# **Book of Abstracts**

# EUROINVENT ICIR 2019

# **International Conference on Innovative Research**

### May 16<sup>th</sup> to 17<sup>th</sup>, 2019

Iasi – Romania Palace of Culture

Organized by:

- ▲ Romanian Inventors Forum
- ★ Faculty of Materials Science and Engineering, The "Gheorghe Asachi" Technical University of Iasi, Romania
- ARHEOINVEST Platform, Alexandru Ioan Cuza University of Iasi
- Centre of Excellence Geopolymer and Green Technology CEGeoGTech), Universiti Malaysia Perlis (UniMAP)

With support of:

- ▲ International Federation of Inventors' Associations IFIA
- ★ World Invention Intellectual Property Associations WIIPA

**Editors:** 

Andrei Victor SANDU, Mohd Mustafa Al Bakri ABDULLAH,

Petrică VIZUREANU, Che Mohd Ruzaidi GHAZALI, Ion SANDU

ISSN Print 2601-4580 ISSN On-line 2601-4599

Editors:

Andrei Victor SANDU

Mohd Mustafa Al Bakri ABDULLAH

Petrică VIZUREANU

Che Mohd Ruzaidi GHAZALI

Ion SANDU

Technical Editors:

Lecturer PhD.Eng. Dragos Cristian ACHITEI

Assist.PhD.Eng. Catalin-Andrei TUGUI

### Copyright © 2019 All Rights reserved to the Editors

All the abstracts are provided by the authors. No major corrections were applied by editor.





### EUROPEAN EXHIBITION OF CREATIVITY AND INNOVATION E U R O I N V E N T IAŞI - ROMANIA XI<sup>th</sup> Edition, 16th - 18th May 2019

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

Under the auspices of EUROINVENT we organize:

1. Inventions and Research Exhibition

http://www.euroinvent.org/

2. International Conference on Innovative Research

http://www.euroinvent.org/conference

3. Technical-Scientifical, Artistic and Literary Book Salon

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

#### 4. European Visual Art Exhibition

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

#### **Event purposes:**

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

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

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

### Foreword

This volume contains the information of the ICIR Euroinvent 2019 Conference and the abstracts of selected peer-reviewed papers from the 2019 International Conference on Innovative Research, which was held in Iaşi, România from 16 to 17th of May 2019.

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

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

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

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

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

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

The editors would like to express their sincere appreciations and thanks to all the committee members of the ICIR 2019 for their tremendous efforts. Thanks also to IOP Conference Series for producing the volume with full articles.

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



# **Scientific Advisory Board**

**Prof.Dr. Ion SANDU** Alexandru Ioan Cuza University of Iasi, Romania - President Prof.Dr. Kamarudin HUSSIN Universiti Malaysia Perlis (UniMAP) Prof.Dr.Eng. Dan CASCAVAL Gheorghe Asachi Technical University of Iasi, Romania **Prof.Dr. Christian CODDET** Universite de Technologie Belfort-Montbeliard, France Prof.Dr.Eng. Neculai Eugen SEGHEDIN Gheorghe Asachi Technical University of Iasi, Romania **Prof.Dr. Michal SZOTA** Czestochowa University of Technology Poland **Prof.Dr. Lidia BENEA** Dunarea de Jos University of Galati, Romania (UGAL) **Prof.Dr.Eng. Catalin POPA** Technical University of Cluj-Napoca, Romania **Prof.Dr. Antonio CANDEIAS** University of Evora, Portugal **Prof.Dr. Marcin NABIALEK** Czestochowa University of Technology Poland Prof.Dr. Che Mohd Ruzaidi GHAZALI Universiti Malaysia Terengganu (UMT) Prof.Dr. Katarzyna BLOCH Czestochowa University of Technology Poland Prof.Dr.Eng. Cornel SAMOILA Transilvania University of Brasov Assoc.Prof.Dr. Mohd Mustafa Al Bakri ABDULLAH Malaysian Research & Innovation Society Prof.Dr.Eng. Cristian PREDESCU Politehnica University Bucharest, Romania

### Chairman

Prof. Dr. Eng. Petrica VIZUREANU

The "Gheorghe Asachi" Technical University of Iasi, Romania

### **Event Coordinator**

Assist.Prof.Dr.Eng. Andrei Victor SANDU

Romanian Inventors Forum &

The "Gheorghe Asachi" Technical University of Iasi, Romania



# **Technical and Organizing Committee**

#### Lecturer Dr.Eng. Dragos Cristian ACHITEI Gh. Asachi Technical University of Iasi, Romania

#### Assist.Dr.Eng. Madalina Simona BALTATU

Gh. Asachi Technical University of Iasi, Romania

### Assist.Prof.Eng. Doru Dumitru BURDUHOS-NERGIS

Gh. Asachi Technical University of Iasi, Romania

### Assist.Prof.Eng. Diana Petronela BURDUHOS-NERGIS

Gh. Asachi Technical University of Iasi, Romania

#### Assist.Prof.Dr.Eng. Bogdan ISTRATE

Gh. Asachi Technical University of Iasi, Romania

#### **PhD Vasile PELIN**

Al. I. Cuza University of Iasi, Romania

### Lecturer Dr.Eng. Manuela Cristina PERJU

Gh. Asachi Technical University of Iasi, Romania

#### Lecturer Dr.Eng. Ioan Gabriel SANDU

Romanian Inventors Forum & Gh. Asachi Technical University of Iasi, Romania

#### Assist.Prof.Eng. Catalin Andrei TUGUI

Gh. Asachi Technical University of Iasi, Romania

#### S.R. III. Dr. Viorica VASILACHE

Al. I. Cuza University of Iasi, Romania



### EUROINVENT JOINT PROGRAM

EUROINVENT Exhibition		EUROINVENT ICIR Conference	
DAY 1 – THURSDAY MAY 16			
08.00	Stand setup for participants	8.00	Participants registration
10.30	Artistic moment		
11.00 EUROINVENT Opening Ceremony			
		12.00	ICIR Opening Ceremony
13.00	First Jury Meeting	12.10	Keynote Speaker
13.30	Jury evaluation (I)	12.40	Invited Speaker
	Visiting	13.00	Lunch
	Demonstrations of inventions	14.00	Poster Session
		14.30	Plenary Session 1
17.00	End of exhibition day	16.00	Plenary Session 2
		17.30	End of conference day
DAY 2 – FRIDAY MAY 17			
		09.00	Invited Speakers
10.00	Exhibition start	10.00	Plenary Session 3
10.10	Jury evaluation (II)	11.30	Plenary Session 4
11.00	Media Interviews	13.00	Poster Session
14.00	Jury Final Meeting	14.00	Break for lunch (individual)
16.00	<b>Book Award Ceremony</b>		
17.00	Exhibition Closure and tear down		
19.00 Cocktail Dinner + Delegations Award Ceremony			
DAY 3 - SATURDAY MAY 18			
10.00			
10.00	Workshop PCCD160 - 2018		
13.00	Euroinvent Award ceremonv		
15.00	Farewell Message		



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

The "Gheorghe Asachi" University of lasi 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.



Contact: Blvd D. Mangeron 41A, RO - 700050, Iaşi, România Tel: +40.232. 230009 Web: www.sim.tuiasi.ro

### 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.



#### Contact:

Str. Sf. P.Movila 3, L11, III/3 RO - 700089, Iaşi, România Tel: +40.745.438604, e-mail: euroinvent@yahoo.com web: www.afir.org.ro



EUROINVENT ICIR 2019



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



Center of Excellence Geopolymer & Green Technology (CEGeoGTech) lead by Vice Chancellor Universiti Malaysia Perlis (UniMAP), Professor. Dr. Kamarudin Hussin. CEGeoGTech located at the School of Materials Engineering, Kompleks Pusat Pengajian Jejawi 2, Taman Muhibbah, o2600 Arau, Perlis. CEGeoGTech has been established on July 2011 with the intention to induce innovation in green material technology among researchers in Universiti Malaysia Perlis. CEGeoGTech are able combining their expertise and skills in various fields to support the academic structure in the generation of human capital that contributes to the development of high quality research. This center also can become a pillar of academic activities, especially regarding research, development and innovation. CEGeoGTech have 8 fields of research includes:

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

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

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

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



#### Contact:

Blvd. Carol I no. 11, Corp G demisol RO - 700506, Iaşi, România Tel/fax: +40.232.201 662, e-mail: ion.sandu@uaic.ro web: www.uaic.ro

# **OP** 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.

### **IOP Conference Series: Materials Science and Engineering**

#### Abstracted In

IOP Conference Series: Materials Science and Engineering (MSE)

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

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





#### **Keynote Speaker**

### Mihaly REGER, PhD

Professor Rector of Óbuda University, Hungary



Prof. Mlhaly REGER is the rector of Óbuda University since 2016. In 2012 was entitled Doctor of the Hungarian Academy of Sciences, being Habilitated since 2010, having its PhD defended in 1998. He was Head of Institute of Materials and Technology, Banki Donat Faculty of Mechanical and Safety Engineering, Óbuda University from 2011 to 2016. His Main research fields are continuous casting of steels, formation of surface and subsurface defects, modeling of solidification process (physical and mathematical), solidification of transparent materials, direct observation and image analysis of solidified structures, steady and non-steady state solidification, heat treatment, surface laser treatment, modeling of metallurgical and heat treating processes. He has published over 230 articles with more than 110 citations (without self citations). Detailed list of publications

https://m2.mtmt.hu/gui2/?type=authors&mode=browse&sel=10001931

#### DEFECT FREE STEEL CONTINUOUS CASTING, THE ROLE OF MATHEMATICAL MODELLING

Mathematical modeling is a useful tool for predicting material properties even in case of complex technological processes. One of the most complicated processes in the mass production of steels is continuous casting. Defect free casting requires an excellent accordance between steel properties being cast and the technological parameters, especially from the aspect of inner quality and homogeneity of cast products. As an example, one of the most unpredictable defects of cast slabs is the centerline segregation can be mentioned. The centerline segregation in slabs develops in a complex way; it is connected partly to the macrosegregation and partly to the shrinkage of solidifying melt. As a result of these processes, the centerline segregated part of the slab will have a different chemical composition compared to the average composition and/or it will contain shrinkage holes, discontinuities and inclusions. After the solidification process during hot rolling the complex shaped interdendritic holes will be closed as a function of applied strains. The difference in chemical composition will remain even after the slab has spent several hours at over 1000 oC in the soaking furnace before hot rolling. Hot rolled products (heavy plates, strips) with centerline segregation will contain, depending on the solidification and technological parameters, a middle part with a chemical composition dissimilar to the average. According to industrial experiences, the segregation level (including the carbon content) can hardly be decreased by heat treatment.

International Conference on Innovative Research Iasi,  $16^{th}$ - $17^{th}$  of May 2019



#### **Invited Speaker**

### Mohammad FIRDAUS ABU HASHIM, PhD

Senior Lecturer/Research Fellow Faculty of Engineering Technology/Center of Excellence Geopolymer and Green Technology (CeGeoGTech), Universiti Malaysia Perlis (UniMAP)



Dr. Mohammad Firdaus Abu Hashim is a senior lecturer in the Faculty of Engineering Technology at Universiti Malaysia Perlis (UniMAP), Malaysia where he has been an academic staff since April 2017. Dr. Mohammad Firdaus Abu Hashim completed his first degree in Materials Engineering with honors in 2012 and received his PhD degree in 2018 from University Malaysia Perlis in Materials Engineering with distinction. His current research is focusing on geopolymer as a filler in the composites/thermoset system. This new form of materials with geopolymer materials with cement characteristics proposed several economic benefit, durability, good mechanical properties, less water absorption, and fire and heat resistance, where he published a quite number of technical papers in indexed conference proceedings. Since 2013, he becomes part of the research team of Geopolymer Group under Center of Excellence Geopolymer and Green Technology (CeGeoGTech) at UniMAP which focused on geopolymer material as a filler in composites system which in piping materials. Dr. Mohammad Firdaus Abu Hashim has become one of the member of Board of Engineers Malaysia (BEM) and became graduate technologist in Materials Science Technology from Malaysia Board of Technologist (MBOT).

#### CHARACTERISTICS OF GEOPOLYMER FILLED GLASS REINFORCED EPOXY COMPOSITE USING FILAMENT WINDING TECHNIQUE

The effect of different weight percentage of geopolymer filler in glass reinforced epoxy pipe at which can achieve the best mechanical properties and adhesion between fly ash-based geopolymer matrixes. The glass fiber was impregnated with different weight percentage and different molarity of fly ash-based geopolymer and epoxy hardener resin. Composite samples were made manually by filament winding technique and cured under room temperature. The sections perpendicular to the fibers and surfaces of the composites were analyzed by means of scanning electron microscope to estimate the adhesion between geopolymer matrices and fiber reinforcement. Relatively, wide range of geopolymer weight percentage from 10 % to 40 % at which can obtain high compressive properties, maximal values of compressive strength is 94.64 MPa and compressive modulus 2373.58 MPa for the sample with 30 % weight percentage of filler loading. Adhesion of the geopolymer matrix to glass fiber was very good and hardly to determine the differences by scanning electron microscope image observation within the range of optimal geopolymer filler content. The higher percentage of geopolymer filler in glass reinforced epoxy pipe was too abundant to provide the suitable viscosity and workability before it had been totally homogenous, this factor caused that it should be carried out in the future to determine how many cavities are in the composites. Determining the optimum weight percent and microstructure of fly ash-based geopolymer filler will make it easy to find the maximum strength to get the best properties of this type of materials.

International Conference on Innovative Research Iasi,  $16^{th}$ - $17^{th}$  of May 2019



# Invited Speaker

Rodica Mariana ION, Dr.

Professor

ICECHIM, Research Group "Evaluation and Conservation of Cultural Heritage", 202 Splaiul Independentei, Bucharest, Romania;

Valahia University of Târgoviște, Doctoral School of Materials Engineering, Târgoviște, Romania rodica\_ion2000@yahoo.co.uk



**Prof. Rodica-Mariana ION, Ph.D.,** is Full Professor of Nanomaterials at Valahia University, Targoviste and Head of Cultural Heritage Research Group ICECHIM - Bucharest, Romania. Author of 275 publications (Hirsch index=24 (Google Scholar), 19 (Scopus); 20 books/chapters; 23 patents on nanoparticles applications on conservation/ restoration of mural paintings, stone surface, paintings, books, wood churches; experize in scientific analytical investigations of artifacts, photochemical ageing processes and weathering mechanism. She is involved in international projects (Method based on nanomaterials for conservation of paper and wood artifacts, Color and Space in Cultural Heritage) and national projects (Innovative techniques and materials for preservation / restoration of stucco and decorative elements of masonry in patrimony buildings, New diagnosis and treatment technologies for the preservation and revitalization of archaeological components of the national cultural heritage, Technologies based on nanomatdrials for conservations and restoration of different monuments, as Corvins'Castle, Adamclisi, Roman Mosaico, so on).

#### INVESTIGATIONS OF THE CORVINS'CASTLE TOWERS – AN ARTISTIC, ARCHITECTURAL AND TECHNOLOGICAL ACHIEVEMENT OF THE 15TH – 17TH CENTURIES

Some samples from the towers of the Corvins'Castle, Hunedoara, are analyzed in order to identify the provenance of the raw materials and weathering / deterioration processes. Modern analytical techniques, as XRD, FTIR, Raman, SEM-EDS, colorimetry, porosimetry are used to evaluate the structure and chemical composition (quartz, mica, dolomite, feldspar and plagioclase as albite and microcline minerals). Some minerals similar with apatites have been evidenced being responsible for the consolidated resistance structure inside of the towers. International Conference on Innovative Research Iasi,  $16^{th}$ - $17^{th}$  of May 2019



**EUROINVENT** 

**ICIR 2019** 

Professor Habil. Department of Metallic Materials Science and Physical Metallurgy,Faculty of Materials Science and Engineering, Politehnica University of Bucharest, ROMANIA ghibanbrandusa@yahoo.com



Brândusa Ghiban is full professor at Department of Metallic Materials Science and Physical Metallurgy, at University Politehnica from Bucharest, with the competencies in the field of plastic deformation of materials, heat treatments, physical chemistry of metallic materials, Physical Metallurgy, The theory of structural material properties, corrosion, with the ability: to assimilate knowledge and theoretical knowledge of the constitutional structure, structural transformations and properties of advanced materials for general use and special purpose, knowledge of constitutional and structural effects of technological processes by which the shape and properties of metallic and nonmetallic final product are made, knowledge of scientific bases of dependencies between structure and properties and structure influence the behaviour of metallic materials in use and under the mechanical action, chemical action of the environment, temperature and radiation, to carry out projects related to the development, characterization and performance testing of materials and interdisciplinary projects in the field materiology. Brândusa Ghiban is expert for the European Community Brussels on FP7 projects and the Commission of Steel and Coal, member at the Board of Directors of the Institute of Rare and Radioactive Metals and also evaluator of different research project at national or international level.

#### Brown band characteristics of Aluminum cladding alloys

Clad materials are a variant of the typical composites, which consist of two or more materials joined on their interface surfaces. Clad materials as metallic composite materials are developed for the needs of user because the single metal often cannot satisfy it application conditions. That is, the advantage of clad materials is that the combination of different properties of materials can satisfy both the need of good mechanical properties and the demand of users such as industrial consumer. The purpose of this study is to study structural aspect in aluminum 3003 clad material with 4004 and 4045 alloy, after different cladding time. Generally, Al 3003 material is Al–Mn alloy which has superior ductility, but the strength and hardness are low. Al series 4xxx material is Al–Si alloy which has high strength and hardness, but the ductility is low.







# **SECTION 1**

# SYNTHESIS AND CHARACTERIZATION OF MATERIALS



# Impact of Volcanic Ash on Geopolymerization of Volcanic Ash based Geopolymer Composites: A Review

### Salmabanu LUHAR<sup>1,\*</sup>, Nirmalakumar Parshwanath RAJAMANE<sup>2</sup>, Ofelia-Cornelia CORBU<sup>3,4,5</sup>, Ismail LUHAR<sup>6</sup>

<sup>1</sup>Department of Civil Engineering, Malaviya National Institute of Technology, Jaipur, Rajasthan, India

 <sup>2</sup>Center for Advanced Concrete Research at SRMU, Chennai, India
 <sup>3</sup>Technical University of Cluj-Napoca, Faculty of Civil Engineering, Dept. Central Laboratory of the Civil Engineering Faculty, Romania
 <sup>4</sup>Research Institute for Construction Equipment and Technology, Bucuresti
 <sup>5</sup>Center of Excellence Geopolymer& Green Technology (CEGeoGTech), School of Materials Engineering, Universiti Malaysia Perlis, 01000 Kangar, Perlis, Malaysia
 <sup>6</sup>Retired Geologist, Ground Water Resources Department, India

\*ersalmabanu.mnit@gmail.com

**Abstract**. Volcanic ash is a product from explosive type of volcanic eruptions. Fresh particles of volcanic ash are gritty, abrasive, vexatious and corrosive in nature with huge scale dispersion. Consequently, it is the need of the hour to dispose this waste systematically in order to have relief from dilemmas like land fillings; climatic changes, pollution of environment, waters, and health hazards although the soil is a mineral intake. This crucially reviewed manuscript includes not merely the comprehension of the incorporation of volcanic ash to develop novel green Geopolymer composites but also to study its impact on the geopolymerization reaction kinetics and reactivity at dissimilar temperatures along with a precise account of its chemistry, mineralogy and the morphology.

Keywords: volcanic, Geopolymer, geopolymerization, abrasive.



# Comparative Study of Experimental Approaches to Increase the Availability of Phytochemicals using Gamma Radiation

Alexandru PETRE<sup>1,2</sup>, Emanuel VAMANU<sup>1,\*</sup>

<sup>1</sup>University of Agronomic Science and Veterinary Medicine - Faculty of Biotechnology, 59 Marasti blvd, 1 district, 011464, Bucharest, Romania <sup>2</sup>Horia Hulubei National Institut for Physics and Nuclear Engineering, 30 Reactorului, 077125 Magurele, Ilfov, Romania

email@emanuelvamanu.ro

**Abstract**. In recent years, there has been significant interest in the reduction of health risks due to diseases caused by oxidative stress. Many plants contain compounds which mitigate such decay, and there are many studies which attempt to increase the availability of these phytochemicals using gamma radiation. This paper reviews 14 such studies, in attempt to shed light on the overarching elements of the employed experimental designs. Most studies of gamma irradiated plants evaluate the total phenolic and flavonoid content, as well as the antioxidant capacity of plant extracts, while only a few evaluated the antimicrobial activity and the vitamin or mineral content. The assays used to quantify this data were rather similar however, the dosimetry and extraction methods varied greatly, according to the plant which was being studied. Among the reviewed papers, only 3 found that the irradiation of plant material decreased or had no effect on the assayed parameters. The other 11 studies showed significant increases, at various doses, among the assayed data.

**Keywords**: Co-60, irradiated plants, antioxidant activity, total phenolic and flavonoid content, vitamin and mineral content.

#### **References:**

[1] S. Mohajer, R.M. Taha, M.M. Lay, A.K. Esmaeili, M. Khalili, Stimulatory effects of gamma irradiation on phytochemical properties, mitotic behaviour, and nutritional composition of sainfoin (Onobrychis viciifolia Scop.), ScientificWorldJournal. 2014 (2014) 854093.



# Wear-Corrosion Response of Cerium Oxide Reinforced Cobalt Hybrid Composite Layers in Biological Solution

### Nicoleta SIMIONESCU<sup>1</sup>, Lidia BENEA<sup>1,\*</sup>, Jean Pierre CELIS<sup>2</sup>

<sup>1</sup>Competences Centre: Interfaces-Tribocorrosion-Electrochemical Systems (CC-ITES), Faculty of Engineering, Dunarea de Jos University of Galati, 47 Domneasca Street, RO-800008 Galati, Romania
<sup>2</sup>Department of Metallurgy and Materials Engineering, Katholieke Universiteit Leuven, Kasteelpark Arenberg 44, B-3001 Leuven, Belgium

<sup>\*</sup>lidia.benea@ugal.ro

Abstract. The research work aims at improving biomaterials surface properties by Co/nano-CeO2 composite layers obtained by electrocodeposition method from a cobalt sulphate solution containing CeO2 dispersed nano-particles. The thicknesses of pure cobalt and Co/CeO<sub>2</sub> hybrid nanocomposite layers are measured versus applied current density and time of the plating process. The tribocorrosion properties of Co/nano-CeO<sub>2</sub> hybrid nanocomposite layers and pure Co layer obtained were comparatively investigated friction sliding tests in an unidirectional tribometer in lubricating conditions using biological solution (Hank). During the tribocorrosion test, the normal force, tangential force, coefficient of friction, number of cycles as well as the electrochemical parameter (potential), were continuously monitored. The results show that the wear - corrosion (tribocorrosion) behavior of Co/nano-CeO<sub>2</sub> hybrid nanocomposite layers are closely related with dispersed reinforcing nano-CeO<sub>2</sub> content. The hybrid nanocomposite layers with all CeO<sub>2</sub> content shows increased wear - corrosion resistance as compared with pure Co layer, by decreasing wear volume loss with increasing nano-CeO<sub>2</sub> particles dispersed into plating electrolyte.

**Keywords**: hybrid nanocomposite layer, nano-ceo<sub>2</sub> dispersed particles, tribocorrosion, wear volume loss, electrodeposition.

#### **References:**

[1] L. Benea, Electrochemical Impedance Spectroscopy and Corrosion Behavior of Co/CeO<sub>2</sub> Nanocomposite Coatings in Simulating Body Fluid Solution. Metallurgical and Materials Transactions A., (2013), 1114-1122.



### Corrosion Behavior of Ni/Wc Nano-Structured Composite Layers Synthesized by Electrochemical Method

Lidia BENEA<sup>1,\*</sup>, Nicoleta SIMIONESCU<sup>1</sup>

<sup>1</sup>Competences Centre: Interfaces -Tribocorrosion-Electrochemical Systems (CC-ITES), Faculty of Engineering, Dunarea de Jos University of Galati, 47 Domneasca Street, RO-800008 Galati, Romania

<sup>\*</sup>lidia.benea@ugal.ro

Abstract. Ni/WC nano-structured composite coatings were developed by electrodeposition method from a nickel plating electrolyte containing WC nanoparticles (diameter size of ~60 nm). The corrosion behavior of Ni/WC nano-structured composite coatings and pure Ni coating were comparatively investigated in wet conditions in the solution that simulates the primary water of Pressurized Water Reactors (PWRs). The morphology and chemical composition of the obtained coatings before was observed through scanning electron microscopy (SEM). The open circuit potential (OCP) and Electrochemical Impedance Spectroscopy (EIS) methods were used to evaluate the corrosion behavior, at room temperature. The nanohardness of pure Ni and Ni/WC nanocomposite coatings was tested by nanoindentation technique. SEM-EDX analyze proved that WC nanoparticles were successfully incorporated into Ni matrix. Presence of WC nanoparticles in the nickel matrix transforms surface morphology from regular pyramidal to irregular global and changes the crystallizations of nickel matrix to smaller and thinner crystallites. Ni/WC nanocomposite coating revealed a higher nanohardness value in comparison with pure Ni coating. The corrosion resistance of Ni/WC nanocomposite coating is higher under similar experimental conditions as compared with pure nickel layers, proving an enhancement of corrosion resistance.

**Keywords:** electrodeposition, nanostructured composite layers, tungsten carbide nanoparticles, corrosion, spectroscopy.

#### **References:**

[1] L. Benea, S-B. Basa, E. Danaila, N. Caron, O. Raquet, P. Ponthiaux, J-P. Celis; Fretting and wear behaviors of Ni/nano-WC composite coatings in dry and wet conditions. Materials and Design 65 (2015) 550–558.



# Effect of the Inflammatory Conditions and Albumin Presence on the Corrosion Behavior of Ti6Al4V Alloy in Saliva Biological Solution

Laurentiu DRĂGUS<sup>1,2</sup>, Lidia BENEA<sup>1,\*</sup>, Nicoleta SIMIONESCU<sup>1</sup>, Anca RAVOIU<sup>1,2</sup>, Veaceslav NEAGA<sup>1</sup>

<sup>1</sup>Competences Centre Interfaces-Tribocorrosion-Electrochemical Systems (CC-ITES), Dunarea de Jos University of Galati, 47 Domneasca Street, RO-800008 Galati, Romania
<sup>2</sup>Faculty of Medicine and Pharmacy, Dunarea de Jos University of Galati, 47 Domneasca Street, RO-800008 Galati, Romania

<sup>\*</sup>lidia.benea@ugal.ro

Abstract. The field of biomaterials imposes a multidisciplinary approach that requires the involvement of sciences such as biology, medicine, chemistry and materials engineering so that the material implanted in a living organism does not cause any adverse reaction. This research area of biomaterials is considered as fascinating and challenging. It's fascinating because of its potential applications and the need to improve the quality of life. It is challenging due to the various complexities it faces when biomaterials encounter biological environments for the longevity of life by maintaining or restoring tissue or organ functions. Metallic biomaterials are used as pivots for anchoring dental implants and as parts of orthodontic devices such as crowns and bridges of prostheses. Ti6Al4V is well known as a corrosion resistant alloy for dentistry applications due to this film of titanium oxide formed on its surface. However the inflammatory conditions ad protein presence could affect the corrosion resistance of this alloy. Our research work aims to investigate the effect of albumin and inflamatory conditions to corrosion resistance of Ti6Al4V in saliva Fusayama Meyer biological solution. In order to simulate the peri-implant inflammatory conditions in vitro studies were conducted with addition of hydrogen peroxide (reactive oxygen species, found during inflammation) and albumin the most typical protein of biological fluids. Electrochemical methods as Open Circuit Potential, Electrochemical Impedance Spectroscopy and Potentiodynamic Polarization were applied for corrosion investigations. The results provide evidence that titanium's alloy corrosion resistance is affected by inflammatory conditions and albumin presence in saliva biological solution.

**Keywords**: corrosion, saliva Fusayama Meyer, Ti6Al4V alloy, hydrogen peroxide, albumin, electrochemical impedance spectroscopy.



# Influence of Different Concentration of Hydrogen Peroxide on the Corrosion Behavior of Ti-6AI-4V Alloy Immersed in Physiological Solution

Anca RAVOIU<sup>1,2</sup>, Nicoleta SIMIONESCU<sup>1</sup>, Lidia BENEA<sup>1,\*</sup>

<sup>1</sup>Competences Centre Interfaces-Tribocorrosion-Electrochemical Systems (CC-ITES), Dunarea de Jos University of Galati, 47 Domneasca Street, RO-800008 Galati, Romania

<sup>2</sup>Faculty of Medicine and Pharmacy, Dunarea de Jos University of Galati, 35 Alexandru Ioan Cuza Street, 800010 Galati, Romania.

<sup>\*</sup>lidia.benea@ugal.ro

Abstract. The materials used as implants are expected to be highly non toxic and should not cause any inflammatory or allergic reactions in the human body. The success of the biomaterials is mainly dependent on the reaction of the human body to the implant. Titanium and some of its alloys are used as biomaterials for dental and orthopedic applications. The most common grades used are commercially pure titanium and the Ti-6AI-4V alloy. Increased use of titanium and its alloys as biomaterials comes from their superior biocompatibility and excellent corrosion resistance because of the thin surface oxide layer, and good mechanical properties, as a certain elastic modulus and low density that make that these metals present a mechanical behavior close to those of bones. Strong and totally biocompatible, titanium is one of the few materials that naturally match the requirements for implantation in the human body. Hydrogen peroxide appears in the human body when an inflammation occurs. The objective of this study was to evaluate the influence of different concentration of hydrogen peroxide on the corrosion behavior of Ti-6Al-4V alloy immersed in Hank physiological solution. Electrochemical methods as Open Circuit Potential and Electrochemical Impedance Spectroscopy were applied for corrosion investigations. The results provide evidence that Ti-6AI-4V corrosion resistance is affected by inflammatory conditions presence in Hank solution.

Keywords: Corrosion, Ti-6AI-4V alloy, hydrogen peroxide.



# Marine Corrosion Behavior of EH 36 Steel in the Black Sea Coast

### Laurentiu MARDARE, Lidia BENEA<sup>\*</sup>

Competences Center: Interfaces-Tribocorrosion-Electrochemical Systems, Faculty of Engineering, Dunarea de Jos University of Galati, Domnească Street, 47, RO-800008, Galati Romania

<sup>\*</sup>lidia.benea@ugal.ro

Abstract. The marine environment is a very aggressive environment for metallic materials, especially for unprotected carbon steel. The steel have a low corrosion resistance in harsh corrosive environment like seawater. However, the most equipments and marine structures are made from carbon steelsteel. The Black Sea is a brackish water with low salinity. Due to higherstrength and added excellent toughness and formability. The High Strength Low Alloy (HSLA) steel EH36 is used in shipbuilding and other marine structures. This paper presents a comparative investigation regarding the corrosion resistance of: i) uncoated EH36 naval steel, ii) coated EH36 naval steel with a two-component polymeric primer and iii) EH 36 naval steel coated with two-component polymeric primer modified by adding of TiO<sub>2</sub> nanoparticles. All the samples have been subjected to corrosion in seawater collected from the Black Sea. In situ electrochemical measurements as: open circuit potential (OCP), polarization resistance (R<sub>p</sub>), potentiodynamic polarization (PD) and cyclic voltammetry polarization (CV) were performed to monitor the corrosion process. The results show the improved corrosion resistance of polymeric coatings in marine environment compared with uncoated naval steel.

**Keywords**: Marine corrosion, Electrochemical methods, Polymeric coatings, EH36 naval steel.

#### **References:**

[1] M. P. Casaletto , V. F. A. Privitera, M. Bruno, A. Napolitano, S. Piacente, Inhibition of Cor-Ten steel corrosion by "green" extracts of Brassica campestris, Corrosion Science, 136, (2018) 91-105.

# Extraction of Pesticide Residues from Plant Extracts Using Regenerative MCM41 Mesoporous Materials

**EUROINVENT** 

**ICIR 2019** 

Mihai-Alexandru FLOREA<sup>1,2</sup>, Bogdan PURCAREANU<sup>1,4,\*</sup>, Adelina BICU<sup>1,2</sup>, Veronica DRUMEA<sup>1</sup>, Cerasela GIRD<sup>2</sup>, Mihai GRIGOROSCUTA<sup>3,4</sup>, Dan Eduard MIHAIESCU<sup>4</sup>, Laura OLARIU<sup>1,5</sup>

 <sup>1</sup>S.C. BIOTEHNOS S.A., Gorunului Street No. 3-5, 075100 Otopeni, Ilfov, Romania
 <sup>2</sup>University of Medicine and Pharmacy "Carol Davila", Bucharest, Romania
 <sup>3</sup>National Institute of Materials Physics, 405<sup>a</sup>, 077125, Magurele, Ilfov, Romania
 <sup>4</sup>Politehnica University of Bucharest, Polizu Street No. 1-7,011061, Romania
 <sup>5</sup>Academia Oamenilor de Stiinta din Romania, 54 Spl. Independentei,050094, Bucharest, Romania

<sup>\*</sup>bogdan.purcareanu@biotehnos.com

Abstract. The aim of the study was to determinate the adsorbtion degree of pesticide residues on MCM41 mesoporous material from plant extracts usually used in phytotherapeutic treatments. The choise of the material was based on the high adsorbtion capacity, due to the specific surface area, over 800 m<sup>2</sup>/g and for the possibility of their regeneration/ reused capacity. The silica matrix was synthesized starting from tetraethylorthosilicate (TEOS) - the silica source and hexadecyltrimethylammonium bromide (CTAB)- as a template agent, the whole process taking place in continuous flow at room temperature and normal pressure. The material obtained was characterized by scanning and transmission electron microscopy (SEM and TEM) for determination of pores morphology, textural analysis- B.E.T, by Fourier-transform infrared spectroscopy (FTIR) for spectral fingerprint and by dynamic light scattering (DLS) for determination of hydrodynamic diameter of particles. The tests were carried out on extracts performed with organic solvents from some medicinal species (Menthae officinalis, Salvia officinalis, Matricaria chamomilla), using mesoporous material MCM41 for isolation/concentration of pesticide residues. Quantification of pesticide residues was performed using a gas chromatograph coupled with a triple quadrupole mass spectrometer (GC-MS/MS), for both extracts and MCM41 material.

Keywords: MCM41, renewable/reused, pesticide residues, GC-MS/MS.



# Surface Properties in Surfactant Systems Containing Amino Acid-based Surfactants

### Irina Elena CHICAN, Dana VĂRĂȘTEANU<sup>\*</sup>, Irina FIERĂSCU, Radu Claudiu FIERĂSCU, Marian DEACONU

National Institute for Research and Development in Chemistry and Petrochemistry ICECHIM-Bucharest, 202 Splaiul Independentei, 060021, Bucharest, Romania

<sup>\*</sup>dvarasteanu@yahoo.com

**Abstract**. The development of green surfactants produced from renewable raw materials at the expense of petrochemical-based surfactants took into account the increasing requirements for environmental protection and the demand of the society for sustainable development. A variety of renewable raw materials such as triglycerides, carbohydrates or amino acids are used in green surfactant synthesis. The natural structure of green surfactants induces low toxicity and high biodegradability [1, 2]. In this work was investigated the behavior of surfactant systems containing amino acid-based surfactants (sodium lauroyl glycinate and sodium lauroyl sarcosinate) and amphoteric or nonionic surfactants, highlighting the differences between surfactant systems containing sodium lauroyl glycinate or sodium lauroyl sarcosinate due to nitrogen methylation of the amide nitrogen in the latter. Synergetic behavior of aqueous surfactant systems were found, leading to improved properties in terms of surface tension and foaming power.

Keywords: green surfactants, surface tension, foaming power, viscosity.

- [1] S. Rebello, A. K. Asok, S. Mundayoor, M. S. Jisha, Surfactants: toxicity, remediation and green surfactants. Environmental chemistry letters, 12 (2014) 275-287.
- [2] M.C. Moran, A. Pinazo, L. Pérez, P. Clapés, M. Angelet, M.T. García, M.P. Vinardell and M.R. Infante, Green amino acid-based surfactants, Green Chem, 6 (2004) 233-240.

# <sup>1</sup>H NMR Quantification of Cannabidiol (CBD) in Industrial Products Derived from Cannabis Sativa L. (Hemp) Seeds

Carlo SICILIANO<sup>1,\*</sup>, Fabio MAZZOTTI<sup>2</sup>, Anna NAPOLI<sup>2</sup>, Donatella AIELLO<sup>2</sup>, Pierantonio de LUCA<sup>3</sup>, Andrea TEMPERINI<sup>4</sup>

 <sup>1</sup>Dipartimento di Farmacia e Scienze della Salute e della Nutrizione, Università della Calabria, I-87036 Arcavacata di Rende (CS), Italy
 <sup>2</sup>Dipartimento di Chimica e Tecnologie Chimiche (CTC), Cubo 12/D, Università della Calabria, I-87036 Arcavacata di Rende (CS), Italy
 <sup>3</sup>Dipartimento di Ingegneria Meccanica, Energetica e Gestionale, Università della Calabria, I-87036 Arcavacata di Rende (CS), Italy
 <sup>4</sup>Dipartimento di Scienze Farmaceutiche, Università di Perugia, Via del Liceo 1, 06123 Perugia, Italy

<sup>\*</sup>carlo.siciliano@unical.it

**Abstract**. The identification and quantification of legal cannabinoids in industrial food products have become key objectives for nutritional, and pharmaceutical sciences. A rapid, inexpensive, minimal chemical preparation and clean-up steps, determination of cannabidiol (CBD), the most abundant and biologically important cannabinoid of *Cannabis sativa* L., in industrial food products remains challenging. Current methods employ GC-MS and LC-MS techniques, which require severe physico-chemical treatments before sampling, with the risk of analyte loss. A novel, highly sensitive and specific, <sup>1</sup>H NMR spectroscopy method, is here disclosed to quantify CBD in food products (oil, flour, cakes) derived from hemp seeds.

**Keywords:** cannabidiol, CBD, hemp seeds, quantitative <sup>1</sup>H NMR, industrial food products.

#### **References:**

 T. J. Raharjo, R. Veerporte, Methods for the Analysis of Cannabinoids in Biological Materials: a Review, Phytochemical Analysis, 15 (2004), 70-94.



# <sup>1</sup>H and <sup>13</sup>C NMR Investigation of Oils Extracted from Exotic Fruits

**EUROINVENT** 

**ICIR 2019** 

Carlo SICILIANO<sup>1,\*</sup>, Anna NAPOLI<sup>2</sup>, Donatella AIELLO<sup>2</sup>, Pierantonio de LUCA<sup>3</sup>, Andrea TEMPERINI<sup>4</sup>

<sup>1</sup>Dipartimento di Farmacia e Scienze della Salute e della Nutrizione, Università della Calabria, I-87036 Arcavacata di Rende (CS), Italy

<sup>2</sup>Dipartimento di Chimica e Tecnologie Chimiche (CTC), Cubo 12/D, Università della Calabria, I-87036 Arcavacata di Rende (CS), Italy

<sup>3</sup>Dipartimento di Ingegneria Meccanica, Energetica e Gestionale, Università della Calabria, I-87036 Arcavacata di Rende (CS), Italy

<sup>4</sup>Dipartimento di Scienze Farmaceutiche, Università di Perugia, Via del Liceo 1, 06123 Perugia, Italy

<sup>\*</sup>carlo.siciliano@unical.it

**Abstract.** Fruit seeds are generally thrown out as waste during industrial preparation of foods and after human consumption. Continous efforts have been dedicated to the assessment of nutritional characteristics of many fruit seeds. Today, the use as foods of commercially available exotic fruits is widespread in many countries, but their contents in terms of nutrients are not fully understood, and they remain object of investigation. We propose a practical, inexpensive, qualitative and quantitative approach for the determination of the fatty acid chain profile in the total lipid contents of oils obtained from a series of exotic fruit seeds. The analytical method is based on the application of high-resolution <sup>1</sup>H and <sup>13</sup>C NMR spectroscopy techniques.

**Keywords**: exotic fruits, seed oils, quantitative 1H NMR, PUFA, MUFA, SFA, human nutrition.

#### **References:**

[1] C. Siciliano, E. Belsito, R. De Marco, M.L. Di Gioia, A. Leggio, A. Liguori, Quantitative determination of fatty acid chain composition in pork meat products by high resolution <sup>1</sup>H NMR spectroscopy, Food Chemistry, 136 (2013), 546-554.



# Stabilization of a Sliding Slope by Using Mixed Wooden-Concrete Piles

Ioana TATARU<sup>\*</sup>, Nicoleta Maria ILIEŞ, Ildiko BUCUR

Technical University of Cluj-Napoca, Faculty of Civil Engineering, 15 C-tin Daicoviciu str, 400020, Cluj-Napoca, Romania

<sup>\*</sup>pantea\_ioana2004@yahoo.com

**Abstract**. This paper aims to present an ecological solution for stabilizing a sliding slope located near a saltwater lake, by using mixed wooden-concrete piles. Aspects about major disadvantage of wood degradation due to watering and drying were discussed since 1920. Today, due to a massive deforestation in Romania, ecological organizations are trying to limit the wood exploitation as global warming effects are becoming more and more obvious year after year. Therefore, by using mixed wooden-concrete piles, the life expectancy of a wooden structure is extended with about 80 years. This combination of wood and concrete could save natural and non-renewable materials comsumption by extending the life of existing ones or, simply, by designing sustainable piles. The present research study includes a series of calculations and computer tests in order to determine the exactly dimension of the piles and their effect on slope stability.

**Keywords**: slope stability, saltwater, wooden-concrete piles, sustainable structure.



# Influence of Slag Powder in the Cement Mortar Mixes on the Characteristics of Compactness, and Freeze-Thaw Strength

Liliana Maria NICULA<sup>1</sup>, Ofelia CORBU<sup>1,2,3,\*</sup>, Mihai ILIESCU<sup>1</sup>

 <sup>1</sup> Faculty of Civil Engineering, Technical University of Cluj-Napoca, 28, Memorandumului Street, 400114 Cluj-Napoca, Romania
 <sup>2</sup> Research Institute for Construction Equipment and Technology, ICECON S.A. Bucharest, 266, Pantelimon Road
 <sup>3</sup> Center of Excellence Geopolymer & Green Technology (CEGeoGTech), School of Materials Engineering, University Malaysia Perlis, 01000 Kangar, Perlis, Malaysia

<sup>\*</sup>corbu.ofelia@staff.utcluj.ro

**Abstract**. Worldwide, there is a clear imperativeness to reduce the consumption of non-renewable raw materials. We envisaged the use of slag products as a material cementitious characteristics or as artificial aggregates, so that materials embedded in construction produce as little environmental impact as possible. After cooling, the blast furnace slag product was used in the new mortar mixes in two forms: in the form of a powder product milled from the granulated slag, and in the form of an aggregate made of non-granulated slag, sorted to the sized of 0/4 mm. Ground-granulated slag in the form of a powder below 63µm was used as an addition to the cement mass, and the newly obtained artificial aggregate, sorted to 0/4 mm, was used in various percentages for replacing the natural aggregates in the control mix.

**Keywords**: cement mortar mixes, freeze-thaw strength, compactness, porosity, freez-thaw cycles.

#### **References:**

[1] B. Kolani, L. Buffo - Lacarrière, A. Sellier, G. Escadeillas, L. Boutillon, L. Linger, Hydration of slag-blended cements, Cement & Concrete Composites 34 (2012) 1009–1018.



# Using Shape Memory Effect to Obtain a New Polymer for the Manufacture of Complete Dentures

### Maria BOLAT, Arina CIOCAN-PENDEFUNDA, Zenaida SURLARI<sup>\*</sup>, Cosmin BIDA, Carina BALCOS, Raluca BACIU, Dana-Gabriela BOSINCEANU

Grigore T. Popa University of Medicine and Pharmacy of Iasi, Faculty of Dental Medicine, 16 Universitatii Str., 700115, Iasi, Romania

<sup>\*</sup>zinamaseluta@yahoo.com

Abstract. Currently, polymeric materials represent a very important place in all areas of human activity, taking part more and more in life, day by day. Of these, synthetic polymeric biomaterials - simple or composite - constitute a very trendy topic and with a great dynamic, given to the diversity of their use in medical and pharmaceutical fields. Aim: In this respect the study aims improving the quality of acrylates used for removable dentures, by incorporating vitamin B12 into the structure of acrylic polymer for the treatment of the oral aphtae, as well as for prophylactic purpose. Matherial and methods: The polymerization method used in this study is the template polymerization in which we used the monomer and polymer of acrylate Superacryl Plus by Spofa Dental and as a template molecule we used cyancobalamin. To highlight the amount of vitamin B12 retained during synthesis, the samples were subject to extraction by SOXHLET method. Results: It was noticed that the polymers obtained in the presence of vitamin B12 have a selective memory, retaining preferentially produces with similar structure.

Keywords: removable dentures, total edentulous, acrylates, B12.

#### **References:**

 G Dhir, D.W. Berzins, V.B. Dhuru, Physical properties of denture base resins potentially resistant to Candida adhesion, J. Mater. Sci. Mater. Med., 19 (2008), 959-964.



# Research on the Application of Ultrasound to Enhancing the Quality of Multilayer Polyethylene Films by Inserting Filiform Materials

Gabriela-Victoria MNERIE<sup>\*</sup>, Dumitru MNERIE

National R&D Institute for Welding and Materials Testing - ISIM Timisoara, 30 Mihai Viteazu Blv, 300222, Timişoara, Romania

<sup>\*</sup>gmnerie@isim.ro

**Abstract**. In the framework of ISIM Timisoara, preliminary research was carried out for the ultrasonic joining of two dissimilar materials. The research made in CEX-US lab was motivated by the farmers' need to improve the quality of transparent polyethylene films used in the production of greenhouses and agricultural solaria. Successful attempts have been made to enrich the quality of multilayer films by inserting of some metallic and non-metallic wires. The experiments were performed on specialized ultrasonic equipment using sonotrode of various metallic materials and with different geometries, with working regimes adapted to the inserted materials. The paper contains some experimental results for the determination of the new behavioral characteristics in the agricultural exploitation operations. There are also some recommendations on the applicability of these new improved materials.

**Keywords**: joining of dissimilar materials, ultrasonic field, agriculture, polyethylene sheets, quality.

#### **References:**

 A. Gomer, W. Zou, N. Grigat, J. Sackmann, W. K. Schomburg, Fabrication of Fiber Reinforced Plastics by Ultrasonic Welding, Journal of Composite Science, (2018).



# Synthesis and Characterization of Nickel Ferrite Nanoparticles and Polymeric Composite EMIS Application

**EUROINVENT** 

**ICIR 2019** 

### Ioana ION<sup>\*</sup>, Alina CARAMITU, Virgil MARINESCU, Delia PATROI, Eugen MANTEA, Aristofan TEISANU, Jana PINTEA, Cristian MORARI, Cristina BANCIU, Magdalena LUNGU

INCDIE ICPE-CA Bucharest, Romania, Splaiul Unirii 313, sector 3, Bucharest

ionioana@icpe-ca.ro

Abstract. Nickel ferrite nanoparticles (NPs) with particles smaller than 50nm was synthetized by co-precipitation method using a solution of Fe<sup>3+</sup> salt with 3M concentration on which was added salt of Ni<sup>2+</sup> to obtain a solution with molar report of Fe  $^{3+}$ /Ni  $^{2+}$ =2/1. A KOH solution was added under magnetic stirring on the salt solution. The synthetized NPs were characterized by thermal analysis (TG, DTG and DSC) and from results was chosen the temperature of heat treatment of 500°C. The formation of the nickel spinel ferrite system was confirmed by X-ray diffraction method. The morphological characterization was done by SEM technique which confirms the nanometric size in the range of 14 to 23 nm. Magnetic properties were investigated using a Vibrating Sample Magnetometer (VSM) instrument. The magnetic powder presents the following characteristics: MR=3.21emu/g, Ms= 15.09 emu /g, HC=229.7 Oe. The synthetized NPs were further used as functional filler in polymeric composite with the aim to obtain materials for Electromagnetic Interference Shielding (EMIS) application. In order to increase the attenuation, the silver was added.

Keywords: nickel ferrite nanoparticle, electromagnetic interference.

**Acknowledgenents**: The work was performed under contracts no. 35N/2018 and 30PFE/2018 between National R&D Institute for Electrical Engineering ICPE-CA and Romanian Ministry of Research and Innovation (MCI). Also, the authors acknowledge the financial support of MCI through the contract no. 19 31 0101/2019.



# Spectroscopic Investigation of Transparent Polylactic Acid

### Robert-Alexandru DOBRE<sup>\*</sup>, Alina-Elena MARCU, Mihai STANCIU, Marian VLĂDESCU

Politehnica University of Bucharest, Iuliu Maniu Bvd. 1-3, 061071, Bucharest, Romania

rdobre@elcom.pub.ro

**Abstract**. In the recent years, the 3D printing technology [1] became more affordable, being used in various fields like medicine, design, architecture, manufacturing and electronics. Using 3D printed materials has many advantages: speed, cost, design freedom, customization and sustainability. An application in which 3D printing can be used is Visible Light Communication (VLC) [2], where the polylactic acid (PLA) material can be used as cover for the transmitter (which is typically a LED), or the receiver, in order to protect the system from various external factors. The paper investigates how transparent PLA material with various thicknesses attenuates and influences the spectral composition of the light passing through it. The transmission spectrum is measured using a spectrometer, and the attenuation using a lux meter. Based on the results, it can be determined if PLA can be used in a certain optical application, depending on the spectral composition of the involved light.

**Keywords**: 3D printing, polylactic acid, transmission spectrum, visible light communication.

- [1] T. D. Ngo, A. Kashani, G. Imbalzano, K. T. Q. Nguyen, D. Hui, Additive manufacturing (3D printing): A review of materials, methods, applications and challenges, Composites Part B: Engineering, 143 (2018) 172-196.
- [2] H. P. Pathak, X. Feng, P. Hu, P. Mohapatra, Visible Light Communication, Networking and Sensing: A Survey, IEEE Communications Surveys & Tutorials, 17 (2015) 2047-2077.

# Thermal and Electrical Investigation of Graphene-Enhanced Conductive Polylactic Acid based Filaments for 3D-Printing

**EUROINVENT** 

**ICIR 2019** 

### Andrei DRUMEA, Robert Alexandru DOBRE, Cristina Ioana MARGHESCU<sup>\*</sup>

"Politehnica" University Bucharest, Romania

<sup>\*</sup>cristina.marghescu@cetti.ro

Abstract. 3d printing technologies have greatly evolved in the last decade, allowing the construction of complex structures with good mechanical properties and reduced costs. These aspects are interesting in some areas of electronics technology, like realization of electrical interconnections and The 3d printed structures realized with polylactic acid based sensors. filaments are cheaper to manufacture than standard copper-based technology for inteconnects [1] but resistivity [2] is too high. Presented paper analyzes graphene-enhanced polylactic acid (PLA) based conductive filament samples that offer lower resistivity. The variation of the DC resistance with temperature and impedance dependance on frequency are analyzed. The results in this paper can be used to develop new cost effective and easy to manufacture applications like printed temperature sensors, conductive traces, flexible thermal protection circuits, or new cases for electronic modules that could also act as a temperature fuse besides the default role of preventing ESD damaging.

Keywords: 3D printing, conductive filament, DC resistance.

- K. Prashantha, F. Roger, Multifunctional properties of 3D printed poly(lactic acid)/graphene nanocomposites by fused deposition modeling, Journal of Macromolecular Science, Part A (2016), 24-29.
- [2] R. A. Dobre, A. E. Marcu, A. Drumea, M. Vladescu, "Thermal and Electrical Investigation of Conductive Polylactic Acid Based Filaments", EUROINVENT International Conference on Innovative Research (ICIR), May 17-18, 2018, Iasi, Romania.



# Microstructure and Properties of High Entropy Alloy Coating

### Raluca-Maria FLOREA

"Gheorghe Asachi" Technical University of Iasi-Romania, Department of Materials Science, Blvd. Mangeron, No. 61A, 700050, Iasi, Romania

raluca.m.florea@gmail.com

**Abstract**. As a novel metallic alloy system, high-entropy alloys (HEAs) have received considerable attention in the past decade. The name HEA indicates that the mixing of the principal elements in the alloy leads to a substantial change in entropy. This change in entropy promotes the formation of a simple solid solution instead of complex compounds. Due to their recorded high symmetry crystal structures, resistances to degradation in corrosive/oxidizing environment, high temperature phase stabilities and favorable mechanical properties, multi-component high-entropy alloys (HEAs) are being classified as potential alternatives for high temperature structural materials. The paper is structured in five chapters: obtaining technologies, microstructures, properties of HEA coatings and conclusions.

Keywords: entropy, HEA coating, electrodeposition.

- T.M. Butler, M.L. Weaver, Oxidation behavior of arc melted AlCoCrFeNi multi-component high-entropy alloys, Journal of Alloys and Compounds, 674 (2016) 229-244.
- [2] W. Li, P. Liu, P.K. Liaw, Microstructures and properties of high-entropy alloy films and coatings: a review, Materials Research Letters, 6:4 (2018) 199-229.


EUROINVENT ICIR 2019

### Nondestructive Testing Methods for Assessment of Biomaterials based on Titanium Alloys

Rozina STEIGMANN<sup>1</sup>, Gabriel Silviu DOBRESCU<sup>1</sup>, Madalina Simona BALTATU<sup>2</sup>, Adriana SAVIN<sup>1,\*</sup>, Zdenek PREVOROVSKY<sup>3</sup>, Petrica VIZUREANU<sup>2</sup>

<sup>1</sup> National Institute of R&D for Technical Physics, NDT Department, Iasi, Romania <sup>2</sup> "Gheorghe Asachi" Technical University of Iasi, Faculty of Sciences and Materials Engineering, Iasi, Romania <sup>3</sup>Institute of Thermomechanics, NDT Laboratory, Prague, Czech Republic

\*asavin@phys-iasi.ro

**Abstract**. Taking into account their specific strength, corrosion resistance and high biocompatibility, Ti-Mo-Si alloys are more used nowadays for medical prostheses manufacturing [1]. The experimental determination of elastic matrix, mechanical wear and the probability of appearance and propagation of thin cracks are required towards complete characterization. Thus, resonant ultrasound spectroscopy (RUS), acoustic emission (AE) [2] are used as non-destructive methods. SEM, EDX are involved, to choose the best concentration of elements with aim of improvement of mechanical properties. RUS has been employed to detect the presence of discontinuities at surface/inside the sample. Using AE at higher compressive loading means obtaining a warning before the catastrophic failure of a component. The frequency information and other parameters from AE data are useful for identification of failure mechanism

Keywords: biomaterials, Titanium alloys, nondestructive testing methods.

#### **References:**

 A.A. John, S.K.Jaganathan, E. Supriyanto, A. Manikandan, Surface modification of titanium and its alloys for the enhancement of osseointegration in orthopaedics Current Science 111(6) (2016) 1003.



### Ultrasound Methods for Determining the Influence of Yttrium in Mg-0.5Ca-xY

Adriana SAVIN<sup>1,\*</sup>, Nicoleta IFTIMIE<sup>1</sup>, Rozina STEIGMANN<sup>1</sup>, Gabriel Silviu DOBRESCU<sup>1</sup>, Corneliu MUNTEANU<sup>2</sup>, Bogdan ISTRATE<sup>2</sup>

<sup>1</sup>National Institute of R&D for Technical Physics, NDT Department, Iasi, Romania <sup>2</sup>Gheorghe Asachi Technical University, Faculty of Mechanical Engineering, Iasi, Romania

\*asavin@phys-iasi.ro

**Abstract**. Biodegradable materials are used as alternative implants for orthopedic applications due suitable strength, fatigue resistance, ductility and biocorrosion resistance which are features for biodegradable implants. Mechanical properties can be improved by adding alloying elements. The decrease of the corrosion rate of Mg can be induced by modifying the structure and phase distribution. Usually Ca is added to control corrosion rate of Mg alloys and thining grain boundaries [1]. Rare earths are often used as addition elements to improve alloys properties as biocompatibility and creep resistance. The interest in this study is to analyse the influence of Yttrium over elastic properties of these alloys in order to choose the best values appropriate with human bones, using Resonant Ultrasount Spectroscopy [4] and ultrasound method.

Keywords: biodegradable materials, noninvasive evaluation, bone repair.

#### **References:**

[1] Li Z, Gu X, Lou S, Zheng Y. The development of binary Mg–Ca alloys for use as biodegradable materials within bone. Biomaterials. 2008 Apr 1;29(10):1329-44.



### The Effect of the Precious Metal Addition in Chemical Composition of the Non Precious Dental Alloys on their Microstructure Characteristics

### Claudia MILEA<sup>\*</sup>, Aurora ANTONIAC, Daniela GHEORGHITA, Elena GROSU, Iulian ANTONIAC

University Politehnica of Bucharest, 313 Splaiul Independentei, 060029, Romania

<sup>\*</sup>milea.claudia.12@yahoo.com

**Abstract**. Compared to conventional Co-Cr and Ni-Cr alloys the ones doped with precious metals (Au, Pt, Ru) appeared with the idea to improve the corrosion resistance. The purpose of this study was to clarify the effect of the precious metals additions on the microstructure of such alloys. The microstructure and the inclusionary state of the investigated alloys were observed with an optical microscope while the morphological details at higher magnification and the chemical composition of some compounds were investigated with an SEM equipped with EDS.

Co-Cr alloys dopped with precious metals showed a very complexe microstructure compared to the classical nonprecious studied alloys.

Keywords: alloys, precious metals, surface analysis, metallography.

#### References:

- L. Reclaru, H. Luthy, P.Y. Eschler, A. Blatter, C. Susz, Corrosion behaviour of cobalt–chromium dental alloys doped with precious metals, Biomaterials, 26 (2005) 4358–4365.
- [2] J.H. Potgieter, E.Van Der Lingen, Noble Metal Additions to Passive Alloys: Effect on Corrosion Resistance, Reference Module in Materials Science and Materials Engineering, 2016, doi:10.1016/b978-0-12-803581-8.01649-0.

**Acknowledgements:** This work was supported by a grant of the Romanian Ministery of Research and Innovation, CCCDI-UEFISCDI, Project number PN-III-P1-1.2-PCCDI-2017-0239 / 60PCCDI/2018, within PNCDI III.



### Performing and Characterization of Biodegradable Magnesium Alloys Type Mg-Zn-Zr-Ag Coated with Hydroxyapatite

### Elena GROSU<sup>1,\*</sup>, Claudia MILEA<sup>1</sup>, Aurora ANTONIAC<sup>1</sup>, Pham Hong QUAN<sup>1</sup>, Alina VLADESCU<sup>2</sup>, Eugeniu VASILE<sup>1</sup>, Iulian ANTONIAC<sup>1</sup>

<sup>1</sup>University Politehnica of Bucharest, 313 Splaiul Independentei, 060042, Bucharest <sup>2</sup>National Institute for Optoelectronics–INOE 2000, 409 Atomistilor St, RO77125, Magurele, Romania

<sup>\*</sup>elena\_grosu@yahoo.com

**Abstract**. In recent years, the study of the biodegradability and biocompatibility of magnesium alloys has led to encouraging results on possible applications in orthopedic surgery [1, 2]. The purpose of this study was to control and evaluate the rate of biodegradation by coating of experimental biodegradable magnesium alloy Mg-Zn-Zr-Ag (ZQ 63 and ZQ71) with hydroxyapatite through magnetron sputtering method. Hydroxyapatite exhibit ability to make fast links with strong tissues. Methods for characterization of magnesium alloy coated with hydroxyapatite were: X-ray diffraction, electronic scanning microscopy, X-ray dispersion energy spectroscopy and Fourier Transform Infrared Spectroscopy to obtain relevant data on morphology, composition and structure coatings.

Keywords: magnesium alloys, orthopedic implants, microscopy.

#### **References:**

- [1] I.V. Antoniac, M. Marian, M. Dinu, Metallurgical Characterization of Some Magnesium Alloys for Medical Applications, Advanced Materials and Structures IV, 188 (2012) 109-113.
- [2] J.V. Rau, I. Antoniac, M. Fosca, A. De Bonis, A.I. Blajan, C. Cotrut, V. Graziani, M. Curcio, A. Cricenti, M. Niculescu, Glass-ceramic coated Mg-Ca alloys for biomedical implant applications, Materials Science&Engineering C-Materials for Biological Applications, 64 (2016) 362-369.

**Acknowledgments:** "This work was supported by a grant of the Romanian Ministery of Research and Innovation, CCCDI-UEFISCDI, Project number PN-III-P1-1.2-PCCDI-2017-0239/60PCCDI/2018, within PNCDI III".



### Proces of Magnetising Bulk Amorphous alloys Fe<sub>43+x</sub>Co<sub>29-x</sub>Y<sub>8</sub>B<sub>20</sub> (x= 0 lub 5)

**EUROINVENT** 

**ICIR 2019** 

Marcin NABIALEK<sup>1</sup>, Bartłomiej JEZ<sup>1,\*</sup>, Kinga JEZ<sup>1</sup>, Pawel PIETRUSIEWICZ<sup>1</sup>, Katarzyna BLOCH<sup>1</sup>, Joanna GONDRO<sup>1</sup>, Andrei Victor SANDU<sup>3</sup>, Mohd Mustafa Al Bakri ABDULLAH<sup>3</sup>

<sup>1</sup>Institute of Physics, Faculty of Production Engineering and Materials Technology, Czestochowa University of Technology, 19 Armii Krajowej Str., 42-200 Czestochowa, Poland
<sup>2</sup>Gheorghe Asachi Technical University of Iasi, Faculty of Materials Science and Engineering, 41 D. Mangeron Blvd., 70050, Iasi, Romania
<sup>3</sup>Geopolymer & Green Technology (CeGeoGTech), School of Material Engineering, Universiti Malaysia Perlis (UniMAP), 01000 Kangar, Perlis Malaysia

\*bartek199.91@o2.pl

**Abstract**. The paper presents the results of investigations of the structure and magnetic properties of  $Fe_{43+x}Co_{29-x}Y_8B_{20}$  bulk amorphous alloys (x = 0 or 5). Alloy samples were made using injection a liquid alloy into a copper mold. The produced materials were characterized by soft magnetic properties, i.e. a high saturation of magnetisation value (about 1.15T) and a relatively low coercive field value (below 100 A/m). Increasing the cobalt content in alloys affected the high Curie temperature (around 700K). On the basis of H. Kronmüler's theory, an analysis of the magnetisation process in area so-called the approach to ferromagnetic saturation was carried out. The analysis showed that the impact on the process of magnetising the produced materials have linear defects in the form of pseudodislocation dipoles.

**Keywords**: bulk metallic glasses, soft magnetic materials, ferromagnetic saturation, injection casting.



### Phases and Compounds Composition Analyze of ZnMgCa Biodegradable Alloy

Simona POPESCU (DOBRIȚA)<sup>1</sup>, Sergiu STANCIU<sup>1</sup>, Ramona CIMPOEȘU<sup>1,\*</sup>, Bogdan ISTRATE<sup>1</sup>, Georgeta ZEGAN<sup>2</sup>, Iulian IONIȚĂ<sup>1</sup>, Bogdan Anton PRISECARIU<sup>2</sup>

<sup>1</sup>Technical University "Gheorghe Asachi" from Iasi, Blv. Mangeron no. 41, 700050, Iasi, Romania

<sup>2</sup>"Grigore T. Popa" University of Medicine and Pharmacy,Department of Surgery, Faculty of Dental Medicine Universitatii Street, number.16, 700115 Iasi, Romania

<sup>\*</sup>ramona.cimpoesu@tuiasi.ro

**Abstract**. Besides biocompatible materials, a new class of metallic materials with medical applications dedicated to specific traumas is that of biodegradable materials. Zinc-based materials are mentioned as the 'Calcium of the XXI century'. Zn has been considered as one of the newest promising biodegradable metallic metals together with Mg-based and Febased alloys. A new experimental composition of ZnMgCa alloy was obtained using an induction furnace from high purity zinc, magnesium and calcium materials. The material chemical compounds and phases were determined using EDS Bruker detector and XRD X'Pert equipment in molded state of the alloy. Microstructure of the alloy was determined using scanning electron microscopy and the distribution of constituents using VegaTescan software.

Keywords: biodegradable, zinc, chemical compounds, SEM, EDS, XRD.

- [1] Yingchao Su, Irsalan Cockerill, Yadong Wang, Yi-Xian Qin, Lingqian Chang, Yufeng Zheng, Donghui Zhu, Zinc-Based Biomaterials for Regeneration and Therapy, Trends in Biotechnology, 37, 4, (2019) 428-441.
- [2] J. Venezuela, M.S. Dargusch, The influence of alloying and fabrication techniques on the mechanical properties, biodegradability and biocompatibility of zinc: A comprehensive review, Acta Biomaterialia, 87 (2019) 1–40.



# Simulation of Solidification Parameters of Cast-Iron and Aluminum based Alloy

Dumitru MIHAI, Nicanor CIMPOEŞU<sup>\*</sup>, Vasile MANOLE

Technical University "Gh. Asachi", Blv. Mangeron, Iaşi, Romania

<sup>\*</sup>nicanor.cimpoesu@tuiasi.ro

**Abstract**. Numerical solutions allow researchers to observe and quantify what is not usually visible or measurable during real casting processes.

The results are very close to those obtained experimentally fact that creates a big advantage in simulation process usage. Parameters like filling time and filling sequence, cooling rate and solidification time were evaluated for both metallic materials. Different dimensions and geometries of applicative elements influence considerably the casting behavior of a material even if the process is realized in the same conditions.

Keywords: simulation, solidification, cast-iron, filling time, filling sequence.

- [1] M.A. Azeem, M.K. Bjerre, R.C. Atwood, N. Tiedje, P.D. Lee, Synchrotron quantification of graphite nodule evolution during the solidification of cast iron, Acta Materialia 155 (2018) 393-401.
- [2] D. Mihai, N. Cimpoeşu, Iron based alloys behavior by molding simulation point of view, Metalurgia International, 15 (11), (2010), 30-34.



### Preliminary Results on Microstructure Profile of Copper-based Shape Memory Alloy

Cristian TUDORA<sup>1,3</sup>, Mărioara ABRUDEANU<sup>1,4</sup>, Sergiu STANCIU<sup>2</sup>, Daniel ANGHEL<sup>1</sup>, Gabriela PLAIAŞU<sup>1</sup>, Vasile RIZEA<sup>1</sup>, Ioan ȘTIRBU<sup>2</sup>, Ramona CIMPOEŞU<sup>2,\*</sup>, Margareta COTEAȚĂ<sup>2</sup>

<sup>1</sup>University Pitesti, Pitesti, Arges, Romania
 <sup>2</sup>Technical University Gheorghe Asachi of Iasi, Iasi, Romania
 <sup>3</sup> Institute for Nuclear Research Pitesti, Mioveni, Arges, Romania
 <sup>4</sup>Technical Science Academy of Romania, Bucuresti, Romania

<sup>\*</sup>ramona.cimpoesu@tuiasi.ro

**Abstract:** Shape memory alloys represent a perfect solution for noiseleslly activation with possibility of natural activation without extra energy consume. Copper-based shape memory alloy represent a cheap solution of classical Nitinol. In this article results about an experimental alloy microstructure are presented. Scanning electron microscopy (SEM VegaTC demo), optical microscopy (OM) and atomic force microscopy (AFM Nanosurf EasyScan II) were used to analyze the profile of a shape memory alloy based on copper after the annealing heat treatment. Dimensions and profile of martensitic plates, obtained as a result of annealing heat treatment, were evaluated and analyzed.

Keywords: shape memory alloy, Cu-based, SEM, OM, AFM.

#### **References:**

[1] Stošić Z, Manasijević D, Balanović L, Holjevac-Grgurić T, Stamenković U, Premović M, Minić D, Gorgievski M, Todorović R., Effects of Composition and Thermal Treatment of CuAl-Zn Alloys with Low Content of Al on their Shape-memory Properties, Mat. Res, 20, (2017), 1425-1431.

**Acknowledgement:** This article was made with support of project —Thermal shock and fatigue on shape memory alloy from CuZnAI and CuAlNi systems – HTSMAsII FP7-INFRA-312643, SFERA user research.



**EUROINVENT** 

**ICIR 2019** 

Ștefan TUDORAN<sup>1,\*</sup>, Ionelia VOICULESCU<sup>2</sup>, Victor GEANTĂ<sup>2</sup>, Madalina Simona BALTATU<sup>3</sup>, Iulia MÂRZA<sup>4</sup>, Ion PĂTRAȘCU<sup>1</sup>, Bogdan Mihai GĂLBINAȘU<sup>1</sup>, Robert CIOCOIU<sup>2</sup>

 <sup>1</sup>Carol Davila University of Medicine and Pharmacy, 8 Eroii Sanitari Blvd. Bucharest
 <sup>2</sup>University Politehnica of Bucharest, 313, Splaiul Independentei, 060042, Romania
 <sup>3</sup>Gheorghe Asachi Technical University of Iasi, 67 Dimitrie Mangeron Blvd., 700050
 <sup>4</sup>University of Las Palmas de Gran Canaria, Calle Juan de Quesada, 30, 35001 Las Palmas de Gran Canaria, Las Palmas, Spain

<sup>\*</sup>tudoranstefan@gmail.com

**Abstract**. Among the biomedical alloys, titanium based alloys are currently the best solution for implantation as a result of low levels of toxicity. To improve mechanical properties, a series of chemical compositions of some titanium alloys have been studied over the past 15 years, to provide the elasticity values as close as possible to bone. The paper presents the main mechanical and microstructural characteristics of Ti-Nb-Ta-Zr alloys compared to other titanium brands. It was found that in the absence of thermal treatments, the highest hardness values (437HV1) were obtained for the Ti15Nb10Ta10Zr alloy, and the lowest hardness (259 HV1) was obtained for the Ti98.4 alloy.

Keywords: titanium, chemical composition, microstructure, microhardness.

- [1] S. Li, Y. Hao, R. Yang, Y. Cui, M. Niinomi, Effect of Nb on Microstructural Characteristics of Ti-Nb-Ta-Zr Alloy for Biomedical Applications, Mat. Trans, 43, 12 (2002) p.2964-2969.
- [2] J. Zhang, C. C. Tasan, M. J. Lai, A. -C. Dippel & D. Raabe, Complexionmediated martensitic phase transformation in Titanium, Nature Communications, doi: 10.1038/ncomms14210 (2017) p. 1-8.

### Obtainment and Characterisation of High Entropy Alloys Used for Medical Applications

**EUROINVENT** 

**ICIR 2019** 

Victor GEANTĂ<sup>1,\*</sup>, Ionelia VOICULESCU<sup>1</sup>, Radu ȘTEFĂNOIU<sup>1</sup>, Mirela CODESCU<sup>2</sup>, Hajnal KELEMEN<sup>3</sup>, Geta PAVEL<sup>4</sup>, Alina VLĂDESCU<sup>5</sup>, Andrei Victor SANDU<sup>6</sup>

 <sup>1</sup>Politehnica University of Bucharest, 313 Splaiul Independenței 060042, Bucharest, Romania
 <sup>2</sup>National Institute for R&D in Electrial Engineering ICPE-CA, 313 Splaiul Unirii, District 3, Bucharest, 030138, Romania
 <sup>3</sup>University of Medicine, Pharmacy, Science and Technology of Targu Mures, Gheorghe Marinescu 38, Tirgu Mures, Mures, 540139, Romania
 <sup>4</sup>The University of Agricultural Sciences and Veterinary Medicine, Iaşi, 3, Mihail Sadoveanu Alley, Iaşi, 700490, Romania
 <sup>5</sup>National Institute for Research and Development in Optoelectronics INOE 2000, 409 Atomiștilor street, Măgurele, 077125, Ilfov
 <sup>6</sup>Gheorghe Asachi Technical University of Iasi, 67 Dimitrie Mangeron Blvd., 700050, Iasi, Romania

<sup>\*</sup>victorgeanta@yahoo.com

**Abstract**. The experimental CrFeMoNbTaTiZr alloys were designed based on the extremely low bio-toxicity of the chemical elements. They are currently used as a basis for alloying of classical alloys used in medical device manufacturing. From this alloying system, were obtained in a Vacuum Arc Remelting (VAR) equipment six alloys: CrFeMoNbTaTi, CrFeMoNbTaZr, CrFeMoTaTiZr, CrFeTaNbTiZr, CrTaNbTiZrMo and FeTaNbTiZrMo. The microstructural analysis of the obtained alloys have been performed by optical and SEM microscopy. The microhardness tests show results in the range of 575 – 1337 HV<sub>0.2/10</sub>. In order to improve the mechanical properties heat treatment procedures have been applied.

**Keywords**: high entropy alloys, obtaining, vacuum arc remelting, medical applications, microstructure, microhardness.

#### **References:**

[1] V. Geantă, I. Voiculescu, Tratat de obținere a materialelor metalice biocompatibile, Editura Printech, București, 2018.



### **New Refractory High Entropy Alloys**

Ionelia VOICULESCU<sup>1,\*</sup>, Victor GEANTĂ<sup>1</sup>, Radu ȘTEFĂNOIU<sup>1</sup>, Adrian ROTARIU<sup>2</sup>, Elena SCUTELNICU<sup>3</sup>, Mircea Cristian PANTILIMON<sup>1</sup>, Dumitru MITRICĂ<sup>4</sup>, Valentin CRĂCIUN<sup>5</sup>

<sup>1</sup>University Politehnica of Bucharest, 313, Splaiul Independentei, 060042, Bucharest, Romania

<sup>2</sup>Technical Military Academy, 39-49 G. Coşbuc Blvd., 050141, Bucharest, Romania <sup>3</sup>University "Dunărea de Jos" from Galați, Manufacturing Engineering Department, 47 Domnească street, Galați, Romania

<sup>4</sup>National R&D Institute for Nonferrous and Rare Metals – IMNR, Advanced and Nanostructured Materials Laboratory, 102 Biruintei Blvd., Pantelimon, Ilfov, Romania <sup>5</sup>National Institute for Laser, Plasma and Radiation Physics, Măgurele, Romania

<sup>\*</sup>ioneliav@yahoo.co.uk

**Abstract**. In the paper are studied the microstructure and mechanical properties of a new types of refractory high entropy alloys, that can be used for thermal engine components as well as for military incendiary bullet. The main characteristics required for such applications are high compression resistance, microstructural stability during thermal stress, hardness and corrosion resistance. To obtain such specific characteristics, the raw materials must be melted in inert protective atmosphere, and then heat treated for homogeneization of the microstructure and chemical composition. In the study have been studied three types of high entropy alloys, HfMoNiTaW, 2HfMoNiTaW and MoTaNiW obtained in VAR installation. The heat treatment, performed at 800°C with a holding time of 4 hours, allow obtaining a good homogeneization of chemical composition but generating also a decreasing of microhardness, from maximum value of 637 HV0.2 to minum value of 527HV0.2.

Keywords: refractory, high entropy alloys, heat treatment, microstructure.

#### **References:**

 J.P.Couzinié, O.N.Senkov, D.B.Miracle, G.Dirras, Comprehensive data compilation on the mechanical properties of refractory high-entropy alloys, Data in Brief 21, (2018) 1622–164.



### The Active Screen Influence of Edge Effect in Plasma Nitriding

### Manuela-Cristina PERJU, Mihai AXINTE, Carmen NEJNERU<sup>\*</sup>, Nicanor CIMPOEŞU, Cătălin-Andrei ŢUGUI

Technical University "Gheorghe Asachi" of Iasi, Department of Technologies and Equipments for Materials Processing, Blvd. Mangeron, No. 51, 700050, Iasi, Romania

<sup>\*</sup>nejnerucarmen@yahoo.com

**Abstract**. Plasma nitriding thermochemical treatment has a beneficial effect regarding wearing resistance. One of the disturbing effects for plasma nitriding is edge effect, which modifies the properties uniformities on the edges of the treated part. Edge effect is found in the intersection area of the two surfaces adjacent negative light. The active screen has a role in modifying the plasma field for the entire part, so also in the edges areas. This overcomes and reduces the negative technological consequences of the edge effect. Different analysis for the subjected areas were made, also on the surface parts but also in depth of the parts, in it's section.

Keywords: active screen plasma nitriding, edge effect, negative light.

- [1] M. Axinte, C. Nejneru, M.C. Perju, N. Cimpoeşu, I. Hopulele, Research on hollow cathode effect and edge effect avoidance in plasma nitriding treatment, Tehnomus New Technologies and Products in Machine Manufacturing Technologies, Suceava 18 (2011) 181-184.
- [2] M. Olzon-Dionysio, M. Campos, M. Kapp, S. de Souza, S.D. de Souza, Influences of plasma nitriding edge effect on properties of 316 L stainless steel, Surf. Coat. Technol. 204 (2010) 3623–3628.
- [3] C.A. Tugui, M. Axinte, Nejneru, C. Nejneru, P. Vizureanu, M.C. Perju, D. Chicet, Active Screen Plasma Nitriding Efficiency and Ecology, Applied Mechanics and Materials 657 (2014) 369-375.



### Performance of Local Fly Ash Geopolymers under Different Types of Acids

### Dumitru-Doru BURDUHOS-NERGIS, Petrica VIZUREANU<sup>\*</sup>, Liviu ANDRUSCA, Dragos-Cristian ACHITEI

"Gheorghe Asachi" Technical University of Iasi, Blvd. Mangeron, No. 51, 700050, Iasi, Romania

\*peviz2002@yahoo.com

**Abstract**. A new class of ceramic materials, known as geopolymers, possess comparable or even higher mechanical and chemical properties than ordinary Portland cement based materials. Because geopolymers can be used in a wide variety of areas, from civil engineering applications to decorative objects manufacturing, they can get in contact with different types of acidic corrosive substances. The degradation degree depends mostly on the acidic solution concentration and the exposure time. Due to the interaction between the geopolymer compounds, AI, Si and Fe ions solubility and the corrosive environment substance, there may follow severe consequences on the material mechanical properties. These consequences are highly related to the geopolymers three-dimensional structure depolymerization. The performance of geopolymers under severe environmental condition depends on the raw material, mineralogical composition and activation method.

**Keywords**: geopolymer, concrete, local fly ash, acid attack, compressive strength, weight loss.

#### **References:**

[1] V. Sata, A. Sathonsaowaphak, P. Chindaprasirt, Resistance of lignite bottom ash geopolymer mortar to sulfate and sulfuric acid attack, Cement and Concrete Composites, 34(5) (2012) 700–8.



### Materials Types and Selection for Carabiners Manufacturing: A review

### Diana-Petronela BURDUHOS-NERGIS, Contantin BACIU, Petrica VIZUREANU, Nicoleta-Monica LOHAN, Costica BEJINARIU<sup>\*</sup>

"Gheorghe Asachi" Technical University of Iaşi, Dimitrie Mangeron street, no. 67. Iaşi, Romania

<sup>\*</sup>costica.bejinariu@tuiasi.ro

**Abstract**. The carabiners are vital components of fall protection systems used in a variety of areas, such as: caving, construction, arboriculture, industry, rescue or evacuation operations etc. Therefore, these metallic links play an important role in preventing work accidents wich are related with fall from heights. During carabiners manufacturing process, the material selection occupies an important place among the obtaining steps, because there are a high number of mechanical and chemical properties that must be possessed by the final product, in order to provide adequate user safety. This paper aims to present the manufacturing process and the main properties of the materials used for carabiners, as well as the specific advantages and disadvantages of each material type.

**Keywords**: carabiner, fall arrest system, manufacturing process, carabiners materials, mechanical properties, safety.

- K. B. Blair, D. Custer, J. M. Graham, Analysis of fatigue failure in Dshaped carabiners, Sports Eng., 8 (2005)107–113.
- [2] R. Blackford, Materials in mountaineering, Jenkins M (ed), Materials in sports equipment, Woodhead, (2003) 279-325.



### In vitro Corrosion Behavior of Ti-Mo-W Alloy in Artificial Saliva

Ştefan-Ioan GHICA, Cosmin-Mihai COTRUŢ<sup>\*</sup>, Mihai BUZATU, Iulian-Vasile ANTONIAC, Victor GEANTĂ, Mihai BUŢU, Mircea-Ionuţ PETRESCU, Radu ŞTEFĂNOIU, Elena UNGUREANU, Gheorghe IACOB, Roxana-Nicoleta IONESCU

University POLITEHNICA of Bucharest, 313 Spl. Independenței, Bucharest, Romania

<sup>\*</sup>cosmin.cotrut@upb.ro

**Abstract**. Titanium and its alloys are preferred materials used for medical devices manufacturing due to its specific properties. The corrosion behavior in artificial saliva of the newly developed Ti-Mo-W alloys, with elastic modulus closer to the human bone value [1] was studied by means of linear polarization technique [2] in the following steps: i) measurement/monitoring of open circuit potential ( $E_{OC}$ ) over 6 hours; ii) tracing linear polarization curves from ±200 mV (vs. OCP) - Tafel plots, with a scan rate of 0.167 mV/s. Electrochemical tests were performed according to ASTM G59-97 (2014) using a Potentiostat/Galvanostat to which a low current interface (LCI) was coupled. The tests were performed in Fusayama Meyer artificial saliva with a pH of 5.2 at the human body temperature ( $37\pm0.5^{\circ}$ C) which mimic the oral environment. The results indicate the alloys Ti15Mo7W and Ti15Mo11W have better corrosion behavior than Ti6Al4V.

Keywords: titanium alloys, corrosion resistance, artificial saliva.

#### **References:**

[1] M. Buzatu, V. Geantă, R. Stefănoiu, M. Buţu, M.I. Petrescu, M. Buzatu, I. Antoniac, G. Iacob, F. Niculescu, Ş.I. Ghica, H. Moldovan, Investigations into Ti-15Mo-W alloys developed for medical applications, Materials, 12 (2019) 1-10.



### Mechanical Tests for Ti-based Alloys as New Medical Materials

Mădălina-Simona BĂLȚATU<sup>1</sup>, Petrică VIZUREANU<sup>1,2,\*</sup>, Viorel GOANȚĂ<sup>3</sup>, Cătălin-Andrei ȚUGUI<sup>1</sup>, Victoraș GEANTĂ<sup>4</sup>

 <sup>1</sup>"Gheorghe Asachi" Technical University of Iasi, Faculty of Materials Science and Engineering, 41 "D. Mangeron" Street, 700050, Iasi, Romania
 <sup>2</sup>Centre of Excellence Geopolymer & Green Technology School of Materials
 Engineering, University Malaysia Perlis, Kompleks Pengajian Jejawi 2, 02600 Arau
 <sup>3</sup>"Gheorghe Asachi" Technical University of Iasi, Faculty of Mechanical Engineering, "Gheorghe Asachi", 61-63 "D. Mangeron" Street, 700050, Iasi, Romania
 <sup>4</sup>University Politehnica of Bucharest, Faculty of Materials Science and Engineering, 313 Splaiul Independentei, 060042, Bucharest, Romania

<sup>\*</sup>peviz2002@yahoo.com

**Abstract**. Medical implants of titanium alloys are frequently used in medicine being in attention for the researchers to develop alloys with properties close to the human bone. The most important thing in development of alloys for medical apllications is to be composed from biocompatible elements to avoid to affect the health of patients. The paper contains some mechanical properties of three alloys of Ti-Mo-Zr-Ta. Results revealed that it possesses very good mechanical properties for use in medical applications.

Keywords: Ti-Mo-Zr-Ta alloys, tensile strength, orthopedic applications.

#### **References:**

- [1] Geetha M., Singh A.K., Asokamani R., Gogia A.K., Ti based biomaterials, the ultimate choice for orthopaedic implants - A review, Mater. Sci., vol. 54, 2009, p. 397-425.
- [2] M.S. Bălţatu, P. Vizureanu, M.H. Ţierean, M.G. Minciună, D.C. Achiţei, Ti-Mo Alloys used in medical applications, Advanced Materials Research 1128, 2015, p. 105-111.

**Acknowledgements:** This work was supported by a grant of the Romanian Ministry of Research and Innovation, CCCDI – UEFISCDI, project number PN-III-P1-1.2-PCCDI-2017-0239 / 60PCCDI 2018, within PNCDI III.





EUROINVENT ICIR 2019

### Properties of New Ti-Mo-Si Alloys for Medical Use

Iustinian BĂLȚATU<sup>1</sup>, Petrică VIZUREANU<sup>1,2,\*</sup>, Florin CIOLACU<sup>3</sup>, Dragoș-Cristian ACHIŢEI<sup>1</sup>, Mădălina-Simona BĂLȚATU<sup>1</sup>

<sup>1</sup>"Gheorghe Asachi" Technical University of Iasi, Faculty of Materials Science and Engineering, 41 "D. Mangeron" Street, 700050, Iasi, Romania <sup>2</sup>Centre of Excellence Geopolymer & Green Technology School of Materials Engineering, University Malaysia Perlis, Kompleks Pengajian Jejawi 2, 02600 Arau, Perlis

<sup>3</sup>"Gheorghe Asachi" Technical University of Iasi, Faculty of Chemical Engineering and Environmental Protection, 71A D. "D. Mangeron", 700050, Iasi, Romania

peviz2002@yahoo.com

**Abstract**. In recent years, researchers have shown a particular interest in improving titanium alloys in the field of medicine. Paper presents some mechanical properties and contact angle of three alloys of Ti-Mo-Si. This alloys was obtained in order to use them in medical applications as well as contact angle revealed that alloys presents a good surface interaction with future tissues. From mechanical properties obtained, elasticity modulus suggest this alloys in use for medical applications because were obtained values close to the human bone.

Keywords: Ti-Mo-Si alloys, young modulus, medical applications.

#### **References:**

- [1] Geetha M., Singh A.K., Asokamani R., Gogia A.K., Ti based biomaterials, the ultimate choice for orthopaedic implants - A review, Mater. Sci., vol. 54, 2009, p. 397-425.
- [2] M.S. Bălţatu, P. Vizureanu, M.H. Ţierean, M.G. Minciună, D.C. Achiţei, Ti-Mo Alloys used in medical applications, Advanced Materials Research 1128, 2015, p. 105-111.

**Acknowledgements:** This work was supported by a grant of the Romanian Ministry of Research and Innovation, CCCDI – UEFISCDI, project number PN-III-P1-1.2-PCCDI-2017-0239 / 60PCCDI 2018 , within PNCDI III.



### Investigation of Thermal Degradation and Electrical Properties of Polyamide Materials Versus Polybismaleimide Materials for Fire-Fighters Helmets

**EUROINVENT** 

**ICIR 2019** 

Paul CIUBOTARIU-ANA, Nicoleta-Monica LOHAN<sup>\*</sup>, Cristian-Andrei MICU, Constantin BACIU, Stefan-Lucian TOMA, Costica BEJINARIU

"Gheorghe Asachi" Technical University of Iasi, 67, Dimitrie Mangeron Str., 700050, Iasi - Romania

<sup>\*</sup>monica.lohan@yahoo.com

**Abstract**. In this paper, a study on thermal degradation of polybismaleimide materials for fire-fighters helmets compared to polyamide materials was performed by applying simultaneous mass spectrometry and Fourier transform infrared spectroscopy of gas products from a thermogravimetric analyzer.

The results of TG measurement indicate a difference in the mass loss behavior between the two polymers materials. The thermal decomposition of polyamide material takes place in the single stage in the temperature range of 400-460°C with a mass loss of 98% while that of polybismaleimide material takes place in two steps with a residuu at 650°C of 85%.

The electrical analyzes consisted in the application of the electric breakdown test and the calculation of the breakdown parameters.

Keywords: firefighter helmets, Personal Protection Equipment.

- P. Ciubotariu-Ana, C. Micu, N. M.Lohan, B.Pricop, L.G.Bujoreanu, C Bejinariu, IOP Conference Series-Materials Science and Engineering, 374 (2018).
- [2] M. Cristea, C. Gaina, D. Ionita, V. Gaina, Journal of Thermal Analysis and Calorimetry, 93, Issue (1) (2008).



# Accumulation of Stress Induced Martensite in Fe<sub>43.5</sub>Mn34AI<sub>15±x</sub>Ni<sub>7.5∓x</sub> Shape Memory Alloys

Victor APOSTOL, Nicoleta-Monica LOHAN, Elena MIHALACHE, Radu-Ioachim COMĂNECI, Nicanor CIMPOEȘU, Bogdan PRICOP, Mihai POPA, Leandru-Gheorghe BUJOREANU<sup>\*</sup>

Faculty of Materials Science and Engineering, The "Gheorghe Asachi" Technical University of Iași, Blvd. Mangeron, No. 69A, 700050, Iasi, Romania

<sup>\*</sup>lgbujor@tuiasi.ro

**Abstract**. Fe<sub>43.5</sub>Mn<sub>34</sub>Al<sub>15</sub>Ni<sub>7.5</sub> shape memory alloys (SMAs), discovered at the beginning of present decade, has drawn considerable attention of scientific community due to its enlarged thermal stability (from -50 to +150<sup>0</sup>C) of superelastic behavior [1]. After cyclic heat treatment, solution treatment and ageing, the specimens became oligocrystalline and reinforced by NiAl nanoprecipitates. The typical thermomechanical processing routine, before cyclic heat treatment of FeMnAlNi alloys, involves hot rolling, annealing and cold rolling [2]. The present paper discusses the effects of  $\pm$  1.5 at. % aluminum substitution with nickel, by correlating tensile behavior with microstructural observations. The SMA specimens with chemical composition Fe<sub>43.5</sub>Mn34Al<sub>15±X</sub>Ni<sub>7.5±X</sub> were subjected to tensile tests, comprising loading-unloading cycles, based on which recoverable strain and energy storage efficiency were calculated.

**Keywords**: stress induced martensite, tensile testing, pseudoelasticity, thermomechanical processing, optical microscopy.

#### **References:**

[1] T. Omori, K. Ando, M. Okano, X. Xu, Y. Tanaka, I. Ohnuma, R. Kainuma, K. Ishida, Superelastic effect in polycrystalline ferrous alloys, Science 333 (2011) 68-71.



### Particularities of Forming Behavior for INCONEL 718 Superalloy

### Brandusa GHIBAN<sup>\*</sup>, Madalin-Constantin GURAGATA, Nicolae SERBAN

University Politechnica of Bucharest, Splaiul Independenței nr. 313, sector 6,

Bucureşti, Romania

<sup>\*</sup>ghibanbrandusa@yahoo.com

**Abstract**. Present paper has the aim of establishing the plastic forming behavior of the INCONEL 718 superalloy used for turbine engines. The experiments were realized in laboratory conditions, on a free falling dawn hammer, with high of free falling about H = 0.2 m, and the falling dawn mass about 71 kg. The determinations were made in the range of temperatures about  $1100 - 1250^{\circ}$ C, at every 50°C. Finally, the graphics of plastic forming versus temperature and mechanical working versus temperature were drawn. The final conclusion was that the optimum range of temperature for hot working of the INCONEL 718 alloy is  $1150 \div 1250^{\circ}$ C, in which the plastic forming resistance and specific hot working are optimum.

Keywords: INCONEL 718, deformability, forming degree

- [1] A. Iturbea, E. Giraud, E. Hormaetxe, A. Garay, G. Germain, K. Ostolaza, P.J. Arrazola- Mechanical characterization and modelling of Inconel 718 material behavior for machining process assessment, Materials Science & Engineering A 682 (2017) 441–453.
- [2] X. Wang, C. Huang, B. Zou, H. Liu, H. Zhu, J. Wang, Dynamic behavior and a modified Johnson–Cook constitutive model of Inconel 718 at high strain rate and elevated temperature, Mater. Sci. Eng. A 580 (2013) 385–390.



### Brown Band Characteristics of Aluminum Cladding Alloys

### Claudia NATRA, Brandusa GHIBAN<sup>\*</sup>

University Politechnica of Bucharest, Splaiul Independenței nr. 313, sector 6,

Bucureşti, Romania

<sup>\*</sup>ghibanbrandusa@yahoo.com

**Abstract**. Clad materials are a variant of the typical composites, which consist of two or more materials joined on their interface surfaces. Clad materials as metallic composite materials are developed for the needs of user because the single metal often cannot satisfy it application conditions. That is, the advantage of clad materials is that the combination of different properties of materials can satisfy both the need of good mechanical properties and the demand of users such as industrial consumer. The purpose of this study is to study structural aspect in aluminum 3003 clad material with 4004 and 4045 alloy, after different cladding time. Generally, Al 3003 material is Al–Mn alloy which has superior ductility, but the strength and hardness are low. Al series 4xxx material is Al–Si alloy which has high strength and hardness, but the ductility is low.

**Keywords**: aluminum alloys, automotive applications, brown band, cladding, 3003 aluminum, 4004 aluminum, 4045 aluminum alloys.

- [1] V.C. Gudla, K. Rechendorff, Z.I. Balogh, T. Kasama, R. Ambat, In-situ TEM investigation of microstructural evolution in magnetron sputtered Al-Zr and Al-Zr-Si coatings during heat treatment, Mater. Des. 89 (2016) 1071–1078.
- [2] In-Soo SON, Sang-Pill LEE, Jin-Kyung LEE, Woo-Cheol KIM, Ji-Seon MOON, Sangmok LEE, Jong-Sup LEE, Yong-Bae KIM, Geun-Ahn LEE, Dong-Su BAE- Effect of hydro co-extrusion on microstructure of duocast Al 3003/Al 4004 clad materials, Trans. Nonferrous Met. Soc. China 24(2014) s75-s80.



### SEM/EDS Analyses on Shape Memory Alloys Subjected to Electrochemical Corrosion

### Elena-Raluca BACIU, Roxana-Ionela VASLUIANU<sup>\*</sup>, Maria BOLAT, Bogdan BULANCEA, Alice MURARIU, Dana-Gabriela BOSÎNCEANU

Faculty of Dental Medicine, "Grigore T. Popa" University of Medicine and Pharmacy, 16 Universității Street, 700115, Iași, Romania

<sup>\*</sup>roxana302000@yahoo.com

**Abstract**. The aim of the present paper was to investigate the modifications occurred in the Ti-based shape memory alloys subject to electrochemical corrosion in artificial saliva. By 2D and 3D microscopy and by qualitative determinations of the luminous variation we could notice the effects of electrochemical corrosion tests on the surface of the metallic material, and by EDS determinations (Line and Mapping modes) of the surface chemical composition we could determine the chemical modifications produced following the corrosion tests.

**Keywords**: Ti-based shape memory alloys, artificial saliva, chemical composition.

- [1] E. Henderson, D.H. Nash, W.M. Dempster, On the experimental testing of fine Nitinol wires for medical devices, Journal of the Mechanical Behavior of Biomedical Materials, 4 (2011) 261-268.
- [2] C. Baciu, E.R. Baciu, R. Cimpoeşu, C.G. Levente, D.G. Bosînceanu, M. Baciu, C. Bejinariu, Microstructural Analysis of Ti-Based Shape Memory Alloys Following the Electrochemical Corrosion in Artificial Saliva, IOP Conf. Ser.: Mater. Sci. Eng. 209, 012033, doi:10.1088/1757-899X/209/1/012033, (2017).



### **Centerline Inhomogeneity of Flat Products**

Mihaly RÉGER<sup>\*</sup>, Eniko Reka FÁBIÁN, Laszlo TÓTH

Óbuda University, Budapest, Hungary

<sup>\*</sup>reger@uni-obuda.hu

Abstract. Defect free casting requires an excellent accordance between steel properties being cast and the technological parameters, especially from the aspect of inner quality and homogeneity of cast products. One of the most unpredictable defects of cast slabs is the centerline segregation. The centerline segregation in slabs develops in a complex way; it is connected partly to the macrosegregation and partly to the shrinkage of solidifying melt. As a result of these processes, the centerline segregated part of the slab will have a different chemical composition compared to the average composition and/or it will contain shrinkage holes, discontinuities and inclusions. After the solidification process during hot rolling the complex shaped interdendritic holes will be closed as a function of applied strains. The difference in chemical composition will remain even after the slab has spent several hours at over 1000 oC in the soaking furnace before hot rolling. Hot rolled products (heavy plates, strips) with centerline segregation will contain, depending on the solidification and technological parameters, a middle part with a chemical composition dissimilar to the average (i.e. in case of St52 grade the segregated area can be characterized by a carbon content of 0,3-0,5 wt% and manganese content of 1,7-1,9 wt%). According to industrial experiences, the segregation level (including the carbon content) can hardly be decreased by heat treatment.

Keywords: homogeneity, segregated, hot rolling, during, interdendritic.

- Krauss, G., "Steels: Heat Treatment and Processing", ASM Int. Metals Park Ohio, USA, (1990).
- [2] Král, L, et al., "Diffusion of Carbon and Manganese in Fe-C-Mn", Defect and Diffusion Forum, Vol. 263 (2007) 153-158.



### New Materials of Ti-based Alloys for Medical Application

Madalina Simona BALTATU<sup>1</sup>, Petrica VIZUREANU<sup>1,2,\*</sup>, Victoras GEANTA<sup>3</sup>, Ionelia VOICULESCU<sup>3</sup>, Radu STEFANOIU<sup>3</sup>

<sup>1</sup>"Gheorghe Asachi" Technical University of Iasi, Faculty of Materials Science and Engineering, 41 "D. Mangeron" Street, 700050, Iasi, Romania <sup>2</sup>Centre of Excellence Geopolymer & Green Technology School of Materials Engineering, University Malaysia Perlis, Kompleks Pengajian Jejawi 2, 02600 Arau. <sup>3</sup>University Politehnica of Bucharest, 313 Splaiul Independentei, 060042, Bucharest, Romania

\*peviz2002@yahoo.com

**Abstract**. Frequently in medical field are used implants of titanium alloys with properties close to the human bone. It were elaborated three alloys of Ti-Mo-Si system with good properties beside of classical alloys like Ti6Al4V and C.p.Ti. Current paper present a comparation on the alloys used in medicine opposite to Ti-Mo-Si system elaborated.

Keywords: Ti-Mo-Si alloys, mechanical properties, biomaterials.

#### References:

- Chen Q., Thouas G.A., Metallic implant biomaterials, Materials Science and Engineering R, vol.87, 2015, p. 1–57.
- [2] Bălţatu M.S., Vizureanu P., Mareci D., Burtan L.C., Chiruţă C., Trincă L.C., Effect of Ta on the electrochemical behavior of new TiMoZrTa alloys in artificial physiological solution simulating in vitro inflammatory conditions, Materials and Corrosion, vol. 67, nr. 12, 2016, p. 1314-1320.

Acknowledgements: This work was supported by a grant of the Romanian Ministry of Research and Innovation, CCCDI – UEFISCDI, project number PN-III-P1-1.2-PCCDI-2017-0239 / 60PCCDI 2018 , within PNCDI III.



### Analysis of Ni-Cr Alloys Used like Biomaterials

Dragos Cristian ACHITEI, Madalina Simona BALTATU<sup>\*</sup>, Petrica VIZUREANU, Andrei Victor SANDU

Gheorghe Asachi Technical University, 41 D. Mangeron Street, 700050, Iasi, Romania

<sup>\*</sup>cercel.msimona@yahoo.com

**Abstract**. The paper presents some aspects about the Ni-Cr commercial alloys used for denthal implants. For the study are used 3 alloys, with different compositions, which are subjected to thermal processing. After experiments, the samples are studied by microscopic analysis and microhardness measurements.

**Keywords**: Ni-Cr, properties, cast samples, composition, medical applications.

#### **References:**

- D. Sutiman, A. Cailean, I. Cretescu, et al., Corrosion behaviour of Ni-Cr based biomaterials in rondelli saliva, Revista De Chimie, 59-4 (2008) 417-421.
- [2] A.I. Popescu, M. Tarcolea, V. Oprisan, et al., Analysis by Microscopy Techniques of Metal-Ceramic Dental Restorations with Ni-Cr Support, Revista de Chimie, 66-10 (2015)1671-1674.

**Acknowledgements:** This work was supported by a grant of the Romanian Ministry of Research and Innovation, CCCDI – UEFISCDI, project number PN-III-P1-1.2-PCCDI-2017-0239 / 60PCCDI 2018 , within PNCDI III.



### Advanced Glass Reinforced Epoxy Filled Fly Ash Based Geopolymer Filler: Preparation and Characterization on Piping Materials

**EUROINVENT** 

**ICIR 2019** 

Mohammad Firdaus Abu HASHIM<sup>1,2,\*</sup>, Mohd Mustafa Al Bakri ABDULLAH<sup>1,3</sup>, Andrei Victor SANDU<sup>1,4</sup>, Attila PUSKAS<sup>5</sup>, Yusrina Mat DAUD<sup>1,3</sup>, Farah Farhana ZAINAL<sup>1,3</sup>, Meor Ahmad FARIS<sup>1,2</sup>, HASRI<sup>6</sup>, HARTATI<sup>6</sup>

<sup>1</sup>Center of Excellence Geopolymer & Green Technology (CEGeoGTech), School of Materials Engineering, Universiti Malaysia Perlis, (UniMAP), 02600 Jalan Kangar-Arau, Perlis, Malaysia

<sup>2</sup>Faculty of Engineering Technology, Universiti Malaysia Perlis, Perlis, Malaysia <sup>3</sup>School of Materials Engineering, Universiti Malaysia Perlis, (UniMAP), 02600 Jalan Kangar-Arau, Perlis, Malaysia

<sup>4</sup>Faculty of Materials Science and Engineering, Gheorghe Asachi Technical University of Iasi, Str. D. Mangeron 41, Iasi, Romania

<sup>5</sup>Faculty of Civil Engineering, Technical University of Cluj-Napoca, Str. Baritiu 25, Cluj-Napoca, Romania

<sup>6</sup>Fakultas Matematika & Ilmu Pengetahuan Alam, Universitas Negeri Makassar, Kampus FMIPA UNM, Parangtambung, JL. Mallengkari, Makassar, 90224, Indonesia

<sup>\*</sup>firdaushashim@unimap.edu.my

**Abstract**. The preparation and characterization of glass reinforced epoxy filled with different weight percentage of geopolymers filler obtained from fly ash and epoxy resins are reported limited of study. Recent glass reinforced epoxy pipe are reported exhibits relatively low mechanical properties, which limit their usage in structural applications and in oil and gas industrial. Thus, this restriction could be overcome through the formation of the addition of geopolymer fillers to improve their strength and toughness.

Keywords: Glass reinforced epoxy, geopolymer, fly ash.

#### **References:**

 D. Tran, P. Louda, O. Bortnovsky, P. Bezucha, Mechanical properties of silica-based geopolymer composites cured at ambient conditions in accordance with size-independent method. 2010.

### A Review on Synthesis and Factors of Controlling the Formation of Titanium Dioxide (TiO<sub>2</sub>) Thin Film via Sol-Gel Method

**EUROINVENT** 

**ICIR 2019** 

Kamrosni Abdul RAZAK<sup>1,2,\*</sup>, Dewi Suriyani Che HALIN<sup>1,\*\*</sup>, Mohd Mustafa Al Bakri ABDULLAH<sup>1</sup>, Petrica VIZUREANU<sup>1,3</sup>, Mohd Arif Anuar Mohd SALLEH<sup>1</sup>, Norsuria MAHMED<sup>1</sup>, Azliza AZANI<sup>1</sup>, Madalina Simona BALTATU<sup>3</sup>, Ayu Wazira AZHARI<sup>1,4</sup>

<sup>1</sup>Center of Excellence Geopolymer & Green Technology (CEGeoGTech), School of Materials Engineering, Universiti Malaysia Perlis, (UniMAP), 02600 Jalan Kangar-Arau, Perlis, Malaysia
<sup>2</sup>Faculty of Engineering Technology, Universiti Malaysia Perlis, (UniMAP), Perlis, Malaysia
<sup>3</sup>Gheorghe Asachi Technical University of Iasi, Faculty of Materials Science and Engineering, 41 D. Mangeron Blvd., 70050, Iasi, Romania
<sup>4</sup>Water Research Group (WAREG), School of Environmental Engineering, Universiti Malaysia Perlis 02600 Arau, Perlis, Malaysia

\*kamrosni@unimap.edu.my, \*\*dewisuriyani@unimap.edu.my

**Abstract**. Many studies on  $TiO_2$  thin films synthesis formed by conventional and advanced sol-gel processes have been reported. Sol–gel process is one of the simplest methods offers many advantages to the researcher such as controllability, reliability, reproducibility of the material and therefore can be selected for the preparation of high quality nano-structured thin films. Previous studies indicate that the properties of  $TiO_2$  films appear to strongly depend on the process conditions and starting materials used in the processes. Therefore, many researchers have used sol-gel method to synthesize  $TiO_2$ . Synthesis and the factors that controlling the formation of  $TiO_2$  thin film via sol-gel method were briefly reviewed in this mini review.

Keywords: Titanium dioxide, sol-gel method, synthesis.



### Graphene Geopolymer Hybrid: A Review on Mechanical Properties and Piezoelectric Effect

Nuaim Siddiqi DANIAL<sup>1,2,\*</sup>, Dewi Suriyani Che HALIN<sup>2, \*\*</sup>, Muhammad Mahyiddin RAMLI<sup>1</sup>, Mohd Mustafa Al Bakri ABDULLAH<sup>2</sup>, Siti Salwa Mat ISA<sup>1</sup>, Lina Fasihah Abdul TALIP<sup>1</sup>, Nur Syafiqah MAZLAN<sup>1</sup>

<sup>1</sup>School of Microelectronic Engineering, Universiti Malaysia Perlis, Pauh Putra Campus, 02600, Arau, Perlis, Malaysia

<sup>2</sup>Center of Excellence Geopolymer & Green Technology (CEGeoGTech), School of Materials Engineering, Universiti Malaysia Perlis,02600 Jalan Kangar Arau, Perlis

nuaimsiddiqi@gmail.com, \*dewisuriyani@unimap.edu.my

**Abstract**. A review on graphene geopolymers hybrid is presented, focusing on the mechanical properties and piezoelectric effect. The method and way of mixing graphene with geopolymers are discussed, including form of graphene that frequently being used by researchers which is graphene oxide (GO) and reduced graphene oxide (rGO). Type of geopolymers being focused in this paper is fly ash and kaolin. The flexural and compressive strength, fracture toughness and stiffness are highlighted in terms of mechanical properties after mixing with geopolymers. The piezoelectric effects on geopoylmer are emphasized as graphene acted as conductive filler. Research findings revealed that graphene geopolymer hybrid displayed improvement in mechanical properties despite agglomeration and some defects that need to be rectified.

Keywords: Graphene, Geopolymers, Graphene Oxide.

#### **References:**

[1] A. A. Balandin et al., "Superior thermal conductivity of single-layer graphene," Nano Lett., vol. 8, no. 3, pp. 902–907, 2008.



### Study On the Mechanical Properties and Corrosion Resistance of Sintered AZ91 Alloys

Siti Hawa SALLEH<sup>1,2,\*</sup>, Nur Hidayah Ahmad ZAIDI<sup>1,3</sup>, Salmie Suhana Che ABDULLAH<sup>1,3</sup>

<sup>1</sup>School of Materials Engineering, Universiti Malaysia Perlis, 02600 Arau, Perlis, Malaysia
<sup>2</sup>Centre of Excellence Geopolymer and Green Technology, Universiti Malaysia Perlis, 02600 Arau, Perlis, Malaysia
<sup>3</sup>Centre of Excellence Frontier Materials Research, Universiti Malaysia Perlis, Seriab, 01000 Kangar, Perlis, Malaysia

<sup>\*</sup>sitihawa@unimap.edu.my

**Abstract**. The current work presents the mechanical properties and the corrosion resistance in 0.01M NaCl of sintered AZ91 magnesium alloys. It is found that the mechanical properties of sintered AZ91 are significantly increased with sintering time, which was attributed to the formation of refined microstructure matrix phase. However, less sintering time of AZ91 alloy performs better in corrosion resistance as the corrosion rate and hydrogen evolution rate of 2 hrs sintering is apparently lower than 4 hrs sintering time. It is may due to the formation of Mg oxide layers during sintering process has accelerates the corrosion and hydrogen evolution from the surfaces.

Keywords: AZ91 alloys, corrosion rate, hydrogen evolution, hardness.

- L. Rossrucker, K. J. J. Mayrhofer, G. S. Frankel and N. Birbilis: J. Electrochem. Soc., 2014, 161, (3), C115–C119.
- [2] M. Taheri, J. R. Kish, N. Birbilis, M. Danaie, E. A. McNally and J. R. McDermid: Electrochim. Acta, 2014, 116, 396–403.



### Compliance Behaviour on Zakat Donation: A Qualitative Approach

Jama Mohamed Sareye FARAH, Muhammad Hakimi Mohd SHAFIAI, Abdul Ghafar ISMAIL

Faculty of Economics and Management, National University of Malaysia, Bangi-Selangor Kolej Pengajian Islam Johor (MARSAH), Johor Bahru, Johor

jamacc10@hotmail.com, hakimi@ukm.edu.my, agibab62@gmail.com

Abstract. This study examines the compliance behaviour on zakat donation. The study further defined compliance behaviour in term of religious obligation among the Faculty of Economics and Management academicians at National University of Malaysia (UKM) using a qualitative approach. This Study used interview methods with a saturated sample size. The findings of this study revealed that there is a variety of commitments and obligations for compliance behaviour on zakat donation. Among the common themes of zakat paying motivations namely; religious obligation, knowledge about zakat, helping the poor, confidence in the fair distribution of zakat collection to Asnaf, a reward from Allah, helping Muslim community, the influence of zakat officers, tax rebate incentive, purify one's income and property, and influence of religious teachers. This study suggested that more comprehensive studies be done in the area of zakat compliance behaviour using a qualitative approach since the majority of the prior studies on zakat compliance only focused quantitative method. This study also recommends the future studies might concentrate on internal or psychological obligation and donation on zakat.

Keywords: Donation, Compliance, Income, Zakat, Qualitative.



## **SECTION 2**

## PROCEDURES AND TECHNOLOGIES FOR MATERIALS ENGINEERING



### A Probabilistic Kinetic Model for Predicting Grain Growth Processes in Alloys

Tamás RÉTI<sup>\*</sup>, Imre FELDE, Mihály RÉGER, László TÓTH, Zoltan FRIED

Óbuda University, Bécsi út, 96/B, H-1034 Budapest, Hungary

<sup>\*</sup>reti.tamas@bgk.uni-obuda.hu

**Abstract**. This paper deals with possible generalizations of the traditional grain growth kinetic functions. A novel probabilistic model devoted to the grain growth prediction in alloys is presented. It is based on the extension of the tradition power law kinetic equation proposed by Beck (1948). The Beck's isothermal kinetic

equation is defined as  $D(t) = A_0 e^{-\left(\frac{E}{RT}\right)} t^m$  where D(t) is the grain size (diameter), t is the time, E is the activation energy in J/mol,  $A_0$  is the preexponential factor, m is the time exponent, R is the universal gas constant (R=8,314 J/mol) and T is the absolute temperature in degree Kelvin. In the probabilistic model proposed it is assumed that during grain growth the activation energy (E) is not constant, but its distribution is determined by the initial microstructure morphology of alloys. More exactly speaking, it is supposed that the activation energy is a random variable which is characterized by an appropriately selected probability density function f(E). Using the probability density function can be formulated

as  $D(t, f) = \int_{0}^{\infty} A_0 e^{-\left(\frac{E}{RT}\right)} t^m f(E) dE$ . The probability density function f(E) describing

the change of activation energy E can be defined in various forms. By selecting different versions of preselected probability density functions, the practical applications of the extended grain growth kinetic model is demonstrated by examples.

Keywords: Probabilistic model, grain growth process, activation energy.



### Optimization of the Objective Function – Surface Quality by End-Milling Dimensional Machining of Some Aluminum Alloys

Mihail Aurel ȚÎȚU<sup>\*</sup>, Alina Bianca POP, Ștefan ȚÎȚU, Gheorghe Ioan POP<sup>1</sup>

Lucian Blaga University of Sibiu, 10, Victoriei Street, code 550024, Sibiu, România The Academy of Romanian Scientists, 54, Splaiul Independenței, Sector 5, Bucharest, Romania

<sup>\*</sup>mihail.titu@ulbsibiu.ro

**Abstract**. Aluminum alloys are materials that have relatively good machinability, which helps the process because many of the components of the aircraft are of high dimensions. The manufacturing process is protracted and involves long semi-finishing and finishing operations, so it is recommended that any researcher who begins and finishes an experimental study should do it base on a specific experimental plan. This scientific paper presents applied research based on an extremely pertinent active experiment that has led to some practical solutions applied in the aerospace industry worldwide. The obtained conclusions led to the validation of the experimental model and the application of the research presented within an aerospace industry organization with important global valences.

**Keywords**: Quality,modeling and experimental optimization, experimental model validation, active experiment, applied scientific research, aluminum alloy.

- [1] K. Bloch, M. Ţîţu, A.V. Sandu, Investigation of the Structure and Magnetic Properties of Bulk Amorphous FeCoYB Alloys, InRevista de Chimie, Volumul 68, Numărul 9, page 2162-2165, ISSN 0034-7752 (2017).
- [2] D. Montgomery, Design and Analysis of Experiments. Eighth Edition ed. Hoboken: John Wiley & Sons, Inc, (2013).



### Modeling the Machined Surface Quality of an Aluminum Alloy Using the Active Experiment Type

### Alina Bianca POP, Mihail Aurel ȚÎȚU<sup>\*</sup>, Gheorghe Ioan POP, Ștefan ȚÎȚU

Lucian Blaga University of Sibiu, 10, Victoriei Street, code 550024, Sibiu, România The Academy of Romanian Scientists, 54, Splaiul Independenței, Sector 5, Bucharest, Romania

\*mihail.titu@ulbsibiu.ro

**Abstract**. The surface roughness obtained by the cutting processes has always been a subject of great interest when it is intended to improve the quality of the final product requested by the customer. The objective of this scientific paper involves a comparative study on the tracking of the surface roughness measured both longitudinally and transversely in the direction of the cutting feed movement, following the end-milling process of an aluminum alloy used in the aerospace industry worldwide. Practical experiments have conducted in a prestigious company in the aerospace industry of Romania. This study is in the category of scientific papers with an extremely high level of applied scientific research using experimental statistical modeling of active type.

**Keywords**: product quality, surface roughness, cutting parameters, endmilling process, applicative scientific research, aluminum alloy.

#### **References:**

[1] D. Dobrotă, M. Țiţu, F. Dobriţa, V. Petrescu, The Analysis of Homogeneity of the Chemical Composition in Castings Made of Aluminum Alloy, InRevista de Chimie, Volumul 67, Numărul 3, page 520-523, ISSN 0034-7752, Martie(2016).



**EUROINVENT** 

**ICIR 2019** 

Aurelian BUZĂIANU<sup>1,\*</sup>, Roxana TRUŞCĂ<sup>1</sup>, Petra MOŢOIU<sup>2</sup>, Ioana CSAKI<sup>3</sup>, Anghel IONCEA<sup>1</sup>, Vlad MOŢOIU<sup>2</sup>

<sup>1</sup>Metav-R&D, Bucharest, 31 C.A. Rosetti St., 020011, Romania
 <sup>2</sup>Tehnoid Com Ltd., 48 Baritiu Str., 011295, Romania
 <sup>3</sup>University "Politehnica" Bucharest, 313, Splaiul Independentei; 060042, Romania

<sup>\*</sup>buzaianu@metav-cd.ro

Abstract. The cumulative effect of erosion-corrosion process in geothermal turbines results in significant damages, especially for rotors and turbine blades; the degree in which they are affected depends on steam temperature, mechanical impact and the geothermal composition of the substances dissolved in steam. Layer composite materials are a feasible option to improve the erosion-corrosion resistance and the durability of turbine components. There cermet powders containing tungsten carbide are used for high velocity oxygen fuel (HVOF) spaying and for electro-spark deposition (ESD) to obtain graduate microstructure and to form local hard structures. Both technique by WC-cermet depositions was found to be most suitable to improve wear resistance, to repair rotors and blades and to provide possible life extension of geothermal turbines. The paper presents a comparative assessment of tungsten carbide and the technological parameters used for HVOF and ESD cermet layer depositions. Also, the work presents the analysis of the micro chemical composition, the micromechanical characterization and erosion-oxidation resistance of HVOF and ESD coatings using WC-cermet on steel substrates. The experimental procedure involved X-ray diffraction of the specimens, micro mechanical tests and SEM investigation to provide detailed information about adhesion of protective layers and micro-morphological modifications.

**Keywords**: WC- cermets; HVOF and ESD depositions; geothermal power plants.



**EUROINVENT** 

**ICIR 2019** 

Marzieh Javadi TOGHCHI<sup>1,2,3,4,\*</sup>, Carmen LOGHIN<sup>3</sup>, Irina CRISTIAN<sup>3</sup>, Christine CAMPAGNE<sup>1,2</sup>, Pascal BRUNIAUX<sup>1,2</sup> Luminita CIOBANU<sup>3</sup>, Aurèlie CAYLA<sup>1,2</sup>, Yan CHEN<sup>4</sup>

 <sup>1</sup>Ecole Nationale Supérieure des Arts et Industries Textiles, GEMTEX, Roubaix, France
 <sup>2</sup>University of Lille, Nord de France, Lille, France
 <sup>3</sup> Faculties of Textile, Leather and Industrial Management, Gheorghe Asachi Technical University, Iasi, Romania

<sup>4</sup>College of Textile and Clothing Engineering, Soochow University, Suzhou, China

\*marzieh.javadi-togh@ensait.fr , marzieh.javadi-toghchi@tuiasi.ro

**Abstract**. Two sets of 3D interlock woven fabrics were manufactured (five samples made of cotton yarns and five samples while one-third of yarns were hybrid cotton/silver yarns). After that, the thermal resistance and water vapor permeability of all the fabrics were measured and compared. The results stated that the thermal resistance of asymmetric fabrics for both sets of fabrics was different regarding which exterior face was in contact with the hot plate. It affirms that the internal voids of each ply play a significant role in thermal resistance of 3D interlock woven fabrics. As a result, the asymmetric 3D interlock woven fabrics can be applied as double-face fabrics for different climate conditions as the order of the layers changed the thermal resistance due to the porosity of each ply. Furthermore, a reduction was observed in thermal resistance for the fabrics with silver presence ( $\sim$ 40%) while the other parameters remained unchanged (e.g. yarn density, fabric structure, and fabric porosity).

**Keywords**: Thermal resistance, Water vapor permeability, 3D Interlock woven fabrics.

#### **References:**

[1] BS EN ISO 11092: 2014: Physiological Effects- Measurement of Thermal and Water-Vapour Resistance under Steady-State Conditions Sweating Guarded-Hotplate Test, BSI Standards Publication. September 2014.


# Treatment of Industrial Slag Zinc Ferrite by Zeolite Sludge

#### Pierantonio de LUCA<sup>1,\*</sup>, Ivano BERNAUDO<sup>2</sup>, Sebastiano CANDAMANO<sup>1</sup>, Carlo SICILIANO<sup>3</sup>, Anastasia MACARIO<sup>2</sup>

 <sup>1</sup>Dipartimento di Ingegneria Meccanica, Energetica e Gestionale. Università della Calabria, I -87036 Arcavacata di Rende (CS). Italy
<sup>2</sup>Dipartimento di Ingegneria per l'Ambiente ed il Territorio ed Ingegneria Chimica. Università della Calabria, I-87036. Arcavacata di Rende(Cs). Italy
<sup>3</sup>Dipartimento di Farmacia e Scienze della Salute e della Nutrizione. Università della Calabria, I-87036 Arcavacata di Rende (Cs). Italy

<sup>\*</sup>pierantonio.deluca@unical.it

**Abstract**. The study reports the results in the removal efficiency of the metals released by zinc ferrite in aqueous systems, using a zeolitic sludge as an ion exchanger The so-called zinc ferrite is an industrial waste produced during the treatment of minerals for zinc extraction. The zeolitic sludge used in the experimental campaign is a by-product that derives from industrial processes and contains a combination of synthetic zeolites such as 4A (LTA) and 13X zeolite (FAU). Initially, different systems have been prepared, with predefined weight ratios of zeolitic sludge/water and zeolitic sludge/zinc ferrite/water. The systems were analyzed, at different times, by plasma mass spectrometry (ICP-MS) which allowed to measure the variation of concentration of Fe, Mg, Ca, Zn, Mn, Pb, Sr, Na, K ions. Finally, the results obtained were compared with data reported in previous studies that used other ion exchangers. Zeolitic sludges were efficient for the total absorption of Pb and Zn ions.

**Keywords**: Industrial waste; zinc ferrite; ionic exchange; zeolitic sludge, zeolite.

#### **References:**

[1] P. D. Luca, I. Bernaudo, R. Elliani, A. Tagarelli, J. B. Nagy, A. Macario, Industrial waste treatment by ETS-10 ion exchanger material, Materials, (2018) 11.



# Brackish Water Treatment with Carbon Nanotubes

Paola FOGLIA<sup>1</sup>, Danilo VUONO<sup>1</sup>, Carlo SICILIANO<sup>2</sup>, Anna NAPOLI<sup>3</sup>, Janos B. NAGY<sup>4</sup>, Pierantonio de LUCA<sup>4,\*</sup>

 <sup>1</sup>Dipartimento di Ingegneria per l'Ambiente ed il Territorio ed Ingegneria Chimica. Università della Calabria, Arcavacata di Rende (Cs).I-87036 –Italy
<sup>2</sup>Dipartimento di Farmacia e Scienze della Salute e della Nutrizione. Università della Calabria, I-87036 Arcavacata di Rende (Cs) - Italy
<sup>3</sup>Dipartimento di Chimica e Tecnologie Chimiche. Università della Calabria, I-87030 Arcavacata di Rende (CS) – Italy
<sup>4</sup>Dipartimento di Ingegneria Meccanica, Energetica e Gestionale. Università della Calabria, Arcavacata di Rende (CS). I-87036 Rende- Italy

<sup>\*</sup>pierantonio.deluca@unical.it

**Abstract**. The present work aims to experiment the action of carbon nanotubes (MWCNTs) in the removal of sodium chloride from aqueous systems, not using them as a membrane but dispersing them directly in solution, in order to evaluate possible applications in the desalination of brackish water. For this purpose, different aqueous systems have been prepared by varying the sodium chloride concentration and the amount of carbon nanotubes dispersed therein. The systems were stirred for scheduled times and then the amount of residual sodium chloride was measured by drying, after filtration, the systems and weighing the dry residue. Furthermore, the variation in pH and conductivity have been followed as a function of time. In the final part of the experimentation, after having identified the best system, the tests were carried out directly on sea water and using different types of carbon nanotubes such as non-purified and purified and oxidized ones.

Keywords: carbon nanotube, brackish water, desalination, sodium chloride.

#### **References:**

[1] P. S. Goh, A. F. Ismail, B. C. Ng, Carbon nanotubes for desalination – an innovative material with enormous potential, Advanced Membrane Tecnology Research Centre, Universiti Teknologi Malaysia, Johor, Malaysia, (2013) 7-10.



## Influence of Melt Preparing Technology on the Structure of Cast Aluminum-Silicon Alloy

#### Gennady TYAGUNOV, Tatyana KOSTINA, Evgeny BARYSHEV<sup>\*</sup>, Irina VANDYSHEVA, Kseniya SHMAKOVA

Ural Federal University, 19 Mira str, 620002, Ekaterinburg, Russia

e.e.baryshev@urfu.ru

**Abstract**. Influence of melting conditions on the structure of AL30 alloy has been studied. To this end, the temperature dependences of physical properties of liquid alloy has been investigated. In is shown, that the formation of the microhomogeneous and the equilibrium alloy structure during melting process leads to significant decreasing of amounts of eutectic silicon. However the amounts of primary  $\alpha$ -aluminum solid solution and intermetallic compounds with dendritic form. Such treatment leads to decreasing of size of primary  $\alpha$ -aluminum solid solution particles. On the base of experiments the physical model of aluminum-silicon alloy solidification was proposed.

**Keywords**: aluminum-silicon alloy, melting, liquid metal properties, temperature dependence, cast structure.

- T. Lipinski, Influence of Ti and melt number on microstructure and mechanical properties of Al-Si alloy on agriculture machine parts, Engineering for Rural Development, 17 (2017) 1431-1436.
- [2] V. Kiselev, T. Kostina, G. Tyagunov, E. Kolotukhin, V. V'yukhin A. Silin Effect of melt heating temperature on crystallization and structure of hypereutectic silumin, Melts, 2 (1995) 3-9.



## A New Approach on 3D Scanning-Printing Technologies for Medical Applications

Ioana Nicoleta NEGRU, Monica LEBA<sup>\*</sup>, Sebastian ROSCA, Laura MARICA, Andreea IONICA

University of Petrosani, 20 Universitatii str, 332006, Petrosani, Romania

\*monicaleba@upet.ro

**Abstract**. The 3D printer is a very much discussed subject nowadays. It has many positive aspects and its purpose is to minimize costs, streamline complex processes, and shorten implementation times. From simple applications to complex systems, almost any assembly or subassembly can be reproduced using 3D printers, either based on a design or on a 3D real-world scan. Medicine is one of the domains that have turned to these devices, achieving amazing performance. 3D scanning and printing are basic elements in the development of new processes that were not possible at the moment. Thus, there are 3D molds of the external ear of the human ear, applications in the repair of the epithelium affected by certain external factors, prostheses, medical molds, and heart valves. In the present paper, we aim to explore, presenting advantages and disadvantages, existing systems for 3D scanning and designing of 3D models for printing in the field of orthopedics in order to outline a new approach on sports accidents intervention and reahabilitation.

**Keywords**: additive manufacturing, 3D molds, medical orthosis, prosthetics, sports medicine, Physical Medicine and Rehabilitation Services.

- D. K. Mills, Future Medicine: The Impact of 3D Printing, Journal of Nanomaterials & Molecular Nanotechnology, (2015).
- [2] A. Squelch, 3D printing and medical imaging, Journal of Medical Radiation Sciences, 65(3), (2018).



## Investigation of Mode II Interlaminar Fracture Toughness of Lignocellulosic Laminated Specimens – an Experimental Approach

Marius Nicolae BABA<sup>\*</sup>, Mircea MIHALCICĂ, Călin ITU, Mihaela Violeta MUNTEANU, Maria Luminița SCUTARU

Transilvania University of Brașov, B-dul Eroilor no. 29, 50036 Brașov, Romania

<sup>\*</sup>mariusbaba@unitbv.ro

**Abstract**. Mode II interlaminar fracture toughness of lignocelullosic laminated composite materials made of beech veener with urea formaldehyde resin and rye flour was investigated using the critical strain energy release rate associated with the onset of crack growth using the end loaded split specimens. The experimental data analysis was conducted by means of a mixed mode bending device using both the corrected compliance method based on linear elastic fracture mechanics principles and the area method accounting for the whole shape of load-displacement curve obtained through a complete loading-unloading cycle. The obtained results show a good agreement among the two experimental methods.

**Keywords**: lignocellulosic laminated composites, interlaminar fracture, critical strain energy release rate, end loaded split specimen.

- European Structural Integrity Society (ESIS), (1998) "Protocol for interlaminar fracture testing of composites (Mode I DCB – ISO CD 15024.2 and Mode II ELS – ESIS TC4 Version 95-11-10)", Polymers and Composites Task Group.
- [2] Hodgkinson, J.M., (2000) "Mechanical Testing of Advanced Fibre Composites", Woodhead Publishing Cambridge (UK).
- [3] Reeder, J.R., Crews, J.H., (1990) "Mixed mode bending method for delamination testing". AIAA Journal 28 (7), pp. 1270-1276.



## Machining of Thermal Sprayed Coatings – A Case Study for Self-Fluxing Powder

Cristian STESCU, Daniela CHICET<sup>\*</sup>, Corneliu MUNTEANU, Cristian CROITORU, Vlad CÂRLESCU

"Gheorghe Asachi" Technical University of Iasi, 67 D.Mangeron Blvd., 700050, Iasi, Romania

\*dchicet@tuiasi.ro

**Abstract**. In this paper we studied the possibility of mechanical processing of a coating produced by atmospheric plasma spray method from nickelbased self-fluxing powder. Two samples were realized from the same alloy type - NiCrBSiFe alloyed with WC, one of which was mechanically processed in the raw state and the other after applying the self-fluxing treatment. Subsequently, their behavior was analyzed during the mechanical processing process by monitoring the forces involved. Both the morphology of the coatings after their processing and their mechanical properties were evaluated.

Keywords: atmospheric plasma spray, machining, self-fluxing powder.

- R. Gonzalez, M. Cadenas, R. Fernandez, J L Cortizo, E. Rodriguez, Wear behaviour of flame sprayed NiCrBSi coating remelted by flame or by laser, Wear, 262 (2007) 301–307.
- [2] J. Brillo, G. Lauletta, L. Vaianella, E. Arato, D. Giuranno, R. Novakovich, E. Ricci, Surface tension of liquid Ag-Cu binary alloys, ISIJ International, 54 (2014) 2115-2119 C. Paulin, D. Chicet, V. Paleu, M. Benchea, Ş. Lupescu, C. Munteanu, Dry friction aspects of Ni-based self-fluxing flame sprayed coatings, IOP Conference Series: Materials Science and Engineering 227 (2017), Issue 1, article number 012091.



## Investigation of Thermal Coating Influence on the Fire Resistance of a Multi-layer Material

Ovidiu MOCĂNIȚA, Daniela CHICET<sup>\*</sup>, Bogdan ISTRATE, Cristian MICU, Corneliu MUNTEANU

"Gheorghe Asachi" Technical University of Iasi, 67 D.Mangeron Blvd., 700050, Iasi, Romania

\*dchicet@tuiasi.ro

**Abstract**. In modern practice, more and more multilayered materials are emerging as response to the ever-changing demands of construction beneficiaries. One of these, a fire resistant multilayer material, is studied in this article. The multilayer material was made in two variants - on support of aluminum foam, respectively ceramic foam, and a ceramic fiber plate was used for the side exposed directly to the flame. On this plate, an Al<sub>2</sub>O<sub>3</sub> ceramic coating with the role of thermal barrier was realized by atmospheric plasma spray method. His influence of was evaluated by comparing the recorded temperatures during the fire resistance tests for both the coated and the non-coated samples.

Keywords: fire resistance, thermal barrier coating, multy-layer material.

- [1] D. A. Kontogeorgos, G. K. Semitelos, I. D. Mandilaras, M. A. Founti, Experimental investigation of the fire resistance of multi-layer drywall systems incorporating Vacuum Insulation Panels and Phase Change Materials, Fire Safety Journal 81 (2016) 8–16.
- [2] O. Mocăniţa, D. Chicet, P. Avram, C. Micu, C. Munteanu, Aspects regarding the use of aluminium foams as matrix for some fire-resistant multi-layer materials, UPB Scientific Bulletin, Series B: Chemistry and Materials Science, Volume 81, Issue 1 (2019), 236-242.



## Computer-Assisted Processing for Rolling Mill Frame Reconditioning

#### Manuela-Cristina PERJU, Carmen NEJNERU<sup>\*</sup>, Mihai AXINTE, Dumitru Doru BURDUHOS-NERGIS, Traian MIRICĂ

Technical University "Gheorghe Asachi" of Iasi, Department of Technologies and Equipments for Materials Processing, Blvd. Mangeron, No. 51, 700050, Iasi, Romania

<sup>\*</sup>nejnerucarmen@yahoo.com

**Abstract**. Roll stands frames are the most important parts of a mill. This frame supports the work rolls and other devices or mechanisms that ensure lamination precision and mill productivity. The reaction forces created by metal deformation during rolling must be with stand by the frame. Therefore, when designing and executing mill frames, special attention must be paid to their mechanical properties, such as: stiffness and resistance. The roll stand frame must possess high stiffness, strength depending on the forces that will occur during rolling, but in the same time, the design must be simple and with minimal production costs. The aim of this paper is to present a computer-assisted design of a roll stand frame from a rolling mill used for cold rolling processes.

Keywords: stand, cold rolling, mill frames, computer-assisted, stiffness.

- S. Tukesh, G.R. Kesheory, Design optimization of work roll chock and backup roll chock in cold rolling mill, International Research Journal of Engineering and Technology 05 (2018) 423-427.
- [2] J. Tomczak, A. Tofil, Design and technological capabilities of a universal forging mill, Mechanik 11 (2017) 988-992.
- [3] I.G. Ghionea, CATIA V5, Aplicații în inginerie mecanică, Editura Bren, București, 2015.



## Recovery of LiCoO<sub>2</sub> Compound from Cathodic Paste of Waste LIBs, by Ultrasonography in Lactic Acid Solution

Ionuţ BRATOSIN<sup>1</sup>, Cristina-Mădălina TOMA<sup>1</sup>, Eugeniu VASILE<sup>1,\*</sup>, Valeriu-Gabriel GHICA<sup>1</sup>, Mihai BUZATU<sup>1</sup>, Mircea-Ionuţ PETRESCU<sup>1</sup>, Gheorghe IACOB<sup>1</sup>, Tunde-Anna KOVÁCS<sup>2</sup>

<sup>1</sup>University POLITEHNICA of Bucharest, 313 Spl. Independenței, Bucharest, Romania <sup>2</sup>ÓBUDA University, 1081 Budapest, Hungary

<sup>\*</sup>eugeniuvasile@yahoo.com

**Abstract**. Lithium-ion batteries (LIBs) are use in electric devices such as phones, cameras, laptops, etc. and also for electric automotive propulsion. More consumption means more amount of scrap. The wastes of LIBs contain rare and high value metals: Co (31 \$/kg), Li, Ni, Cu, AI. Many recycling processes were developed with the purpose of recovering metals contained in used batteries. This paper presents a method for separation active cathodic paste (containing LiCoO<sub>2</sub> compound) from the aluminum cathode using a solution of lactic acid and an ultrasonic bath. Cathodic paste has been detached from aluminum foils and analized by X-ray diffraction, X-ray spectroscopy (EDX), and scanning electron microscopy (SEM). The effects of operating temperature, concentration of lactic acid, the power of ultrasonic bath, on extraction efficiency were investigated.

Keywords: lithium-ion battery, recycling technology, EDX-SEM.

- [1] C.M. Toma, G.V. Ghica, M. Buzatu, M.I. Petrescu, E. Vasile, G.Iacob, A recovery process of active cathode paste from spent Li-ion batteries, IOP Conf. Ser.: Mater. Sci. Eng. 209 (2017) 1-8.
- [2] B. Huang, Z. Pan, X. Su, L. An, Recycling of lithium-ion batteries: Recent advances and perspectives, Journal of Power Sources, 399 (2018) 274-286.



## Influence of Process Parameters for Selective Laser Melting on the Roughness of 3D Printed Surfaces in Co-Cr-W Dental Alloy Powder

Andrei-Mihai BACIU<sup>1</sup>, Costica BEJINARIU<sup>2</sup>, Anisoara CORABIERU<sup>2</sup>, Elena MIHALACHE<sup>2</sup>, Margareta LUPU–POLIAC<sup>2</sup>, Constantin BACIU<sup>2\*</sup>, Elena-Raluca BACIU<sup>3</sup>

 <sup>1</sup>"S.C. Colorcontrol S.R.L, Cluj – Napoca, 25A, Orăştiei Street, Cluj – Romania
<sup>2</sup>"Gheorghe Asachi" Technical University of Iasi, 63, Dimitrie Mangeron Blvd., 700050
<sup>3</sup>"Gr. T. Popa" University of Medicine and Pharmacy of Iasi, Romania, Faculty of Dental Medicine, 16 University Street, 700115, Iasi – Romania

<sup>\*</sup>constantin\_baciu@yahoo.com

**Abstract**. Modern technologies of Additive Manufacturing type allow for the obtaining of the metal components specific to medical prosthetics in the best conditions. Selective Laser Melting (SLM) method is frequently used in dental medicine since there is an obvious trend to replace the classical casting techniques especially for non-noble Co-Cr-W alloys. According to the values of processing parameters (SLM) there will be parts having different roughness of the exterior surfaces. The conducted studies analysed the influences exercised by three process parameters (laser power – P, scan speed –  $v_{scan}$  and exposure time –  $t_e$ ) on roughness amplitude expressed by value (Ra). By combining the three distinct values adopted for each parameter we made nine sets of lamellar samples on whose non sandblasted surface, surface sandblasted once and surface sandblasted in two successive stages we carried out roughness measurements.

**Keywords**: Selective Laser Melting; parameters; roughness of 3D; dental alloy powder.

#### **References:**

[1] K.D. Sapate; U. Tejashree Apte, Metal Fabrication by Additive Manufacturing, IJCET, 7 (1) (2017).



## Heat Treatment Behavior of Alternator Shafts Steels

Dragoş-Teodor BRAN, Brandusa GHIBAN<sup>\*</sup>

University Politechnica of Bucharest, Splaiul Independenței nr. 313, sector 6,

Bucureşti, Romania

<sup>\*</sup>ghibanbrandusa@yahoo.com, dragos.bran@yahoo.com

Abstract. The present paper analyzes properties such as the hardness, the tensile and toughness begaviour and the microstructure for multiple bars of C40 and C45 steel used for shafts in alternators. The materials have been manufactured by rolling processes, followed by normalization treatments or forging processes followed by normalization treatments. Heat treatments are performed on steels to produce different microstructural phases that affect the mechanical properties. Microstructural changes during austenite decomposition depend on the transformation temperature region and cooling rate. Over the years, many experimental studies have been performed to reveal the microstructural changes during isothermal holding or continuous cooling of austenite for various kinds of steels. Each diagram (either CCT or TTT) is limited because the temperatures at which specific transformations occur can vary due to several factors, such as: the chemical composition of steel, the solid solution condition in the austenite prior to cooling and transformation, the presence of precipitates in austenite, the prior austenite grain size, and the applied stresses during the transformation.

**Keywords**:alternator shaft, carbon steel, heat treatments, TTT, CCT diagrams.

- [1] Gao, K., et al., Numerical and experimental analysis of 3D spot induction hardening of AISI 1045 steel. Journal of Materials Processing Technology, 2014. 214(11): p. 2425-2433.
- [2] Gür, C.H. and I. Cam, Comparison of magnetic Barkhausen noise and ultrasonic velocity measurements for microstructure evaluation of SAE 1040 and SAE 4140 steels. Materials Characterization, 2007. 58(5): p. 447-454.



## Influence of Surface Roughness and Current Intensity on the Adhesion of High Alloyed Steel Deposits - Obtained by Thermal Spraying in Electric Arc

**EUROINVENT** 

**ICIR 2019** 

#### Radu-Armand HARAGA, Costica BEJINARIU, Alin CAZAC, Bogdan TOMA, Constantin BACIU, Stefan-Lucian TOMA<sup>\*</sup>

"Gheorghe Asachi" Technical University of Iasi, No. 67 Prof. D. Mangeron Blvd., 700050, Iasi, Romania

\*stl\_toma@yahoo.com

**Abstract**. In this paper the surfaces of some steel samples, low alloyed, were covered by electric arc thermal spray with a steel layer, high alloyed, containing FeNiCrSiB-WC/TiC, using a core wire. In order to study the influence of process parameters on obtained deposits, the surface roughness and the intensity of electric current varied on three levels and the rest of the technological parameters were kept constant. The microstructural characteristics, chemical composition, physical and mechanical properties of the obtained deposits were investigated by SEM analysis of microhardness and by X-ray diffraction. The deposition porosity was investigated by optical microscopy. The adhesion of the layers was investigated by the traction test.

Keywords: thermal spray, surface roughness, adhesion.

- [1] St.L. Toma, C. Bejinariu, R. Baciu, S. Radu, The effect of fron. nozzle geom. and gas pres. on the steel coat., Surf & Coat. Technol. 220 (2013) 266–270.
- [2] D.E. Crawmer, in: J.R. Davis (Ed.), Handbook of Thermal Spray Technology, ASM International, 2004, p. 54.



## Metakaolin - Waste Glass Geopolymers. The Influence of Hardening Conditions on Mechanical Performances

**EUROINVENT** 

**ICIR 2019** 

Andreea Mihaela MONCEA<sup>1</sup>, Ana-Maria PANAIT<sup>1,\*</sup>, Florina Diana DUMITRU<sup>1</sup>, Andreea Georgiana BARAITARU<sup>1</sup>, Marius Viorel Olteanu<sup>1</sup>, Gyorgy Deák<sup>1</sup>, Mădălina BOBOC<sup>1,2</sup>, Silvius STANCIU<sup>2</sup>

 <sup>1</sup>National Institute for Research and Development in Environmental Protection Bucharest, Splaiul Independentei 294, Bucharest, Romania
<sup>2</sup> Dunarea de Jos University of Galati, Romania, Domnească Street, 47, RO-800008, Galati, Romania

<sup>\*</sup>anamaria.moncea@gmail.com

Abstract. The development of new ecological materials for the construction field represents a sustainable solution for waste management as long as their properties are comparable with those of traditional materials in terms of strengths, durability, corrosion resistance etc. Considering the large amount of glass wastes that are generated (e.g. technical waste glass derived from industrial activities) a sustainable approach is to recycle them in new products. To this purpose, metakaolin-waste glass geopolymers were obtained by using 10% technical glass powder and 90% metakaolin, activated with an alkaline solution of NaOH 12M. After 24 hours of hardening in certain conditions (in covered moulds at room temperature) the geopolymer specimens were subjected to thermal treatments at temperatures up to 600°C, in order to establish the influence of hardening conditions on mechanical performances. The transformations which occur in the geopolymer matrix during the hardening process were studied by thermal analyses and x-ray diffraction. The results showed that the 10% waste glass addition along with a higher treatment temperature improve the mechanical resistance.

Keywords: geopolymers, waste glass, mechanical performances.



## Experimental Research on Reconditioning Transmision Axes by MAG Robotic Welding

Ion-Aurel PERIANU<sup>\*</sup>, Emilia Florina BINCHICIU, Nicușor-Alin SÎRBU, Aurel Valentin BÎRDEANU

National Institute in Welding and Material Testing - ISIM Timisoara, blv. Mihai Viteazu no.30, 300222, Timisoara, Romania

<sup>\*</sup>aperianu@isim.ro

**Abstract**. Research carried out aimed to repair through MAG welding, highstrength transmission axes - AISI 4030 - used in the structure of public transport; applying as addition material wire type G 69 4 M Mn3Ni1CrMo according to EN ISO 16834-A, with suitable characteristics for fatigue, resiliency and torsion.

The experimental program was structured in three stages, the first, was the assessment of the damaged shaft, the crack, hardness tests, sclerometric analysis, as well as assessing the weld, performed inappropriately, on a previous repair. The second, to determine the welding technology and test its fiability; and the third, to develop welding technology for layer deposition through an experimental program and applied welding technology.

Results of resilience and sclerometric tests are according to industrial specifications for the welding compatibility of base materials, which is deposited by robotic MAG process.

Keywords: GMAW, high strenth steel, repair, tram shafts.

#### **References:**

[1] D. Arsi'c, V. Lazi'c, S. Aleksandrovi'c, R.R. Nikoli'c & B. Hadzima -Reparation of the fractured mandrel axle-shaft by welding, Advances and Trends in Engineering Sciences and Technologies – Al Ali & Platko (Eds) © 2016 Taylor & Francis Group, London, 978-1-138-02907-1.



# Electrochemical Behaviour of Ti-based Alloys for Medical Application

Andrei Victor SANDU<sup>1,2</sup>, Petrica VIZUREANU<sup>1,2,\*</sup>, Victoras GEANTA<sup>3</sup>, Ionelia VOICULESCU<sup>3</sup>, Radu STEFANOIU<sup>3</sup>

<sup>1</sup>"Gheorghe Asachi" Technical University of Iasi, Faculty of Materials Science and Engineering, 41 "D. Mangeron" Street, 700050, Iasi, Romania <sup>2</sup>Centre of Excellence Geopolymer & Green Technology School of Materials Engineering, University Malaysia Perlis, Kompleks Pengajian Jejawi 2, 02600 Arau. <sup>3</sup>University Politehnica of Bucharest, 313 Splaiul Independentei, 060042, Bucharest, Romania

\*peviz2002@yahoo.com

**Abstract.** Nowadays, primordial concern represent population health with all materials that are used in medical applications. It were obtained three alloys of titanium with addition of elements like molybdenum and silicon, in a vacuum arc melting furnace (VAR), in argon atmosphere. These alloys were evaluated in solutions similar with to the human body. Results revealed that it possesses a good behavior which does not influence the human body, with future applications in medical field.

Keywords: Ti-Mo-Si alloys, corrosion resistance, medical application.

#### **References:**

- [1] Bălţatu M.S., Vizureanu P., Cimpoeşu R., Abdullah M.M.A.B., Sandu A.V., The Corrosion Behavior of TiMoZrTa Alloys Used for Medical Applications, Revista de Chimie, vol. 67, nr. 10, 2016, p. 2100-2002.
- [2] Oliveira NT.C., Guastaldi A.C., Electrochemical stability and corrosion resistance of Ti–Mo alloys for biomedical applications, Acta Biomaterialia 5, 2009, p. 399–405.

**Acknowledgements:** This work was supported by a grant of the Romanian Ministry of Research and Innovation, CCCDI – UEFISCDI, project number PN-III-P1-1.2-PCCDI-2017-0239 / 60PCCDI 2018 , within PNCDI III.



**EUROINVENT** 

**ICIR 2019** 

Ayu Wazira AZHARI<sup>1,2,\*</sup>, Nurdini Md NORDIN<sup>1</sup>, Dewi Suriyani Che HALIN<sup>2</sup>, Uda HASHIM<sup>3</sup>

<sup>1</sup>Water Research Group (WAREG), School of Environmental Engineering, Universiti Malaysia Perlis 02600 Arau, Perlis, Malaysia <sup>2</sup>Center of Excellence Geopolymer & Green Technology (CEGeoGTech) School of Material Engineering, Universiti Malaysia Perlis 02600 Arau, Perlis, Malaysia <sup>3</sup>Institute of Nano Electronic Engineering, Universiti Malaysia Perlis, Malaysia

<sup>\*</sup>ayuwazira@unimap.edu.my

**Abstract**. In this study, statistical analysis using Taguchi's method was used to investigate the effects of various process parameters involved in metal assisted chemical etching (MACE) of silicon. The process parameters that include etching time and various etchant concentration were selected and visualized in Taguchi modeling. Each response was then characterized using field emission scanning electron microscopy (FESEM). All data was then analyzed and evaluated using ANOVA and graph modelling in order to visualize the interaction of each model. The ANOVA results show that for etching rate, size and separation of Si nanowires, the p-values was less than 0.05 implies that the model is significant.

**Keywords**: Taguchi design, Design of Experiment, metal assisted chemical etching, Si nanowire.

#### **References:**

 A.Ghafarinazari, M. Mozafari, Systematic study on metal assisted chemical etching on high aspect ratio silicon nanostructure. Science Direct, (2014) 442-448.



## Graphitization of Oil Palm Trunk Waste at Lower Heating Temperature

Norizah Abdul KARIM<sup>1,2,\*</sup>, Muhammad M. RAMLI<sup>2,3</sup>, Andrei Victor SANDU<sup>2,4</sup>, Elena CHIRILA<sup>4</sup>, Che Mohd Ruzaidi GHAZALI<sup>2,5</sup>

 <sup>1</sup>Faculty of Engineering Technology, Universiti Malaysia Perlis
<sup>2</sup>Center of Excellence Geopolymer and Green Technology, School of Materials Engineering, Universiti Malaysia Perlis (UniMAP), Perlis, Malaysia.
<sup>3</sup>School of Microelectronic Engineering, Universiti Malaysia Perlis
<sup>4</sup> Gheorghe Asachi Technical University of Iasi, Faculty of Materials Science and Engineering, 41 D. Mangeron Blvd., Iasi, Romania
<sup>5</sup>School of Fundamental Science, Universiti Malaysia Terengganu, Terengganu, Malaysia

<sup>\*</sup>izahkarim87@gmail.com

**Abstract**. Previously synthetic graphite was produced under higher temperature above  $2500^{\circ}$ C in complex processing method, which bear the name of the scientist whose discover the synthetic graphite namely "Acheson Process". However, via pyrolysis process, in controlled heating condition, and specific heating rate by utilizing oil palm trunk waste, synthetic graphite were manage to produce at much lower heating temperature. In this research, the heating temperature was varied in the range of  $500^{\circ}$ C,  $800^{\circ}$ C, and  $1000^{\circ}$ C. The heating treatment, the samples were characterized by using X-ray Diffraction (XRD) and analysed by using X'Pert Highscore Plus software. Graphitic nature of the synthetic graphite produced was further supported by RAMAN analysis. The morphological study was carried out by using Scanning Electron Microscope (SEM). Based on the analysis, optimum processing parameters was optimized. It is at the temperature of 800°C and at the heating rate of  $20^{\circ}$ /min.

#### **References:**

 M. S. Umar, P. Jennings, and T. Urmee, "Strengthening the palm oil biomass Renewable Energy industry in Malaysia," Renew. Energy, vol. 60, pp. 107–115, 2013.



## Electrochemical Behavior of Reinforcing Steel Bar under Influence of Aggressive Ions

### Rohaya Abdul MALEK<sup>\*</sup>

Center of Excellent Geopolymer and Green Technology, School of Materials Engineering, Kompleks Pengajian Jejawi 2, Taman Muhibbah, 02600 Jejawi Arau, Malaysia

<sup>\*</sup>rohayamalek@unimap.edu.my

Abstract. One of the most important cases of deterioration of reinforced concrete structure was due to corrosion of reinforcing steel bar. Instead of penetration of aggressive ions for example chlorides, sulfates, acids and others; the selection of materials used for casting or repair; and the casting process should be concern as well. Due to this factor, the understanding on the electrochemical behavior of reinforcing steel bar using different materials for repairing for deteriorated concrete structures will be considered. To reveal this phenomenon, the ready-cast specimens mixed with chloride as prepared earlier will be demolished at 301 days of concrete age. The chemical and morphology factors related to corrosion products were quantitatively identified and correlated it usina electrochemical measurements results. For corroding reinforcing steel bar by fully and partially influenced of chloride ions, the corrosion products were mainly contained wuestite, magnetite and lepidocrocite confirmed by XRD patterns.

**Keywords**: brazing, solder, copper, silver, liquid metal properties, kinematic viscosity, temperature dependence, isotherm.

- [1] D. A. Koleva, J. Hu, A. L. A. Fraaij, P. Stroeven, N. Boshkov, and J. H. W. de Wit, "Quantitative characterisation of steel/cement paste interface microstructure and corrosion phenomena in mortars suffering from chloride attack," Corros. Sci., vol. 48, no. 12, pp. 4001–4019, Dec. 2006.
- [2] L. Courard, T. Piotrowski, and A. Garbacz, "Near-to-surface properties affecting bond strength in concrete repair," Cem. Concr. Compos., vol. 46, pp. 73–80, 2014.



## Willing of Public to Purchase and Understanding Pedestrian AEB System in Malaysia

Ahmad Raziqin RAZAOB<sup>1</sup>, Mohd Radzi Abu MANSOR<sup>1</sup>\*, Nor Kamaliana KHAMIS<sup>1</sup>, Khairil Anwar Abu KASSIM<sup>2</sup>

<sup>1</sup>Department of Mechanical Engineering, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Malaysia <sup>2</sup>ASEAN NCAP, Taman Kajang Sentral, 43000 Kajang, Malaysia

\*radzi@ukm.edu.my

Abstract. Automated Emergency Brake (AEB) is a vehicle safety technology which has the potential to prevent a crash or reduce the impact speed of a crash. The technology can alert a driver to an imminent crash and help them use the maximum braking capacity of the car. AEB comes in three categories namely low speed, higher speed and pedestrian system. The pedestrian AEB system detects pedestrian movement in relation to the path of the vehicle to determine the risk of collision. AEB systems are designed to support the driver only in emergency situations and that the driver remains responsible for the vehicle at all times. The main aim of this study is to determine understanding of citizen in Malay-sia and their willingness-to-pay for pedestrian AEB system to fit in their vehicle. The result of this research will find the willingness of Ma-laysia citizen to purchase with affordable range price of pedestrian AEB system and their understanding it function and the importance of this system nowadays. From this study, it can encourage car manufacturers in Malaysia to produce vehicles that fitted with pedestrian AEB system on their car as standard of ASEAN NCAP in the future.

Keywords: Automated emergency brake (AEB); pedestrian; willing-to-pay.

#### **References:**

[1] K.A.A. Kassim, Y. Ahmad, S. Mustaffa, M.R.A. Mansor, The New Car Assessment Program for Southeast Asian Country (ASEAN NCAP) Roadmap 2021-2025 (2018) 1-28.



## Optimization of *Brucea javanica* Seeds Oil Extraction Process Parameters Using Response Surface Methodology (RSM)

Khalil HASNI, Zul ILHAM<sup>\*</sup>

Biomass Energy Lab, Institute of Biological Sciences, Faculty of Science, University of Malaya 50603 Kuala Lumpur, Malaysia

<sup>\*</sup>ilham@um.edu.my

**Abstract**. The aim of study was to optimize soxhlet oil extraction process for extraction of oil from *Brucea javanica* seeds and explore its different applications. The extraction parameters were optimized using surface response methodology (RSM) based on Box-Behnken experimental design. Properties of the *Brucea javanica* oil (BJO) was checked along with GCMS and FTIR analysis. GCMS analysis indicated the presence of important fatty acid in the BJO and FTIR suggested the presence of core functional groups in BJO. Quadratic model was used to analyse the results obtained from the optimised experimental design. ANOVA of developed model showed good presentation of model with  $R^2$  value of 0.9078. Similarly, it was discovered that the model and all its terms were significant because their probability values (p-values) were discovered to be less than 0.05. The design of experiment showed a highest yield of 44.89 % at 75  $^{\circ}$ C, 6 hour extraction time and hexane 425ml.

**Keywords**: *Brucea javanica* oil, Response Surface Methodology, Box-Behnken Experimental Design, Seeds Oils, Soxhlet Apparatus.



## **SECTION 3**

## **MATERIALS APPLICATION**

## Development and Justification of Optical Device for Contactless Measurement of the Displacements of Control Object Surfaces

### Igor MIROSHNICHENKO<sup>1,\*</sup>, Ivan PARINOV<sup>2</sup>

<sup>1</sup>Don State Technical University, 1 Gagarin Square, 344000, Rostov-on-Don, Russia

<sup>2</sup>Southern Federal University, 105/42 Bolshaya Sadovaya str., 344006, Rostov-on-Don, Russia

ipmir2011@yandex.ru

**Abstract**. The results of the development and computational-experimental justification of optical device for contactless measurement of the displacements of control object surfaces by using a laser interferometer are described. The proposed device allows solving actual measurement problems by diagnosing the state of structural materials and researching the strength properties of structures in mechanical engineering, aircraft building, shipbuilding, etc.

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

- [1] I.P. Miroshnichenko, I.A. Parinov Scientific Ground of a New Optical Device for Contactless Measurement of the Small Spatial Displacements of Control Object Surfaces, IOP Conference Series: Materials Science and Engineering, 209 (2017).
- [2] I.P. Miroshnichenko, I.A. Parinov Development of a Optical Measuring Set-Up, IOP Conference Series: Materials Science and Engineering, 374 (2018).
- [3] I.P. Miroshnichenko, I.A. Parinov On Increasing Quality of Measurement Results at Testing State of Construction Materials, Advances in Structural Integrity. Proceedings of SICE 2016. Springer Singapore: Springer Nature Singapore Pte Ltd. (2018) 663-671.



## The Application Kit Increase Torque in the Diesel Engine by Applied Ionic Energy

Siseerot KETKAEW<sup>\*</sup>

Ramkhamhaeng University, Ramkhamhaeng street, 10240, Huamark, Bangkapi, Bangkok, Thailand

\*siseerot@hotmail.com

Abstract. This research presents the application kit for increase torque in the diesel engine by applied ionic energy using high voltage power supply which relies on the principle of mini converter using the IC number SG3525 as the pulse signal generator and adjusting the duty cycle at 10 percent, 20 percent and 30 percent. By maintaining the switching frequency at 20 kHz to drive the power MOSFET number IRF710 to work to control the operation of the high frequency high voltage switching transformer#TLF4T98001 to obtain a high voltage voltage greater than or equal to 1 kVp, using a load cell as an electrode for changing other gases In the air is oxygen gas and then put into the air intake pipe well to increase the amount of oxygen which will make the combustion in the engine room better. The test result is when the duty cycle is increased will increase the high voltage and will increase the reaction in the electrolyte cells respectively which, when testing the torque measurements while connecting the electrodes will see that the duty cycle at 30 percent has the highest voltage which causes the highest reaction. Thus resulting in the highest amount of oxygen resulting in the highest torque of the engine compared to the torque of the engine that has not yet been connected to the electrodes.

Keywords: ionic, diesel engine, torque, high voltage, switching.

- C., G, High-Frequency Switching Power Supplies-Theory and Design, New York, McGraw – Hill, (1989).
- [2] K.D, Power Semiconductor Controller drive, Prentice Hall, (1989).
- [3] R., M. H, Power Electronics Circuit Devices and Application, Prentice Hall International, (1988).



# Microencapsulated PCMs for Thermal Energy Storage in the Range 300-500°C: Pilot-Testing

Albert Ioan TUDOR<sup>1</sup>, Ciprian NEAGOE<sup>1</sup>, Radu Robert PITICESCU<sup>1,\*</sup>, Maria Dolores ROMERO-SANCHEZ<sup>1,2</sup>

<sup>1</sup>National R&D Institute for Nonferrous and Rare Metals, Bd. Biruintei 102, Pantelimonllfov, Romania <sup>2</sup>Applynano Solutions S.L., San Vicente del Raspeig s/n, 03690, Alicante, Spain

<sup>\*</sup>rpiticescu@imnr.ro

**Abstract**. Phase Change Materials (PCM) became one of the most interesting research direction toward improving the use of concentrated solar power plants. Different methods were proposed to increase storage capacity as a result of the encapsulation protection and efficient thermal energy storage with high operating temperature. Here we present a soft chemical process to encapsulate inorganic KNO<sub>3</sub>-NaNO<sub>3</sub> as PCM system using nanostructured ZnOshell materials, based on hydrothermal synthesis followed by spray drying and their thermal conductivity measurements are discussed.

**Keywords**: PCM, micro-encapsulation, inorganic, thermal diffusivity, thermal conductivity, design of micro-pilot measurement system.

#### References:

[1] A. I. Tudor, A. M. Motoc, C.F. Ciobota, D. N. Ciobota, R. R. Piticescu, M.D. Romero-Sanchez, SolvothermalMethod as а Green of Chemistrysolution for micro-encapsulation PCMs for hightemperaturethermalenergystorage, Manufacturing Review 5. (2018)1-10.

**Acknowledgments:** Financial support from MCI, POC 2014-2020 Program, contract 93/09.09.2016 ENERHIGH and the grant financedby RDI Programe for Space Technology andAvancedResearch–ROSA STAR, projectnumber 528-ANDROTECH.



## IoT-based Foucault Pendulum Automation and Oscillation Amplitude Control

Daniel MATASARU<sup>1,\*</sup>, Luminita SCRIPCARIU<sup>1</sup>, Antonio MOLES<sup>2</sup>, Francesco GAMBINO<sup>2</sup>

<sup>1</sup>Technical University "Gheorghe Asachi" of Iasi, Bd. D. Mangeron 67, Iasi, Romania <sup>2</sup>Universita degli Studi di Palermo, Piazza Marina, 61, 90133 - Palermo, Italia

<sup>\*</sup>dmatasaru@etti.tuiasi.ro

Abstract. The Foucault Pendulum was invented in 1851 by Leon Foucault, in order to demonstrate the theory of Earth rotation. The aim of this Erasmus+ student project is to design a small Foucault pendulum that is able to continuously oscillate with the help of an actuator that does not affect its relative rotation in respect to the Earth, the so-called Coriolis force. The causes of not achieving a constant amplitude movement are the loss of energy mainly due to the resistance force acting on the pendulum, on the bending cable and the frictional losses at the point of suspension. Therefore, such a system should be designed to minimize energy consumption and maximize oscillation time. To do this, a Faraday force generated by a coil driven by a micro-controller and a sensor at the pendulum rest point to calculate the oscillation period are used, creating a micro-smart-system that later on could be connected to an other devices such as a computer, a mobile phone etc, thus to the Internet of Things. Furthermore, the pendulum should be self-initiated with a little disturbance and absorb any disturbance on its own.

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

#### **References:**

 L. Foucault, Demonstration physique du mouvement de rotation de la terre au moyen du pendule, C. r. hebd. seances Acad. sci. Paris Volume: 32 (1851) 135-138.



## Development of Electric Charge Generator by Applied Pulse High Intensity Electric Field

#### Siseerot KETKAEW\*

Ramkhamhaeng University, Ramkhamhaeng street, 10240, Huamark, Bangkapi, Bangkok, Thailand

\*siseerot@hotmail.com

Abstract. This research presents the development of electric charge generator by applied pulse high intensity electric field. The power supply based on flyback converter comprises of a pulse generator using IC#TL494 on the output high voltage adjustment by switching frequency adjustment at 50 Hz by using IC#TLP250 for ground isolator and signal expanding to Power MOSFET#IRFP450 driving to control high voltage transformer to generate 1 kV, 2 kV and 3 kV by using electrode cell (high intensity non-uniform electric field cell) for generate electric charge. The results showed that, when the adjustable high voltage increases the intensity of electric field, resulting in increased production of electric charge and increased respectively. The testing of electric charge quantity measuring will observation at high voltage 1 kV electric field intensity equal 5 kV/cm enables generate electric charge +1.25 kV and -1.19 kV, high voltage 2 kV electric field intensity equal 10 kV/cm enables generate electric charge +2.17 kV and -2.33 kV and high voltage 3 kV electric field intensity equal 15 kV/cm enables generate electric charge +3.37 kV and -3.15 kV. The developed in this research are design and develop of circuit generate pulse high voltage can produce positive and negative high voltage waveforms. By the power to the electric field cell by the principle of high non-uniform electric field (high intensity electric field) for application. The guidelines of the this development will make the quantity of electric charge can produce both positive and negative electric charge are more quantity than the original. Therefore, this research can develop an applied research industry and innovation for commercial in the future.

Keywords: electric charge generator, electric field, flyback converter.

#### **References:**

[1] S. Dan, 1994, Switching power supply techniques and design, Entel Thai Company Limited.



## A Research on the New Type Solar Water Heating Tank with Energy Saving

## Chun-Te LEE<sup>\*</sup>

Department of Leisure and Sports management, Cheng Shiu, Taiwan

<sup>\*</sup>charter@gcloud.csu.edu.tw

**Abstract**. Taiwan is a country with quite adequate amount of sunlight; even at the northern highlands solar-powered water heater will still be usable. However, the first-generation conventional storage water heater and the second-generation improved storage water heater design are not an idea. When hot water is being used, the tank refills itself with cold water, and, thus, resulting in the decrease of water temperature inside tank. This will cause the heater to have an additional heating cycle, also to increase consumption of energy sources. As for the disadvantage of the secondgeneration storage water heater, we have designed the third generation storage water heater, the smart solar water heating tank with a movable "partition disk" inside the tank, to improve and effectively resolve problem of mixing hot and cold water so that the hot water can be fully utilized. And the result is the usage of hot water being twice more efficient than the firstgeneration conventional design, and 1.6 times more than the second generation improved design.

Keywords: Carbon Reduction, Solar Energy, water- heating tank.

- [1] J. K. Chin, L. T. Sheng, J. Guang Min, "Subsidy Programs on Diffusion of Solar Water Heaters in Taiwan," Renewable Energy 2010.
- [2] O. W. Wen Sheng, H. M. Jin, C. R. Ling, C. J. Fu, L. S. Chi, "Taiwan solar design studies use standard insolation," Architecture, vol. 64, (2008) 103-118.

## Study to Achieving a Class of Road Concrete with Slag Powder Addition at the Cement Mass and Substitution with Artificial Aggregates

**EUROINVENT** 

**ICIR 2019** 

Liliana Maria NICULA<sup>1</sup>, Ofelia CORBU<sup>1,2,3,\*</sup>, Mihai ILIESCU<sup>1</sup>

 <sup>1</sup> Faculty of Civil Engineering, Technical University of Cluj-Napoca, 28, Memorandumului Street, 400114 Cluj-Napoca, Romania
<sup>2</sup> Research Institute for Construction Equipment and Technology,
ICECON S.A. Bucharest, 266, Pantelimon Road, 2nd District, postal code 021652, CP 3-33, icecon@icecon.ro
<sup>3</sup> Center of Excellence Geopolymer & Green Technology (CEGeoGTech), School of Materials Engineering, Universiti Malaysia Perlis, 01000 Kangar, Perlis, Malaysia

<sup>\*</sup>corbu.ofelia@staff.utcluj.ro

**Abstract**. In order to notice the influence of slag in the form of powder used as an addition to the cement mass and the substitution of natural aggregates with artificial aggregates from crushed and sorted slag, first of all, mixtures of mortars were made for a reduced volume of material. In the mixes design of new road concrete, we have taken into account the results obtained on the most representative mortar mixes. We chose mixtures of mortar with 15% addition of slag powder in the cement mass and those in which the 0/4 mm natural aggregate was substituted in a ratio of 20%, 40%, and 60% with artificial aggregates of crushed and sorted slag from the by-products stockpiles resulting from the process of obtaining the cast iron in the furnaces. The intended objective is to obtain a BcR 5.0 road concrete class that can be used in all categories of traffic. From the results obtained on mortar and concrete mixtures, it can be seen that compressive strengths and flexural tensile strengths remain close both in mortars and in concretes.

Keywords: artificial, slag powder, flexural strengths, compressive strengths.

#### **References:**

 A. Aghaeipour, M. Madhkhan, Effect of ground granulated blast furnace slag (GGBFS) on RCCP durability Construction and Building Materials 141 (2017) 533–541.



## Disinfection Apparatus for Rice Germ and Packaging Room

#### Siseerot KETKAEW\*

Ramkhamhaeng University, Ramkhamhaeng street, 10240, Huamark, Bangkapi, Bangkok, Thailand

\*siseerot@hotmail.com

**Abstract**. This paper presents the design and construction of disinfection apparatus for rice germ and packaging room by ripple pluse corona energy using adjust electric field intensity. Using flyback converter principle and controlling of the switching by IC#SG3526. The flyback converter is designed to operate at 20-25 kHz frequency through a DC high voltage high frequency transformer at output voltage of 1 kV to 5 kV, and at the input voltage of 24 V<sub>AC</sub>, By adapting the stainless tips between aluminium net in electrode cell set , one - hour operating yields the ozone gas (O<sub>3</sub>) generating capacity of 2.5 ppm to 5.5 ppm and at 3.7 ppm enables enables eliminate diseases in rice germ and packaging room. In the future can be developed apparatus in the commercial of Thailand 4.0.

Keywords: ozone, flyback converter, electric field, rice germ, packaging room.

- S. Ketkaew, Ozone generator by using corona rays for treating musty odors, Electrical Engineering Network Conference Rajamangala University of Technology 4<sup>th</sup> Annual (2012) 617-620.
- [2] S. Ketkaew, Plasma Ozonizer Using Micro-Converter for Ammonia (NH<sub>3</sub>) Decreasing in Shrimp Food Production. Procedia Engineering 32 (2012) 148-154.
- [3] S. Ketkaew, Development of Corona Ozonizer Using High Voltage Controlling of Produce Ozone Gas for Cleaning in Cage, Modern Environmental Science and Engineering (ISSN 2333-2581), Academic Star Publishing Company, Vol.3, No.7 (2017) 505-509.



## Behavior of Electrical Insulated Materials the Requirement for Ensuring the Conformity of the Electrical Insulated Work Equipment

Georgeta BUICĂ<sup>1,\*</sup>, Anca Elena ANTONOV<sup>1</sup>, Constantin BEIU<sup>1</sup>, Remus DOBRA<sup>2</sup>, Mircea RISTEIU<sup>2</sup>

<sup>1</sup>National Research and Development Institute for Labor Protection "AI. Darabont", Bucharest, Blvd. Ghencea no. 35A, sect. 6, România <sup>2</sup> "1 Decembrie 1918" University, Gabriel Bethlen Str. No. 5, 510009, Alba Iulia, Romania

gbuica@protectiamuncii.ro

**Abstract**. Electrical Insulated tubes are the main components of electrical Insulated poles and other electrical protection equipment used in electrical installations. The study presents the results of the research on identifying the technical and safety requirements for hollowed or foam-filled electrical Insulated tubes. For identifying the technical and safety requirements specific to the electrical Insulated tubes, once took into account the safety requirements for protective equipment in which they are to be fitted, as well as the results of the analysis and the assessments of their behavior in use. The research study shows the behavior of the various electrical Insulated materials, under the influence of mechanical, electrical, thermal and environmental factors, in order to verify and certify the safety functions of electrical Insulated tubes, which have to be guaranted in use.

Keywords: electrical insulated tubes, electrical risk, mechanical risk.

- [1] Buică G., Management of electrical equipment and protective devices used in electrical installations, SIMPRO 2018, 263 268.
- [2] INCDPM, Guide for the application of GD No.1146/2006 regarding the minimum safety and health requirements for the use of work equipment by workers (in Romanian), National Institute of Research and Development for Occupational Safety Alexandru Darabont, Bucharest.



## Co-based Magnetic Nanostructured Material for High Frequency Applications

Mirela Maria CODESCU<sup>\*</sup>, Elena CHIŢANU, Delia PĂTROI, Eugen MANTA, Jana PINTEA

R-D National Institute for Electrical Engineering ICPE-CA, 313 Splaiul Unirii, 300138, Bucharest, România

<sup>\*</sup>mirela.codescu@icpe-ca.ro

Abstract. The RF circuits are difficult to miniaturize without compromises concerning the technical performances. The inductors and antennas are the major constraints for systems miniaturization, due to the lack of magnetic materials with adequate high frequency properties. The paper presents novel Co-based magnetic nanostructured materials, with improved characteristics which recommend them as potential candidates for transformers and inductors in electronic components: ligher level for saturation magnetisation and electric resistivity in comparison with commercial ferrites. The magnetic nanocomposites are prepared by sol-gel route and consist on Co magnetic nanocrystallites, arranged in a crystalline matrix (silicates, for example). The main physical characteristics of the Co/SiO<sub>2</sub> nanopowders are developed after appropriate calcination and annealing, being dependent on the SiO<sub>2</sub> amount and on the thermal treatment parameters: saturation magnetisation  $M_s = 95 - 175 \text{ emu/g}$ , coercivity  $H_c = 21.7 - 26.9 \text{ kA/m}$  (273 - 338 Oe) and increased resistivities for the sintered samples, due to the presence of the SiO<sub>2</sub> layers.

**Keywords**: soft magnetic nanocomposites, electrically insulated nanopowders, Co/SiO<sub>2</sub> nanoparticles.

- M. Wu, Y. Zhang, S. Ge, G. W. Taylor, Microwave magnetic properties of Co<sub>50</sub>/(SiO<sub>2</sub>)<sub>50</sub> nanoparticles, Applied Physics Letter, 80, 23, 2002, 4404 - 4406.
- [2] N. J. Tang, W. Zhong, X. L. Wu, H. Y.Jiang, W. Liu, Y. W. Du, Synthesis and complex permeability of Co/SiO<sub>2</sub> nanocomposites, Materials Letters, 59, 14- 15, 2005, 1723-1726.



## Biotechnologies used in Wastewater Treatment

#### Ioana Corina MOGA<sup>\*</sup>, Gabriel PETRESCU, Gabriel ANGHELACHE, Alexandra Georgiana PANTAZI, Bogdan Iulian DOROFTEI

DFR Systems SRL, 46 Drumul Taberei str., 061392, Bucuresti, Romania

<sup>\*</sup>corinamoga@yahoo.com

**Abstract**. One of the most efficient biological wastewater treatment process is based on the biofilm carriers utilization, on which the microorganisms attaches to form biofilm communities. The biological technology that used artificial mobile supports is known as the Moving Bed Biofilm Reactor (MBBR) process. The micoorganisms needed in wastewater treatment require hydrophilic substrates. To promote biofilm formation and development, the chemical nature of the biofilm carriers should be carefully selected. The majority of the biofilm carriers are made from polyethylene. This material has hydrophobic properties. The authors propose a new material with more hydrophilic properties. Talcum is combined with polyethylene resulting a more hydrophilic material. The results regarding the biofilm adhesion on the new material are presented by the authors.

**Keywords**: moving bed bofilm reactor, biofilm carriers, wastewater treatment, microorganism, aeration, carbon compounds removal.

- [1] A. Nowak, R. Mazur, E. Panek, E. Dacewicz, K. Chmielowski, Treatment efficiency of fish processing wastewater in different types of biological reactors, Physics and Chemistry of the Earth, Parts A/B/C, 109 (2018) 40-48.
- [2] L. Yang, H.Q. Li, P. Yang, Evaluation of different structures of moving bed biofilm reactors (MBBR) for synthetic wastewater treatment, IOP Conference Series: Earth and Environmental Science, 167(1) (2018) 012009.



## Imposed Technical Requirements and Materials Used in Manufacture of Firefighter Gloves

**EUROINVENT** 

**ICIR 2019** 

#### Constantin ARVINTE, Andrei-Victor SANDU, Dumitru-Doru BURDUHOS-NERGIS, Mihai-Adrian BERNEVIG-SAVA, Costica BEJINARIU<sup>\*</sup>

"Gheorghe Asachi" Technical University of Iaşi, 67 Dimitrie Mangeron Street, Iaşi, Romania

<sup>\*</sup>costica.bejinariu@tuiasi.ro

**Abstract**. Ensuring the safety of the operational personnel involved in the intervention actions is a priority for the institutions responsible for the prevention and management of the emergency situations, that's why special attention is paid to the protective performances of the individual protective equipment used. The safety and health of rescuers depend on how the materials used in the manufacture of protective equipment for the action of risk factors behave. This paper presents the conditions that fire protective features that ensure the safety of users.

Keywords: firefighter gloves, material, protection capability, safety.

- V. Blascu, 2007, Fibre textile cu destinații speciale și înalt performante, Ed. Performantica, București.
- [2] EN 659:2003+A1:2008, Protective gloves for firefighters.



## Considerations on the Surface Roughness of SLM Processed Metal Parts and the Effects of Subsequent Sandblasting

**EUROINVENT** 

**ICIR 2019** 

#### Mihai-Adrian BERNEVIG-SAVA<sup>1</sup>, Ciprian STAMATE<sup>1</sup>, Nicoleta-Monica LOHAN<sup>1</sup>, Andrei-Mihai BACIU<sup>2</sup>, Constantin BACIU<sup>1,\*</sup>, Ioan POSTOLACHE<sup>1</sup>, Elena-Raluca BACIU<sup>3</sup>

 <sup>1</sup>"Gheorghe Asachi" Technical University of Iasi, 67, Dimitrie Mangeron Str., 700050
<sup>2</sup>"S.C. Colorcontrol S.R.L, Cluj – Napoca, 25A, Orăștiei Street, Cluj – Romania
<sup>3</sup>"Gr. T. Popa" University of Medicine and Pharmacy of Iasi, Romania, Faculty of Dental Medicine, 16 University Street, 700115, Iasi – Romania

<sup>\*</sup>constantin\_baciu@yahoo.com

**Abstract**. Selective Laser Melting is an Additive Manufacturing technology based on 3D scanning of successive layers of metal powder. Three distinct values were determined for each of the three technological parameters (P – the power of the laser,  $V_{scan}$  – scanning speed and  $t_e$  – exposure time), therefore resulting nine sets for the "layer by layer" processing. After SLM processing, the samples were sandblasted simply (1S), sandblasted successively (2S), or left unsandblasted (NS). The roughness (Ra) of the outer surfaces was measured for all the samples, and there was found a decrease in the height of the micro-irregularities and the uniformization of the roughness profile along with the intensification of the sandblasting process.

Keywords: Co-Cr-W, dental alloy, Selective Laser Melting, roughness.

- [1] C.Y. Yap; C.K. Chua; Z.L. Dong; Z.H. Liu; D.Q. Zhang; L.E. Loh; S.L. Sing, Review of selective laser melting: Materials and applications, Appl Phys Rev, 2(4), 041101 (2015).
- [2] Qin, Q.; Chen, G.X. Effects of parameters on surface roughness of metal parts by selective laser melting. Adv. Mater. Res., 872 (2014) 834–836.



## Electrical and Thermal Characteristics of Nitinol Wires for Linear Heat Detectors

Cristian-Andrei MICU, Monica Nicoleta LOHAN, Paul CIUBOTARIU-ANA, Costin-Ovidiu MOCANITA, Mihai DUMITRU, Costica BEJINARIU<sup>\*</sup>

"Gheorghe Asachi" Technical University of Iaşi, 67 Dimitrie Mangeron Blvd., Iaşi, Romania

<sup>\*</sup>costica.bejinariu@tuiasi.ro

**Abstract**. In this work were investigated the modifications of electrical and thermal properties that occur with the phase changes ( $M \rightarrow A$ ) during heating a Nitinol shape memory alloy wire for using it as a linear heat detector. The investigations were made using three Nitinol wires with different diameters (1; 0.1 and 0.075 mm). For the thermal characterization we used differential scanning calorimetry (DSC Netzsch 200 Maia) using two different heating rates and for resistivity a milliohmmeter (Extech 380560) and a thermocouple. The results were analyzed from the point of sensitivity of the smart element in order to be used as heat variation detector.

**Keywords**: DSC, fire safety, linear heat detector, resistivity, shape memory alloy, wires.

- [1] Employing a shape memory alloy in a fire alarm temperature sensitive element, Patent US4356478A, USA.
- [2] Jaronie Mohd Jani, Martin Leary, Aleksandar Subic, Mark A. Gibson, A review of shape memory alloy research, applications and opportunities, Materials and Design, 56 (2014) 1078–1113.



## Al<sub>0.5</sub>CrCoFeNi High Entropy Alloy for Geothermal Environment

#### Laura Elena GEAMBAZU, Ciprian Alexandru MANEA<sup>\*</sup>, Ioana CSAKI, Florin MICULESCU

University Politehnica of Bucharest, Splaiul Independenței, 313, Bucharest, Romania

\*ciprian6@gmail.com

**Abstract**. Al0.5CoCrFeNi high entropy alloy was processed by mechanical alloying and investigated in term of powders characteristics and microstructures. The obtained power was pressed and sintered resulting in a bulk material that will be further processed to obtain electrodes that will be deposited on the substrate by electro spark deposition process, in an attempt to obtain a corrosion resisting coating. High Entropy Alloys are known due to their corrosion and wear resistant properties, which makes them the perfect candidates in numerous domains as marine, geothermal, oil and gas industries, where the aggressive environment tends to corrode the in work components of the equipment. The cocktail effect is characteristic to the high entropy alloys, where every component brings its own good, resulting in an alloy with predetermined properties.

Keywords: high entropy alloys, corrosion, geothermal.

- [1] Murty, B.S.; Yeh, J.; Ranganathan, S. High-Entropy Alloys; Butterworth-Heinemann: Oxford, UK, (2014).
- [2] Cantor, B.; Chang, I.; Knight, P.; Vincent, A. Microstructural development in equiatomic multicomponent alloys. Mater. Sci. Eng. A 375 (2004) 213–218.


# Nanomaterials Applied for Heavy Metals Removal from Wastewater

### Cristina Ileana COVALIU<sup>\*</sup>, Gigel PARASCHIV, Oana STOIAN, Alexandru VIŞAN

University Politehnica of Bucharest, Faculty of Biotechnical Systems Engineering, 313 Splaiul Independenței, 060042, sector 6, Bucharest, Romania

<sup>\*</sup>cristina\_covaliu@yahoo.com

**Abstract**. In the past years, nanotechnology has been studied and it proved that is one of the advanced ways for toxic compounds removal from wastewater. In this paper we focus on nanomaterials used for wastewater treatment polluted with heavy metals. Nanoparticles have very high and specific adsorption capacity being applied in water depollution, remediation and treatment process. The depollution methods based on nanomaterials are more cost-effective, less time and energy consuming, generating no or less waste in comparison with conventional methods. The aim of this review is to summarize the applications of nanoadsorbants for heavy metals depollution methods.

**Keywords**: nanomaterials, nanotechnology, heavy metals, wastewater, pollution, toxic element.

- [1] F. Lu, D. Astruc, Nanomaterials for removal of toxic elements from water, Coordination Chemistry Reviews, 356 (2018) 147-164.
- [2] Prachi, P. Gautam, D. Madathil, A. N. B. Nair, Nanotechology in waste water treatment: a review, International Journal of ChemTech Research, 5 (2015) 2303-2308.



# Obsolescence of Metal Materials and Products

### Avram NICOLAE, Mirela SOHACIU<sup>\*</sup>, Maria NICOLAE

University POLITEHNICA of Bucharest - Center for Research and Eco-Metallurgical Expertise, Spl.Independenței nr.313, sector 6, București, Romania

<sup>\*</sup>msohaciu@yahoo.com

**Abstract**. It is shown that the degradation of materials is a complex field, for which it becomes necessary to launch on the knowledge market a new scientific branch, Material Degradation Engineering. To analyse the degradation of materials, it is recommended to use the ecotechnological paradigm, on the basis of which the knowledge of the negative (entropic) effects of degradation can be deepened. In this paper, we define, characterise and reason the forms of materials obsolescence, i.e. the unplanned and the planned obsolescence. Taking as example the steel, which is a durable-sustainable material, we present some ways to minimize the negative effects of the material obsolescence.

**Keywords**: material lifecycle, performance of materials, advanced material, yin material, yang material, natural-ecological system, consumism and consumerism.

- Nicolae A., Stroe B.F., Minea A.A., Semenesu A., Mauthner I.A., Ecosociologie metalurgică [Metallurgical Ecosociology], Publisher: Printech, Bucharest (2011).
- [2] Nicolae A., Predescu C., Nicolae M., Vizureanu P., Vasiliu A., Minea A.,M., Optimizarea conceptului D.D. în siderurgie [Optimisation of the D.D. concept in siderurgy], Publisher: Printech, Bucharest (2006).
- [3] Sohaciu M.G., Tehnologii de reintegrare a deşeurilor industriale [Technologies for industrial waste reintegration], Publisher: Printech, Bucharest (2016).



# Synthesis of ZnO Nanoparticles for Water Treatment Applications

Gyorgy DEAK<sup>1</sup>, Florina-Diana DUMITRU<sup>1,\*</sup>, Andreea Mihaela MONCEA<sup>1</sup>, Ana Maria PANAIT<sup>1</sup>, Andreea BARAITARU<sup>1</sup>, Marius OLTEANU<sup>1</sup>, Mădălina BOBOC<sup>1,2</sup>, Silvius STANCIU<sup>2</sup>

 <sup>1</sup>National Institute for Research and Development in Environmental Protection Bucharest, Splaiul Independentei 294, Bucharest, Romania
<sup>2</sup> Dunarea de Jos University of Galati, Romania, Domnească Street, 47, RO-800008, Galati, Romania

<sup>\*</sup>dianadumitru1986@gmail.com

Abstract. Industrialization on a global scale has led to water pollution with a variety of persistent organic pollutants, highly toxic and hazardous to the living organisms and also difficult to remove with the existing wastewater treatment technologies. Various methods have been tested for removing these organic contaminants, among which nanotechnology appears to be one of the most promising approaches, as nanomaterials present larger specific surface area and particular physical, chemical and biological properties (developed due to small particle size) suitable for environmental applications. In recent years, SiO2, TiO2 and ZnO nanoparticles have been the focus of interest in the wastewater treatment investigations. In the present paper, ZnO nanoparticles were synthesized through the hydrothermal method. The pH of the precursor solution was varied in order to obtain ZnO nanoparticles with a high crystallinity degree. The obtained nanoparticles were characterized by x-ray diffraction (XRD) and scanning electron microscopy (SEM) coupled with energy dispersive spectrometry (EDS). The results showed that the pH of the precursor solution is determinant in obtaining an ordered structure.

Keywords: nanomaterials, waste water treatment, ZnO.



# **Recycling of CRT Glass in Plastering Mortars**

### Maria-Iuliana MARCUS, György DEÁK<sup>\*</sup>, Florina-Diana DUMITRU, Mihaela-Andreea MONCEA, Ana-Maria PANAIT, Cristina MARIA

National Institute for Research and Development in Environmental Protection Bucharest, Splaiul Independentei 294, Bucharest, Romania

<sup>\*</sup>dkrcontrol@yahoo.com

Abstract. Landfilling of end-of-life CRT (cathode ray tube), from computers and other electric or electronic equipment, is an emerging environmental issue which require immediate actions. CRT glass waste represents over 50% of the weight of WEEE (Waste Electrical and Electronic Equipment). However, recycling techniques for CRT glass represent a major problem due to the different compositions of the glass used in CRT manufacturing, in particular due to the presence of lead in various amounts in the panel, funnel and neck tubing. The present paper investigates an alternative method for CRT glass recycling by using it as a substitute for natural fine aggregates in plastering mortars. Research has been carried out for both: analysis of glass chemical stability (assessing the interaction with water to simulate the behaviour of CRT glass in landfills or discarded WEEE in inappropriate areas), and leaching behaviour of the binding mortars with CRT glass as fine aggregate substitute. The results showed that the obtained mortars presented a good chemical stability, the concentration of lead being under the detection limit.

Keywords: CRT glass, chemical stability, plastering mortars.

#### **References:**

[1] INCDPM Bucharest, "Development of recycling techniques for glass with special properties into ecological construction materials", project within Research Programme NUCLEU – MARES, contract no. 43N/2018, Bucharest 2018.



# Electrospun Nanofiber Membranes for Textile Wastewater Treatment

### Liliana Rozemarie MANEA, Anișoara BERTEA, Andrei Petru BERTEA<sup>\*</sup>

"Gheorghe Asachi" University, 67 Profesor Dimitrie Mangeron Blvd, 700050, Iași, Romania

apbertea@tex.tuiasi.ro

**Abstract**. Among the many uses of electrospun membranes, wastewater treatment is one of the most important, because of their special qualities (large surface area, great porosity, outstanding pore interconnectivity). In the textile industry, wastewater treatment is of utmost importance, especially for recycling purposes. This paper reviews the ways of obtaining these electrospun membranes and the possibilities for their use in the treatment of textile waste water, with a special emphasis on removing the color of these waters.

Keywords: electrospun membranes, textile wastewater, colour removal.

- [1] S. Tabe, 2014, Electrospun Nanofiber Membranes and Their Applications in Water and Wastewater Treatment, in A. Hu, A. Apblett (Eds) Nanotechnology for Water (Heidelberg: Springer), 111-144.
- [2] R. K. Mishra, P. Mishra, K. Verma, A. Mondal, R. G. Chaudhary, M. M. Abolhasani, S. Loganathan, 2018, Electrospinning production of nanofibrous membranes, Environ Chem Lett, 16(2018) 1-34.
- [3] S. A. Hosseini, M. Vossoughi, N. M. Mahmoodi, M. Sadrzadeh 2018 Efficient dye removal from aqueous solution by high-performance electrospun nanofibrous membranes through incorporation of SiO<sub>2</sub> nanoparticles, Journal of Cleaner Production 183 (2018) 1197-1206.

# 3D Warp Interlock P-Aramid Fabrics for Composite Reinforcement and Ballistic Vest Applications: Effect of Yarn Density on its Formability Characteristics

**EUROINVENT** 

**ICIR 2019** 

### Mulat ABTEW<sup>1,2,3,4,\*</sup>, Carmen LOGHIN<sup>1</sup>, Irina CRISTIAN<sup>1</sup>, Francois BOUSSU<sup>2,3</sup>, Pascal BRUNIAUX<sup>2,3</sup>, Y CHEN<sup>4</sup>, L Wang<sup>4</sup>

 <sup>1</sup>Faculty of Textiles, Leather and Industrial Management, Gheorghe Asachi Technical University of Iasi, Iasi, Romania
<sup>2</sup>University of Lille 1 Nord de France, Lille, France
<sup>3</sup>Ecole Nationale Supérieure des Arts et Industries Textiles, GEMTEX, Roubaix, France
<sup>4</sup>Soochow University, College of Textile and Clothing Engineering, Suzhou, China

<sup>\*</sup>abtew.mulat@tuiasi.ro

**Abstract**. Material formability becomes one of the most important characteristic of textile performance in the manufacturing of threedimensional (3D) components to fit a 3D surface in various technical applications. In this study, different forming characteristics of 3D warp interlock fabrics in dry fabric condition were investigated. 3D warp interlock architecture with different areal density from same para-aramid yarn with a linear density of 168dtex were systematically designed and produced on automatic dobby loom with standard atmospheric conditions. The approach utilizes a low speed forming process with a predefined hemispherical shape of punch for the analysis of different forming behaviour of the fabrics specimen.

**Keywords**: 3D warp interlock fabric, para-aramid fabrics, material forming, forming behaviour; high performance fiber, female soft body armour.

- [1] Dufour C, Boussu F, Wang P, et al. Forming behaviour of 3D warp interlock fabric to produce tubular cross composite part. In: 14th AUTEX World Textile Conference. Bursa, Turkey, (2014).
- [2] Lee JS, Hong SJ, Yu WR, et al. The effect of blank holder force on the stamp forming behavior of non-crimp fabric with a chain stitch. Compos Sci Technol 67 (2007) 357–366.



# Laser Cladding Reconditioning of Injection Moulding

Alexandru PASCU<sup>\*</sup>, Elena Manuela STANCIU, Ionut Claudiu ROATA, Catalin CROITORU

Transilvania University of Brasov, Materials Engineering and Welding Department, 29 Eroilor Blvd.,500036, Brasov, Romania

<sup>\*</sup>alexandru.pascu@unitbv.ro

**Abstract**. Nowadays, the laser cladding became a viable technology for reconditioning of die-casting and injection moulds used in the automotive industry. Advanteges like precision, good bonding with the substrate and low heat affected zone recommend the laser cladding process as the best solution for restauration of weared mould and dies [1,2].

This research addresses to the reconditioning of an injection moulding used for manufacturing of rubber seals. The reconditioning process have been carried out using an TRUMPH TruePulse 556 laser and a cladding head made by PRECITEC, manipulated by means of an CLOOS robotic arm sincronised with a rotational table. Inconel 718 was used as addition material for repair MOULD STEEL 1.2738. Crack free and dense coatings were obtained with similar hardens and wear resistance of the base material. The samples were analised by optical and electron microscopy and EDS mapping.

Keywords: laser cladding, reconditioning, injection mould.

- [1] D. Cong, H. Zhou, Z. Ren, H. Zhang, L. Ren, C. Meng, C. Wang, Thermal fatigue resistance of hot work die steel repaired by partial laser surface remelting and alloying process, Optics and Lasers in Engineering, 54 (2014) 55–61.
- [2] R. Song, S. Hanaki, M. Yamashita, H. Uchida, Reliability evaluation of a laser repaired die-casting die, Materials Science and Engineering, A 483–484 (2008) 343–345.



# Recent Graphene Oxide / TiO2 Thin Film Based on Self- Cleaning Application

Azliza AZANI<sup>1,\*</sup>, Dewi Suriyani Che HALIN<sup>1,\*\*</sup>, Kamrosni Abdul RAZAK<sup>1</sup>, Mohd Mustafa Al Bakri ABDULLAH<sup>1</sup>, Mohd Arif Anuar Mohd SALLEH<sup>1</sup>, Norsuria MAHMED<sup>1</sup>, Muhammad Mahyiddin RAMLI<sup>1,2</sup>, Ayu Wazira AZHARI<sup>1,3</sup>

 <sup>1</sup> Center of Excellence Geopolymer & Green Technology (CEGeoGTech), School of Materials Engineering, Universiti Malaysia Perlis, 02600 Jalan Kangar
<sup>2</sup> School of Microelectronic Engineering, Universiti Malaysia Perlis, Pauh Putra Campus, 02600, Arau, Perlis, Malaysia
<sup>3</sup>Water Research Group (WAREG), School of Environmental Engineering, Universiti Malaysia Perlis 02600 Arau, Perlis, Malaysia.

\*aazliza@hotmail.com, "dewisuriyani@unimap.edu.my

**Abstract**. Graphene oxide/TiO2 (GO/TiO2) thin films works as self-cleaning device have been developed in various method onto selected substrates. It was noticeable that graphene oxide is the best form in the group of graphene family. Under self-cleaning application, the wettability test and electroconductivity of the sample was the main characteristic for self-coating study. As planned, graphene-loaded TiO2 films were highly conductive, transparent and produced promising enhanced photocatalytic activities. Moreover, the GO/TiO2 film surface exhibits superhydrophilic properties within a short time compared to TiO2 film. Thus under this finding, the enhanced photocatalytic activity of GO/TiO2 films is attributed to its efficient charge separation, owing to electrons injection from the conduction band of TiO2 to graphene.

Keywords: Graphene oxide, Thin film, Superhydrophilic, Self-cleaning.

#### References:

[1] S. Prabhu, L. Cindrella, O. Joong, and K. Mohanraju, Solar Energy Materials and Solar Cells Superhydrophilic and self-cleaning rGO-TiO<sub>2</sub> composite coatings for indoor and outdoor photovoltaic applications, Sol. Energy Mater. Sol. Cells, 169 (2017) 304–312.

# Extraction of Nitrogen, Phosphorus and Potassium from Food Waste under Elevated Temperature by Heat Induced Bath Method

**EUROINVENT** 

**ICIR 2019** 

Mohamad Anuar KAMARUDDIN<sup>1,\*</sup>, Nor Fazliana AHMAD<sup>1</sup>, Ioan Gabriel SANDU<sup>2,3</sup>, Rasyidah ALROZI<sup>4</sup>, Ion SANDU<sup>5</sup>, Mohd Mustafa Al Bakri ABDULLAH<sup>3</sup>

 <sup>1</sup>Environmental Technology Division, School of Industrial Technology, Universiti Sains Malaysia, 11800 Penang, Malaysia
<sup>2</sup> Gheorghe Asachi Technical University of Iasi, Faculty of Materials Science and Engineering, 41 D. Mangeron Blvd., 70050, Iasi, Romania
<sup>3</sup>Center of Excellence Geopolymer & Green Technology (CEGeoGTech) School of Materials Engineering, Universiti Malaysia Perlis, 01000, Kangar, Perlis, Malaysia
<sup>4</sup>Faculty of Chemical Engineering, Universiti Teknologi MARA, Penang Campus, 13500 Permatang Pauh, Penang, Malaysia
<sup>3</sup>Center Alexandru Ioan Cuza University of Iasi, Arheoinvest Platform, Bd. Carol I, no. 22, Iasi, Romania

anuarkamaruddin@usm.my

**Abstract**. 38,000 tonnes of waste is generated per day in Malaysia and 15,000 tonnes of that are comprises with food wastes. This large amount of fraction should be recovered to produce a new valuable product that brings benefits such as fertiliser because it contains various nutrients such as proteins, lignocellulse and carbohydrates. This study aims to determine the effects of thermal treatment on the macronutrient of food waste that collected from cafeteria of Universiti Sains Malaysia (USM). Hot water bath was employed as thermal treatment of food waste with five different temperatures (60 °C to 100 °C) with two reaction time (30 min and 60 min). The results have demonstrated increases in the percentage of nitrogen (N) and concentration of phosphorous (P) however for the concentration of potassium (K) shows inversely related after subjected to hot water bath.

Keywords: Food waste, hydrothermal, macronutrient, nitrogen.



# Bending Behaviour of Cold Formed Steel Structural Member with Perforated Section in House Framing System

Lim Yon SHENG<sup>1</sup>, Fatimah DE'NAN<sup>1</sup>

<sup>1</sup>School of Civil Engineering, Engineering Campus, Universiti Sains Malaysia, Penang, Malaysia

Abstract. This paper presents a numerical study on bending behavior of cold-formed steel framing system and effective cost reduction between perforated and non-perforated steel section in steel framing system are investigated. The results are expressed in terms of displacement and yield moment. Using Staad.Pro and Lusas, a total of 26 set of nonlinear analyses were carried out to investigate the effects of opening spacing, edge distance and thickness of section on bending behavior. The result showed that increasing the opening spacing and edge distance would increase the bending capacity. C-channel steel section showed better moment resistance in thicker section. The result was then compared with the C-channel steel section without opening. From the analysis, it was observed that C-channel steel section without opening had higher bending capacity than C-channel steel section with opening in major axis. However, there is a small difference in terms of yield moment when comparing C-channel section with 0.4D of square opening and 0.3L edge opening as well as 0.1L opening space with C-channel section without opening while reducing the volumes up to 7.28%. Thus, C-channel section with 0.4D of square opening, 0.3L edge opening and 0.1L opening space give a very effective cost reduction.

**Keywords**: Steel framing system, Perforated, Bending behaviour, Finite element analysis, Non-linear analysis.



# A Study on Development of Efficient Column Detection System in Wastewater Treatment of Thermal Power Plants

### Juhyeong KIL<sup>\*</sup>

Lotus Prosuming Management®, 3F, 3 Hangeulbiseok-ro 46na-gil, Nowon-gu, Seoul, Korea

kjh@lotuselectrode.com

Abstract. This study deals with the development of a column capable of analyzing the regeneration exchange cycle of ion exchange resin or the state of ion exchange resin in water treatment of thermal power plant. This is to obtain reliable water treatment results with scientific and efficient monitoring. It is also intended to develop an ion exchange resin detection system capable of reducing the cost savings due to maintenance. Generally, thermal power plants use high purity water to obtain steam, and keeping water quality of plant water at a high purity level in a water circulation system is an essential element for stable operation of a power plant. To obtain high purity water using ion exchange resins is one of the methods currently used today. So far, only the water quality of the system has been measured, but the condition of the column and other factors are theoretically and largely excluded. Therefore, it is very important to analyze the changes in the water quality while observing the reactions in the column as the phytoremediation passes through the column. In addition, it is necessary to observe the exact condition of the system water as well as the exchange cycle and maintenance of the ion exchange resin. Therefore, it is necessary to develop column sensing sensors and measuring devices with smart functions. This study aims to help ensure stable operation of thermal power plants by maintaining an objective and reliable high-purity system numbers at the site.

**Keywords**: column, thermal power plant, ion exchange, smart sensor, water treatment, water quality, high purity, exchange resin, phytoremediation.







# **SECTION 4**

# **MATERIALS & LIFE SCIENCE**



## Assessment of Ionic and Anionic Surfactants Effect on Demineralized Osteochondral Tissue

Vitalie COBZAC<sup>1,\*</sup>, Liliana VEREȘTIUC<sup>2</sup>, Mariana JIAN<sup>1</sup>, Viorel NACU<sup>1</sup>

 <sup>1</sup>State Medical and Pharmaceutical University "Nicolae Testemitanu", Bd. Stefan Cel Mare 165, MD2004, Chisinau, Republic of Moldova;
<sup>2</sup>Grigore T. Popa University of Medicine and Pharmacy, 9-13 Kogalniceanu Street, 700454, Iasi, Romania

vitalie.cobzac@usmf.md

**Abstract**. Rabbit demineralized osteochondral tissue were decellularized, separately with SDS and Triton X-100 for 24, 48 and 72 hours, at concentrations of 2%, 1% and 0.5%, respectively. The greatest DNA removal was achieved with Triton X-100 solutions. Cytotoxicity tests with CSM and chondrocytes have shown good and very good results, but a gradual decrease in cell viability related to the duration of treatment with surfactants compared to the control was registered. The same trend was observed in the cells population test after 7 days, while there was no difference at the 14th day. It was also determined that samples decellularized with SDS have a higher resistance to enzymatic degradation than the control and the decellularized tissue with Triton X-100. The swelling test and elasticity modulus measurements did not show values dependent of the surfactant nature.

**Keywords**: osteochondral tissue, cartilage regeneration, SDS, Triton X-100, cytotoxicity, CSM, chondrocytes, cells population, enzymatic degradation, swelling test.

#### **References:**

 V. Cobzac, V. Nacu, Gh. Croitor, S. Coşciug, M. Jian. The graft for osteochondral defect repair. Brevet de invenţie MD 1177 Y. 2017.



# The Development of Dust Smoke Eliminator Using C-Ozonize Electrical System

### Siseerot KETKAEW<sup>\*</sup>

Ramkhamhaeng University, Ramkhamhaeng street, 10240, Huamark, Bangkapi, Bangkok, Thailand

\*siseerot@hotmail.com

**Abstract**. This article offers dust smoke eliminator using c-ozonize (corona ozonize) electrical system. The high voltage direct current applying the principle of the flyback converter to use. And control of power MOSFET with IC number TL494 at 20 kHz frequency through the high-voltage switch to get high voltage direct current of 1 kV to 5 kV. A voltage of 36 volts is applied to the platinum wire placed 1 cm away from the aluminum plate in the package. Ozonize and electric field set the efficiency of dust trap is 98.95% and designed to work for 1 hour. The machine can product ozone gas 127 mgO3/hour to 293 mgO3/hour and ozone gas content of 258 mgO3/hour can be used to reduce the hydrocarbon gases from lead smoke very well.

Keywords: dust, smoke, corona, ozonize, electric field.

- S. Ketkaew, Plasma Ozonizer Using Micro-Converter for Ammonia (NH3) Decreasing in Shrimp Food Production, Procedia Engineering 32 (2012) 148-154.
- [2] S. Ketkaew, Electric air filter for dust trap and disease killing by applied electrostatic technique: TSB 2010 International Conference on Biotechnology for Healthy Living, The 22nd Annual Meeting of the Thai Society for Biotechnology, Prince of Songkla University, Trang Campus, Thailand (2010).
- [3] S. Ketkaew, The Case Study of 5 kHz –25 kHz High Frequency Adjustment in Converter Circuit of Generate Ozone Gas, AU Journal of Technology. Published by Assumption University (ABAC) Hua Mak, Bangkok, Thailand, (2007) 42-47.



# Smart Lock System for Airbnb Platform using Global Navigation Satellite System Services

### Daniel MATASARU<sup>\*</sup>

Technical University "Gheorghe Asachi" of Iasi, Bd. D. Mangeron 67, Iasi, Romania

<sup>\*</sup>dmatasaru@etti.tuiasi.ro

**Abstract**. The smart lock system is based on the Airbnb platform for lease or rent short-term lodging and solves both a technical/operational limitation and trustfulness issue. The solution is to link the housing, the reservation number and the mobile phone of the customer so that, with the help of localization services, the smart lock of the apartment could be opened only by the person wearing the mobile device, when that person reaches the destination, and only in the specified period of time when the reservation is made. The solution can be extended also for car rentals and other rent services.

**Keywords**: GNSS, Smart lock, Airbnb, AirbnBLock, GPS, rent, accommodation.

- [1] https://www.airbnb.com/.
- [2] L. Chen, S. Thombre, K. Jarvinen, ES Lohan, A. Alen-Savikko, H. Leppakoski, MZH. Bhuiyan, S. Bu-Pasha, GN. Ferrara, S. Honkala, J. Lindqvist, L. Ruotsalainen, P. Korpisaari, H. Kuusniemi, Robustness, Security and Privacy in Location-Based Services for Future IoT: A Survey, IEEE Access, Volume: 5 (2017) 8956-8977.



# Investigation of Microalgae Loaded Ceramic Beads for Application as Biostimulants in Agriculture

Ana-Maria GALAN<sup>1</sup>, Alexandru VLAICU<sup>1,2</sup>, Anca PAULENCO<sup>1,\*</sup>, Sanda VELEA<sup>1</sup>, Florin OANCEA<sup>1</sup>

 <sup>1</sup> National Institute for Research & Development in Chemistry and Petrochemistry -ICECHIM, 202 Spl. Independentei, 060021, Bucharest, Romania
<sup>2</sup> University Politehnica of Bucharest, Faculty of Applied Chemistry and Material Science, Gh. Polizu 1-7, 011061, Bucharest, Romania

<sup>\*</sup>ancapaulenco@gmail.com

**Abstract**. One of the main drawbacks in large scale production of microalgae biomass is the high energy required for harvesting, considering the small microalgae cell size and the need to process large volumes of liquid. Current harvesting methods are based on mechanical processes (centrifugation, filtration, sedimentation, flotation, use of membranes) or chemical processes (flocculants, electrolytes, synthetic polymers). Harvesting costs represent up to 1/3 of total process costs. For this reason, abundant research focuses on developing alternative techniques for concentration and sedimentation, that can reduce the cost of this process and thus of the final products obtained from microalgae biomass. This paper focuses on microalgae biomass harvesting by adsorption on porous ceramic beads of various sizes, with applications in agriculture, as biostimulants to support high crop yields. Loading of the ceramic beads with microalgae is accomplished by recirculation of biomass from the suspension. The microalgae are retained in the pores of the ceramic beads.

Keywords: microalgae biomass, harvesting, ceramic beads, biostimulant.

**Acknowledgements:** This work was supported by: PN III Program, PN-III-P1-1.2-PCCDI-2017; Program 1 - Development of national CD system; Subprogram 1.2 - Institutional performance, complex projects developed in CDI consortia, Contract 32PCCDI/2018; Romanian Ministry of Research and Innovation - MCI through "Projects funding excellence in RDI" Program, Contract No. 31PFE/2018 - TRANS -CHEM; PN.19.23.01.02.



# Engineering of Circular Economy and Good Management of Industrial Material Resources

### Vasile Filip SOPORAN<sup>\*</sup>, Tiberiu Romi LEHENE, Sanda PADUREȚU, Marius Dan CRIȘAN

Technical University of Cluj-Napoca, Cluj-Napoca, Romania

\*vfsoporan@gmail.com

Abstract. The paper proposes a presentation of the mechanisms of institutionalization by which materials engineering becomes an action instrument for the circular economy. In the proposed variant, the designed actions are grouped under the following steps: analysis of the current situation and of the assimilation potential at the level of socio-economical mechanisms from the perspective of eco-responsibility; constructive establisment and functioning of the reglementation framework; innovative technological ideas and the entrepreneurial way of promoting of technical solutions; designing and ensuring finance systems, especially financial instruments. The introduction of specific elements from materials engineering stems from the fact that products and services, no matter how complex, use materials in order to ensure some functionality. The structure of the paper followed, according to the methodology of critical engineering thinking, the following aspects: the evolution of global policies on ecoresponsibility; the European institutional debate on the circular economy; reporting products and services to the requirements of the circular economy; material engineering reasoning; the elementary values of the product and service from the perspective of circularity; forms and conditions of circularity.

**Keywords**: materials engineering, circular economy, materials engineering conditionings, material value, functional value, energetic value, environmental value, social value, manufacturing, castings.

#### **References:**

 Soporan, V.F., et al, Ingineria instituționalizării economiei circulare, Unniversitatea Tehnică din Cluj-Napoca, Centrul pentru Promovarea Economiei Circulare – CPADDD, România.



# Assessment Methodology and Coverage of Developments in Production Processes of Castings in Engineering Training Programs

### Vasile Filip SOPORAN<sup>\*</sup>, Tiberiu Romi LEHENE, Sanda PĂDUREȚU, Viorica SAMUILĂ, Timea GABOR, Mihai Marius VESCAN

Technical University of Cluj-Napoca, Cluj-Napoca, Romania

<sup>\*</sup>vfsoporan@gmail.com

Abstract. Starting from the studies on the optimization of the engineering training systems in the casting industry, as an important field of materials engineering, this paper presents a method for evaluating the evolutionary processes in the field of products shaped by casting and incorporating them into university programs. The analysis of the Foundation for Critical Thinking [3] has been adapted to solve the problem. The structure of this paper has taken into account the following aspects: Establishing the purpose of the critical engineering analysis used; Establishing the key problems faced by the manufacturing of cast parts (the system under consideration) and their evolution in the perspective of the whole system; Identification and enumeration of the most important documents and characterization information of the analyzed system; Presentation of the notions, concepts and key ideas to be mastered to understand the operation and possibilities of reforming the engineering training systems in the manufacturing of molded parts; Analysis of problems faced by engineering training systems at the manufacturing stage of molded parts; Specification of key or adopted hypotheses in solving system problems.

**Keywords**: cast parts, engineering training, critical thinking, circular economy.

#### **References:**

[1] V.F. Soporan, M. Crişan, T. Lehene, A.L. Pop, Mater. Sci. Eng. 133, 012063 (2016), DOI:10.1088/1757-899X/133/1/012063.



# Investigations of the Corvins'Castle towers an Artistic, Architectural and Technological Achievement of the 15t<sup>h</sup> - 17<sup>th</sup> Centuries

**EUROINVENT** 

**ICIR 2019** 

Rodica-Mariana ION<sup>1,2\*</sup>, Sorin TINCU<sup>3</sup>, Lorena IANCU<sup>1,2</sup>, Ramona Marina GRIGORESCU<sup>1</sup>, Cristiana RADULESCU<sup>4</sup>, Gabriel VASILIEVICI<sup>1</sup>, Sofia TEODORESCU<sup>4</sup>, Ioana Daniela DULAMĂ<sup>4</sup>, Raluca-Maria STIRBESCU<sup>4</sup>, Ioan Alin BUCURICA<sup>4</sup>, Mihaela-Lucia ION<sup>5</sup>. Anca Irina GHEBOIANU<sup>4</sup>

<sup>1</sup>ICECHIM, Research Group "Evaluation and Conservation of Cultural Heritage", 202 Splaiul Independentei, Bucharest, Romania; <sup>2</sup>Valahia University of Târgoviște, Târgoviște, Romania; <sup>3</sup>Corvin's Castle, Hunedoara, Romania; <sup>4</sup>Multidisciplinary Science and Technology Research Institute of Valahia University of Târgoviște - ICSTM-UVT, Târgoviște, Romania; <sup>5</sup>"Atelierul de Creatie" NGO, Bucharest, Romania

rodica ion2000@yahoo.co.uk

Abstract. Some samples from the towers of the Corvins'Castle, Hunedoara, are analyzed in this paper in order to identify the provenance of the raw materials and weathering / deterioration processes. Modern analytical techniques, as XRD, FTIR, Raman, SEM-EDS, colorimetry, porosimetry are used to evaluate the structure and chemical composition (quartz, mica, dolomite, feldspar and plagioclase as albite and microcline minerals). Some minerals similar with apatites have been evidenced being responsible for the consolidated resistance structure inside of the towers.

Keywords: Corvins'castle, weathering, deterioration, apatites.

- [1] R.M. Ion, et al., Traditional building materials and modern restoration products identified at the painted Matia-fresco Loggia, Corvins' Castle, Romania, Geophysical research Abstracts, 20(2018) 5198.
- Acknowledgements: This work was supported by Romanian Ministry of Research and Innovation - MCI through "Projects funding excellence in RDI" Program, Contract No. 31PFE/2018 - TRANS - CHEM and MCI-UEFISCDI No. 51PCCDI/2018.



# Dental Impression Techniques Assessment: Patients' Rating and Perceptions

Maria BOLAT, Dan-Nicoale BOSINCEANU, Arina CIOCAN-PENDEFUNDA<sup>\*</sup>, Cosmin BIDA, Carina BALCOS, Dana-Gabriela BOSINCEANU

Grigore T. Popa University of Medicine and Pharmacy of Iasi, Faculty of Dental Medicine, 16 Universitatii Str., 700115, Iasi, Romania

arinadr@yahoo.com

Abstract. Dental impression in dentistry is used for many purposes. One of these is to make a model that allows the study of fine details outside the oral cavity, which is sometimes impossible to achieve by direct prosthetic field inspection. Purpose: Through the study, we aim to highlight the importance of the patient's understanding and availability of the prosthetic field impression techniques. Matrial and method: The study lot consisted of 54 patients who formed the data base processed throughout the research, men and women aged 35 to 50 with a partial or total edentation. Conventional impression for mandibular and maxillary jaw were taken with a polyether type material (Impregum, 3 M ESPE), and digital impression was done with the AC Omnicam chairside system (Cerec OMNICAM, Sirona Dental GmBH). Interpretation of results was performed using statistical programs SPSS 15.0 and Wilcoxon Signed-Rank Test, with p = 0.05 as the minimum statistical reference value. Patient preference for impression technique was evaluated with a comparative questionnaire of 9 questions, the results being interpreted with SPSS 15.0. Conclusions: Following the study, we noticed a major tendency for patients to benefit from the most advanced techniques and technologies that provide both a beneficial and easy-to-treat treatment, thus enhancing the comfort and perceptiveness of the dental work that follows be applied. The digital technique was more effective than conventional technique.

Keywords: dental impression technique, patient preference, time efficiency.

#### **References:**

[1] J.E. De La Cruz, P.D. Funkenbusch, C. Ercoli, M.E. Moss, G.N. Graser, R.H. Tallents, Verification jig for implant supported prosthesis: a comparison of standard impressions with verification jigs made of different materials. J Prosthet Dent, 88 (2002), 329–336.



# Types of Geoecological Research and Areas of their Application

### Evgeny BARYSHEV<sup>\*</sup>, Natalia YAKSHINA, Kseniya SHMAKOVA

Ural Federal University, 19 Mira str, 620002, Ekaterinburg, Russia

\*e.e.baryshev@urfu.ru

**Abstract**. Planning for the environmental management, construction, as well as forecasting the impact of human activity on the environment, should be carried out based on the provisions of geoecology, which combines relationships in geographical, biological (ecological) and social-production systems. In this case, a systematic approach, as well as knowledge of the links between different systems, will allow us to simulate the level of human impact on the environment and calculate the optimal degree of intervention in its structure. Modern methods of geoecological studies used to assess the impact of human economic activity on the environment are considered, a comparison of geoecological mapping in Russian and foreign studies is carried out, the main stages necessary for conducting geoecological studies are indicated.

**Keywords**: geoecology, geological, geochemical, geophysical, hydrogeological, geomorphological, geocryological methods of research, mapping.



# Rimetea Village - to be or not to be

Veronica LUCA, Ofelia CORBU\*, Ildikó BUCUR\*\*

Technical University of Cluj-Napoca, 28 Memorandumului Str., 400114, Cluj-Napoca, Romania

<sup>\*</sup>ofelia.corbu@gmail.com , <sup>\*\*</sup>ilbucurro@yahoo.com

Abstract. Following the Roural Group's fields study for Romanian Rural Arhitectural Guides, it was found that the main issues of the villages are the lack of jobs and education. The village of Rimetea (Alba County) has an ascendant trajectory: its development started in 1996 brought a lot of benefits in terms of tourism, economic, social, cultural; for 10 years, the coordinators of the traditional Rimetea's settlements rehabilitation project have carried out hard work having a big purpose: the awareness of locals about their architectural heritage. In 2000, Rimetea was already in an architectural protected area. This is not the only evolutionary moment of the village, because between the 15<sup>th</sup> and the 18<sup>th</sup> centuries, Rimetea becomes a town by the number of blacksmiths and demographics. As a conclusion, today Rimetea should be a model village with jobs and a good level of education but the field study shows that there is an essential thing missing: lack of youth (the workforce)- the future! They have the duty to carry on the spirit of the place. With decreasing natural growth, the current population is represented by the aging population (>70 years) in a percentage of 60%-70%. In this direction, alarm signs must be pulled.

**Keywords**: Rimetea, rehabilitation, rural, village, youth, future, natural growth, spirit of the place, demographics.

- Arh. R. Horațiu, arh. C. Șuteu, arh. M. Gingirof, Rural Group of OAR, "Architecture Guide for the local specificity of the rural area- the hills of Cluj", (2016) 1-6.
- [2] Á. Furu, "Built Heritage Conservation in Rimetea", (2006) 40-46.



# Electric Cars as Environmental Monitoring IoT Network

### Cosmin RUS, Razvan MARCUS, Lilla PELLEGRINI, Monica LEBA\*, Mihai REBRISOREANU

University of Petrosani, 20 Universitatii str, 332006, Petrosani, Romania

\*monicaleba@upet.ro

**Abstract**. Due to the intensification of traffic in large urban agglomerations, the need for monitoring of environmental parameters is increasingly being observed and more and more efficient solutions are being sought for taking over and processing these data. So, the paper proposes to build a network of sensors mounted on electric vehicles to be used to create an interactive map of environmental pollution in urban areas. It has often been observed that motorized air quality monitoring platforms are propelled by conventional gasoline or diesel engines and therefore also produce significant pollution factors that can alter data taken over by the sensor network. The use of an electrical monitoring system has as a major benefit greater accuracy in retrieving data from pollution detectors as it does not appear in the data taken and the influence of classic monitoring system pollution using a classic propulsion platform. The research also includes an efficient communication algorithm made between the sensor networks to take data on the quality of the environment.

**Keywords**: sensors network, monitoring platform, electric vehicles, interactive map, pollution.

- E.N. Ganesh, IOT Based Environment Monitoring using Wireless Sensor Network, International Journal of Advanced Research 5(2), (2017) 964-970.
- [2] S. Leitman, B. Brant, Build Your Own Electric Vehicle 2nd Edition, McGraw-Hill/TAB Electronics, ISBN 978-0071543736, (2008).



# Hand Rehabilitation - A Gaming Experience

Arun Fabian PANAITE, Marius Nicolae RÎȘTEIU, Marius Leonard OLAR, Monica LEBA<sup>\*</sup>, Andreea IONICA

University of Petrosani, 20 Universitatii str, 332006, Petrosani, Romania

\*monicaleba@upet.ro

**Abstract**. This research is made to aim bettering the current hand rehabilitation methodology. It is developed expressly to motivate the patients to play, as their hand is getting healthier. The system consists of a hand motion capturing device, and the game control system, that is using dedicated processing algorithms and aims to register hand movement, and also the progress that the user can make over a period of time. The game it uses is a fairly simple one that does in fact motivate the user to play longer rounds, all the more reason to attend which will always result in positive feedback from the patient.

Keywords: game, muscular, circulatory, motivation, sensors, algorithm.

- M. Mace et al., Validity of a sensor-based table-top platform to measure upper limb function, in 2017, International Conference on Rehabilitation Robotics (ICORR) (2017) 652-657.
- [2] J. W. Burke, M. McNeill, D. Charles, P. Morrow, J. Crosbie, and S. McDonough, Serious Games for Upper Limb Rehabilitation Following Stroke, in 2009 Conference in Games and Virtual Worlds for Serious Applications (2009) 103-110.



# Augmented Reality in Postindustrial Tourism

### Marius Leonard OLAR, Ionela SAMUIL, Andreea IONICA, Monica LEBA<sup>\*</sup>

University of Petrosani, 20 Universitatii str, 332006, Petrosani, Romania

\*monicaleba@upet.ro

**Abstract**. This paper explores the possibility of building an augmented reality (AR) smart system with a certain degree of artificial intelligence in order to recognize the components and their properties from the environment. The elements of the environment can be buildings, access roads, vegetation and so on. All of these can be accessed with AR devices, intelligent glasses, or smartphones displays. The buildings' facades and the access routes, or any other form of geographical relief from the environment, can become triggers for connecting digital content to the real world. The paper presents the different existing applications of AR systems with emphasysis on the tourism field, discussing the potential of further development; the particular aspects concerning the conceptual elements of an AR based model design for postindustrial tourism development.

**Keywords**: smart system, industrial tourism, intelligent devices, environment.

- [1] D. Marimón, C. Sarasua, P. Carrasco, R. Alvarez, J. Montesa, T. Adamek, I. Romero, M. Ortega, P. Gascó. MobiAR: Tourist Experiences through Mobile Augmented Reality (2010).
- [2] C.D. Kounavis, A.E. Kasimati, E.D. Zamani. Enhancing the Tourism Experience through Mobile Augmented Reality: Challenges and Prospects. International Journal of Engineering Business Management, 1 (2012).



# 3D Modeling and Simulation of Human Upper Limb

Marius RISTEIU, Sebastian ROSCA, Monica LEBA\*

University of Petrosani, 20 Universitatii str, 332006, Petrosani, Romania

<sup>\*</sup>monicaleba@yahoo.com

**Abstract**. In this paper we analyze the kinematics and dynamics of the human upper limb to determine the position and orientation of the shoulder and elbow joints in accordance with the forward and reverse kinematic mathematical model and the Jacobian forward and inverse kinematic mathematical model. The paper presents the human arm model in a computer aided-design software based on the results determined from the developed mathematical models and in accordance with five degrees of freedom offered by anatomical position of human arm revolute joints associated to the shoulder and elbow. The entire dynamics of human arm was simulated in MatLab-Simulink in order to control the movement according to different predefined trajectories.

Keywords: kinematic, joint, 3D model, trajectory, DOF.

- R. Bieda, K. Jaskot, The Mathematical Model of the Human Arm, Advanced Technologies in Practical Applications for National Security, Springer, 106 (2018) 241-266.
- [2] S. Duprey, A. Naaiam, F. Moissenet, M. Begon, L. Cheze, Kinematic models of the upper limb joints for multibody kinematics optimization: an overview, Journal of Biomechanics, 62 (2017) 87-94.



# Issues regarding Visible Light Data Communication in Industrial Environments

### Simona RIUREAN<sup>\*</sup>, Monica LEBA, Constantin BUIOCA, Andreea IONICA, Olimpiu STOICUTA

University of Petrosani, 20 Universitatii str, 332006, Petrosani, Romania

<sup>\*</sup>simonariurean@upet.ro

**Abstract**. Significant implementations and encouraging results have already been achieved using visible light communication (VLC) technology for different applications from indoor to free space optics (FSO) and even underwater communication. The LED light fixtures are about to be used with dual functionality - illumination and fast wireless data communication - and when the technology will become mature enough, the general costs for both are supposed to considerably decrease. However, especially due to a complex multipath channel impulse response (CIR) evaluation, there are few researches in VLC applied in industrial environments. At the same time, in the non-Line of Sight (NLoS) VLC setup with fixed optical transmitter (oTx) and optical receiver (oRx) considered here, both the path loss and multipath-induced dispersion significantly limits the link performance. In this paper, we investigate the CIR into indoor industrial environments.

**Keywords**: channel impulse response, line of sight setup, path loss, dispersive channel, optical transmission driver.

#### **References:**

[1] P. Niroopan, Y.H. Chung, On Companding Transform Techniques for OFDM Visible Light Communication over Indoor Dispersive Channels, Advances in Computer Science and Its Applications, Lecture Notes in Electrical Engineering 279 (2014).



# Experimental Study of the Treadmill Inclination Influence on the Flexion Angles of the Lower Limbs Joints

### Daniela TARNITA<sup>1,\*</sup>, Alin PETCU<sup>1</sup>, Alin ONCESCU<sup>1</sup>, Razvan VADUVA<sup>2</sup>, Mihai TENOVICI<sup>2</sup>, Ilaria PETROVICI<sup>2</sup>, Danut-Nicolae TARNITA<sup>2,3</sup>

 <sup>1</sup>Faculty of Mechanics, University of Craiova, 13, A.I.Cuza str, 200318, Craiova, Romania
<sup>2</sup>Emergency Hospital Craiova, 1, Tabaci str. Craiova, Romania
<sup>3</sup>University of Medicine and Pharmacy, P Rares str, 200322, Craiova, Romania

<sup>\*</sup>tarnita.daniela@gmail.com

**Abstract**. This paper presents an experimental study of the flexionextension movement of the human lower limb joints. Measurements were performed on a group of fourteen healthy subjects, experimental data being obtained for flexion-extension cycles during five different walking tests on horizontal and inclined treadmills. Experimental data were obtained using the Biometrics system, which is based on electrogonimeter sensors. Average cycles for each joint were obtained for all subjects in the experimental group and for all experimental tests. The flexion-extension angles at the lower limbs joints have a pronounced increase with the increase of the walking speed, but also with the increase of the treadmill inclination.

Keywords: inclined treadmill, lower limb joints, electrogoniometer, flexionextension.

- D. Tarnita, Wearable sensors used for human gait analysis, Rom J Morphol Embryol 57 (2016) 373-382.
- [2] W. Tao, T.Liu, R. Zheng, H. Feng, Gait analysis using wearable sensors, Sensors 12 (2012) 2255–2283.
- [3] D. Tarnita, et al., Experimental measurement of flexion-extension movement in normal and osteoarthritic human knee, Romanian Journal of Morphology and embryology, 54 (2013) 309-313.



# Numerical Simulations of Varus Slope Influence on the Knee Prosthesis Behavior

### Daniela TARNITA<sup>1,\*</sup>, Dan CALAFETEANU<sup>2</sup>, Danut-Nicolae TARNITA<sup>3</sup>

<sup>1</sup>University of Craiova, 13, A.I.Cuza str., 200318, Craiova, Romania <sup>2</sup> Military Hospital, Craiova <sup>3</sup>University of Medicine and Pharmacy, 2, P Rares str., 200322Craiova, Romania

<sup>\*</sup>tarnita.daniela@gmail.com

**Abstract**. The objective of this study is to investigate the effects of the knee varus on the values and distribution of contact stresses in all components of the total knee prosthesis, using finite element analysis and numerical simulations on the virtual model.

This study aims to compare the values of the contact stresses and the behavior of the three prosthetic components for 6 different cases of varus inclination with anteroposterior inclination angle of  $0^{\circ}$ .

Six virtual 3D models were developed for the six different varus slope of prosthetic knee joint. Using the AnsysWorkbench 15.07 software, numerical simulations and FEM analyses were processed. The stresses maps and the maximum equivalent stresses (von Mises) for the polyethylene insert, for the tibial prosthesis and for the femoral prosthesis are obtained.

Keywords: knee prosthesis, varus slope, virtual model, FEM, stresses.

- [1] T. Villa, F. Migliavacca, D. Gastaldi, M. Colombo, R. Pietrabissa, Contact stresses and fatigue life in a knee prosthesis: comparison between in vitro measurements and computational simulations. J. Biomech., 37(2004) 45-53.
- [2] D.T. Haut, M. Hull, M. Rashid, C. Jacobs, A finite element model of the human knee joint for the study of tibio-femoral contact. J. Biomech. Eng., 124(2002) 273-280.



# Metallographic Analysis of Icon Oklad - St. Great Martyr George

Lăcrămioara-Raluca BIVOL<sup>1</sup>, Valeriu-Gabriel GHICA<sup>1</sup>, Mihai BUZATU<sup>1</sup>, Mircea-Ionuţ PETRESCU<sup>1</sup>, Gheorghe IACOB<sup>1</sup>, Eugeniu VASILE<sup>1,\*</sup>, Dan GHEORGHE<sup>1</sup>, Tunde Anna KOVÁCS<sup>2</sup>

<sup>1</sup>University POLITEHNICA of Bucharest, 313 Spl. Independenței, Bucharest, Romania <sup>2</sup>ÓBUDA University, 1081 Budapest, Hungary

<sup>\*</sup>eugeniuvasile@yahoo.com

**Abstract**. This paper analyzes from the metallographic point of view the icon oklad (St. Great Martyr George), on which silver russian hallmarks [1] are stamped in: the maker's mark- " $\Pi\Gamma$ " (PG), the assayer's mark- " $\Pi$ ·A/1858" (I·A/1858), the silver standard mark "84" (.875) and the town mark. As a result of the optical microscopy and SEM-EDX investigations, it was concluded that the icon oklad was not made of silver alloy, according to silver title 84, but was made of silver plated copper. The presence of russian silver hallmarks clearly indicates the intention to mislead. So it's a counterfeit. The hallmarks could be replicated (copied/falsified) after original silverware or by the old hallmarks that have been published in various catalogs [2]. Unfortunately, in Eastern Europe there is a large production of modern pieces with forged russian hallmarks masked in old artifacts [3].

Keywords: EDX-SEM, silver plated copper, icon oklad, counterfeit.

- [1] M.M. Postnikova-Loseva, N.G. Platonova, B.L. Ulyanova, Gold and silver craft in the 15-20th centuries: the territory of the USSR, (in Russian), Science Publishing, Moscow, 1995.
- [2] Online Encyclopedia of Silver Marks, Hallmarks and Makers' Marks, https://www.925-1000.com/a\_Spurious1899.html [02.03.2019].
- [3] Russian antique silver fakes, http://auctiontrack.bobmeyer99.com/fakesbis.html [2.03.2019].



# Influence of Speed Bumps on Braking Distance

Alexandru MAFTEI<sup>\*</sup>, Andrei Ionut DONTU, Lidia GAIGINSCHI, Iulian AGAPE

Faculty of Mechanical Engineering, "Gheorghe Asachi" Technical University of Iasi, Romania

alexandru.maftei90@gmail.com

**Abstract**. In recent years, the implementation of speed bumps on public roads in Romania has increased. The correct understanding of the role of the speed bump has been misunderstood by the Romanian authorities who use them to slow down traffic on highly used roads. More advanced countries in the segment of traffic controlling and traffic safety have special rules for speed humps and speed bumps. This paper is concerned with the theoretical and experimental study of the performance of the vehicle in emergency braking distance when passing over such a speed bump. The theoretical study is done by using mathematic formulas and the experimental study is done by using a real car and testing it's braking distance in normal weather on a dry road that has a speed bump implemented. Also in this article was study the bump materials components.

The study shows the influence of the induced forces from the speed bump in the car dynamics, once because of the low adhesion surface of a worn out speed bump and secondly because of the changes in normal force on the wheel after passing over the bump.

Keywords: traffic, safety, speed, bump, braking, rubber.



# Design of a Monitoring, Alert and Control System for Indoor Exhibition Spaces

Vlad Dragoș DIACONESCU<sup>1</sup>, Luminița SCRIPCARIU<sup>1,\*</sup>, Petre Daniel MĂTĂSARU<sup>1</sup>, Nicoleta VORNICU<sup>2</sup>, Cristian MURARU<sup>3</sup>, Carmen LOGHIN<sup>1</sup>

> <sup>1</sup> Technical University "Gheorghe Asachi" of Iaşi, Romania <sup>2</sup> Metropolitan Research Center TABOR Romania <sup>3</sup> The Metropolitan Museum of Iaşi, Romania

> > \*Iscripca@etti.tuiasi.ro

**Abstract**. The environmental parameters (temperature, relative humidity, UV factor, light intensity and others) of an indoor exhibition space must be monitored and controlled in order to ensure proper conditions for artefacts' preservation. This can be done by a monitoring, alert and control system (MACS) consisting of a sensor network, a communication infrastructure and a central processing device. Data are measured and collected by sensors, sent by the communication network and, finally, stored and processed into the central node (NC). Based on the analysis of data, decisions are made, alerts are sent to the responsible personnel, by short messages to the mobile phone or by email, and commands are sent to the actuators in order to turn on the environmental control devices (air conditioners, heating or light control devices etc.) The goal of MACS is to provide efficiently and economically a stable quality of the indoor exhibition environment. A case study is done for an exhibition room from the Metropolitan Museum of lasi.

**Keywords**: indoor exhibition, environment monitoring system, control, sensor, artefact preservation.

- [1] K. Sohraby, D. Minoli, T. Znati, Wireless Sensor Networks: Technology, Protocols and Applications, John Wiley &Sons, New Jersey, (2007).
- [2] V.D. Diaconescu, L. Scripcariu, M.R. Diaconescu, Sensor network for museum space object-oriented monitoring system, 10<sup>th</sup> European Symposium on Religious Art, Restoration & Conservation, Proceedings Book, (2018) 99-103.



# Determination of Air Quality in a Petroleum Extraction Area

### Viorel Mircea DRAGAN, Beatrice Daniela TUDOR, Laurentia Geanina PINTILIE<sup>\*</sup>

Dunarea de Jos University, 47 Domneasca Street 800008, Galati, Romania

\*geanina.tiron@ugal.ro

**Abstract**. Direct measurements on atmospheric pollutants have the great advantage of measuring real-time emissions rather than by theoretical calculations. To determine the air quality in an area of petroleum, were made measurements of pollutants in several points of work, in order to identify as many sources emitting pollutants. In this study, a number of measurements were performed at several points of the analyzed perimeter, in order to detect the level of pollutants in the atmosphere. To assess the quantities of pollutants emitted into the atmosphere, four pollutant emission sources were taken into account: combustion plants, reservoir parks, in-house traffic and wells. The results of the four monitored areas of activity were compared with the current legislation [1] on the safety and health of workers against the risks related to the presence of chemical agents.

Keywords: air quality, hydrocarbon, petrolium field, combustion plants.

#### **References:**

 Hotararea nr. 1049 din 09/08/2006 privind cerintele minime pentru asigurarea securitatii si sanatatii lucratorilor din industria extractiva de suprafata sau subteran Publicat in Monitorul Oficial, Partea I nr. 727 din 25/08/2006



# Assessment of Soil Quality in an Area with Hydrocarbon Exploitation Activities

### Viorel Mircea DRAGAN, Beatrice Daniela TUDOR, Laurentia Geanina PINTILIE<sup>\*</sup>

Dunarea de Jos University, 47 Domneasca Street 800008, Galati, Romania

\*geanina.tiron@ugal.ro

**Abstract**. The paper presents an analysis of the soil quality, in the petroleum field from Independenta, Galati. The study was determined by the fact that the hydrocarbon spills from the activity carried out here can have a significant impact on the environment. The paper presents the determinations carried out on soil samples related to heavy metal content and pH. Samples were taken from different areas, starting from a contaminated source, and continuing with the surroundings. For each area, three samples were taken at different levels of depth. Concentration values were compared with the legislation [1] setting out the procedures and technical rules for identifying environmental damage in order to determine the responsibilities for remedying them.

Keywords: soil quality, hydrocarbon, petrolium field, heavy metal.

#### **References:**

[1] Hotărâre nr.1408 din 19/11/2007 privind modalităţile de investigare şi evaluare a poluării solului şi subsolului, Ministerul Mediului şi Schimbărilor Climatice, URL: http://www-old.anpm.ro/hotarare\_nr1408 \_din\_19112007\_privind\_modalitatile\_de\_investigare\_si\_evaluare\_a\_pol uarii\_solului\_si\_subsolului-113.



# Actual Types of Sensors Used For Weighing In Motion

Iulian AGAPE, Andrei Ionut DONTU<sup>\*</sup>, Alexandru MAFTEI, Lidia GAIGINSCHI, Paul Doru BARSANESCU

Faculty of Mechanical Engineering, Technical University "Gheorghe Asachi" lasi, Romania

<sup>\*</sup>dontu.andrei.ionut@gmail.com

**Abstract**. In last decade, the overloaded truks increase in countries with weak infrastructure, for examples in Indonesia the procentage of overloaded truks is more than 60% [1]. To prevent this violation of the country regulations was developed weigh-in-motion (WIM) network stations. For France and not only, the network of WIM stations improved traffic safety, fair competition between transportation companies and infrastructure lifetime [2]. The WIM station is able to determine: the type of the vehicle, the gross weight of the vehicle, the load on each axle, vehicle's speed and so on. The most common sensors used for obtain data informations are force sensors and piezoelectrical sensors.

In this paper will be analyzed the main advantages and disadvantages of each type of sensors used for WIM stations.

Keywords: sensors, weigh-in-motion, speed, load.

- [1] J. Jihanny, B. S. Subagio, E. S. Hariyadi, The analysis of overloaded trucks in Indonesia based on weigh in motion data (east of sumatera national road case study), MATEC Web of Conferences, 147 (2018) 02006.
- [2] V. Dolcemascolo, P. Hornych, B. Jacob, F. Schmidt, E. Klein, Heavy vehicle traffic and overload monitoring in France and applications, PIARC World Road Congress, Seoul, (2015).


# Experimental Determination the Coefficient of Restitution

Mihnea Ion MARIN<sup>1, \*</sup>, Cristian VADUVA<sup>2</sup>, Mihai Robert RUSU<sup>1</sup>, Ligia RUSU

<sup>1</sup>University of Craiova, Str. A.I.Cuza .nr.13, Craiova, Romania <sup>2</sup>University Babes Bolyai, Cluj Napoca, Romania

<sup>\*</sup>mihnea\_marin@yahoo.com

**Abstract**. The aim of this study is to make an experimental determination of restitution coefficient during the clash between ball and stick in oina game. This study is made using a complex system for movement analysis named VICON, on 17 oina balls, that have different wear stages, in contact with two different sticks that have different texture. We make the measurement of cinematic parameters of specific points that are marked, on the equipment , during movement. These parameters are used for calculate, using 2 methods, the restitutions coefficients. The values of these coefficient are 0.495-0,512. This analysis allows to make a prediction of balls trajectory, based on movement measurement during clash and also help to optimization of motor performance in oina game.

Keywords: iona game, cinematic, restitution coefficient, trajectory, clash.

- [1] G. Weir, P. McGavin, The coefficient of restitution for the idealized impact of a spherical, nano-scale particle on a rigid plane Proceedings of the Royal Society A: Mathematical, Physical and Engineering Sciences, 464 (2008) 1295–1307
- [2] P. Mohazzabi,(2011)When Does Air Resistance Become Significant in Free Fall?, The Physics Teacher, 49 (2)(2011) 89–90.
- [3] P.M.McGinnis, Biomechanics of sport and exercise (2nd ed.). Champaign, IL [u.a.]: Human Kinetics, (2005) 85.



**EUROINVENT** 

**ICIR 2019** 

Ioana Corina MOGA<sup>\*</sup>, Alessandra BARDI, Simona DI GREGORIO, Francesco SPENNATI, Giulio MUNZ, Stefano BATISTINI, Ovidiu George IORDACHE, Cornelia Elena MITRAN, Gabriel PETRESCU

DFR Systems SRL, 46 Drumul Taberei str, 061392, Bucuresti, Romania

<sup>\*</sup>corinamoga@yahoo.com

**Abstract**. In Moving Bed Biofilm Reactors (MBBR) the biofilm grows protected within small plastic carriers (known as biofilm carriers), which are designed with high internal surface area. The biological wastewater treatment process consists of adding biofilm carriers in aerated or anoxic tanks to support biofilm attachment and growth. Some of the authors conceived, designed and realised an improved carrier (new shape and material) for fungal biofilm development. The improved biofilm carriers were tested in laboratory conditions and good results were obtained. This new biofilm carrier will be used to treat cellulosic (tannery and papermill) wastewaters and is grafted with cellulose fibers for the self-sustainability of the fungal biomass. This will facilitate substrate adhesion, due to biochemical capabilities of the selected strains, which involve secretion of extracellular enzymes, that can break down substrate by combined action of several degradative processes, such as demethylation, oxidative cleavage of the propane side chain, cleavage of ether bonds between monomers etc.

**Keywords**: biofilm carriers, fungi, cellulose, polyethylene, wastewater treatment, moving bed bofilm reactor, microorganism.

#### **References:**

[1] R.L Camacho-Morales., J.E., Sánchez, Biotechnological Use of Fungi for the Degradation of Recalcitrant Agropesticides. Mushroom Biotechnology, Developments and Applications, 12 (2016) 203-214.



# Aeration System to be Used in Wastewater Treatment

Ioana Corina MOGA<sup>\*</sup>, Octavian Grigore DONŢU, Nicolae BĂRAN, Daniel BESNEA, Edgar MORARU, Gabriel PETRESCU

DFR Systems SRL, 46 Drumul Taberei str, 061392, Bucuresti, Romania

<sup>\*</sup>corinamoga@yahoo.com

**Abstract**. The main purpose of the authors is to develop an improved aeration system to be used in wastewater treatment that will reduce the energy consumption by 20% for conventional activated sludge wastewater treatment plants (WWTPs) and by 40% for Moving Bed Biofilm Reactor (MBBR) WWTPs. A new type of aeration system based on fine-bubble diffusers with high endurance and reliability made from corrosion resistant metals is developed. An ultrasound system is used to clean the diffusers for clogging prevention. Ultrasound systems are used in WWTPs, but in the treatment process and not as an additional solution for anticlogging.

**Keywords**: biofilm carriers, aeration system, air diffuser, wastewater treatment, moving bed bofilm reactor, dissolved oxygen concentration, ultrasound system.

- [1] J. Gu, X. Guangjing, L.Yu, An integrated AMBBR and IFAS-SBR process for municipal wastewater treatment towards enhanced energy recovery, reduced energy consumption and sludge production, Water research, 110 (2017) 262-269.
- [2] B. Tănase, D. Besnea, R. Mlisan, M. Constantin, N. Băran, Constructive solutions for the achievement of fine bubble generators based on microdrilling technologies International Journal of Innovative Science, Engineering & Technology, 2(2) (2015) 46-50.



# Studies on Galvanic Corrosion of Metallic Materials in Marine Environment

Carmen NEJNERU, Cristian SAVIN, Manuela Cristina PERJU<sup>\*</sup>, Dumitru Doru BURDUHOS-NERGIS, Maria COSTEA, Costica BEJINARIU

"Gheorghe Asachi" Technical University of Iasi, Dimitrie Mangeron Street, No. 51, 700050, Iasi, Romania

<sup>\*</sup>cryss\_ela@yahoo.com

**Abstract**. Galvanic corrosion occupies an important place among the corrosion techniques studies, especially because seaports and naval installations presents multiple components which are in direct contact with saltwater during operation time, such as: boats propeller - bronze, ship hull - carbon steel, rivets - steel, different types of protection shields - aluminum etc., thus metallic types combinations increase selective erosion depending on the metal position in the galvanic series. The galvanic corrosion prevention can be achieved by local cathodic protection with pieces of electronegative metal (zinc, magnesium) placed near the contacts or by inserting between these two metals of one or multiple high corrosion resistance materials to that specific environment. This paper presents an experimental study on different metal couplings in Black Sea water corrosion environment, in order to highlight the anodic (oxidation) or cathodic (reduction) protection of each metal during coupling.

**Keywords**: galvanic corrosion, seawater, steel couple, stainless steel, aluminium, phosphorus cast iron, shape memory alloys.

#### **References:**

[1] E. Håkansson, J. Hoffman, P. Predecki, M. Kumosa, The role of corrosion product deposition in galvanic corrosion of aluminum/carbon systems, Corrosion Science, 114 (2017) 10-16.



# Assessment of the Soil Formation Process in Reclaimed Terrains in Bulgarian Copper Mine

Veneta STEFANOVA\*, Petar PETROV, Elena ZHELEVA

University of Forestry, 10 Sv. Kl. Ohridski blvd, 1756 Sofia, Bulgaria

<sup>\*</sup>venistefanova3@gmail.com

**Abstract**. One of the most important preconditions of ecosystem rehabilitation in post mining landscapes is the soil formation process. In this context, the soil samples from Ellatzite copper mine are analyzed according to key parameters – the content of heavy metats, alkali and alkaline earth metals, nitrogen, phosphorus and organic matter. The results of the study show that there are soil formation processes in reclaimed terrains whose speed and qualities depend on the soil-forming materials and the type of vegetation.

Keywords: soil, soil formation process, reclamation, copper mine.

#### **References:**

[1] L. R. Baker, P. White, G. Pierzynski, Changes in microbial properties after manure, lime, and bentonite application to a heavy metalcontaminated mine waste, Apl. Soil Ecolology 48 (2011), 1-10.

**Acknowledgements:** The financial support of the Project BG05M2OP001-2.009-0034 "Support for the Development of Scientific Capacity at the University of Forestry" is greatly acknowledged.



## The Influence of the Technological Process of Rice Husk Ash Synthesis over its Structure

Andreea BARAITARU<sup>\*</sup>, Marius OLTEANU, Andreea MONCEA, Diana DUMITRU, Ana-Maria PANAIT, György DEÁK

National Institute for Research and Development in Environmental Protection Bucharest, Splaiul Independentei 294, Bucharest, Romania

\*baraitaru\_andreea@yahoo.com

**Abstract**. In this research, the identification of the influence of several methods of rice husk ashes preparation over their structure was followed, by varying the synthesis parameters, as well as by subsequent application of the grinding process. The obtained rice husk ash samples with high silica composition, were characterized by X-ray diffraction (XRD) to determine the compositional phases and crystalline structure of the samples, by scanning electron microscopy (SEM) to observe the microstructure and the particle sizes, and by laser granulometry to establish the granulometric distribution. Thus, it was possible to conclude that the technological process used for rice husk ash preparation shows influences on the samples microstructure and composite phases, as well as differences in particle sizes by decreasing their values as a result of mechanical process application. Based on these analyses, it was verified which of the obtained rice husk ash samples present a suitable microstructure, in order to capitalize them in environmental applications.

Keywords: rice hush ash, secondary raw materials, agricultural waste.

#### **References:**

 INCDPM Bucharest, "Innovative organic materials as nanostructured materials and inorganic binders, with applicability in environmental protection", Research Programme NUCLEU – RESCMANS, contract no. 39N/2019, Bucharest 2019.

# Advanced Treatment Solutions Intended for the Reuse of Livestock Wastewater in Agricultural Applications

**EUROINVENT** 

**ICIR 2019** 

Carmen TOCIU<sup>\*</sup>, György DEÁK, Cristina MARIA, Anton-Alexandru IVANOV, Irina-Elena CIOBOTARU, Ecaterina MARCU, Marinescu FLORICA, Cristina CIMPOERU, Ioana SAVIN, Alexandra-Corina CONSTANDACHE

National Institute for Research and Development in Environmental Protection Bucharest, Splaiul Independentei 294, Bucharest, Romania

<sup>\*</sup>tociucarmen@yahoo.com

**Abstract**. One of the main concerns of the developing world is the mitigation of pollution of environmental components together with the recovery and reuse of valuable substances from waste resulting during diverse anthropic activities. Wastewater generated by agro-zootechnic activities is a source of nutrients (nitrogen and phosphorus compounds) and traditionally it is reused for crops irrigation. However adverse effects on the environment may be caused should a proper treatment not be performed, considering the spread of additives/drugs altering the natural metabolism in modern livestock industries and subsequently their presence in waste. In this context, research was conducted on laboratory scale setups of some advanced treatment processes for wastewater resulting from cattle farms. UV disinfection and oxidation using ozone were investigated in order to emphasize the antimicrobial effect and their contribution to the improvement of water quality.

Keywords: livestock wastewater, ozonation, UV disinfection.

#### **References:**

[1] INCDPM Bucharest, "Innovative technologies for irrigation of agricultural crops in arid, semiarid and subhumid-dry climate", Project no. PN-III-P1-1.2-PCCDI-2017-0254, Contract no. 27PCCDI/2018, within PNCDI III.



## Estimation of Soil and Tailing Dump Toxicity: Development and Validation of a Protocol based on Bioindicators and ICP-OES

Darya ILIEVA<sup>1</sup>, Lyudmila ANGELOVA<sup>1</sup>, Gabi DROCHIOIU<sup>2</sup>, Manuela MURARIU<sup>3</sup>, Andriana SURLEVA<sup>1,\*</sup>

<sup>1</sup>Analytical Chemistry dep, University of Chemical Technology and Metallurgy, 8 "St. KI. Ohridski" blvd., 1756 Sofia, Bulgaria
<sup>2</sup>Faculty of Chemistry, Alexandru Ioan Cuza University of Iasi, 11 Carol I, Iasi-700506, Romania
<sup>3</sup> Petru Poni Institute of Macromolecular Chemistry, 41A Gr. Ghica, Iasi-700506, Romania

<sup>\*</sup>surleva@uctm.edu

Abstract. A protocol for estimation of soil toxicity based on germination test, open acid sample digestion and ICP-OES determination of heavy metals and metalloids was proposed. Triticum aestivum was used as a bioindicator and germinated on contaminated soils. After estimation of the state of the plantlets, the accumulated heavy metals and metalloids content were determined. The sample digestion procedure and ICP-OES measurement were validated by analysing plant certified reference material. Additionally, standard addition before sample pretreatment was applied for estimation of method recovery at the levels of heavy metals found in plants from contaminated region. The recovery obtained was between 97 and 105 %. The precisions of the complete protocol (RSD), which included germination tests, sample digestion and ICP-OES measurements, ranged between 4.7% for Mn and 11 % for As. The expanded uncertainty was estimated. The proposed protocol was applied for estimation of soil toxicity and heavy metals bioavailability of tailing dump material and surrounding soils from an abandoned barite mine in Tarnita, Suceava, Romania. The coltsfoot used for remediation of the soil in the studied region was analysed. Cu, Ni, Zn, Mn, Pb, Fe and Al were found in the sample harvested nearby the tailing dump.



# A Study on the Exhaustion of Reactive Dyes As an Influence Factor on The Colour Of Reactive Dyeing Wastewater

## Liliana Rozemarie MANEA, Anișoara BERTEA, Andrei Petru BERTEA<sup>\*</sup>

"Gheorghe Asachi" University, 67 Profesor Dimitrie Mangeron Blvd, 700050, Iași, Romania

apbertea@tex.tuiasi.ro

**Abstract**. One of the most significant pollution factors in the dyeing of textile materials is the colour of wastewater. This feature is particularly pronounced as the dye exhaustion is low. This paper examines the exhaustion of 5 reactive dyes, dyes which are widely used and characterized by modest capacity of exhaustion. The exhaust capacity is analysed in correlation with the value of the liquor ratio and the dye concentration in the dyeing solution.

Keywords: textile dyeing, reactive dyes, wastewater, exhaustion.

- [1] M. Hamdaoui, S. Turki, Z. Romdhani, S. Halaoua, Effect of reactive dye mixtures on exhaustion values, Indian Journal of Fibre & Textile Research, 38 (2013) 405-409.
- [2] S. Koli, G. Lauletta, T. Shinde, P. Raickurkar, Optimization of exhaustion and fixation maximization of reactive dyes, Colourage, 8 (2018) 37-42.
- [3] U. Siddiqua, S. Ali, T. Hussain, H. Bhatti, M. Asghar, The Dyeing Process and the Environment: Enhanced Dye Fixation on Cellulosic Fabric Using Newly Synthesized Reactive Dye, Pol. J. Environ. Stud., 26 (2017) 2215-2222.



# Contributions on the Fire Performance Assessment of ETICS Systems

## Adrian SIMION<sup>\*</sup>, Anghel ION, Horatiu DRAGNE, Daniela STOICA

National Institute of Research and Development in Urban Construction and Sustainable Territorial Development URBAN-INCERC, 266 Pantelimon str, District 2, 021615, Bucharest, Romania

<sup>\*</sup>simion\_i\_adrian@yahoo.com

**Abstract.** The Romanian norms and technical regulations do not provide the obligation of compartment fire tests for composite facade insulation systems "ETICS". Unfortunately, only after these tests can result reliable data on the performance evaluation of ETICS systems under the effects of compartment fires, and there is still no harmonized European standard requiring such tests (in 2018 the first part of a European project that aims to harmonize the fire exposure test of façades was completed). In this context, researchers from the INCERC Fire Security Research and Testing Laboratory in Bucharest, tested experimentally the exposure to compartment fire of two types of ETICS systems, according to the test method set out in BS 8414. The climate test conditions of both systems were similar, and after the tests (for the first time in Romania) a series of data were obtained on the behavior of ETICS systems under the action of compartment fires.

**Keywords**: research, ETICS, assessment, compartment fire, fire performance, large-scale experiments.

- [1] Lalu O., Anghel I., Codescu S., Branisteanu B., Experimental research on fire behaviouranalysis for polystyrene insulation thermal rehabilitations systems, Romanian Journal of Civil Engineering 7 (2016) 208.
- [2] Lalu O., Bubulete L., Termosistem pentru placari exterioare utilizat pentru anveloparea constructiilor, Raspuns la actiunea focului,133 (2017) 8.

# Natural Dyes Extracted from Leaves, Fruits, and Roots of *Piper Betel*, *Adonidia Merrillii* and *Morinda Citrifolia* as Photosynthesizers for Dye Sensitized Solar Cells

**EUROINVENT** 

**ICIR 2019** 

Ayu Wazira AZHARI<sup>1,2\*</sup>, Thiararath Sengthavee EOP<sup>1</sup>, Dewi Suriyani Che HALIN<sup>2</sup>

<sup>1</sup>Water Research Group (WAREG), School of Environmental Engineering, Universiti Malaysia Perlis 02600 Arau, Perlis, Malaysia.
<sup>2</sup>Center of Excellence Geopolymer & Green Technology (CEGeoGTech), School of Material Engineering, Universiti Malaysia Perlis 02600 Arau, Perlis

<sup>\*</sup>ayuwazira@unimap.edu.my

**Abstract**. In this study, the fabrication of dye sensitized solar cell (DSSCs) using the leaves of *Piper Betel* (PB), fruits of *Adonidia Merrillii* (AM) and roots of *Morinda Citrifolia* (MC) and combination of these three dyes (PB/AM/MC) had been conducted. Fabrication of the DSSCs was conducted using layered system, which involved sandwiching of a working electrode (TiO2 semiconductor) and counter electrode (platinum paste) The chemical and electrochemical characteristic of natural dye extracts were determined using pH meter, Fourier transform infrared (FT-IR) spectroscopy and ultra violet (UV-Vis) spectroscopy. From the stjdy, it was observed that PB dyes showed the highest efficiencies (0.0712 %) followed by the combination dyes (0.0065 %) while AM and MC dyes showed the lowest efficiency (1.0x10<sup>-9</sup> % and 0% respectively.

Keywords: DSSC, natural dye, photosensitizer, plant pigment.

#### **References:**

[1] Al-Alwani, M.A.M., Ludin, N.A., Mohamad, A.B., Kadhum, A.A.H., Mukhlus, A., Application of dyes extracted from Alternantheradentata leaves and Musa acuminata bracts as natural sensitizers for dyesensitized solar cells. Spectrochimica Acta - Part A: Molecular and Biomolecular Spectroscopy, 192 (2018) 487-498.



# Experimental and Simulation of Pedestrians Walking through Different Types of Angled-Corridor

## Noorhazlinda Abd RAHMAN<sup>1,\*</sup>, Nur Aina ALIAS<sup>1</sup>, Muhammad Salleh ABUSTAN<sup>2</sup>, Eiji HARADA<sup>3</sup>, Hitoshi GOTOH<sup>3</sup>

<sup>1</sup>School of Civil Engineering, Engineering Campus, Universiti Sains Malaysia, 14300 <sup>2</sup>Faculty of Civil and Environmental Engineering, Universiti Tun Hussein Onn, 86400 Batu Pahat, Johore, MALAYSIA <sup>3</sup>Graduate School of Civil and Earth Resources Engineering, Kyoto University, Katsura Campus, Nishikyo-ku, Kyoto, 615-8540, JAPAN

<sup>\*</sup>celindarahman@usm.my

**Abstract**. Angled-corridor is a common geometrical facility that can be found in any types of buildings. Types of angled-corridor are acute angled-corridor (between 0 and 90°), right angled-corridor (90° or L-shaped corridor or a corner), obtuse angled-corridor (between 90° and 180°) and straight angled-corridor ( $0^{\circ}/180^{\circ}$ ). Comparing a corner and straight corridor to acute- and obtuse- angled-corridors, effects of later types of corridors on the pedestrian flow and dynamics are rarely studied. Rationally, there will be changes to the human walking velocity, like slow down motion when approaching and walking through the angled-corridors. This indirectly could trigger restrictions to the flow of walkers and causing congestion near that turning angle of corridor.

Keywords: angled-corridor, acute angled-corridor, obtuse angled-corridor

#### **References:**

[1] Dias, C., Ejtemai, O., Sarvi, M. and Shiwakoti, N., 2014. Pedestrian walking characteristics through angled corridors: An experimental study. Transportation Research Record: Journal of the Transportation Research Board, (2421), pp.41-50.



# Study of Unattended Child Presence Detection System for ASEAN NCAP Safety Rating

Muhammad Muaz Husaini ROSLI<sup>1</sup>, Nurul Izzati AFANDI<sup>1</sup>, Leah Poi Jia YUEN<sup>1</sup>, Nurul Suziana JOLI<sup>1</sup>, Khairil Anwar Abu KASSIM<sup>2</sup>, Mohd Radzi Abu MANSOR<sup>3,\*</sup>

 <sup>1</sup>Kolej PERMATApintar, Universiti Kebangsaan Malaysia, 43600 Bangi, Malaysia
 <sup>2</sup>ASEAN NCAP, Taman Kajang Sentral, 43000 Kajang, Malaysia
 <sup>3</sup>Department of Mechanical Engineering, Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Malaysia

<sup>\*</sup>radzi@ukm.edu.my

**Abstract**. Cases regarding children death due to the entrapment in the vehicles during hot weather is increased. Our research aims are to study the opinions amongst parents regarding the safety awareness on the child safety in the vehicles and to investigate the preferred operations of child presence detection system in the vehicles. A quantitative research was carried out with surveys of audience awareness while driving with children inside vehicles and the preferred operating child presence detection system in the vehicles. Results found that many parents in Malaysia are aware of the need of the safety for their children. The survey results also found that the majority of the parents preferred to have better sound indicator for child detection system in the vehicles from the car reminder system. Based on the information obtained, 70% of the parents also are willing to pay higher priced for the child detection system in the car because they believed that leaving their children in the car for more than 30 minutes can caused death.

Keywords: child safety, detection system, ASEAN NCAP.

#### References:

[1] K.A.A. Kassim, Y. Ahmad, S. Mustaffa, M.R.A. Mansor, The New Car Assessment Program for Southeast Asian Country (ASEAN NCAP) Roadmap 2021-2025 (2018) 1-28.



# Assessment of Trace Elements Concentrations in Road Dust around the City of Kuala Lumpur

## Muhammad Ikram A WAHAB\*, Wan Mohd Amir Faqry Abd RAZAK

Centre of Health & Applied Sciences, Faculty of Health Sciences, Universiti Kebangsaan Malaysia

<sup>\*</sup>ikram@ukm.edu.my

**Abstract**. This study aimed to assess the concentrations and health effect of heavy metals (Cd, Cu, Cr, Ni, Pb and Zn) in road dust of selected locations in the city of Kuala Lumpur. Sampling was conducted for three times at four locations namely Jalan Tun Razak, Jalan Raja Abdullah, Jalan TAR and Jalan Ayer Molek. The concentration of heavy metals in road dust was analyzed by using ICP-MS. The study found that Jalan TAR has the highest concentrations for the heavy metals Cd ( $0.23 \pm 0.04$  mg/kg), Cu (116.39  $\pm$  38.77 mg/kg), Ni (83.29  $\pm$  23.66 mg/kg), Pb (43.53  $\pm$  7.00 mg/kg) and second highest for Cr (34.69  $\pm$  3.57 mg/kg) and Zn (86.22  $\pm$  23.07). The pollution level of heavy metals in road dust were assessed by Pollution Index and Pollution Load Index, showing that all locations are highly contaminated except Jalan Ayer Molek. Health risk assessment was determined to access the health effect of carcinogenic and non-carcinogenic to adults and children caused by exposure of heavy metals in road dust.

**Keywords**: Health risk assessment; Heavy metal; Road dust; Pollution index.

### **References:**

[1] M. Abbas & N. Tufail. 2013. Health Risks Assessment for Heavy Elements Suspended in Dusty Air Along Murree Highway, Pakistan. American-Eurasian. Journal of Agriculture and Environment Science 13(3): 372-377.



# Evaluation of surface characteristics of direct composite resins after finishing and polishing using fractal analysis

## Irina Nica\*, Gianina Iovan, Galina Pancu, Simona Stoleriu, Sorin Andrian

Grigore T. Popa University of Medicine and Pharmacy lasi, Faculty of Dental Medicine,16 Universitatii Str., 700115, lasi, Romania

<sup>\*</sup>irinanica76@yahoo.com

**Abstract**. Surface characteristics of two composite resins (Filtek Ultimate Universal Restorative, 3M ESPE and Filtek Ultimate Flowable Restorative, 3M ESPE) after finishing and polishing procedure using three systems: two steps Sof-Lex system, 3M ESPE, multi-steps Super Snap system, Shofu, Inc. Kyoto, Japan and multi-steps OptiDisc system, KerrHawe SA were analyse using SEM and AFM investigations. Fractal analysis was performed on SEM and AFM images and the mean fractal dimension was calculated for each sample using FracLac software. For both tested materials decreased fractal dimension with the increase of SEM magnification was observed. Multi-steps OptiDisc system determined the biggest decrease of fractal dimension for both materials, followed by Sof-Lex system and Super Snap. Fractal analysis seems to be an appropriate method to investigate the complex structure of composite resins.

Keywords: fractal analysis, composite resin, finishing, polishing, SEM, AFM

- [1] R. Lopes, N. Betrouni. Fractal and multifractal analysis: A review, Medical Image Analysis, 13 (2009) 634–649.
- [2] I. Nina, S. Stoleriu, G. Iovan, G. Pancu, S. Andrian. Fractal analysis of some restorative nano-filled composite materials microstructure. Stomatology Edu Journal, 2(1) (2015) 36-43.



## CONTENTS

Euroinvent – joint events	3
Foreword	4
Scientific Advisory Board	5
Technical and Organizing Committee	6
Joint Euroinvent Program	7
Organizers	8
Keynote Speaker – Mihaly REGER	12
Invited Speaker – Mohammad FIRDAUS ABU HASHIM	13
Invited Speaker – Rodica Mariana ION	14
Invited Speaker – Brândușa GHIBAN	15

### Section 1: Synthesis and Characterization of Materials

Salmabanu LUHAR, N.P. RAJAMANE, Ofelia-Cornelia CORBU, Ismail LUHAR Impact of Volcanic Ash on Geopolymerization of Volcanic Ash Based Geopolymer Composites: A Review	18
Alexandru PETRE, Emanuel VAMANU	10
Comparative Study of Experimental Approaches to Increase the	19
Availability of Phytochemicals using Gamma Radiation	
Nicoleta SimiONESCO, Lidia DENEA, Jean Pierre CELIS	20
Wear-Corrosion Response of Cerium Oxide Reinforced Cobalt Hybrid	20
Composite Layers in Biological Solution	
Lidia BENEA, Nicoleta SIMIONESCU	
Corrosion Behavior of Ni/Wc Nano-Structured Composite Layers	21
Synthesized by Electrochemical Method	
Laurentiu DRĂGUS, Lidia BENEA, Nicoleta SIMIONESCU, Anca RAVOIU,	
Veaceslav NEAGA	
Effect of the Inflammatory Conditions and Albumin Presence on the	22
Corrosion Behavior of TI6AL4V Allov in Saliva Biological Solution	
Anca RAVOIU, Nicoleta SIMIONESCU, Lidia BENEA	
Influence of Different Concentration of Hydrogen Peroxide on the	•••
Corrosion Rehaviour of Ti-6Al-4V Alloy Immersed in Physiological	23
Solution	
Solution	



Laurentiu MARDARE, Lidia BENEA

Laurentiu MARDARE, Lidia BENEA	24
Marine Corrosion Behavior of EH 36 Steel in the Black Sea Coast	
Mihai-Alexandru FLOREA, Bogdan PURCAREANU, Adelina BICU, Veronica	
DRUMEA, Cerasela GIRD, Mihai GRIGOROSCUTA, Dan Eduard MIHAIESCU,	
Laura OLARIU	25
Extraction of Pesticide Residues from Plant Extracts Using	
Regenerative MCM41 Mesoporous Materials	
Irina Elena CHICAN, Dana VĂRĂȘTEANU, Irina FIERĂSCU, Radu Claudiu	
FIERĂSCU, Marian DEACONU	24
Surface Properties in Surfactant Systems Containing Amino Acid-	26
Based Surfactants	
Carlo SICILIANO, Fabio MAZZOTTI, Anna NAPOLI, Donatella AIELLO,	
Pierantonio de LUCA. Andrea TEMPERINI	
<sup>1</sup> H NMR Quantification of Cannabidiol (CBD) in Industrial Products	27
Derived from Cannabis Sativa L. (Hemn) Seeds	
Carlo SICILIANO Anna NAPOLI Donatella AIELLO Pierantonio de LUCA	
Andrea TEMPERINI	28
<sup>1</sup> H and <sup>13</sup> C NMP Investigation of Oils Extracted from Exotic Eruits	20
Joana TATADU Nicolata Maria II JES, Ildiko BUCUD	
Stabilization of a Sliding Slove by Using Mixed Wooden Consume Diles	29
Liliona Maria NICHLA, Ofalia CODDU, Mihai II JESCU	
Linana Maria NICULA, Olena CORBO, Minai ILIESCO	20
Influence of Slag Powder in the Cement Mortar Mixes on the	30
Characteristics of Compactness, and Freeze-Thaw Strength	
Maria BOLAI, Arina CIOCAN-PENDEFUNDA, Zenaida SURLARI, Cosmin	
BIDA, Carina BALCOS, Raluca BACIU, Dana-Gabriela BOSINCEANU	31
Using Shape Memory Effect to Obtain a New Polymer for the	01
Manufacture of Complete Dentures	
Gabriela-Victoria MNERIE, Dumitru MNERIE	
Research on the Application of Ultrasound to Enhancing the Quality of	32
Multilayer Polyethylene Films By Inserting Filiform Materials	
Ioana ION, Alina CARAMITU, Virgil MARINESCU, Delia PATROI, Eugen	
MANTEA, Aristofan TEISANU, Jana PINTEA, Cristian MORARI, Cristina	
BANCIU, Magdalena LUNGU	33
Synthesis and Characterization of Nickel Ferrite Nanoparticles and	
Polymeric Composite EMIS Application	
Robert-Alexandru DOBRE, Alina-Elena MARCU, Mihai STANCIU, Marian	
VLĂDESCU	34
Spectroscopic Investigation of Transparent Polylactic Acid	
Andrei DRUMEA, Robert Alexandru DOBRE, Cristina Ioana MARGHESCU	
Thermal and Electrical Investigation of Granhene-Enhanced	35
Conductive Polylactic Acid Based Filaments for 3D-Printing	00
Raluca-Maria EL OREA	
Microstructure and properties of high entropy alloy coating	36
Pozina STEIGMANN Gabriel Silviu DOBRESCU Madalina Simona	
DALTATU Advises CAVIN 74-1-1 DEEVODOVCKY Detries VIZUDEANU	
BALTATU, Adriana SAVIN, Zdenek PREVOROVSKT, Petrica VIZUREANU	37
Nondestructive testing methods for assessment of biomaterials based on	
Titanium alloys	
Adriana SAVIN, Nicoleta IFTIMIE, Rozina STEIGMANN, Gabriel Silviu	
DOBRESCU, Corneliu MUNTEANU, Bogdan ISTRATE	38
Ultrasound methods for determining the influence of yttrium in Mg-	50
0.5C4-X1	



2 P

Claudia MILEA, Aurora ANTONIAC, Daniela GHEORGHITA, Elena GROSU, Iulian ANTONIAC The effect of the precious metal addition in chemical composition of the	39
non precious dental alloys on their microstructure characteristics	
Elena GROSU, Claudia MILEA, Aurora ANTONIAC, Pham Hong QUAN, Alina VLADESCU, Eugeniu VASILE, Iulian ANTONIAC	40
Performing and characterization of biodegradable magnesium alloys	
type Mg-Zn-Zr-Ag coated with hydroxyapatite	
Marcin NABIALEK, Bartiomiej JEZ, Kinga JEZ, Pawei PIETRUSIEWICZ, Katarzyna BLOCH, Joanna GONDRO, Andrei Victor SANDU, Mohd Mustafa Al Bakri ABDULLAH	41
Proces of magnetising bulk amorphous alloys Fe <sub>43+x</sub> Co <sub>29-x</sub> Y <sub>8</sub> B <sub>20</sub> (x= 0	
Simona POPESCII (DOBRITA) Sergiu STANCIII Ramona CIMPOESI	
Bogdan ISTRATE, Georgeta ZEGAN, Iulian IONIȚĂ, Bogdan Anton PRISECARIU	42
Phases and compounds composition analyze of ZnMgCa biodegradable	
alloy	
Dumitru MIHAI, Nicanor CIMPOEȘU, Vasile MANOLE	
Simulation of solidification parameters of cast-iron and aluminum	43
Cristian TUDORA Mărioara ABRUDEANU Serciu STANCIII Daniel	
ANGHEL, Gabriela PLAIASU, Vasile RIZEA, Joan STIRBU, Ramona	
CIMPOEȘU, Margareta COTEAȚĂ	44
Preliminary results on microstructure profile of Copper-based shape	
memory alloy	
Ștefan TUDORAN, Ionelia VOICULESCU, Victor GEANTĂ, Madalina Simona	
BALTATU, Iulia MARZA, Ion PATRAȘCU, Bogdan Mihai GALBINAȘU,	15
Fifeets of chamical composition on the microstructural characteristics	45
of Ti-Nh-Ta-Zr allovs	
Victor GEANTĂ, Ionelia VOICULESCU, Radu STEFĂNOIU, Mirela	
CODESCU, Hajnal KELEMEN, Geta PAVEL, Alina VLÅDESCU, Andrei Victor SANDU	46
Obtainment and Characterisation of High Entropy Alloys Used for	
Medical Applications	
Ionelia VOICULESCU, Victor GEANTA, Radu ȘTEFANOIU, Adrian ROTARIU,	
Valentin CP Å CILIN	47
New Refractory High Entrony Alloys	
Manuela-Cristina PERJU, Mihai AXINTE, Carmen NEJNERU, Nicanor	
CIMPOEȘU, Cătălin-Andrei ȚUGUI	48
The active screen influence of edge effect in plasma nitriding	
Dumitru-Doru BURDUHOS-NERGIS, Petrica VIZUREANU, Liviu ANDRUSCA,	
Dragos-Cristian ACHITEI	49
Acids	
Diana-Petronela BURDUHOS-NERGIS, Contantin BACIU, Petrica	
VIZUREANU, Nicoleta-Monica LOHAN, Costica BEJINARIU	50
Materials Types and Selection for Carabiners Manufacturing: A review	



Ştefan-Ioan GHICA, Cosmin-Mihai COTRUŢ, Mihai BUZATU, Iulian-Vasile ANTONIAC, Victor GEANTĂ, Mihai BUŢU, Mircea-Ionuţ PETRESCU, Radu ŞTEFĂNOIU, Elena UNGUREANU, Gheorghe IACOB, Roxana-Nicoleta IONESCU In vitro Corrosion Behavior of Ti-Mo-W Alloy in Artificial Saliya	51
Mădălina-Simona BĂLȚATU, Petrică VIZUREANU, Viorel GOANȚĂ, Cătălin- Andrei ȚUGUI, Victoraș GEANTĂ Mechanical Tests for Ti-based Alloys as New Medical Materials	52
Iustinian BĂLȚATU, Petrică VIZUREANU, Florin CIOLACU, Dragoș-Cristian ACHIȚEI, Mădălina-Simona BĂLȚATU Properties of New Ti-Mo-Si Alloys for Medical Use	53
Paul CIUBOTARIU-ANA, Nicoleta-Monica LOHAN, Cristian-Andrei MICU, Constantin BACIU, Stefan-Lucian TOMA, Costica BEJINARIU Investigation of Thermal Degradation and Electrical Properties of	54
Polyamide Materials Versus Polybismaleimide Materials for Fire- Fighters Helmets	5.
Victor APOSTOL, Nicoleta-Monica LOHAN, Elena MIHALACHE, Radu- Ioachim COMĂNECI, Nicanor CIMPOEȘU, Bogdan PRICOP, Mihai POPA, Leandru-Gheorghe BUJOREANU Accumulation of Stress Induced Martensite in Fe <sub>43.5</sub> Mn34Al <sub>15±x</sub> Ni <sub>7.5∓x</sub>	55
Shape Memory Alloys Madalin-Constantin GURAGATA Brandusa GHIBAN Nicolae SERBAN	
Particularities of forming behavior for INCONEL 718 SUPERALLOY	56
Claudia NATRA, Brandusa GHIBAN	57
Brown band characteristics of Aluminum cladding alloys	57
Elena-Raluca BACIU, Roxana-Ionela VASLUIANU, Maria BOLAT, Bogdan	
BULANCEA, Alice MURARIU, Dana-Gabriela BOSINCEANU	58
SEM/EDS analyses on shape memory alloys subjected to	
electrochemical corrosion Milada DÉCED, Ealla Dala EÁDIÁN Landa TÓTH	
Contorling inhomogeneity of flot products	59
Madalina Simona BALTATU Patrice VIZUPEANU Victores GEANTA Ionalia	
VOICUI ESCU Radu STEFANOILI	60
New Materials of Ti-based Alloys for Medical Application	00
Dragos Cristian ACHITEL Madalina Simona BALTATU, Petrica VIZUREANU.	
Andrei Victor SANDU	61
Analysis of Ni-Cr Allovs Used Like Biomaterials	
Mohammad Firdaus Abu HASHIM, Mohd Mustafa Al Bakri ABDULLAH, Andrei	
Victor SANDU, Attila PUSKAS, Yusrina Mat DAUD, Farah Farhana ZAINAL,	
Meor Ahmad FARIS, HASRI, HARTATI	62
Advanced Glass Reinforced Epoxy Filled Fly Ash Based Geopolymer	
Filler: Preparation and Characterization on Piping Materials	
Kamrosni Abdul RAZAK, Dewi Suriyani Che HALIN, Mohd Mustafa Al Bakri	
ABDULLAH, Petrica VIZUREANU, Mohd Arif Anuar Mohd SALLEH, Norsuria	(2)
MAHMED, Azlıza AZANI, Madalına Simona BALTATU, Ayu Wazıra AZHARI	63
A Review on Synthesis and Factors of Controlling the Formation of Titanium Diamida (TiO) Thin Film air Cal Cal Mathad	
Nuoim Siddigi DANIAL Davi Suriyani Che HALIN Muhammad Mahyiddin	
RAMI I Mohd Mustafa Al Bakri ABDIII I AH Siti Salwa Mat ISA Lina Facibah	
Abdul TALIP. Nur Svafigah MAZLAN	64
Graphene Geopolymer Hybrid: A Review on Mechanical Properties	
and Piezoelectric Effect	



Siti Hawa SALLEH, Nur Hidayah Ahmad ZAIDI, Salmie Suhana Che ABDULLAH Study On the Mechanical Properties and Corrosion Resistance of Sintered AZ91 Alloys	65
Jama Mohamed Sareye FARAH, Muhammad Hakimi Mohd SHAFIAI, Abdul Ghafar ISMAIL Compliance Behaviour on Zakat Donation: A Qualitative Approach	66
Section 2: Procedures and Technologies for Materials Engineer	ring
Tamás RÉTI, Imre FELDE, Mihály RÉGER, László TÓTH, Zoltan FRIED	
A Probabilistic Kinetic Model for Predicting Grain Growth Processes in Alloys	68
Mihail Aurel ȚIȚU, Alina Bianca POP, Ștefan ȚIȚU, Gheorghe Ioan POP Optimization of the Objective Function –Surface Quality by End- Milling Dimensional Machining of Some Aluminum Allovs	69
Alina Bianca POP, Mihail Aurel ȚÎȚU, Gheorghe Ioan POP, Ștefan ȚÎȚU	
Modeling the Machined Surface Quality of an Aluminum Alloy Using	70
Aurelian BUZĂIANU, Roxana TRUȘCĂ <sup>1</sup> , Petra MOŢOIU, Ioana CSAKI, Anghel	
IONCEA, Vlad MOŢOIU	
Considerations Regarding WC-Cermet Depositions by HVOF and ESD	71
Turbines	
Marzieh Javadi TOGHCHI, Carmen LOGHIN, Irina CRISTIAN, Christine	
CAMPAGNE, Pascal BRUNIAUX, Luminita CIOBANU, Aurèlie CAYLA, Yan	70
CHEN Thermal Desistance and Water Vaner Dermashility of 2D Interlask	72
Woven Fabrics Containing Silver Multifilament Yarns	
Pierantonio de LUCA, Ivano BERNAUDO, Sebastiano CANDAMANO, Carlo	
SICILIANO, Anastasia MACARIO	73
Treatment of Industrial Slag Zinc Ferrite by Zeolite Sludge	
NAGY. Pierantonio de LUCA	74
Brackish Water Treatment with Carbon Nanotubes	
Gennady TYAGUNOV, Tatyana KOSTINA, Evgeny BARYSHEV, Irina	
VANDYSHEVA, Kseniya SHMAKOVA Influence of Melt Propering Technology on the Structure of Cest Aluminum	75
Silicon Allov	
Ioana Nicoleta NEGRU, Monica LEBA, Sebastian ROSCA, Laura MARICA,	
Andreea IONICA	76
A New Approach on 3D Scanning-Printing Technologies for Medical Applications	
Marius Nicolae BABA, Mircea MIHALCICĂ, Călin ITU, Mihaela Violeta	
MUNTEANU, Maria Luminița SCUTARU	77
Investigation of Mode II Interlaminar Fracture Toughness of	, ,
Cristian STESCU, Daniela CHICET, Corneliu MUNTEANU Cristian	
CROITORU, Vlad CÂRLESCU	79
Machining of Thermal Sprayed Coatings - A Case Study for Self-	/0
tluxing Powder Ovidiu MOCĂNITA Daniela CHICET Bogdan ISTRATE Cristian MICU	70
ovidiu mooranița, Dameia ericeri, Doguan Isticate, clisităli Mileu,	17



Corneliu MUNTEANU	
Investigation of Thermal Coating Influence on the Fire Resistance of a	
Multi-layer Material	
Manuela-Cristina PERJU, Carmen NEJNERU, Mihai AXINTE, Dumitru Doru BURDUHOS-NERGIS, Traian MIRICĂ	80
Computer-Assisted Processing for Rolling Mill Frame Reconditioning	
Ionuț BRATOSIN, Cristina-Mădălina TOMA, Eugeniu VASILE, Valeriu-Gabriel	
GHICA, Mihai BUZATU, Mircea-Ionuț PETRESCU, Gheorghe IACOB, Tunde-	
Anna KOVÁCS	81
Recovery of LiCoO <sub>2</sub> Compound from Cathodic Paste of Waste LIBs, by	
Ultrasonography in Lactic Acid Solution	
Andrei-Mihai BACIU, Costica BEJINARIU, Anisoara CORABIERU, Elena	
MIHALACHE, Margareta LUPU-POLIAC, Constantin BACIU, Elena-Raluca	
BACIU	82
Influence of Process Parameters for Selective Laser Melting on the	
Roughness of 3D Printed Surfaces in Co-Cr-W Dental Alloy Powder	
Dragoş-Teodor BRAN, Brandusa GHIBAN	02
Heat treatment behavior of alternator shafts steels	65
Radu-Armand HARAGA, Costica BEJINARIU, Alin CAZAC, Bogdan TOMA,	
Constantin BACIU, Stefan-Lucian TOMA	0.4
Influence of surface roughness and current intensity on the adhesion of	84
high alloyed steel deposits - obtained by thermal spraying in electric arc	
Andreea Mihaela MONCEA, Ana-Maria PANAIT, Florina Diana	
DUMITRU, Andreea Georgiana BARAITARU, Marius Viorel OLTEANU,	
Gyorgy DEÁK, Mădălina BOBOC, Silvius STANCIU	85
Metakaolin - waste glass geopolymers. The influence of hardening	
conditions on mechanical performances	
Ion-Aurel PERIANU, Emilia Florina BINCHICIU, Nicusor-Alin SÎRBU, Aurel	
Valentin BÎRDEANU	97
Experimental research on reconditioning transmision axes by MAG	80
robotic welding	
Andrei Victor SANDU, Petrica VIZUREANU, Victoras GEANTA, Ionelia	
VOICULESCU, Radu STEFANOIU	87
Electrochemical Behaviour of Ti-based Alloys for Medical Application	
Ayu Wazira AZHARI, Nurdini Md NORDIN, Dewi Suriyani Che HALIN, Uda	
HASHIM	00
Application of Taguchi's design of experiments in optimization of metal	00
assisted chemical etching process	
Norizah Abdul KARIM, Muhammad M. RAMLI, Andrei Victor SANDU,	
Elena CHIRILA, Che Mohd Ruzaidi GHAZALI	89
Graphitization of Oil Palm Trunk Waste at Lower Heating Temperature	
Rohaya Abdul MALEK	
Electrochemical Behavior of Reinforcing Steel Bar under Influence of	90
Aggressive Ions	
Ahmad Raziqin RAZAOB, Mohd Radzi Abu MANSOR, Nor Kamaliana	
KHAMIS, Khairil Anwar Abu KASSIM	01
Willing of Public to Purchase and Understanding Pedestrian AEB	91
System in Malaysia	
Khalil HASNI, Zul ILHAM	
Optimization of Brucea javanica Seeds Oil Extraction Process	92
Parameters Using Response Surface Methodology (RSM)	

## Section 3: Materials Application

Igor MIROSHNICHENKO, Ivan PARINOV	
Development and Justification of Optical Device for Contactless	94
Measurement of the Displacements of Control Object Surfaces	
Siseerot KETKAEW	
The Application Kit Increase Torque in the Diesel Engine by Applied	95
Ionic Energy	_
Albert Ioan TUDOR, Ciprian NEAGOE, Radu Robert PITICESCU, Maria	
Dolores KUMEKU-SANCHEZ	96
Microencapsulated PCMs for Thermal Energy Storage in the Range	
Daniel MATASADII Luminite SCHIDCADIII Antonio MOLES Errongegee	
GAMBINO	
Jon-based Foucault Pendulum Automation and Oscillation Amplitude	97
Control	
Siseerot KETKAEW	
Development of Electric Charge Generator by Applied Pulse High	98
Intensity Electric Field	10
Chun-Te LEE	
A Research on the New Type Solar Water Heating Tank with Energy Saving	99
Liliana Maria NICULA, Ofelia CORBU, Mihai ILIESCU	
Study to Achieving a Class of Road Concrete with Slag Powder	100
Addition at the Cement Mass and Substitution with Artificial	100
Aggregates	
Siseerot KETKAEW	101
Disinfection Apparatus for Rice Germ and Packaging Room	101
Georgeta BUICĂ, Anca Elena ANTONOV, Constantin BEIU, Remus DOBRA,	
Mircea RISTEIU	102
Behavior of electrical Insulated materials - the requirement for	102
ensuring the conformity of the electrical insulated work equipment	
Mirela Maria CODESCU, Elena CHIȚANU, Delia PATROI, Eugen MANTA,	
Jana PINTEA	103
Co-based magnetic nanostructured material for high frequency	
applications	
Coorgiona DANTAZI Roadon Iulian DOPOETEI	104
Diotechnologies used in westewater treetment	104
Constantin ARVINTE Andrei-Victor SANDU Dumitru-Doru BURDUHOS-	
NERGIS Mihai-Adrian BERNEVIG-SAVA Costica BEIINARIU	
Imposed Technical Requirements and Materials Used in Manufacture	105
of Firefighter Gloves	
Mihai-Adrian BERNEVIG-SAVA, Ciprian STAMATE, Nicoleta-Monica	
LOHAN, Andrei-Mihai BACIU, Constantin BACIU, Ioan POSTOLACHE, Elena-	
Raluca BACIU	106
Considerations on the Surface Roughness of SLM Processed Metal	
Parts and the Effects of Subsequent Sandblasting	
Cristian-Andrei MICU, Monica Nicoleta LOHAN, Paul CIUBOTARIU-ANA,	
Costin-Ovidiu MOCANITA, Mihai DUMITRU, Costica BEJINARIU	107
Costin-Ovidiu MOCANITA, Mihai DUMITRU, Costica BEJINARIU Electrical and Thermal Characteristics of Nitinol Wires for Linear	107
Costin-Ovidiu MOCANITA, Mihai DUMITRU, Costica BEJINARIU Electrical and Thermal Characteristics of Nitinol Wires for Linear Heat Detectors	107



	MICULESCU	
ļ	Al <sub>0.5</sub> CrCoFeNi high entropy alloy for Geothermal Environment	
	Cristina Ileana COVALIU, Gigel PARASCHIV, Oana STOIAN, Alexandru	100
	VIŞAN	109
ì	Nanomaterials applied for neavy metals removal from wastewater	
	Avram NICOLAE, Mireia SOHACIO, Maria NICOLAE	110
ļ	Cuorgy DEAK Elorino Diono DUMITRU Androog Mihoolo MONCEA Ano	
	Maria DANAIT Andrees BARAITARI Marius OLTEANII Mědělina BOROC	
	Silving STANCIU	111
	Synthesis of ZnO nanonarticles for water treatment applications	
Ì	Maria-Iuliana MARCUS, György DEÁK, Florina-Diana DUMITRU, Mihaela-	
	Andreea MONCEA, Ana-Maria PANAIT, Cristina MARIA	112
	Recycling of CRT glass in plastering mortars	
ĺ	Liliana Rozemarie MANEA, Anisoara BERTEA, Andrei Petru BERTEA	112
	Electrospun nanofiber membranes for textile wastewater treatment	113
	Mulat ABTEW, Carmen LOGHIN, Irina CRISTIAN, Francois BOUSSU, Pascal	
	BRUNIAUX, Y CHEN, L WANG	
	3D warp interlock p-aramid fabrics for composite reinforcement and	114
	ballistic vest applications: Effect of yarn density on its formability	
ļ	characteristics	
	Alexandru PASCU, Elena Manuela STANCIU, Ionut Claudiu ROATA, Catalin	
	CROITORU	115
	Laser cladding reconditioning of injection moulding	
	AZIIZA AZANI, Dewi Suriyani Che HALIN, Kamrosni Abdul KAZAK, Mond	
	MUSIAIA AI BAKTI ABDULLAH, MONG ATII ANUAT MONG SALLEH, NOTSUTIA	116
	Becont Cranhone Oxide / TiO2 Thin Film Beard On Self Cleaning	110
	Application	
ļ	Application Mohamad Anuar KAMARUDDIN Nor Fazliana AHMAD Joan Gabriel SANDU	
	Rasvidah Alrozi Ion SANDU Mohd Mustafa Al Bakri ABDUI I AH	
	Extraction of Nitrogen, Phosphorus and Potassium from Food Waste	117
	under Elevated Temperature by Heat Induced Bath Method	
Ì	Lim Yon SHENG, Fatimah DE'NAN	
	Bending Behaviour Of Cold Formed Steel Structural Member With	118
	Perforated Section In House Framing System	
	Juhyeong KIL	
	A Study on Development of Efficient Column Detection System in	119
	Wastewater Treatment of Thermal Power Plants	

Section 4: Materials & Life Science

Vitalie COBZAC, Liliana VEREȘTIUC, Mariana JIAN, Viorel NACU Assessment of Ionic and Anionic Surfactants Effect on Demineralized Osteochondral Tissue	122
Siseerot KETKAEW The Development of Dust Smoke Eliminator Using C-Ozonize Electrical System	123
Daniel MATASARU Smart Lock System for Airbnb Platform using Global Navigation Satellite System Services	124
Ana-Maria GALAN, Alexandru VLAICU, Anca PAULENCO, Sanda VELEA,	125



Florin OANCEA	
Investigation of Microalgae Loaded Ceramic Beads for Application as Biostimulants in Agriculture	
Vasile Filip SOPORAN, Tiberiu Romi LEHENE, Sanda PADUREŢU, Marius	
Dan CRIŞAN	126
Engineering of Circular Economy and Good Management of Industrial Material Resources	
Vasile Filip SOPORAN, Tiberiu Romi LEHENE, Sanda PĂDUREȚU, Viorica	
SAMUILA, Timea GABOR, Mihai Marius VESCAN	127
Assessment Methodology and Coverage of Developments in Production Processes of Castings in Engineering Training Programs	
Rodica-Mariana ION, Sorin TINCU, Lorena IANCU, Ramona Marina	
GRIGORESCU, Cristiana RADULESCU, Gabriel VASILIEVICI, Sofia	
TEODORESCU, Ioana Daniela DULAMĂ, Raluca-Maria STIRBESCU, Ioan Alin	128
BUCURICA, Mihaela-Lucia ION, Anca Irina GHEBOIANU	120
Investigations of the Corvins Castle towers - an Artistic, Architectural and Technological Achievement of the 15th - 17th Centuries	
Maria BOLAT. Dan-Nicoale BOSINCEANU. Arina CIOCAN-PENDEFUNDA.	
Cosmin BIDA, Carina BALCOS, Dana-Gabriela bosinceanu	120
Dental Impression Techniques Assessment: Patients' Rating and	129
Perceptions	
Evgeny BARYSHEV, Natalia YAKSHINA, Kseniya SHMAKOVA Types of Concelegical Persearch and Areas of their Application	130
Veronica LUCA, Ofelia CORBU, Ildikó BUCUR	
Rimetea Village - to be or not to be	131
Cosmin RUS, Razvan MARCUS, Lilla PELLEGRINI, Monica LEBA, Mihai	
REBRISOREANU	132
Electric Cars as Environmental Monitoring IoT Network	
Monica LEBA. Andreea IONICA	133
Hand Rehabilitation - A Gaming Experience	100
Marius Leonard OLAR, Ionela SAMUIL, Andreea IONICA Monica LEBA	134
Augmented Reality in Postindustrial Tourism	154
Marius RISTEIU, Sebastian ROSCA, Monica LEBA <b>3D</b> Modeling and Simulation of Human Unner Limb	135
Simona RIUREAN Monica LEBA, Constantin BUIOCA, Andreea IONICA	
Olimpiu STOICUTA	126
Issues regarding Visible Light Data Communication in Industrial	150
Environments	
Daniela TAKNITA, Alin PETCU, Alin ONCESCU, Kazvan VADUVA, Minai TENOVICI Ilaria PETPOVICI Daput Nicolae TAPNITA	
Experimental Study of the Treadmill Inclination Influence on the	137
Flexion Angles of the Lower Limbs Joints	
Daniela TARNITA, Dan CALAFETEANU, Danut-Nicolae TARNITA	
Numerical simulations of varus slope influence on the knee prosthesis	138
Denavior L'acrămicara-Raluca RIVOL Valeriu-Gabriel GHICA Mihai RUZATU Mircea-	
Ionut PETRESCU, Gheorghe IACOB, Eugeniu VASILE, Dan GHEORGHE,	
Tunde Anna KOVÁCS	139
Metallographic analysis of icon oklad - St. Great Martyr George	
Alexandru MAFTEI, Andrei Ionut DONTU, Lidia GAIGINSCHI, Iulian AGAPE	140
Influence of speed bumps on braking distance	



Vlad Dragoş DIACONESCU, Luminiţa SCRIPCARIU, Petre Daniel MĂTĂSARU, Nicoleta VORNICU, Cristian MURARU, Carmen LOGHIN Design of a Monitoring, Alert and Control System for Indoor Exhibition Spaces	141
Viorel Mircea DRAGAN, Beatrice Daniela TUDOR, Laurentia Geanina PINTILIE Determination of air quality in a petroleum extraction area	142
Viorel Mircea DRAGAN, Beatrice Daniela TUDOR, Laurentia Geanina PINTILIE Assessment of soil quality in an area with hydrocarbon exploitation activities	143
Iulian AGAPE, Andrei Ionut DONTU, Alexandru MAFTEI, Lidia GAIGINSCHI, Paul Doru BARSANESCU Actual types of sensors used for weighing in motion	144
Mihnea Ion MARIN, Cristian VADUVA, Mihai Robert RUSU, Ligia RUSU	145
Ioana Corina MOGA, Alessandra BARDI, Simona Di GREGORIO, Francesco SPENNATI, Giulio MUNZ, Stefano BATISTINI, Ovidiu George IORDACHE, Cornelia Elena MITRAN, Gabriel PETRESCU Improved biofilm carriers for fungal exploitation in wastewater treatment	146
Ioana Corina MOGA, Octavian Grigore DONȚU, Nicolae BĂRAN, Daniel BESNEA, Edgar MORARU, Gabriel PETRESCU Aeration system to be used in wastewater treatment	147
Carmen NEJNERU, Cristian SAVIN, Manuela Cristina PERJU, Dumitru Doru BURDUHOS-NERGIS, Maria COSTEA, Costica BEJINARIU Studies on Galvanic Corrosion of Metallic Materials in Marine Environment	148
Veneta STEFANOVA, Petar PETROV, Elena ZHELEVA Assessment of the soil formation process in reclaimed terrains in Bulgarian conner mine	149
Andreea BARAITARU, Marius OLTEANU, Andreea MONCEA, Diana Dumitru, Ana-Maria Panait, György Deák The influence of the technological process of rice husk ash synthesis over its structure	150
Carmen TOCIU, György DEÁK, Cristina MARIA, Anton-Alexandru IVANOV, Irina-Elena CIOBOTARU, Ecaterina MARCU, Marinescu FLORICA, Cristina CIMPOERU, Ioana SAVIN, Alexandra-Corina CONSTANDACHE Advanced treatment solutions intended for the reuse of livestock wastewater in agricultural applications	151
Darya ILIEVA, Lyudmila ANGELOVA, Gabi DROCHIOIU, Manuela MURARIU, Andriana SURLEVA Estimation of soil and tailing dump toxicity: development and validation of a protocol based on bioindicators and ICP-OES	152
Liliana Rozemarie MANEA, Anişoara BERTEA, Andrei Petru BERTEA A study on the exhaustion of reactive dyes as an influence factor on the colour of reactive dyeing wastewater	153
Adrian SIMION, Anghel ION, Horatiu DRAGNE, Daniela STOICA Contributions on the fire performance assessment of ETICS systems	154
Ayu Wazira AZHARI, Thiararath Sengthavee EOP, Dewi Suriyani Che HALIN Natural Dyes Extracted from Leaves, Fruits, and Roots of <i>Piper Betel</i> , <i>Adonidia Merrillii</i> and <i>Morinda Citrifolia</i> as Photosynthesizers for Dye Sensitized Solar Cells	155
Noorhazlinda Abd RAHMAN, Nur Aina ALIAS, Muhammad Salleh ABUSTAN,	156

157

158



Eiji HARADA, Hitosh	hi GOTOH				
Experimental	and Simulat	tion of	Pedestrians	Walking	Through
Different Types of Angled-Corridor					
Muhammad Muaz Hu	isaini ROSLI, 1	Nurul Izz	ati AFANDI,	Leah Poi J	ia YUEN,
Nurul Suziana JOLI, K	Khairil Anwar A	bu KASS	SIM, Mohd Ra	dzi Abu MA	ANSOR
Study of Unat	ttended Child	Presenc	e Detection	System for	· ASEAN
NCAP Safety F	Rating			-	
Muhammad Ikram A V	WAHAB, Wan	Mohd An	nirFaqry Abd I	RAZAK	
Study of Unat	ttended Child	Presenc	e Detection	System for	· ASEAN
NCAP Safety 1	Rating Assess	nent of <b>T</b>	race Elemen	ts Concent	rations in

Road Dust around the City of Kuala Lumpur

Irina NICA, Gianina IOVAN, Galina PANCU, Simona STOLERIU, Sorin ANDRIAN

Evaluation of Surface Characteristics of Direct Composite Resins after Finishing and Polishing using Fractal Analysis







## PARTNERS FOR INNOVATION





