with “Nicola Tesla” Golden chain by IGIP Society-Germany and with Romanian National Order “Cultural Merit” for scientific activity. The main focus is on the science of materials with special stress on the nano-materials and in the education in the implementation of remote engineering in teaching/learning system.

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REMOTE EXPERIMENT AND CREATIVITY

Most of scientists who have studied the evolution of human society, have agreed to appoint human being "*homo sapiens*" in connection with her intelligence compared to other animals. Fight for survival forced the man to be also "*homo faber*". He had to imagine tools used in everyday work to procure basic needs. Between intelligence and practical work skills is a close connection which contains in it the creative process. But all scientists agreed with the fact that you cannot measure creative ability and that it cannot be a direct result of the education process. Remote experiment, make a transfer from the current methodology of teaching / learning based on "*convergent thinking*" to "*divergent thinking*" that is the decisive step towards creative technologies. The paradox of divergent thinking is that it acts only after the acquisition of the fundamental knowledge in a convergent manner. Only the knowledge gained will ensure flexibility, analysis and synthesis, associativeness and capacity for abstraction. The paper presented the modifications generated by remote experiment in direct connection with the education and creativity assets.

Invited Speaker**Ismail HANAFAI, PhD**

Professor

Dean, School of Materials and Mineral Resources Engineering

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Professor Hanafi 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 (Marcel Dekker, USA), Research Journal of Environmental and Earth Sciences (Maxwell Science), ASEAN Engineering Journal, Iranica Journal of Energy and Environment, Iranian Polymer Journal (Springer), Central European Journal of Engineering (Springer), Journal of Composites and Biodegradable Polymers (Sawy Publishers) and J of Vinyl and Additive Technology (Wiley). At national level, he is also one of the Editorial Board for Journal of Physical Science, International Journal of Automotive and Mechanical Engineering and Journal of Electron Microscopy Malaysia. Prof. Hanafi is Fellow of Academy Science of Malaysia dan Top Malaysian Scientist 2012. Prof. Hanafi h-Index in Google Scholar is 45 and in Scopus is 40 with Total Citation Index, 9,091 and 7,029 respectively until Jan 2016. Also he has received many awards and medal in scientific competitions.

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POLY (VINYL CHLORIDE) / EPOXIDIZED NATURAL RUBBER / KENAF CORE POWDER COMPOSITES : NOVEL APPROACHES TO IMPROVE THE PROPERTIES

Blending of thermoplastic and elastomer has become a technological interest for use as thermoplastic elastomer (TPE). TPE can have properties of thermoplastic material, such as high mechanical properties, high ozone resistance, and high aging resistance. Recently, the use of natural fiber had attracted attention owing to its renewability, availability, low cost, light weight, and the fact that it is environmentally friendly. Among different natural fibers, kenaf fiber offers many potential properties in specific application, such as low density, high specific mechanical properties, and the ability to absorb nitrogen. In this research, two novel approaches namely dynamic vulcanization and the use of polyethylene grafted maleic anhydride (PE-g-MA) as a compatibilizer have been used to improve the properties of poly(vinyl chloride) (PVC) / epoxidized natural rubber (ENR) / (Kenaf Core Powder) composites. Tensile properties, filler dispersion and swelling resistance of PVC/ENR/KCP composites were enhanced with both treatments.

Invited Speaker**Elisabeta BERCEANU, PhD**

State Office for Inventions and Trademarks
berceanu.elisabeta@osim.ro

Since April 2002 onwards Elisabeta Berceanu is working as Patent Examiner at the State Office for Inventions and Trademarks OSIM, Patent Department in substantive examination and search of patent applications in chemistry and pharmaceutical field. Previously, she was Scientific researcher at ICECHIM Bucharest. Elisabeta Berceanu graduated the Polytechnic Institute Bucharest, Organic chemistry and technology, on 1984; on 1998 she was granted PhD in chemistry, by the Romanian Academy – Research Institute for Physical Chemistry, Bucharest, Thesis Title: Electrochemical synthesis of organic compounds. Between October 2004- January 2005, she followed the Industrial Property Course – Patents for Invention at CEIPI - Centre d'Etudes Internationales de la Propriété Industrielle, Université Robert Schuman, Strasbourg, the main purpose of the course being the study of European legislation referring to patent protection, European Patent Convention, European examination procedure, Oppositions and Appeal procedure as well as European Case Law. The lecturer performed numerous presentations in the field of industrial property protection for universities, research institutes and SMEs, both in Romania and abroad.

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INNOVATIVE RESEARCH – KEY ROLE OF PATENT FOR INVENTION

The presentation will be focused both on national and European patenting procedure as well as on the importance of patenting in the context of Innovative research. Some case studies on patenting vs. publishing of scientific articles in connection with the disclosure of the invention will also be discussed.



EUROINVENT
ICIR 2016

International Conference on Innovative Research
Iasi, 19th-20th of May 2016



SECTION 1

SYNTHESIS AND CHARACTERIZATION OF MATERIALS

Production Feature of Soft Magnetic Amorphous Alloys

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Abstract. Methods for making nanocrystalline alloys have been discussed. Temperature dependences of the surface tension (σ), electric resistivity (ρ), magnetic susceptibility (χ) and kinematic viscosity (ν) have been obtained. Comparison of the properties of amorphous ribbons obtained by the pilot and serial technologies has been conducted. Science-based technology of multi-component alloy smelting makes it possible to prepare equilibrium smelt, the structure of which has a significant effect on the properties of the amorphous ribbon before spinning and kinetics of its crystallization has been offered.

Keywords: amorphous alloys, nanopowders, clusters melt processing, properties of amorphous ribbons

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Tribological Properties of Ternary Nanolayers Obtained from Simple/Compound Materials

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Abstract. There are a lot of researchers oriented towards realization of new classes of thin films, having dry-lubrication properties. This scientific work had as a starting point Patents no. 128094/30.06.2014 of Dr. Eng. Gh. Mateescu and Dr. Eng. A. O. Mateescu, granted by the Romanian State Office for Inventions and Trademarks (OSIM).

Keywords: dry lubricant coatings, friction coefficient, ternary composition.

Acknowledgement:

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A study on the soil characteristic and properties of riverbank soil samples from Sungai Perak, Kota Lama Kiri, Kuala Kangsar, Malaysia

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Abstract. Riverbank filtration (RBF) technology is new in Malaysia and only a few efforts have been made to understand the RBF mechanisms and processes. Soil characteristics and properties play important roles in determining the suitability of the site for the RBF application. A research has been carried out in Kota Lama Kiri, Kuala Kangsar, Perak, Malaysia to identify the characteristics of the riverbank soil for different layers of the pumping well (PW) and three adjacent monitoring wells namely MW2, MW3, and MW5. The aquifer extended down to 8 m. The highest hydraulic conductivity value for the PW was 0.91 cm/s and obtained for sample taken from 6 m deep. The highest hydraulic conductivity value for the monitoring wells was 5.03 cm/s and obtained for sample taken from 2.20 to 3.20 m of MW5. The overall well production capacity determined from the pumping test was 112.10 m³/hr.

Keywords: Riverbank filtration, soil characteristics, particle size analysis, hydraulic conductivity

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Reciprocalness of Kaolin to Alkaline Liquid Ratio and Strength of Kaolin Geopolymer

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Abstract. Geopolymer is an incredible alternative green cementitious material which has ceramic-like properties, but does not required calcining that leads to reduction in processing energy usage. The purpose of this research is to study about the correlation between kaolin: liquid ratio with the performance of kaolin geopolymer.

Keywords: Geopolymer, Kaolin, hardness, Flexural strength, X-Ray Diffraction, solid liquid ratio.

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Modeling and Simulation of Temperature Effect in Polycrystalline Silicon PV Cells

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Abstract. Due to the human needs of energy, there is a need to apply new technologies in energy conversion to supply the demand of clean and cheap energy in the context of environmental issues. Renewable energy sources like solar energy has one of the highest potential. In this paper, solar panel is the key part of a photovoltaic system which converts solar energy to electrical energy. The purpose of this paper is to give a MATLAB/ Simulink simulation for photovoltaic module based on the one-diode model of a photovoltaic cell made of polycrystalline silicon. This model reveals the effect of the ambient temperature and the heating of the panel due to the solar infrared radiation. Also the measurements on the solar cell exposed to solar radiation can confirm the simulation.

Keywords: solar energy, photovolatic system, electricity, simulation.

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Investigation of the mechanical properties of FeNiCrMnSi high entropy alloy wear resistant

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Abstract. In this paper we investigated microstructure, hardness and wear resistance for FeNiCrMnAl, high entropy alloy. The FeNiCrMnSi, high entropy alloy was elaborated in a medium induction furnace, by choosing the silicon, as an alliance element within the equi-atomic high entropy alloy, we managed to obtain a dendritic structure, the formation of intermetallic compounds or separated silicon. The medium hardness value of the investigated alloy was 948.33 HV and the medium value of the friction coefficient was 0.6655 in the first 20 seconds and 0.5425 for 1667 seconds. The volume loss of the high entropy alloy FeNiCrMnSi was 0.0557 mm³.

Keywords: high entropy alloy, microstructure, wear resistance, hardness, properties.

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Effect of Montmorillonite Modification on Ultra Violet Radiation Cured Nanocomposite Filled with Glycidyl Methacrylate Modified Kenaf

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Abstract. In this study nanocomposite cured by ultra violet radiation, were produced using modified montmorillonite (MMT) as reinforcing agent, chemically modified kenaf bast fiber as filler and unsaturated polyester as the matrix. Kenaf bast fiber was chemically modified with glycidyl methacrylate (GMA) whilst MMT were modified with cetyl trimethyl ammonium bromide (CTAB) and glycidyl methacrylate (GMA). Scanning electron microscopy (SEM) analysis showed the evidence of compatibility enhancement between MMT and kenaf bast fiber with unsaturated polyester matrix.

Keywords: kenaf fiber, chemical modification, nanocomposite, montmorillonite, compatibility

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Synthesis and characterization of a new high entropy composite matrix

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Abstract. Even if high entropy alloys were not reported in a scientific journal till 2003, these new alloys have been investigated since 1995 due to their high temperature properties. In the last years the synthesis of these alloys has been widely investigated. Thus, the present work has been carried out to produce a high entropy composite using an equiatomic AlCrFeMnNi high entropy alloy (HEA) matrix and graphite particles (Gr) as reinforcing material. The high entropy composite was obtained by powder metallurgy route using a planetary ball mill. The mechanically alloyed mixture was investigated by scanning electron microscopy (SEM). Microstructural investigation realized by SEM revealed the homogenous structure of the composite, with multiple phases and decreasing particles size, mostly reaching nanometric scale.

Keywords: high entropy alloys, composite, mechanical alloying, diffraction, microstructure.

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Friction Behaviour of Polymeric Composite Materials Mixed with Carbon Fibers Having Different Orientations Layout

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Abstract. This paper presents a study of the friction properties of polymeric composite materials reinforced with unidirectional carbon fibers having different stratified structure. Unidirectional reinforces carbon fiber materials are more effective if refer to specific properties per unit volume compared to conventional isotropic materials. Some benefits of carbon fibers composite materials are: low density and high resistance to wear; low or high friction coefficient; resistance to high temperatures; high resistance to breakage and high value ratios strength/density.

Keywords: composite, material, wear, friction, reinforced, carbon, fibers, sliding.

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Influence of ZrO_2 - Y_2O_3 and ZrO_2 - CaO coatings on microstructural and mechanical properties on Mg-1,3Ca-5,5Zr biodegradable alloy

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Abstract. Zirconia (ZrO_2) as a ceramic biomaterial facilitates the osteoconductivity in new bone formation around implant. In order to improve the degradation and the surface properties, it is necessary to apply a surface film to satisfy multiple clinical requirements such as mechanical strength, biocompatibility, and degradation rate. Therefore, surface changing to form a tenacious, biocompatible and corrosion resistant modified layer has become a necessary study in biodegradable materials. The aim of the study is to observe the morphology, structural and scratch analysis for some coatings of ZrO_2 - CaO and ZrO_2 - Y_2O_3 having similar thickness deposited with an atmospheric plasma spraying facility, Sulzer Metco 9MCE, using scanning electron microscopy and X-Ray diffraction. Some mechanical aspects were highlighted during the scratch test. Comparative scratch tests were carried out to study the bonding properties between the coatings and the substrates.

Keywords: biomaterial, deposition, properties.

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Sodium silicate as source of silica for synthesis of mesoporous SBA-15

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Abstract. Ordered mesoporous silica SBA-15 was prepared using hydrothermal synthesis using sodium silicate (Na_2SiO_3) as the silica source and the amphiphilic block copolymer Pluronic P123 as the structure directing agent. The influence of the mass of Na_2SiO_3 , ripening duration, aging time and calcination temperature on the structural and mesoporous properties of silica was studied. X-ray diffraction (XRD), Fourier transform infrared (FTIR), Scanning electron microscopy (SEM) and the nitrogen adsorption desorption using Brunauer Emmett-Teller (BET) are some instruments used to characterize the results of investigation. From XRD analysis, SBA-15 synthesized from sodium silicate yield 2D-hexagonal symmetry (p6mm). From FTIR analysis, functional group Si-O-Si symmetric stretching modes and asymmetric Si-O-Si stretching modes were present. The sample with the highest mass of Na_2SiO_3 and the shortest aging time exhibited the largest surface area and large pore size. The results also showed the morphological structure could be tuned during ripening stage.

Keywords: Mesoporous, SBA-15, sodium silicate, characterization

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Metal Chloride Induced Formation of Porous Polyhydroxybutyrate (PHB) Films: Morphology, Thermal Properties and Crystallinity

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Abstract. Polyhydroxybutyrate (PHB) films with highly porous structures were synthesized using a one phase system comprising of metal chloride/methanol/PHB/chloroform ($MCl_2/CH_3OH/PHB/CHCl_3$). SEM analyses confirmed that the MCl_2 (where $M = Cu^{2+}$ or Ni^{2+}) induced porous structures with pore sizes ranging from 0.3 – 2.0 μm . The average pore size increased with the increasing MCl_2 content. There existed weak physical interactions between the PHB chains and MCl_2 as revealed by FTIR and NMR spectroscopies. The residue of MCl_2 in the porous PHB film does not exert significant influence on the thermal stability of PHB. Nevertheless, the crystallinity of the prepared film is enhanced, as MCl_2 acts as the nucleation sites to promote the growth of spherulites. The possible mechanism for the formation of porous PHB is discussed.

Keywords: Porous, polyhydroxybutyrate, metal chloride, thermal properties, crystallinity

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Damage detection of carbon reinforced composites using nondestructive evaluation with ultrasound and electromagnetic methods

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Abstract. CFRP have applications among most different domains due their low density, high elastic modulus and high ultimate strength along the carbon fibers direction, no fatigue and the expansion coefficient is small. This paper presents the behavior of carbon fiber woven-PPS composites at low velocity impacts. The transversal electrical conductivity is modified due to the plastic deformation following the impacts, and thus electromagnetic procedures can be used for assessment of CFRP using a high resolution sensor with metamaterials lens and comparing the results with those obtained from ultrasound testing with phased array sensor.

Keywords: CFRP, phase array ultrasound, sensor with metamaterials

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Chemical elements diffusion in the stainless steel components brazed with Cu-Ag alloy

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Abstract. The paper presents the study of diffusion of chemical elements through a brazing joint, between two thin components (0.5mm) made of stainless steel 304. An experimental brazing filler material has been used for brazing stainless steel component and then the diffusion phenomenon has been studied, in terms of chemical element displacement from the brazed separation interface. The filler material is in the form of a metal rod coated with ceramic slurry mixture of minerals, containing precursors and metallic powders, which can contribute to the formation of deposit brazed. In determining the distance of diffusion of chemical elements, on both sides of the fusion line, were performed measurements of the chemical composition using electron microscopy SEM and EDX spectrometry. Metallographic analysis of cross sections was performed with the aim of highlight the microstructural characteristics of brazed joints, for estimate the wetting capacity, adherence of filler metal and highlight any imperfections. Analyzes performed showed the penetration of alloying elements from the solder (Ag, Cu, Zn and Sn) towards the base material (stainless steel), over distances up to 60 microns.

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Study on structure and properties of CuZn40Pb alloy

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Abstract. The paper shows aspects about the behavior of Cu-Zn-Pb alloys a subjected to the temperatures variation and corrosion resistance in saline medium (sea water). The chemical composition was determined by spectral analysis on optical spectrometer, type Foundry Masters. The experiments are completed by a microstructure analysis made on scanning electronic microscope.

Key words: cooper, alloys, properties, anlysis

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Hafnium influence on the microstructure of FeCrAl alloys

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Abstract. Due to their special properties at high temperatures, FeCrAl alloys micro-alloyed with Zr can be regarded as potential materials for use at nuclear power plants, generation 4R. These materials are resistant to oxidation at high temperatures, to corrosion, erosion and to the penetrating radiations in liquid metal environments. To improve the mechanical and chemical characteristics of the oxide layer, we introduced limited quantities of Zr, Ti, Y, Hf, Ce in the range of 1-3 %wt in the FeCrAl alloy. These elements, with very high affinity to the oxygen, are capable to stabilize the alumina structure and to improve the oxide adherence to the metallic substrate. FeCrAl alloys microalloyed with Hf were prepared using VAR (Vacuum Arc Remelting) unit, under high argon purity atmosphere. Three different experimental alloys have been prepared using the same metallic matrix of Fe-14Cr-5Al, by adding of 0.5%wt Hf, 1.0%wt Hf and respectively 1.5%wt Hf. The microhardness values for the experimental alloys have been in the range 154 ... 157 HV0.2. EDAX analyses have been performed to determine chemical composition on the oxide layer and in the bulk of sample and SEM analyze has been done to determine the microstructural features. The results have shown the capacity of FeCrAl alloy to form oxide layers, with different texture and rich in elements such as Al and Hf.

Keywords: structure, properties, alloys, elements

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-

Hydrogenation of Styrene by Alumina Supported Nickel Catalysts: Comparison between Classical and Non-Classical Methods

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Abstract: Alumina supported Ni catalysts (Ni/Al₂O₃) with different Ni weight percentages (wt%) were prepared via classical and non-classical methods. All samples were prepared via impregnation technique. The samples prepared via non-classical methods were reduced using KBH₄ as the reducing agent. The catalysts were tested for the hydrogenation of styrene in liquid phase. Optimum activation conditions for the hydrogenation reaction were found to be 360°C for 2 hours. Comparison of the catalytic reactivity for all catalysts at these activation conditions showed that catalysts prepared via classical methods exhibited better activity. The surface properties of the classical catalysts were investigated via H₂-temperature programmed reduction (H₂-TPR) and H₂-temperature programmed desorption (H₂-TPD) to explain this phenomenon.

Keywords: Alumina supported nickel catalysts, classical methods, non-classical methods, hydrogenation of liquid styrene.

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Investigation on mechanical and physical properties of TPU/PVC blend as potential material for bedpan

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Abstract. The purpose of this study is to determine the impact properties, chemical resistance and morphology of TPU/PVC blend in order to be used as potential material to fabricate bedpan. TPU and incorporation of PVC in TPU was done by melt-mixing method. The SEM micrograph showed that 50/50 TPU/PVC exhibited both smooth surfaces, indicating the brittleness of PVC and rough and plasticity fractured surface, indicating the ductility of TPU features.

Keywords: TPU, PVC, TPU/PVC, polymer blend, chemical resistance, drop weight impact, SEM, bedpan.

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The structural characterization of some biomaterials, type AISI 310, used in medicine

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Abstract. Orthopedics biomaterials are intended for implantation in the human body and substituted or help to repair of bones, cartilage or organ transplant, and tendons. At the end of the 20th century, the availability of materials for the manufacture implants used in medicine has been the same as for other industrial applications. The most used metals for manufacturing the orthopedics implants are: stainless steels, cobalt-chrome-molybdenum alloys, titanium and his alloys. The structural researches which are made in this paper, offer a complete analysis of AISI310 stainless steels, using: optical spectrometry, X-ray diffraction and scanning electronic microscopy.

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SECTION 2

**PROCEDURES AND
TECHNOLOGIES
FOR MATERIALS ENGINEERING**

Wetting and spontaneous infiltration; cases study of TaC/(Au, Al and Cu) and TiC/Cu

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Abstract. Spontaneous infiltration of molten metals in to ceramic skeletons, in the course MMCs' production, is related to improved wetting of the ceramic by metals. TiC is considered a "metal-like" carbide and is supposed to be wetted well by metals through metallic bonding mechanism. Nevertheless, TiC/Cu exhibit an unusual behavior since spontaneous infiltration of molten Cu takes place, while TiC is partially wetted by Cu ($\theta=90^\circ$). Further calculation clarifies the difference between TaC/Cu and TiC/Cu infiltration behavior, but is unable to explain the wetting results differences.

Keywords: brazing, wetting, Infiltration, TaC, thermodynamics, mechanical properties

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Geopolymer Concrete for Structural Use: Recent Findings and Limitations

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Abstract. The cement industry faces several challenges including the increased demand which has raised the sustainability concerns. On the other hand, the cement industry is a major consumer of energy which raises the cost challenge in terms of fossil fuel depletion. The reported results showed that the structural behaviour of the reinforced geopolymer concrete members is similar to the known behaviour of the ordinary reinforced concrete members. In addition, the currently available standards have been conservatively used for analysis and designing of reinforced geopolymer concrete structures. On the other hand, the main hurdles facing the spread of geopolymer concrete was the absence of standards and the concerns about the long-term properties. Other issues included the safety, cost and liability.

Keywords: geopolymer, concrete, structural behaviour, flyash, GBFS, beam, column, slab, stress, strain.

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Mixed Consolidation Solution for a Reinforced Concrete Structure

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Abstract. During the last years, reinforced concrete structures become subject for rehabilitation due to two factors: their long life span and large change in norms that led to a large increase of seismic loads in Eastern Europe. These lead to a necessity for rehabilitation of existing building stock in order to use them during their entire life span at the maximum potential. The present paper proposes a solution for rehabilitation for three reinforced concrete buildings of a hospital, that consumed a half of their life span and do not correspond anymore to present norms. The chosen solution is a combination between CFRP rehabilitation and increase of structural elements cross section in order to achieve the stiffness balance in the structure nodes that is required by present norms. As a further matter, correction in stiffness of local elements diminished the lateral drifts of the structure and improved the global seismic response of the building.

Keywords: concrete structure, carbon fiber, rehabilitation, stiffness, structural strengthening.

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Properties and Microstructural Characteristic of Kaolin Geopolymer Ceramics with Addition of Ultra High Molecular Weight Polyethylene

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Abstract. In this paper, the mechanical properties and microstructure of kaolin geopolymer ceramics with addition of Ultra High Molecular Weight Polyethylene (UHMWPE) were studied. Inorganic polymers based on alumina and silica polysialate units were synthesized at room temperature from kaolin and sodium silicate in a highly alkaline medium, followed by curing and drying at 80 °C. Addition of UHMWPE to the kaolin geopolymer are fabricated with UHMWPE loadings of 2, 4, 6 and 8 (wt. %) by using powder metallurgy method.

Keywords: kaolin based geopolymer, alkaline activator solution, ultra-high molecular weight polyethylene, geopolymer ceramic

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Effect of Fluxes on 60Sn-40Bi Solder Alloy on Copper Substrate

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Abstract. This paper investigated the effect of different types of fluxes on the wettability of a type of low temperature lead-free solder, 60Sn-40Bi alloy. The purpose of this paper is to investigate the effect of different types of fluxes on the wettability of 60Sn-40Bi solder (T_m : 138 -170 oC), so that the most compatible flux to be used with low temperature alloy can be determined. The results of this paper showed that the water soluble flux sample has the highest spread area and lowest contact angle. This meant that the solder has the highest wettability when water soluble flux is used, followed by RMA flux and low solids flux. Therefore, it was determined that water soluble flux is the most compatible to be used with the low temperature 60Sn-40Bi solder. The characteristic of this type of flux enables it to function well even at a low working temperature.

Keywords: solder; lead-free; DSC and lead-free

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ESD morphology deposition with WZr8 electrode on austenitic stainless steel support

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Abstract. Stainless steels are used to obtain mechanical parts, working in severe conditions with high dynamic loads in wet, chemically active environments. For this reason, these materials have good corrosion resistance in acidic or basic chemical agents. The main drawback is the relatively low wear and resistance to mechanical stress. This paper proposes a remedy by deposition of the hard thin films of tungsten electrode by spark electro-deposition method (ESD). Tungsten is an alfa element and causes an increase for the mechanical properties at high and low temperatures for the austenitic stainless steels. Tungsten does not alter the corrosion resistance of stainless steels. The morphology for the obtained layers was analyzed using SEM, in 3D images, and profilographs.

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Self-Cleaning Geopolymer Concrete: A Review

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Abstract. Cement productions released high amounts of carbon dioxide (CO₂) to the atmosphere that leads to the increasing of global warming. Thus, an alternative, environmental friendly construction material such as geopolymer concrete has been developed. Geopolymer concrete applies greener alternative binder, which is an innovative construction material that replaces the Portland cement. The self-cleaning properties of the concrete are induced by introducing the photocatalytic materials such as titania (TiO₂) and zinc oxide (ZnO). Self-cleaning concrete that contains those photocatalysts will be energized by ultraviolet (UV) radiation and accelerates the decomposition of organic particulates. Thus, the cleanliness of the building surfaces can be maintained and the air surrounding air pollution can be reduced. This paper briefly reviews about self-cleaning concrete.

Keywords: self-cleaning, titania, zinc oxide, photocatalyst, geopolymer

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Influence of Different Treatment Condition on Biopolymer Yield Production for Coagulation-Flocculation Process

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Abstract. Two different agro wastes (banana pseudostem and rice straw) were utilized in order to extract biopolymer (pectin) known as coagulant aid in water and wastewater treatment. Factors such as pH, temperature and time were chosen due to the critical role in hot acid extraction process. The yield of biopolymer extraction from banana pseudostem was found to be higher at 28 % meanwhile only 18 % from rice straw was manage to produce from the dry weight 10 g, respectively. It was found that extraction temperature and extraction time were the most important factors influencing the biopolymer yield which increased with temperature and time or decreasing pH. Based on two level factorial design, the same condition of pH 1.5, temperature 90°C and 4 hours extraction time can produce high amount of extracted biopolymer. Fourier Transform Infrared Spectroscopy (FTIR) was used to detect the existence of functional group which helps in the coagulation-flocculation process. Result indicates a similar functional group of biopolymer were detected for both difference agro wastes.

Keywords: coagulant aid, biopolymer, banana pseudostem, rice straw, hot acid extraction

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Self-Cleaning Technology in Fabric: A Review

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Abstract. This article gives an overview on photocatalytic self-cleaning technology on fabric resulting from titanium dioxide (TiO₂) and zinc oxide (ZnO) as photocatalyst which decompose the organic stain into water and carbon dioxide (CO₂) in presence of UV light source. The self-cleaning concept is useful in various application including the textiles materials which are normally used in daily life. This technology also can be developed in other application for instance medical textiles, athletic wear, and military uniform and also outdoor fabrics. Additionally, it is beneficial as it effectively conserves water and improves the appearance of the environment and in long term it will reduce energy, laundry cost and time as well.

Keywords: Self-cleaning, fabric; photocatalyst; titanium dioxide

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Morphological and physical - chemical issues of metal nanostructures used in medical field

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Abstract. Last years many applications of nanotechnology integrated into nanomedicine and bio-nanotechnology have attracted attention of many researchers from different fields. Processes from chemical engineering especially nanostructured materials play an important role in medical and pharmaceutical development. Fundamental researches focused on finding simple, easily accomplished synthesis methods, morphological aspects and physico-chemical advanced characterization of nanomaterials. More over, by controlling synthesis conditions textural characteristics and physicochemical properties such as particle size, shape, surface, porosity, aggregation degree and composition can be tailored. Low cytotoxicity and antimicrobial effects of these nanostructured materials makes them be applied in medicine field. The major advantage of metal based nanoparticles is the use either for their antimicrobial properties or as drug-carriers having the potential to be active at low concentrations against infectious agents.

Keywords: nanostructures, synthesis, characteristics

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Development of tailored ceramic microstructures using recycled marble processing residue as pore-former

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Abstract. Recycling of marble processing residue is significant since marble processing constitutes an important industrial sector. The porosity of the sintered ceramics increases substantially by increasing the marble residue admixture loading. This, in turn, leads to a decrease in thermal conductivity. Consequently, the marble residue can be successfully employed as pore-forming agent, in order to improve the insulating behavior of the ceramic materials.

Keywords: ceramic microstructure, marble processing residue, recycling, pore former, thermal conductivity

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The aluminizing in powder technology of AISI 304 steel

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Abstract. The paper presents a study about the aluminizing treatments applied to AISI 304 stainless steel, with the purpose to improve the corrosion resistance. The aluminizing is realized in a powder medium, composed by aluminium powder (with 99.95 % purity), aluminium oxide Al₂O₃ and ammonium chloride NH₄Cl. The structural characterization was made by scanning electronic microscopy to highlight the structure of layer after aluminizing, at different magnitudes.

Key words: steel, aluminizing, properties

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SECTION 3

MATERIALS APPLICATION

Special Features of Structural Changes of Amorphizing Nickel Alloys in Liquid and Heterogeneous state

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Abstract. Polytherms of kinematic viscosity of nickel-based alloys with Cr, Si, Fe and B additives have been studied. It was found out that the first liquid phase volumes appear when temperatures are well below the tabular values of the solidus temperature t_s . The critical temperature of the alloy was defined. The ways of obtaining materials of higher amorphization ability were suggested.

Keywords: amorphous alloys, soldering, kinematic viscosity, heterogeneous field, hysteresis

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Classic and New Materials Used for Structural Rehabilitation. Case Study

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Abstract. New materials development with different combination of properties were always a challenge in terms of their adequate use in civil engineering. Introduction of carbon fibres as strength material for structures was a beginning of a new approach in structural rehabilitation, and sometimes meant the end of classic rehabilitation solution use. The present paper gives an example of a building rehabilitation that use a melt of both new and old solutions in order to achieve the optimum result for building itself. The problem was even more challenging, because the structure considered is only 22 years old, but having some design faults in terms of seismic behaviour and, in addition, one floor was added to existing structure. The chosen solution was a compromise between the use of old and new materials in places where their qualities were best suitable and their minuses could be compensated by the other material

Keywords: concrete structure, carbon fiber, rehabilitation, stiffness.

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Investigation on leaching behavior of fly ash and bottom ash replacement in Self-Compacting Concrete

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Abstract. Fly ash and bottom ash are some of waste generated by coal-fired power plants, which contains large quantities of toxic and heavy metals. In recent years, many researchers have been interested to study on the properties of self-compacting concrete incorporated with fly ash and bottom ash but there was very limited research from the combination of fly ash and bottom ash towards the environmental needs. The results also indicate that this incorporation could effectively minimize the potential of environmental problems.

Keywords: self-compacting concrete, fly ash, bottom ash, waste products, leachability, heavy metals.

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Leakage Current Measurement of Protective Equipment Insulating Materials used in Electrical Installations

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Abstract. This research describes the behavior of equipment and safety devices during use in extreme environmental conditions, in order to establish the technical conditions and additional health and safety requirements during operation, to ensure the health and safety of users, regardless of conditions and working environment in which they are used. The studies have been conducted both on new equipment and means of protection used in electrical installations. There has been evaluated protective equipment made of insulating rubber, reinforced fiberglass or PVC. They have been followed the technical characteristics and protection against electric shock by measuring the leakage current of different insulating materials.

Keywords: Testing, leakage current, risk, equipment, safety, environment, extreme condition.

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Investigation on leaching behavior of fly ash and bottom ash replacement in Self-Compacting Concrete

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Abstract. Fly ash and bottom ash are some of waste generated by coal-fired power plants, which contains large quantities of toxic and heavy metals. In recent years, many researchers have been interested to study on the properties of self-compacting concrete incorporated with fly ash and bottom ash but there was very limited research from the combination of fly ash and bottom ash towards the environmental needs. There are eight heavy metals of concern such as As, Cr, Pb, Zn, Cu, Ni, Mn and Fe. The results indicated that most of the heavy metals were leached below the permissible limits from United States Environmental Protection Agency and World Health Organization limit for drinking water. As a conclusion, the minimum leaching of the heavy metals from the incorporation of fly ash and bottom ash in self-compacting concrete was found in 20% of fly ash and 20% of bottom ash replacement. The results also indicate that this incorporation could effectively minimize the potential of environmental problems.

Keywords: self-compacting concrete, fly ash, bottom ash, waste products, leachability, heavy metals.

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Investigation of the photovoltaic cell/ thermoelectric element hybrid system performance

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Abstract. The PV/TEG hybrid system, consisting of the photovoltaic cells and thermoelectric element, is presented in the paper. The dependence of the PV/TEG hybrid system parameters on the illumination levels and the temperature is analysed. The efficiency of the photovoltaic cell, the thermoelectric element and the PV/TEG system is calculated and a comparison between them is analysed. An economic analysis is also presented.

Keywords: photovoltaic cell, thermoelectric element, hybrid system, parameters, efficiency.

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Effects of the restoration cement on chalk stone buildings

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Abstract. The monument buildings as components of cultural heritage are subject to continuous deterioration due to the environment effects. In the conservative and restorative works, natural cement, called “Roman” cement, without knowing all the adverse effects of this material on the building. This paper aims to study the effects of cement used in restorative works in the particular case of the Basarabi-Murfatlar Churches Ensemble. The chalk stone in contact with the cement, demarches a deterioration process due to ettringite/thaumasite formation as alteration products, which can lead to strain within the material, expansion, strength loss and severe degradation. Several combined techniques (XRD, SEM, thermal analysis DSC/TGA, sulphates content, colorimetric analysis, FT-IR and Raman analysis) were carried out to put into evidence their effects on the building walls.

Keywords: chalk stone, ettringite, thaumasite, cement-based mortar.

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Properties and Leachability of Self-Compacting Concrete (SCC) Incorporated With Fly Ash and Bottom Ash

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Abstract. The process of combustion in coal fired power plant generates ashes, namely fly ash and bottom ash. In addition, coal ash generated from coal combustion generally contains heavy metals within their compositions. In conclusion, this study will serve as a reference which suggests that fly ash and bottom ash are widely applicable in concrete technology and its incorporation in self-compacting concrete constitutes a potential means of adding value with appropriate mix and design.

Keywords: self-compacting concrete, fly ash, bottom ash, waste products, leachability, heavy metals.

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Photocatalytic ZnO for air purification applications

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Abstract. Nano and micro-structured ZnO coatings onto various substrates were grown by chemical methods and optimized with respect to their photocatalytic activity against in-doors common air pollutants. Excellent quality coatings with high stability and photocatalytic efficiency were obtained and integrated in a novel air-purification system.

Acknowledgements

Part of the work was partially supported by a grant of the Romanian National Authority for Scientific Research, CNCS – UEFISCDI, project number PN-II-RU-TE-2012-3-0202.

Keywords: zinc oxide, chemical growth, photocatalysis.

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The Effect on Slurry Water as a Fresh Water Replacement in Concrete Properties

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Abstract. Fly ash Concrete is the most widely used engineering material in the world and one of the largest water consuming industries. Consequently, the concrete manufacturer, ready mixed concrete plant is increased dramatically due to high demand from urban development project. At the same time, slurry water was generated and leading to environmental problems. Moreover, the results also recommended that concrete with slurry water mix have better compressive strength compared to control mix concrete.

Keywords: Slurry Water, Compressive Strength, Modulus of Elasticity, Tensile Strength

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Strength and Density of Geopolymer Mortar Cured at Ambient Temperature for Use as Repair Material

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Abstract. Geopolymers produced by synthesizing aluminosilicate source materials with an alkaline activator solution promised an excellent properties akin to the existing construction material. This study focused on the effect of various binder to sand ratio on geopolymer mortar properties.

Keywords: fly ash, geopolymer, ambient temperature, compressive strength, repair material, repair and rehabilitation.

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Some Analysis of Major Impact of Geothermal Fluid Components in Power Plant Equipment

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Abstract. This paper presents the results from a some analysis and major impact of geothermal fluid composition on the equipment in use in geothermal power plant. The structural analysis of material deposition improve the direct influenced of chemical composition of steam and waters included CaO, MgO, Al₂O₃ and SiO₂ incorporated in the molten phase and the deposits in the scales formed due to equipment.

Keywords: geothermal turbines, corrosion process, SEM analysis.

Acknowledgements

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Effect of Geopolymer filler in Glass Reinforced Epoxy (GRE) Pipe for Piping Application: Mechanical Properties

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Abstract. The presents work is aimed to carry out the effect of geopolymer material which is fly ash as filler in the glass reinforced epoxy pipe on the microstructure of fly ash geopolymer, compression properties, and bulk density using filament winding method. However, the compressive strength of glass reinforced epoxy pipe with fly ash geopolymer filler continues to decline when added to 20 wt% - 40 wt% of geopolymer filler loading. The results showed that the mixing of geopolymer materials in epoxy system can be obtained in this study.

Keywords: GRE pipe, filament winding, geopolymer, fly ash, morphology, compression

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Performance of Straight Steel Fibers Reinforced Alkali Activated Material

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Abstract. This paper focus on the performance of alkali activated material concrete produced by using fly ash activated by sodium silicate and sodium hydroxide solutions. These alkali activated material concrete were reinforced with straight steel fibers with different weight percentage starting from 0 % up to 5 %. Chemical composition of raw material in the production alkali activated material which is fly ash was first identified by using X-ray fluorescence. Result reveal there have an effect of straight steel fibers inclusion to the alkali activated material concrete. Highest compressive strength of alkali activated material concrete which is 67.72 MPa was obtained when 3 % of straight fibers were added. As well as flexural strength, highest flexural strength which is 6.78 MPa was obtained at 3 % of straight steel fibers inclusions.

Keywords: Alkali activated material, straight steel fibers, fly ash Class F, chemical compositions, compressive strength, flexural strength.

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Microstructure and Mechanical Properties of Fly Ash Particulate Reinforced in LM6 for Energy Enhancement in Automotive Applications

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Abstract. Fly ash has gathered widespread attention as a potential reinforcement for aluminium matrix composites (AMCs) to enhance the properties and reduce the cost of production. Aluminium alloy LM6 reinforced with three different amounts (0, 4, 5 and 6 wt. %) of fly ash particle that were prepared by compo-casting method. The addition of fly ash particles improved the physical and mechanical properties of the AMCs. Thus lead to improve the energy consumption in automotive parts.

Keywords: fly ash; LM6; composite and AMC.

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Morphological characterisation of complex powder used for protective coatings for geothermal plant components

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Abstract. This paper aims to review the morphological characteristics, microstructures, physical and chemical properties of two complex composite powders: Ni₁₈Cr₅Si₂B and Ni₂₁Cr₁₁Al_{2.5}Y. These powders will be used as an option for coating geothermal turbine blades to prevent corrosion. The results obtained after morphological evaluation are encouraging for using these composite powders as an option for coating geothermal components using thermal spraying technique.

Key words: structure, powder, composites

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Mechanical and Physical Properties of In-Zn-Ga Lead-Free Solder Alloy for Low Energy Consumption

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Abstract. Due to the demand in the use of electronics devices in industry, the usage of solder connections has increased. In concern with the toxicity of lead in Sn-37Pb solder alloy, developing lead free solder alloy with low melting temperature is one of the most important issues in electronic industry. Previously, researchers found out that the most promising candidate of lead free solder alloy is Sn-3.0Ag-0.5Cu (SAC). However, the melting temperature of this solder alloy is 217°C, 34°C higher than Sn-37Pb. The density of In-Zn-Ga solder alloy is 6.801g/cm³, lower than SAC and Sn-37Pb. For the strength, single lap shear testing was conducted on the In-Zn-Ga solder alloy and the results is near to the strength of SAC.

Keywords: solder; lead-free; DSC and lead-free

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Methods for elimination of dampness in Building walls

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Abstract. Dampness elimination in building walls is a very sensitive problem, with high costs. Many methods are used, as: chemical method, electro osmotic method or physical method. The RECON method is a representative and a sustainable method in Romania. Italy has the most radical method from all methods, successfully applied in buildings and monuments all over radical from all methods, successfully applied in buildings and monuments all over the world. The technology consists in cutting the brick walls, insertion of a special plastic sheeting and injection of a pre-mixed anti-shrinking mortar.

Keywords: building, brick, insertion

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Application of Radio Frequency Identification (RFID) in Mining Industries

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Abstract. RFID technology has recently become a dream of many company or organization because of its strategic potential and high operational in transforming mining operations. Now is the perfect time for RFID technology arising as the next revolution in mining industry. This paper will review regarding the application of RFID in mining industries and access knowledge regarding RFID technology and overseen the opportunity of this technology to become an importance element in mining industries. The application of Radio-frequency identification (RFID) in Mining Industries includes to control of Personal Protective Equipment (PPE), control of personnel to access mining sites and RFID solutions for tracking explosives.

Keywords: mining industry, Radio Frequency Identification (RFID).

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SECTION 4

MATERIALS & LIFE SCIENCE

Antioxidant activity and phytochemical compounds of *Salacca Zalacca* fruit

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Abstract. Snake fruit (*Salacca zalacca*) is palm tree specie, with high nutritional and healthy properties. This study aims to investigate and compare the composition, total phenolic, flavonoid, tanins and monoterpenoids contents from the core and shell of this fruit. The results obtained from this study indicate that snake fruit contain certain amounts of polyphenols, flavonoids, tannins and monoterpenoids, proving them to be perfect sources of antioxidants.

Keywords: Snake fruit (*Salacca zalacca*), polyphenols, flavonoids, tannins, monoterpenoids, antioxidants.

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Evolution of Geopolymer Binders: A Review

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Abstract. Use of the geopolymer binder in the construction industry as a cement replacement material can be an ideal solution for solving different environmental problems. The properties of the produced geopolymers are mainly influenced by its microstructure; hence, it is required to thoroughly understand the geopolymer formation and geopolymerization mechanism. However, the currently available models have shown some limitations and there is a need for deeper knowledge regarding the physicochemical analysis of geopolymer binders. The amorphous microstructure that appears using the XRD analysis refers to the geopolymerization nanoproductions, which produce a very tiny microporosity matrix that promotes the superior properties of geopolymers.

Keywords: geopolymer, geopolymerization, microstructure, NMR, XRD, FTIR.

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Green Bio-oil Extraction Technique For Oil Crops

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Abstract. The move towards a green bio-oil extraction technique is highlighted in this paper. The commonly practised organic solvent oil extraction technique could be replaced with a modified microwave extraction. *Jatropha* seeds (*Jatropha curcas*) were used to extract bio-oil. Thus, this is a green technique of bio-oil extraction using only water as extractant. An extended study using seashell waste as a biocatalyst for oil extraction from empty fruit bunch (EFB), biomass waste from oil palm crop was done. Oil yield for non-catalytic extraction was 43.8% while with addition of seashell-based biocatalyst was 44.5%. The pH increased from 3.5 to 4.3. The viscosity of bio-oil obtained by catalytic means increased from 20.5 to 37.8 cP. A rapid and environment friendly extraction technique is preferable to enhance bio-oil yield.

Keywords: green extraction, bio-oil, *jatropha*, modified microwave extraction, pressurized hot water extraction, seashell biocatalyst.

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Low cost data acquisition system with USB connectivity

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Abstract. In the process of designing an electronic system the digital oscilloscope plays an essential role but it also represents one of the most expensive equipment present on the typical workbench. In order to make electronic design more accessible to students and hobbyists, an affordable data acquisition system was imagined. The paper extensively presents the development and testing of a low cost, medium speed, data acquisition system which can be used in a wide range of electronic measurement and debugging applications, assuring also great portability due to the small physical dimensions. Each hardware functional block is thoroughly described, highlighting the challenges that occurred as well as the possible solutions to overcome them. A PC application that uses the USB (Universal Serial Bus) communication in order to set the acquisition parameters and receive the acquired signals in order to display them is also presented in detail. The entire system was successfully manufactured and passed all the tests.

Keywords: data acquisition, measuring equipment, embedded systems.

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Antimicrobial property of zinc based nanoparticles

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Abstract. Pathogen bacteria strains with wide spectrum can cause serious infections with drastic damages on humans. There are studies reflecting antibacterial effect of nanoparticles type metal or metal oxides as an alternative or concurrent treatment to the diseases caused by infectious agents. Synthesised nanoparticles using different methods like sol-gel, hydrothermal or plant extraction were tested following well-established protocols with the regard to their antimicrobial activity. It was found that zinc based nanoparticles possess strong synergistic effect with commonly used antibiotics on infection treatment.

Keywords: bacteria, oxides, human body

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The effect of erosion and abrasion on surface properties of composite resin

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Abstract. Oral cavity is a complex environment, where the restorative materials are exposed to acids attack or/and abrasive challenge. One of the clinical results of these chemical and mechanical phenomena is the alteration of surface properties of restorative materials. The exposure to acidic beverages increases the surface roughness of composite resins. Toothbrushing using a toothbrush having medium hardness of bristles and a toothpaste with low relative dentine abrasivity also increases the surface roughness of composite resins. Abrasive challenge immediately after and 30 minutes after an acidic attack determines the highest alteration of the surface state of composite resin. To a lesser alteration of composite resins surface roughness, toothbrushing 60 minutes after an acidic challenge is recommended.

Keywords: erosion, abrasion, composite resin, surface roughness

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Study of Switching Electric Circuits with DC Hybrid Breaker, One Stage

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Abstract. The paper presents a method of extinguishing the electric arc that occurs between the contacts of direct current breakers. The method consists of using an LC type extinguishing group to be optimally sized. From this point of view is presented a theoretical approach to the phenomena that occurs immediately after disconnecting the load and the specific diagrams are drawn. Using these, the elements extinguishing group we can choose. At the end of the paper there is presented an analyses of the circuit switching process by decomposing the process in particular time sequences. For every time interval there was conceived a numerical simulation model in MATLAB-SIMULINK medium which integrates the characteristic differential equation and plots the capacitor voltage variation diagram and the circuit dumping current diagram.

Keywords: Current zero, electric arc, hybrid breaker, simulation.

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Sensory evaluation based fuzzy AHP approach for material selection in customized garment design and development process

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Abstract. Material selection is the most difficult section in the customized garment product design and development process. This study aims to create a hierarchical framework for material selection. The analytic hierarchy process and fuzzy sets theories have been applied to mindshare the diverse requirements from the customer and inherent interaction/interdependencies among these requirements. A real empirical application for the physically disabled people is carried out to demonstrate the proposed method. Both the theoretical and practical background of this paper have indicated the fuzzy analytical network process can capture expert's knowledge existing in the form of incomplete, ambiguous and vague information for the mutual influence on attribute and criteria of the material selection.

Keywords: sensory evaluation, fuzzy AHP, fuzzy set, advance material, MCDM, material selection, material application.

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Quality Engineering Tools Focused on Designing Remote Temperature Measurements for Inaccessible Locations by Using Light Components Parameterization of the Heated Materials

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Abstract. This paper is focused on research dedicated to measure the bucket wheel bearing temperature of the bucket wheel excavator (BWE). It proposes a measurement method for heating friction materials because is difficult to detect the temperature variation in the bearing. The major issue is to detect the generated infrared light according to the material detection. The temperature is considered the major signal of the wheel reliability and a remotely temperature detection method is proposed and because the sleeve bearing is a crucial part of the excavator a predictive measurements system for buckled wheel axis system was designed.

Keywords: tools, materials, temperature variation

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The implications of free 3D scanning in the conservation state assessment of old wood painted icon

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Abstract. The present paper presents the conservation state and the making of a 3D model of a XVIII-th century orthodox icon on wood support, using free available software and cloud computing. In order to create the 3D model of the painting layer of the icon a number of 70 pictures were taken using a Nikon DSLR D3300, 24.2 MP in setup with a Hama Star 75 photo tripod, in loops 360° around the painting, at three different angles. The pictures were processed with Autodesk 123D Catch, which automatically finds and matches common features among all of the uploaded photographs in order to create the 3D scene, using the power and speed of cloud computing. The obtained 3D model was afterwards analyzed and processed in order to obtain a final version, which can now be use to better identify, to map and to prioritize the future conservation processes and finally can be shared online as an animation.

Key words: conservation, model, 3D model

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Colour Change Evaluation on UV Radiation Exposure for *Păun - Repedea* Calcareous Geomaterial

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Abstract. The present paper presents a method that evaluates the hydrophobization efficiency of two types of pellicles, involving UV artificial ageing and colorimetric analysis of the treated surfaces.

Keywords: geomaterials, porous surfaces, stone waterproofing, hydrophobic pellicle, accelerated aging, UV exposure, colorimetry CIE L*a*b*, Spectrum Irradiance Measurement, SEM-EDX, OM

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A Concept Design of Three Rudders-Shaped Like Body in Columns for Low-Drag USV

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Abstract. This paper presented a new design for the unmanned surface vessel (USV) platform with a self-manoeuvring system which is capable of collecting the same data as a hydrography boat. This platform was designed with three hulls that were placed in triangle position. The results revealed that a larger configuration distance between the three hulls will lead to a reduction in resistance and the platform will be in highly stable condition. The relationships derived from these findings should produce a stable and low-drag platform to accomplish the design concept of three rudders-shaped like body in columns for low-drag USV. This concept may help us to accomplish the design requirements that are related to low-drag and minimum power operation.

Keywords: unmanned surface vessel, rudders-shape, slender body, low-drag, resistance, stability.

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Methodology for appreciation the manufacturing castings from perspective of circular economy

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Abstract. This paper presents a methodology for studying the trends toward developing circular economy, comprising the following steps: description the field analyzed statistically and technological, establishing assessment criteria, establishing the event which will be analyzed and its description and evaluation of the event from the perspective of circular economy.

The case study was designed to the manufacture castings through the analysis, after the methodology proposed, by the work of the 71-th World Foundry Congress in 2014 from Bilbao.

Keywords: manufacture castings, circular economy, event analyzed, evaluation criteria, World Foundry Congress Bilbao 2014

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Entrepreneurial platform for circular economy in terms of manufacturing castings

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Abstract. The paper presents the features of entrepreneurial platform for circular economy from the perspective of one area affecting natural resources (materials and energy) and has an aggressive impact on the environment.

For achieving the goals set in the methodology mentioned there are presented the results of the scientific approach on adapting castings to the requirements of circular economy mainly on the following issues: the technological concern, the current situation, the market trends, the instruments of the circular economy, public policies, legal frameworks, technical and technological solutions, financing solutions and financial instruments, examples of good practice, process actors, events, production issues from the perspective of circular economy, publications and other issues.

Keywords: circular economy, entrepreneurial platform, manufacture castings, sustainable development, environmental protection.

A 9 Screen Diagram for Economics Instruction

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Abstract. This research uses the systematic 9 screen diagram of the TRIZ in combination with an innovative economics learning approach. Developing an innovative tool, the 9 screen diagram for economics instruction. It can help learners overcome three great obstacles: (1) Unable to establish a link between economic models and real environment; (2) Unable to make creative think by economic models; and (3) there is no way to use innovative thinking to establish new models.

Keywords: TRIZ, 9 Screen Diagram, Economics Instruction, price elasticity of demand, price elasticity of supply.

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Using Porter's Model to Analyze the Competitive Performance of Distance Education in Higher Education in Taiwan

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Abstract. This study employs Michael E. Porter's Five Forces Model to analyze the competitiveness of distance education as it enters conventional education in Taiwan. First, it analyzes the competitiveness of Taiwan's distance education industries and conventional education based on Porter's Five Forces Model. Second, it explores the effect of distance education on conventional education in Taiwan. Last, this study discusses how to improve the competitiveness of Taiwan's distance education for higher education.

Keywords: Porter's Five Forces Model; conventional education; distance education

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