"DUNĂREA DE JOS" UNIVERSITY OF GALAȚI

FACULTY OF ENGINEERING

DEPARTMENT OF MATERIALS AND ENVIRONMENTAL ENGINEERING

UGALMAT 2020

On-LINE INTERNATIONAL CONFERENCE ON MATERIAL SCIENCE & ENGINEERING DECEMBER 8-9, 2020, GALATI, ROMANIA

INTERNATIONAL CONFERENCE ON MATERIAL SCIENCE & ENGINEERING
DECEMBER 8-9, 2020, GALATI, ROMANIA

BOOK of ABSTRACTS

UgalMat 2020

DECEMBER 8-9, 2020

GALATI, ROMANIA

organized by
Department of Materials and Environmental Engineering,
Faculty of Engineering,
"Dunarea de Jos" University of Galati, Romania

INTERNATIONAL CONFERENCE ON MATERIAL SCIENCE & ENGINEERING
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Conference main topics

- Alloy constitution and phase transformations, alloy design and modeling
- Corrosion and wear
- Composites materials
- Casting and alloy solidification
- Advanced Materials and Innovative Technologies
- Nanomaterials and Nanotechnologies
- Metal forming
- New heat treatment processes
- Powder metallurgy products
- Surface engineering, surface phenomena, interfaces, thin films and multilayer.
- Other topics can be presented without restriction, if they harmonize with the proposed sections.

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INVITED PLENARY LECTURES

Alina Adriana MINEA -"Gheorghe Asachi" Technical University of Iaşi, Romania
A new perspective on ionic liquid based fluids as candidates for new heat transfer fluids and their applications in solar energy systems

Iulian RIPOSAN - POLITEHNICA University of Bucharest
Thermal & Expansion-Contraction Curves specific parameters: connection to the shrinkage sensitiveness of iron castings

Leandru-Gheorghe BUJOREANU -"Gheorghe Asachi" Technical University of Iaşi, Romania
Abnormal grain growth effects in FeMnAlNi alloys

Kamel EARAR- "Dunarea de Jos" University of Galati
Biomaterials for dental application

Narcisa Cela PÎNZARIU[1], Kamel EARAR[2]- [1]The University of Sheffield [2]"Dunarea de Jos" University of Galati,
Current approaches in fixed ceramic prosthesis on a zirconium support

ORAL PRESENTATIONS

SECTION I FROM THEORY TO MATERIALS ENGINEERING AND APPLICATION

CONFERENCE CHAIR: DANIELA LAURA BURUIANĂ, ELENA EMANUELA HERBEI
8th of December On-line Microsoft Teams 15.20-16.05

SECTION II ADVANCED MATERIALS AND INNOVATIVE TECHNOLOGIES

CONFERENCE CHAIR: DANIELA LAURA BURUIANĂ, ELENA EMANUELA HERBEI
9th of December On-line Microsoft Teams 10.00-12.00

POSTER SESSION

SECTION I FROM THEORY TO MATERIALS ENGINEERING AND APPLICATION

CONFERENCE CHAIR: DANIELA LAURA BURUIANĂ, ELENA EMANUELA HERBEI
8th of December On-line Microsoft Teams 116.10-18.00

SECTION II ADVANCED MATERIALS AND INNOVATIVE TECHNOLOGIES

CONFERENCE CHAIR: DANIELA LAURA BURUIANĂ, ELENA EMANUELA HERBEI
9th of December On-line Microsoft Teams 12.00-14.05

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Viorica Plescan Ghisman, Nicoleta Simionescu, Gabriel-Bogdan Carp, Daniela Laura Buruiană **OP3. Experimental Studies On The Influence Of Slag On Surface Water**

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P1.5	Florentina Potecasu **Microstructure of the diffusion zone formed after the recrystallization treatment at the Cu/Al interface**
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SECTION 2 ADVANCED MATERIALS AND INNOVATIVE TECHNOLOGIES

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ABSTRACTS

INVITED PLENARY LECTURES

Alina Adriana MINEA

IPL1 A new perspective on ionic liquid based fluids as candidates for new heat transfer fluids and their applications in solar energy systems

"Gheorghe Asachi" Technical University of Iaşi, Romania

The high negative impact of human actions on the environment receives remarkable attention, especially on the increased global changes. In this idea, clean and sustainable energy sources have to be considered and punctually settled. Solar energy is one of the best candidates, which directly converts solar energy into electricity and heat without damaging the environment and dropping the greenhouse gas emissions.
Nanofluids (NF) are a new class of fluids based on regular heat transfer fluids loaded with solid nanoparticles. The nanofluid development increased over the last years, especially due to energy crisis and to their demonstrated potential to increase heat transfer (i.e. mainly due to thermal conductivity increase). In the last decade, many research groups demonstrated that NF thermal conductivity is highly improved by adding nanoparticles and all their thermophysical properties are influenced by nanoparticle addition. Despite the tremendous research efforts, NFs properties, as well as their measurement techniques, are still debated in the archived literature.
A recent research trend is dedicated to ionic liquids and their derivatives applications. These new class of fluids can be seen as an alternative for high temperature heat transfer fluids used in solar applications, due to their unique properties. This review discusses, in terms of practical aspects and future application, about heat transfer fluids properties with special focus on the possible use of ionic liquids based fluids in heat transfer applications.
Concluding, ionanofluids - that relies on ionic liquids - need a coordinated approach in order to propose them as a possible candidate for solar heat transfer applications.

Keywords

New fluids, Ionic Liquids, Heat Transfer augmentation, Solar energy.

Short biography

Prof.dr.habil. Alina Adriana Minea is full professor at Technical University “Gheorghe Asachi” Iasi (TUIASI) and from 2013 has habilitation in materials engineering area. Currently hold the position of Director of Council for Doctoral studies in TUIASI. Her major field of research is heat and mass transfer mostly with applications in new heat transfer fluids and energy efficiency. Other research interests include nanofluids, ionanofluids, heat transfer, heat exchangers, energy and cooling technologies, solar energy. She published over 120 articles and authored or co-authored 21 books, most of them in heat transfer area and new fluids. She currently serves as associate Editor for Journal of Thermal Sciences (Springer) and International Journal of Thermophysics (Springer), while she is member of the Editorial Board for Thermal Science Journal, as well as for other international journals. Presently she is the Dissemination manager for COST action NanoConvex and was the dissemination manager of NANOUPTAKE (Overcoming Barriers to Nanofluids Market Uptake).

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IPL2 Thermal & Expansion-Contraction Curves specific parameters: connection to the shrinkage sensitiveness of iron castings

I. Riposan
S. Stan, M. Chisamera, A.M. Cojocaru, L. Neacsu, E. Stefan, I. Stan
POLITEHNICA University of Bucharest, Bucharest, ROMANIA

Experiments compare hypoeutectic grey [GI] and ductile [DI] irons with white [WI] irons solidification patterns, using a technique to simultaneously evaluate cooling curves and contraction / expansion of metals during solidification (a specially designed ceramic cup, incorporating a thermocouple and contraction/expansion measuring device). The recorded data are processed using specialized software, which conveniently displays both cooling and contraction / expansion curves and their specific parameter values.

Three important moments were found on the expansion/contraction-cooling curves: the start of eutectic freezing, the point of maximum expansion and the end of solidification. All of the tested irons have similar values for initial expansion up to the start of eutectic freezing [ε_{di} (TSEF) = 0.44%] due to the ferrostatic pressure, silica sand mould expansion, mould movement etc. The maximum expansion [ε_{di} (max)], reached between the end of the eutectic reaction and the end of solidification, depends on the carbides/graphite ratio and graphite morphology: WI-0.47%, GI-0.55%, DI-1.03%, as averages. Graphitic expansion [ε_{di} (gr) = ε_{di} (max) - ε_{di} (TSEF)], absent for WI, increases to 0.11% [GI] and up to 0.6% [DI].

Nodular graphite formation leads to a 5.5 times higher graphitic expansion, a 2.5 times higher level for the acceleration rate of the graphitic expansion up to the maximum level, and higher length (time) of the expansion at the maximum level landing, compared to lamellar graphite formation, and, consequently, promotes greater shrinkage sensitivity, as measured in furan resin mould test castings. It is the result of the increasing of the graphitic force on the mould walls, so cavities enlarge. Contrary, more graphite formation at the end of solidification, which also increases expansion, contributes to reduce the shrinkage level, due to the forcing of the last liquid iron to occupy the previous formed cavities.

From practical point of view, it is important to apply special metallurgical treatments to favour a strong graphitization process at the end of solidification. The test data acquired offer a possible explanation of other reported results on reduced shrinkage tendency in ductile iron castings when using Ce,Ca,S,O-FeSi inoculation or La-MgFeSi nodularisation treatment. This is attributed to a bimodal or skewed nodule size distribution (fewer large nodules formed at the start of solidification and a high number of much smaller nodules formed later, towards the end of solidification).

Key words: white, grey and ductile cast iron; solidification; simultaneous thermal and contraction analysis; graphitic expansion; shrinkage.

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ORAL PRESENTATIONS

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8th of December On-line Microsoft Teams 15.20-16.00

OP1.POLYSACCHARIDE NANOCAPSULES FOR DRUG DELIVERY APPLICATIONS, CURRENT STATUS AND FUTURE PERSPECTIVES

M Florea[1] ; R M Ion[1,2]

[1]Doctoral School of Engineering Science, Valahia University Targoviste, 35 Lt. Stancu Ion str., 130105 Targoviste, Romania [2] ICECHIM, 202 Splaiul Independentei, 060021 Bucharest, Romania

In recent years pharmaceutical formulations using polymeric nanocapsules have been widely studied for developing novel drug delivery strategies. Nanocapsules provide a unique core-shell nanostructure, consisting of a liquid/solid core surrounded by a polymeric shell. Natural or modified polysaccharides are prime candidates for use as building blocks of the nanocapsule shells, due to their demonstrated safety, versatility and low cost and to the fact that they are widely used as excipients in classical drug formulations. The aim of this paper is to present the recent advances in drug delivery strategies using polysaccharidic nanocapsules and to discuss future opportunities and challenges in developing modern pharmaceutical formulations using such systems. KEYWORDS: drug delivery, nanotechnology, nanocapsule, polysaccharide.

OP2. HYBRID NANOSTRUCTURED MATERIALS FOR DIELECTRIC ELECTRONICS

Herbei Elena Emanuela
Centre of Nanostructures and Functional Materials; Faculty of Engineering, University "Dunãrea de Jos" of Galati, Romania
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The scientific interest is mainly related to understanding the types of interactions between organic and inorganic component and the effect of these interactions on the properties of the new material formed. The applicative interest in hybrid dielectric thin films is mainly related to the new emerging field of transparent flexible and printable electronics. Hybrid nanostructured dielectric materials used for electronics and especially those applicable in structure of different types of transistors represents a new class of multifunctional materials that combine characteristic properties of organic component (flexibility, transparency) with properties of inorganic component (excellent strength, toughness, thermal stability, high dielectric constant).

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OP.3 EXPERIMENTAL STUDIES ON THE INFLUENCE OF SLAG ON SURFACE WATER

Viorica PLESCAN GHISMAN[1], Nicoleta SIMIONESCU[1], Gabriel-Bogdan CARP[1], Daniela Laura BURUIANĂ[1,*]

[1] Faculty of Engineering, "Dunărea de Jos" University of Galati, Romania

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The efficient use and recycling of industrial water is a major challenge to the sustainability of the planet. Blast furnace slag is a by-product of metallurgical operations during the production of cast iron. In this research we studied the quenched granulated slag of water generated from the process of making cast iron through the blast furnace route. The elemental analysis of granulated slag and of granulated slag stored in water was determined by X-Ray Fluorescence (XRF) analytical equipment. The granulated slag was stored in water for 3,5,7,14,21 and 28 days. The analysis of water was made with an UV-VIS Spectrophotometer in range of wavelength 200-700 nm.

KEYWORDS: surface water, granulated slag, cast iron process

Acknowledgments: This study was supported by the project "ANTREPRENORDOC", Contract no. 36355/23.05.2019, financed by The Human Capital Operational Programme 2014-2020 (POCU), Romania.

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POSTER SESSION

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8th of December On-line Microsoft Teams 116.10-18.00

P1.1 The analysis of heat treated Cu-Zn alloy

Achitei Dragos Cristian, Vizureanu Petrica, Baltatu Simona

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The paper presents a study about the structural and hardness modifications, induced through heat treatment for an Cu-Zn alloy. It were applied classic heat treatments: annealing, solution quenching and ageing. The studied alloys is part of brass category and is used in industry for manufacturing the parts which work in normal exploitation conditions.

P1.2 Numerical and experimental studies for thermal conductivities determination of synthetic wood with recyclable waste

Daniel LEPADATU, Loredana JUDELE, Ciprian ALECU, Vasile CAUNII

In this paper we will make a study of the thermal conductivity of synthetic wood - numerically and experimentally. The peculiarity of this research is that the samples are obtained entirely from recyclable waste mostly from wood biomass but with additional additions of other compatible waste thus maximizing each component. The experimental planning is done using Design of experiment method which offers us the possibility to decrease the number of samples but with maximizing the information on the researched results. It is a modern method of planning and experimental analysis that offers the user a suitable tool for obtaining information necessary for research on new materials that are very current but which through the sometimes-unexpected interactions between the study parameters can lead to erroneous conclusions. Thus, we planned and modeled four samples with variable waste content, but the attention was focused only on two variables (polystyrene and seed shells) for which we followed the evolution. In addition to wood biomass waste (sawdust of various kinds) we introduced nets and adhesives or different polymers. In addition to wood biomass waste (sawdust of various kinds) we introduced in recipes adhesives or different polymers. From the obtained results we concluded that the values of thermal conductivity obtained both experimentally and numerically include synthetic wood with recyclable waste in the category of an insulating material which is good. Our final goal is to improve this feature but with the maintenance of mechanical strength in an acceptable range in order to make it usable in multiple areas but with the adjustment of input parameters through mathematical optimization.

P1.3 Obtaining nitinol with ultrafine structures

Florentina Potecasu

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Shape memory alloys define a group of metallic materials that have the ability to return to predefined shapes when a suitable thermal procedure is applied to them. They are a unique class of alloys that can seemingly permanently reconstitute deformations when heated to a certain temperature. Shape memory alloys (MFAs) are advanced materials with spectacular effects, which have opened up increasingly wide fields of use on an industrial scale. By techniques specific to powder metallurgy and in addition to the processing by severe plastic deformation, the aim was to obtain nitinol with fine or ultrafine granulation. Recipes for mixtures of titanium, nickel and copper metal powders with a particle size of less than 100 micrometers were used as raw materials. The application of severe plastic eformation after sintering led to the fragmentation of grains and sub-grains into increasingly fine subdivisions. Research has shown that processing applied by methods specific to powder metallurgy can be a solution for obtaining nitinol with fine and ultrafine structures and that it is justified to expand the area of experimentation to homogenize the material and reduce porosity.

P1.4 Mechanical characteristics in the cross section of thick sheets intended for the realization of metal structures from low alloy steel

Florentina Potecasu

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Steels for constructions and welded structures are carbon and low-alloy steels intended for the realization by technological processes of high productivity (plastic deformation, cutting, welding, etc.) of metal structures satisfying as the case may be, resistance conditions or resistance and tightness conditions. The main feature of these steels results from the specific calculation rules and consists of changing the chemical composition depending on the thickness of the product to ensure unique values of the yield strength for all product thicknesses made of a brand of steel. The mechanical characteristics were determined on specimens taken on the transverse direction of the 15 sheets; 25; 35 mm. The mechanical characteristics, although different for the analyzed sectors, have always been within the limits required according to EN 10025/2 - 2004

P1.5 Microstructure of the diffusion zone formed after the recrystallization treatment at the Cu/Al interface

Florentina Potecasu

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The paper presents research on obtaining and characterizing Al-Cu metal composites for the manufacture of electrical conductors, in order to reduce the consumption of Cu - deficient element. Al-Cu electroconductive composites were obtained, with different compositions and arrangements on a macroscopic scale of copper in the aluminum matrix. The process for obtaining the electroconductive Al-Cu composite material comprises

as main stage the cold extrusion,, which realizes the joining of the components and the constitution as such of the composite with different properties compared to the component elements and those of the Al-Cu alloys.

P1.6 Mechanical strength and creep resistance of some materials with lead base mass

Florentina Potecasu

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The purpose of this research work is to make in the same conditions, by plastic deformation, semi-finished products from three series of materials with the same metal matrix: series 1- cast lead, series 2 - Pb-Sb alloy and series 3 - lead powder with oxidation controlled with a grain size of less than 40 mm. For each series of materials, mechanical strength and creep strength were determined and significantly better mechanical properties were found for the third series of materials. The explanation lies in the fact that in the case of the 3rd series, the semi-finished products extruded from controlled oxidized lead powder hardened sharply as a result of the breaking of the oxide films that coated the powder particles.

P1.7 Scanning electron microscopy investigation of the synthetic wood with recyclable waste

Loredana JUDELE, Daniel LEPADATU, Bogdan ISTRATE

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In this paper is presented the current stage of the research in the field of woody-recyclable wood materials such as sawdust, wood biomass, etc., as well as other compatible waste improves the physical- mechanical characteristics of the new biomaterial with a huge absorption potential for recyclable waste. There are good perspectives in evolution for analyzed biomaterial and has a universal potential for absorbing recyclable waste. The wood is a natural material of an organic nature (vegetable - has the origin of the trees), easy to process, with a pleasant appearance and has been used since ancient times in the construction of buildings and engineering works, shipbuilding, etc. Thus, the combination of different biomass wastes with binders and other recyclable materials can generate a product with net characteristics superior to natural wood linked primarily to its average production duration but also to properties such as superior mechanical strength or absorption resistance of water. In the experimental tests we made a series of combinations between different types of waste (sawdust of different sizes as well) with different additives and binder. The binder used to obtain the samples was a Urelite type resin combined in different configurations with Sodium Silicate - solution. Samples made by the research team were analyzed using the scanning electron microscope (SEM Quanta 200 3D microscope). It was possible to capture at different scales the microstructure made from the combinations in the polymer matrix of the different constituents. This research proposed and realized a biomaterial that responds to the current requirements of the circular economy by maximizing recyclable waste content and able to integrate into its demanding complexity of multiple domains of use.

P1.8 Severe plastic deformation of CoZr-based magnetic composites

Carmela Gurau[1], Gheorghe Gurău[1], Petrică Alexandru[1], Felicia Țolea[2]

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In the present research, bulk multilayered magnetic composites with various chemical composition were fabricated successfully by high speed high pressure torsion (HSHPT). The severe plastic deformation was made on Co-Zr hard magnetic alloy and the following soft magnetic alloys: Ni-FeGa, Fe-Si-B-Cr and Fe-Pd-Mn. The alloys used in this study in as-cast state or as-quenched ribbons. Afterwards the thin disks were severely plastic deformed in packages to fabricate composites with 2 and 3 layers. The composites were produced by solid state joining using HSHPT technology which due to the short processing time prevents the formation of fragile intermetallic layers. The results indicate that there is a good bonding between hard magnetic alloy and the soft magnetic alloys. Therefore, the strength are improved due to introduction of high plastic strains.

P1.9 Considerations on the characteristics of steels used in the manufacture of flat products for the manufacture of welded pressure pipes

Elisabeta Vasilescu

"Dunarea de Jos" University of Galati, Romania

The steels used in the manufacture of flat products for the manufacture of pressure welding pipes are fine-grained carbon steel or poorly alloyed with manganese, aluminum, nickel, vanadium, titanium and niobium delivered in laminated or normalized state. The main characteristics of the use of steels for welded pipes are: high mechanical strength and low temperature resilience. The paper highlights the importance of meeting all the requirements imposed by the material norm and the manufacture of the laminated sheets in achieving the prescribed pressure characteristics of the pressurepressure pipes as well as the connection relationship between them. The paper analyzes the requirements of the product norms for the manufacture of slabs for the welded pipes as well as the delivery conditions according to the European rules for ensuring the characteristics of the sheets at the level of the requirements of the final product. The aspects regarding the non-compliance with the surface quality requirements due to non-compliance with the obligations of the board manufacturer and on the other hand the lack of firmness of the order made by the buyer are highlighted.

P1.10 Dental implant design and the role of biosurface topography in the biointegration process

Elisabeta Vasilescu Vlad Gabriel Vasilescu

"Dunarea de Jos" University of Galati, Romania

In the top applications of dentistry are found biomaterials that interact with the body through mechanical and chemical adaptations with a beneficial role on the durability of medical devices. Advances in this area bring changes at the conceptual level, which propose the transition from classical implant to biomimetic implant with advantages such as effective management of biological interactions at the nanometer level, significantly contributing to improving the functionality and durability of implanted biomaterials.

Modifications of metal surfaces are often used as a means to control tissue-implant interactions and shorten the duration of osseointegration. The characteristics of the processed surface of the implant include the pore size and interconnection, in the case of macro-textured surfaces, the surface roughness in the case of micro-textured surfaces and the surface chemistry. In vitro research on titanium implants with different surface micro-topographies has demonstrated the differentiation of bone and mineralization cells in close dependence with their roughness. Rough surfaces favor osseointegration by attaching osteoblasts and subsequent proliferation and by the size of the implant-bone contact area, with a positive influence on the primary stability of the implant. The paper presents some of the results obtained in the mechanical and chemical processing of the biosurface of titanium samples, conventional titanium alloys and experimental titanium bioalloys.

P.11 Multilayered composites fabricated by HSHPT

Gheorghe Gurau[1], Carmela Gurau[1], Vedamanikam Sampath[2], Felicia Tolea[3] and Francisco Manuel Braz Fernandes[4]

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The present study aims at development of Ni-Ti based multilayered composites by the high speed high pressure torsion (HSHPT) technology. Bimetallic 'Ni-Ti//Ni-Ti' 'Ni-Ti//NiFe-Ga' shape memory composites (SMCs) with 2 to 32 layers were fabricated and investigated. Ni-Ti are among the most performing shape memory alloys showing very good shape memory properties and widely investigated. SMCs including Ni-rich (lower temperatures), Ti-rich (higher temperatures) SMAs alloys and magnetic shape memory alloys (MSMA) may be widely used in modern industries as microactuators and displacement / force sensors or dampers. Manufactured multilayered composites are characterized by optical microscopy (OM), scanning electron microscopy (SEM), transmission electron microscopy (TEM) and differential scanning calorimetry (DSC). Experimental results indicated that the ultrafine grained multilayered composites were successfully processed via HSHPT. A significant grain refinement was observed by TEM investigation. SMCs showed very good bonding, high- quality interfaces with no apparent intermetallic layers.

P1.12 Corrosion behavior of materials AL5083, 316L and A681 in seawater

Gina Genoveva Istrate, Alina Crina Mureșan

Faculty of Engineering, University "Dunărea de Jos" of Galati, Romania

In this paper the corrosion behavior of different materials has been evaluated based on exposure in seawater. The laboratory immersion test technique has been applied to evaluate the effect of seawater on the corrosion behavior of different materials. In three sets of experiments, carbon steels (A 681 Type O7), austenitic stainless steels (316L) and aluminum alloys (Al5083) were utilized. The specimens were fixed fully submerged in seawater. The corrosion process was evaluated using weight loss method, open-circuit potential measurements (OCP) and polarization techniques. To determine gravimetric index and the rate of

penetration, samples were immersed in corrosive environment for 89 days and weighed periodically. The electrochemical experiments were conducted with a Potentiostat/Galvanostat (PGP 201) analyzer. It was connected to a PC. The Voltamaster software was used for electrochemical data analysis. A three-electrode cell composed of a specimen as a working electrode, Pt counter electrode, and saturated calomel electrode SCE (Hg (l)/ Hg2Cl2 (s)) as a reference electrode were used for the tests. The weight loss tests revealed the lowest corrosion rate values for stainless steel and aluminum alloys, indicating a beneficial use for these materials in marine environments. The potentiodynamic method shows that the lowest corrosion rate in seawater (2.8 µm / year) was obtained for the Al 5083 alloy, and the highest value of the corrosion rate (41.67 µm / year) for carbon steel A681.

P1.13 Using a smartphone light sensor for studiyng light transmission during the fabrication of polymeric membranes

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Smartphone sensors are gaining research interest due to continuous sensor upgrades, leading to more precise readings of these sensors. For this study, the light sensor of a smartphone was used in determining light transmittance during the phase inversion process of ultrafiltration polysulfone-membrane manufacturing. Membrane separation is one of the best available technologies when it comes to water and wastewater treatment. The purpose of this study was to correlate light transmittance, at certain demixing steps during phase inversion, with membrane porosity, pure water flux and crosssectional SEM images. Results show close relation between light transmittance and the mentioned membrane properties.

P1.14 The applying software programs, for technological design, and simulation of the casting process, in optimizing the technology of making castings

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The solidification of castings from metal alloys is a complex physical - chemical process, which has a great influence on the quality of castings. The optimization of the solidification of the cast parts is based on the exact knowledge of the solidification mechanism of the part. The only solution for the rapid and low-cost, settlement of technological problems, related to the solidification of castings is the computer simulation of solidification. The use of software to simulate the solidification of castings has made it possible to conduct concrete studies to optimize casting technologies. For the manufacturing technologies of parts with complex configuration, these programs, for simulating of the alloy flowing, and it solidification, inside of the form of casting, are increasingly used, this leading to an increase of the quality of the cast part, and of the economic efficiency.

P1.15 Research on 2D numerical simulation of the longitudinal rolling of some metal materials

Basliu Vasile

"Dunarea de Jos" University of Galati

The additional information provided by numerical simulation methods in the processing of metallic materials by plastic deformation helps users to identify potential intrinsic problems. Thus, examples of problems with plastic deformation are given by the initiation of surface or volume defects such as: the initiation and propagation of cracks, the formation of areas with a high degree of deformation especially at the corners of semi-finished products, cracks, and others. Numerical modeling aims to support research users and industrial users by providing additional information on how to produce internal deformations of materials. Also, another advantage of using numerical simulations is that of previewing the plastic deformations in materials, thus limiting the potential dangers of defects. The paper presents some aspects that appear in the two-dimensional plastic deformation of a longitudinally rolled aluminum alloys. The resulting model provided the following types of results: total deformation, equivalent plastic stress, equivalent elastic stress, and equivalent stress. The results of the 2d model are provided in the form of graphs and images that by changing a color gradient are highlighted the most intensely deformed plastic areas. For this, the academic version of the Ansys Mechanical software was used.

P1.16 Research on a 3D finite element modeling of a longitudinally rolled aluminum alloy

Basliu Vasile

"Dunarea de Jos" University of Galati

Finite element modeling is a useful method in the plastic processing of metallic materials by highlighting areas with a high plastic deformation especially in three-dimensional applications. Finite element modeling is a useful method in machining plasticization of metallic materials by highlighting areas with high plastic deformation, especially in three-dimensional applications. Three dimensional numerical modeling as opposed to two-dimensional come with an additional dvantage, in the sense of providing the user with spatial visualization of plastic deformation. Also, continuously recorded numerical modeling provides the user the tendency of displacement of the plastic deformation and the most visible can be observed at the edges of the semi-finished product where it is most pronounced. 3D numerical modeling also helps the user to preview the plastic deformation of the material before the actual deformation. The present case study refers to the longitudinal rolling of some rectangular semi-finished products (slabs) in 3D format of some aluminum alloy. Total deformation, equivalent plastic stress, equivalent elastic stress are some of the final results provided by the model tested in this simulation. Numerical simulations can be customized by particular cases, applying different deformation forces and deformation speeds, thus observing by comparison between simulations the appearance of additional plastic deformations or increases in the values of plastic deformation. The analysis was done with the help of Ansys Mechanical software, the academic version.

P1.17 Inorganic modified polymer mixtures. Mechanical properties

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Composites have been found to be the most promising and discerning material available in this century. Epoxy resins are the most widely used thermosetting matrices due to their good mechanical strength, low shrinkage, excellent manufacturability, effective electrical insulation, and stable thermal properties.
To obtain optimal performance of the composite material, a broad variety of inorganic and organic modification agents are used. Also, the inorganic modification agents help to improve the material by increasing the abrasion resistance and lowering the coefficient of thermal expansion. For this study three inorganic agents namely ammonium metavanadate, nickel nitrate and boric acid, were used all together to change the basic properties of an epoxy resin (Epiphen RE4020-DE4020). Equal amounts of the three agents were milled together and the obtained compound was used to form 1% to 5% weight ratios inorganic agents modified epoxy materials. Different materials had been obtained and they were mechanical tested.

KEYWORDS: mechanical properties, epoxy resin, ammonium metavanadate, nickel nitrate, boric acid

P1.18 Studies regarding the properties of tryptophan modified epoxy resins

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Epoxy resins are high-performance thermosetting resins that display a unique combination of properties, including excellent adhesion, chemical and heat resistance, good mechanical properties, and very good electrical insulating properties. In addition, almost any properties of epoxy can be modified to meet a specific need. These systems do have some environmental problems. One problem is that the systems usually generate dense smoke and toxic decomposition products during combustion. An environmental problem of epoxy resins is that all the curing agents are toxic before the cure. Tryptophan, an amino acid, has been used as a novel, environmentally friendly curing agent instead of toxic curing agents to crosslink the diglycidyl ether of bisphenol A (DGEBA) epoxy resin.
Therefore, the development of environmentally friendly epoxy systems is of great importance for designing green and biocompatible materials in many applications.
Whatever the path would be it is necessary, first of all, to know how to place the amino acid into the polymer and which the effects of amino acid presence are over the basic properties of epoxy resin. In the present study a mixture of certain concentrations of tryptophan was inserted in two types of epoxy resins. In order to evaluate the character of tryptophan the Raman spectroscopy, scanning electron microscopy and specific heat behaviours were investigated.

KEYWORDS: epoxy resin, tryptophan, amino acid, specific heat

P1.19 Gps-denied geo-localisation using visual odometry for drone navigation

Marin Florin Bogdan
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Abstract: Although most of unmanned aerial vehicles (UAV) navigation is based on GPS (Global positioning system) there are scenarios in case navigation and localization cannot be guaranteed due to occlusion, indoor operations and signal jamming. We envision an computer vision algorithm to use localization using identification of topological representation of the map considering the UAV use a pre-processed map using public known satellite images in order to detect landmarks on the maps to serve as position reference. As the drone traverses the map by moving and turning, the landmarks are identified and the position is determined. We propose position estimation using a set of visual landmarks that are indicated before trip movement and this landmarks are precisely georeferenced. This landmark are easily objects to identify such as road houses, buildings.

P1.20 Drone identification using computer vision based on deep learning algorithm

Marin Florin Bogdan, Marin Mihaela, Gurau Gheorghe, Gurau Carmela
Faculty of Engineering -"Dunarea de Jos" University of Galati

Abstract: UAVs (Unnamed Aerial Vehicles), commonly known as drones, are available to the market in the last decade for different applications. Unfortunately this technology can be used also as explosive carrier to attack different targets. There is a need worldwide to protect crowded places, governmental buildings, nuclear stations, military bases and troops, airports and other sensitive areas from drone attack. Targeted drone attacks on military bases are increasing with the development and availability of drone technology. Computer vision based approach for detecting drones is a reliable solution to detect drones. Drones are small and nowadays can be programmed to act autonomously without human remote control to be detected by other means. Radar detection of the drones is unreliable due to small size and expensive. In this paper we propose an algorithm using computer vision based on deep learning algorithm to detect drones system. For the training of this system a dataset composed of drones is gathered from open sources.

P1.21 Ants identification using convolutional neural networks

Mihaela Marin ,Marin Florin Bogdan

Faculty of Engineering -"Dunarea de Jos" University of Galati

Abstract: Insects monitoring is a field of interest for ecologists. Human observation to study insects can be time consuming, and nowadays other methods provide accurate measurements and provide huge amount of data. Computer vision can be a useful tool for ecologists that are using image analysis for insect monitoring. Software algorithms needs to use computer vision technique in order to recognize insects, such as ants in order to asses ant movement data collected from the video recording. In this paper we propose an algorithm to recognize ants based on convolutional neuronal networks aiming to explore ant movement. Recognition of ants is used to monitor ants movement and gain valuable insights and produce statistics, visualization, filtering, and comparison. This is achieved through a convolutional neural network based algorithm for automatic detection, and labeling of ants. This can be used for ant movement tracking.

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P1.22 Research on the rolling of microalloy steel strips

Ionel Petrea, Marian Neacsu

Faculty of Engineering -"Dunarea de Jos" University of Galati

The paper presents the experimental data regarding the implementation of the technology for obtaining hot rolled strips from micro-alloy steels.

Research in order to obtain the first alloy steels or made since the 70s of the twentieth century, with the aim of obtaining new steels with superior properties and with lower production costs.

In order to meet the users and respond to their growing demands for microalloyed steels with high mechanical characteristics, two development paths have been identified:

- ✓ Improving the structure by micro alloying with certain elements and
- ✓ by performing rigorously controlled thermomechanical processes

In order to achieve new high-performance steels, the mechanisms by which hardening occurs in low-carbon steels have been studied, both the structural hardening of the matrix by the grain refining effects induced by certain alloying elements (V, Nb, Ti, N , Zr, Al, etc.) as well as hardening by precipitation of complex carbides and carbonites that these elements form.

The research described in the paper is part of the research trends of these steels around the world.

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ORAL PRESENTATIONS

SECTION II ADVANCED MATERIALS AND INNOVATIVE TECHNOLOGIES

CONFERENCE CHAIR: DANIELA LAURA BURUIANĂ, ELENA EMANUELA HERBEI
9th of December On-line Microsoft Teams 10.00-12.00

OP1. Structural changes of nitrogen-ferrite after aging in temperature interval up to 100 ° C

Tatyana Mechkarova, Yaroslav Argirov, Daniela Spasova, Aneliya Stoyanova

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This article establishes the extent to which nitrogen ferrite ages at temperatures below 100 ° C and what structural and strength changes occur. The tests were performed on samples of technically pure iron (Armco). The samples were pre-deformed by a tensile test machine and recrystallized to achieve a coarse-grained ferrite structure. Nitrogen ferrite is obtained after gas nitriding and quenching. After quenching, the samples are stored in a refrigerator, after which the formed surface layer is removed by electrochemical corrosion (the layer interferes with X-ray structural studies). Then aging heat treatment is performed at temperatures below 100 ° C. After the aging process, X-ray diffraction analysis and microhardness test were performed.

OP2. Sensitive properties of screen printed carbon electrode modified with polypyrrole and various doping agents for the voltammetric detection of different amino acids

Ancuta Dinu, Constantin Apetrei

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Background: Polypyrrole is an electrically conducting polymer, which consists of five-membered heterocyclic rings, and has attracted much attention because of its good electrical conductivity and the possibility to use in redox reactions. For this reason, polypyrrole has been used in the development of numerous sensors and biosensors, thus increasing their performance, detection capability and sensitivity.

Aim: The objective of this work was to study the electrochemical properties of chemically modified screen-printed carbon electrodes with conducting polymers, respectively polypyrrole, for the sensitive determination of three amino acids: L-Phenylalanine, L-Tyrosine and L-Tryptofan.

Method: The chronoamperometry method was also used for the deposition of polypyrrole in the presence of various doping agents. Detection of the amino acids was carried out by cyclic voltammetry method applied to carbon screen printed electrode modified with polypyrrole. This method provides information about the electrochemical reactions and the oxidation-reduction processes that take place on the electrode surface when it is immersed in the solution to be analyzed. Results and discussion: The carbon screen printed

electrode modified with polypyrrole was characterized initially in aqueous solution of potassium chloride (KCl). The voltammetric behavior observed in potassium chloride solution, which this is an inactive solution, is related to redox processes of the dopant agent and of the polypyrrole. Cyclic voltammograms present peaks that are characteristic to polypyrrole redox processes and the polypyrrole peaks depend of the chemical nature of the dopant. The same modified sensors were studied in solutions with KCl 0.1 M and 10-3 M L-Phenylalanine, L- Tyrosine and L-Tryptophan. The practical applicability of the sensors was demonstrated by the precise and accurate quantification of amino acids in pharmaceutical products, from different producers. Conclusions: The sensors modified with various doping agents developed in this study is appropriate for the analysis of the amino acids in pharmaceutical products.

KEYWORDS: voltammetry, polypyrrole, amino acid.

OP3. Temperature – dependent eco – friendly synthesis of gold nanoparticles from *sambucus nigra*

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In this paper we report the eco – friendly synthesis of gold nanoparticles (AuNPs) from aqueous extract of Elderflower (Sambucus nigra) at different temperatures and different rection conditions: room temperature, 24 hours, no stirring;300 C under a constant stirring of 600 rpm for 30 minutes and 500 C and a constant stirring of 450 rpm. Elderflower (Sambucus nigra) was purchased readily dried and used to prepare the aqueous extract that was screened for bioactive compounds using qualitative analyses and, using spectrophotometric determinations, the amount of different phytocompounds was determined (e.g.: total content of tannins, polyphenols and flavonoids). UV – Vis spectra were recorded in the range of 250 – 800 nm at different time intervals (0 s, 5 min, 30 min, 1 hour, 4 hours and 24 hours) to determine the stability of the eco – friendly AuNPs and a maximum at 543 nm appeared in the spectrum. The colour of AuNPs ranged from light violet (room temperature – AuNPs) to cherry – red (500 C – AuNPs). FTIR spectroscopy was used to determine the presence of different functional groups in both aqueous extract and eco – friendly AuNPs and dynamic light scattering (DLS) technique allowed a precise determination of their diameter. Also, antioxidant activity was evaluated using the DPPH technique and the values obtained for the AuNPs were considerable higher that those calculated for the corresponding aqueous extract.

OP.4 Low density nickel bases superalloy foams

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In this paper the authors investigate the influence of the density on the final mechanical properties of the nickel-based superalloy foams manufactured by powder metallurgy. For this, samples of different porosity were manufactured, from NiCrSiB dense and hollow spherical particles, with and without space holders in the 50-90% range and characterized in terms of density, porosity, sintering degree and by compression tests

according to ISO 13314:2011. To explain the fracture behaviors of the specimen SEM investigations were made using a Jeol-JSM 5600 LV microscope. An initial study aimed the evaluation of the influence of the sintering regime on the sintering degree of the foams, the best results were obtained for a sintering at 1000 °C for 30 minutes. At lower temperatures the bonding of the particles were limited even at long sintering times. Increasing the temperature to around 1100 °C the samples become over-sintered and the relative density increased significantly. The samples obtained by combining pore formers with loose powder sintering presented a hierarchical porosity. The macropores have relatively the same size in all samples (2-2.5mm), internal pores depending on the size of the used particles. The introduced macropores increased the porosity of the specimens by approximately 25%. This reduction of density also reduces the effective breaking section of the samples. By increasing the particle size the relative density decreases further, and the compression strength of samples is also decreasing. The presence of macropores favors the introduction of strain concentrators in their area which led to decreased local lengthening of sintering necks and the appearance of micro cracks. Energy consumed in compression for samples obtained with solid and hollow particles using space holders is much lower than for samples obtained without space holders.

OP.5 Biomaterials Used for Dental Bone Augmentation

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In this paper we study and evaluate biomaterials use and their effectiveness for bone augmentation in implant dentistry. Biomaterials must meet special bio-compatibility requirements, to easily adapt to clinical and laboratory technologies. In bone augmentation techniques (also called guided bone regeneration - GBR) two main types of biomaterials are used: addition materials and regeneration membranes, that isolate the bone defect during its recovery (resorbable or not over time). Recently, guided bone regeneration techniques are being used frequently in different clinical situations, in order to obtain: bone substrate favorable to implant insertion, control of alveolar ridge atrophy, repair of bone defects. In the modern history of dentistry, synthetic bone substitutes are widely used, and we can mention a few examples, such as: gypsum, which even after 20-30 years from insertion has no side effects. There is a tendency to update the method, but with more sophisticated products than CaSO4; bioactive glasses: their surface layer contains phosphate ions, which positively influence the crystallization of hydroxyapatite and quartz crystals, used in guided precipitation of proteins on their surface. The most used bioactive materials remain calcium phosphates (CP), such as hydroxyapatite (HA) or tricalcium phosphate (TCP) and bioactive glasses. These biomaterials are in a continuous process of optimization and improvement and biomedical engineers are constantly searching new types of biomaterials.

KEYWORDS: dentistry, bone augmentation, biomaterial, biocompatibility

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OP.6Analysis of Development, Research and Innovation in the Rural Space of the South East Region

Balasan Daniela – Lavinia, Buhociu Florin - Marian

The rural environment faces quite major problems as opposed to urban areas of our country because of differences in living standards. Developed agriculture and improved rural areas can only take place by building on the innovation of processing and marketing structures, improving infrastructure, increasing the rural economy through job achievement and increasing economic competitiveness. In this paper I set out to analyses in detail the evolution of the labour market in the rural area of the South-East region and to carry out a plan of measures to boost regional competitiveness, as well as to identify the difficulties faced by the rural area. The low level of education is a significant problem in the development of the rural area due to a lack of skilled labour. The South-East region can enjoy significant development potential if it is explored effectively. The efficient modernization and development of agricultural activity through adaptation to climate change and adaptation to cutting-edge technology and the model of European markets, as well as attracting young people with qualifications are effective ways to re-strengthen rural areas.

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POSTER SESSION

SECTION II ADVANCED MATERIALS AND INNOVATIVE TECHNOLOGIES

CONFERENCE CHAIR: DANIELA LAURA BURUIANĂ, ELENA EMANUELA HERBEI
9th of December On-line Microsoft Teams 12.00-14.05

P2.1 Green synthesis of metallic nanoparticles, phytochemical compounds and antioxidant activity using two types of algae plants

Ioana- Raluca Suica-Bunghez, Cristina Covaliu, Ana-Alexandra Sorescu, Rodica-Mariana Ion
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In this paper are described the components characteristic of different algae types, from different location (Belgium and Korea). The dried marine algae were green (Enteromorpha spp.) and brown (Hizikia fusiforme). Algae have important components, like chlorophyll and other plant pigments, omega-3 fatty acids and essential elements. Also, it has shown to provide a rich source of natural bioactive compounds with antifungal, antibacterial and antioxidant properties. Another important aspect is the fact that algae demonstrated a good wastewater treatment, in addition to the economic aspect, algae biomass is a source of biodiesel and offers an efficient way for nutrient consumption and provide aerobic bacteria with oxygen through photosynthesis. It is a low-cost technique for the removal of phosphorus, nitrogen and pathogens. So, the aim of our study was to characterize and compare the quantitatively (polyphenols, tannins, flavonoids) and qualitative (saponins, proteins, terpenoids, steroids) properties of two algae types extracts. The formation and characterization of gold nanoparticles (AuNPs) and algae extracts were confirmed by UV-Vis spectroscopy, optical microscopy (OM), SEM analysis and Fourier transformed IR spectroscopy (FTIR). The antioxidant activity was determined by DPPH method. KEYWORDS: algae; antioxidant activity; phytochemical compounds; nanoparticles.

P2.2 Manufacturing technology of some impact resistant materials

Iulian Paduraru, Vasile Bria, Adrian Cîrciumaru

Impact resistance is a key parameter for composite materials. Composite structures can experience impact loads either accidentally in the designed life or in an anticipated hostile service environment. That is why the manufacturing technology is very important. For materials manufacture were established: the type of polymer matrix, the types of fabrics and additives which will be used to improve impact resistance and also analysis of mechanical properties of formed composite materials (bending and tensile tests). Knowledge of the mechanical properties of polymeric materials is necessary in all areas of their applicability. Thus, rigidity and mechanical strength are key properties for most applications in which polymeric matrix composites are used.

P2.3 Spectral and microscopic characterization of macro-heterocyclic compound RhTMPyP / ZnTSPc

Liviu Olteanu, Rodica Mariana Ion, Sofia Teodorescu, Ioana Daniela Dulama, Raluca Maria Stirbescu, Nicolae Mihail Stirbescu

Macro-heterocyclic compounds, such as porphyrins and phthalocyanines, have unique physical and chemical properties. The formation of such adducts involves intense interactions between two differently charged macrocycles, this interaction being strongly influenced by the nature of the metal inside. Their ability to absorb light throughout the spectrum and self-organization being adequate for the realization of dye-sensitized solar cells (DSSCs). The investigations of spectral properties of the macroheterocyclic compound (RhTMPyP/ ZnTSPc) are achieved by Raman and FT-IR analysis. The surface morphology of the samples was probed by scanning electron microscopy (SEM, SEM+EDS).

P2.4 Poly(3-HydroxyButyrate-co-3-HydroxyValerate) based Inorganic Consolidate for Firwood Preservation

Madalina Elena David Ramona Marina Grigorescu, Lorena Iancu, Elena Ramona Andrei, Rodica-Mariana Ion

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The aim of this study was to address one of the major challenges of conservation state of wooden artifacts or artworks namely, the preservation and restoration of wood surfaces. The factors involved in the deterioration of wood are mainly the external factors such as fire, low temperature and microbiological agents, which act on the wood and induce some degradation processes, identified by discoloration, fragility and unsightly appearance. In this study, biodegradable materials based on poly(3-hydroxybutyrate-co-3-hydroxyvalerate) (PHBHV) and composites based on PHBHV and particles (zinc oxide (ZnO), carbonated hydroxyapatite (CHAp) or its metallic derivatives with silver (Ag) and strontium (Sr)) were used in order to investigate their consolidation capacity on firwood specimens. Colorimetric measurements have confirmed that the chosen treatments did not change the color of the natural wood. The hardness test revealed that the presence of the polymer and particles increases the mechanical properties of the samples. By sorption-desorption tests (hysteresis) a lower hysteresis index with up to 21% compared to control has been obtained, the treatments based on PHBHV-ZnO and PHBHV-SrCHAp coatings presented the lower hysteresis index. Also, by water absorption test was confirmed that the used treatments confer a strong hydrophobic character which prevents exfoliation of the wood samples.

P2.5 Mathematical modeling in view of property prediction of DD11 steel laminated in LBC Liberty Galati

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This paper presents the elaboration of the equations of the mathematical model with the help of which the mechanical properties of the hot rolled strips in LBC Liberty Galati can be predicted. In the realization of the mathematical model by statistical methods there are two important stages. The first, known as the preliminary experiment, solves a series of problems related mainly to the selection of process factors (parameters), as well as the interactions that may occur, and in the second stage (the basic experiment) we proceed to the elaboration of the model and its statistical analysis. The equations of the elaborated mathematical model are of the form: Y = f (x1, x2, x3). We considered as main influencing factors (independent variables of the process of making hot rolled strips) the following technological parameters of processing: 1 - carbon equivalent - CE,, [%]; 2 - rolling end temperature - Tsf, [0C]; 3 - winding temperature - Tî, [0C]. Dependent variables (parameters to be optimized): • Y1 - breaking strength, Rm, [Mpa]; • Y2 - flow limit, Rp02 [Mpa]; • Y3 - specific elongation at break, A5, [%]; By calculating the differences between the values recorded when measuring the mechanical properties and those obtained by calculation based on the mathematical model developed, we found that these differences are small or very small. For this reason it can be said that the elaborated mathematical model is in close accordance with the process of rolling hot strips that it describes and is able to predict the values of mechanical properties.

P2.6 Development of the graphic interface for prediction of mechanical properties, based on the mathematical model, for cold laminated steel strips brand DC01

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During the work, several technological variants for obtaining cold rolled steel strips of the DC01 brand were studied, under the conditions of Liberty Steel Galati. For all the 25 technological variants studied, the afferent mechanical properties comply with the norms in force on the Liberty Steel Galati platform (SR EN 10310). Carrying out the mathematical modeling of the process of obtaining cold-rolled strips led to obtaining mathematical equations of the studied process, valid for a time $\tau = 35 \div 39$ hours, maintenance at recrystallization annealing and a degree of deformation during cold rolling $\varepsilon = 61 \div 65\%$. The equations of the mathematical model obtained are first order equations and were statistically verified using the Fischer criterion. Following the verifications performed, it was found that they can be used in the analyzed process. The presented mathematical model allows the calculation of the optimization of the parameters of the

process of obtaining cold rolled strips in Liberty Steel Galati, so as to obtain the optimal complex of resistance and plasticity properties, with minimal costs. Interpreting the equations of the model, it results that the mechanical properties of the resistance increase as the value of the degree of deformation increases. Elongation at break is influenced by the mathematical model, primarily by the treatment temperature, in the sense that as the recrystallization annealing heat treatment temperature increases, the elongation also increases. With the help of the MATLAB software and on the basis of the obtained mathematical model, a program related to a graphical interface was made, for predicting the values of the researched mechanical properties.

P2.7 Optimization of the heat treatment process applied to the ALZn4,5Mg alloy using the mathematical model and the energy consumed

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The paper optimized the thermomechanical treatment process using the mathematical model of the process applied to an aluminum alloy and the energy consumed in thermomechanical processing. The mathematical model was performed by statistical methods, namely regression analysis by active experiment. The elaborated mathematical model allows the calculation of the optimization of the parameters of the heat treatment process, so as to obtain the optimal complex of resistance and plasticity properties, with minimum costs. For the calculation of the values of the mechanical properties, the equations of the mathematical model obtained for each property from the researched ones are used. The mathematical equations are: Y1 = 62.06 + 1.89 · t + 6.48 · τ-0.07 · t · τ, Y2 = 39.06 + 1.73 · t + 6.73 · τ-0.07 · t · τ Y3 = 17.42-0.03 · t + 0.006 · τ + 0.001 · t · τ Y4 = 106.19 + 0.53 · t-5.48 · τ-0.02 · t · τ By optimization it is desired to obtain minimum values, for the researched mechanical properties, equal to the values imposed by EN_485-2-2007 for a minimum energy consumption. The calculation of energy consumption in the form of heat involves the calculation of energy consumed in the heat treatment furnace on which artificial aging is performed. From the calculation performed with the help of MATLAB, from the total of 1377 possible variants of thermal processing for temperatures between 140ºC and 220ºC and for a holding time between 4 and 20 hours resulted 192 variants of thermal processing, which lead to values of mechanical properties that simultaneously respect the conditions imposed by EN 485-2-2007. In order to find out the optimal treatment variant, when a certain value is imposed for one of the properties, the energy cost is calculated for those thermal processing variants. The optimal variant is the one with the lowest energy consumption (Qmin).

P2.8 Research of the M-C interface by SEM Analysis of prosthetic restorations with metal substructure from different experimental titanium bioalloys.

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In restorative dentistry, metal-ceramic restorations are appreciated for their advantages related to the concomitant provision of a special aesthetics (provided by the ceramic component) and durability (provided

by the metal component). The study of the characteristics of the M-C bond implies the understanding of the adhesion phenomenon and its mechanisms, among which the chemical adhesion has a determining role. The oxides formed at the interface of the two components control the quality of the metal-ceramic bond, both by their nature and by the thickness of the layer formed. The paper presents some of the results obtained by studying the interface area, examining the surface of both components and evaluating their characteristics in M-C restorations with metallic component from experimental titanium bioalloys, by scanning electron microscopy (SEM) analysis and EDAX analysis.

P2.9 Considerations on the properties of titanium bioalloys used in implantology in relation to the characteristics of hard tissue to ensure bone biointegration.

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The role of tissue integration of oral implants is essential in the implantprosthetic rehabilitation of edentulousness. Given the considerations regarding the nature of the titanium bond established at molecular level with the bone tissue elements, we appreciate that one of the most important aspects that can ensure the success of the implant is tissue compatibility, a characteristic that influences the healing, restoration and remodeling process. . Considered an almost ideal material in dental endosseous implantology due to its excellent corrosion resistance, titanium is distinguished by low specific gravity and very good mechanical properties; A solid bond is established between the titanium implant and the surrounding bone that facilitates a mechanical, rigid ankylosing anchor that stabilizes the endosseous implant. On the other hand, titanium alloys are even more appropriate in light of the concept of functional biocompatibility (defined by Wintermatel and Mayer in 1999) given that the set of physical-mechanical properties (eg modulus of elasticity and ability to optimally transmit demands at the implant-tissue interface) can be improved by alloying with chemical elements such as: molybdenum, zirconium, rhenium, niobium, chromium, manganese, etc. The paper summarizes the conditions that ensure the functionality and durability of the dental implant in relation to biomaterials (usual titanium alloys and new experimental alloys) taking into account both the intrinsic biocompatibility and functional biocompatibility of implant biomaterials.

P2.10 Sensors based on nanoaprticles oxide for dopamine detection

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Quantification of dopamine (DA) in the physiological liquids, is of interest because it is a important neurotransmitter that is linked to a wide variety of medical conditions [1]. Selective identification of dopamine allows monitoring the Parkinson's and Alzheimer's disease, the disorder Attention Deficit Hyperactivity Disorder (ADHD) and Schizophrenia [2-3], and is also accepted as prognostic biomarker. Thus,

the analysis and control of neurotransmitters have a particular importance in the field of neuroscience, where current treatment is arbitrary, based mainly on the patient's clinical observations. The most traditional methods widely used for the detection of neurotransmitters are in vitro methods, (High Performance Liquid Chromatography (HPLC) [4], Absorption Spectroscopy [5]), in which both methods require special laboratory settings and long or in vivo consumption, which are very expensive (positron emission tomography) [6]. Electrochemical sensors provides a real-time response with high sensitivity and selectivity due to the electroactive nature of dopamine, so they can be used as an in vitro molecular diagnostic method. In this review are presented a series of electrochemical sensors based on modified carbon sensor with hybrid materials based on ZnO, ZrO2, TiO2 and Al2O3 nanoparticles.

P2.11 Antibacterial activity of gold nanoparticles decorated zinc oxide nanorods

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This study is carried out to evaluate the effect of Gold nanoparticles decorated ZnO nanorods on antibacterial activity. Small ZnO nanorods were synthesized by solvothermal method. Obtained nanomaterials were decorated with small gold nanoparticle through chemical reduction. The structure and morphology were analyzed by X-ray diffraction, Raman spectroscopy, scanning electron microscopy (SEM), and energy dispersive X-ray spectroscopy (EDS). The antibacterial properties of unmodified and Au decorated ZnO nanorods against Listeria monocytogenes, Escherichia coli and Staphylococcus aureus were investigated. The results showed that all nanomaterials exhibited different antibacterial effects to all three bacteria. These results indicate that obtained materials have shown potential for antibacterial

P2.12 The influence of the coagulation bath temperature on the polymeric membranes properties

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In the last years, membrane technology represented an unconventional method to wastewater treatment. Membrane separation represents a high-class technology because of its high removal efficiency and cost effectiveness. Preparation techniques for polymer membranes demonstrate an essential aspect of film properties. In this article, the influence of the coagulation bath temperature on the obtaining process on the polymeric membranes properties is of interest for this study. The polymer used is polysulfone (PSf) because of its chemical and mechanical properties and is one of the most used material in ultrafiltration process. The membranes were obtained using the immersion precipitation method, by phase inversion. By immersing the thin polymer film in the coagulation bath (distilled water) the solvent from the solution is replaced by the nonsolvent. This phenomenon produces the formation of pores and morphological structure that have a

substantial influence on the transport properties. The temperature of the coagulation bath has been set at 5, 20 and 40 °C. Membranes are characterized by pure water flux, permeability, porosity and retention of methylene blue. The low temperature of coagulation bath improves the membrane's rejection, and its influence was most notable.

P2.13 SEM Microscopy for identification of spatial formations fullerenes type, made up of carbon atoms, obtained by applying discharges pulsed electric process – EDI - over metallic surfaces, with graphite cathode

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Thermogravimetric analysis at which the pyrolytic graphite layed with EDI procedure was subjected, revealed a number of interesting observations such as mass additions at various temperature ranges. These interesting phenomena have led to further analysis at which the pyrolytic graphite layed with EDI procedure was subjected. The investigation consisted in a set of SEM electron microscopy analysis. This analysis aims to identify if besides the pyrolytic graphite film, after applying electrical discharges in pulse EDI treatment, is also obtain other chemical species responsible for the addition of mass such as fullerenes or carbon nanotubes which are spatial structures composed of carbon atoms sp2 hybridized – C20 – C90 that are able to encapsulate inside their large molecule other small molecules N2 , HOH.

P2.14 Increasing the thermal stability of a polyether polyol by nanomodifying it with bentonite type laminated aluminosilicate

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Polyols are organic compounds that contain multiple functional groups with a strong acid character - OH. Polyols are used in synthesis of polyurethanes and they are generally composed of large molecules with molecular masses between 250 and 5000 UAM. The polyols are obtained by successive additions following a reaction between a chemical species containing an epoxy ring, with an organic molecule containing functional group (s) –OH. Depending on the functional groups contained, the polyols are classified into polyether polyols - chemical species containing ether group -R-O-R- and polyester polyols - chemical species that contain the ester group R - CO - O - R. A nanocomposite material is a multiphase compound in which one of the phases has one or two or all three dimensions of the particles that make it up to the order of magnitude of max 100 nm. This phase is homogeneously dispersed in a matrix which in it confers new properties. For the modification of the polyol, natural bentonite was used, - content of 60-62% (cf. technical data sheet) montmorillonite. This mineral has a stratified molecular structure, which allows the intercalation of the hydrocarbon chains of the polyol. Subsequent to the modification with montmorillonite they were subjected to thermogravimetric analyzes - TGA polyol samples PETOL 36 3 BR variant in order to identify the degradation graphs to identify degradation graphs that lead to information on the thermal stability of the

product. Following the performance of thermogravimetric analyzes, a substantial improvement of the thermal stability of the polyol was found with the increase of the nanomodifier content.

P2.15 Behavior of an experimental model of s-rotor turbine with two pairs of aerodonamically coupled cups in tests in the wind tunnel

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The paper is based on experiments conducted on the wind tunnel at low wind speeds (d a D / H ratio of 1. Cupele semicilindrice opuse la 180 degrees are aerodynamically coupled by overlap and with an air passage gap to equalize the pressures. The formed channel is shaped to allow the same for pairs of blades at 90 degrees. The experimental model has an area of 0.025m2 which represents 10% of the surface of the measuring section of the wind tunnel (0.25m2). The behavior of the experimental model was compared with the experimental models of S-rotor with 2, 3 and 4 semi-cylindrical cups, with the same interception surface. The results confirm the better start of the experimental model by reducing dead zones and operating more evenly and stably over a longer range of wind speeds. The results confirm the validity of the proposed concept of interwoven aerodynamic coupling of semi-cylindrical cups.

P2.16 Characterization of transition zones to the operation of adjacent fluidized beds

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Two of the important disadvantages of fluidized layers used as thermally and chemically active media for surface treatments is the maintenance of a ratio between the diameter and height of the working enclosure around 1 (H / D = 1) and the difficulties in operation when the enclosure diameter is larger than 0.6 ... 0.8m. The present paper aims to characterize the functioning of the adjacent fluidized beds (AFB) and especially of the transition areas. An experimental model with 5 identical and adjacent unit fluidized beds with dimensions of 0.1m x 0.1m is used. The aim was to expand the fluidized layer, the pressure drop in the bed and the correlation of the pressures between AFB and their variation in the passage areas for different regimes. The results confirm the possibility of using adjacent fluidized layers in applications with horizontal modular development by correlating the gas dynamics of the fluidized layer on adjacent cells.

P2.17 Correlation of fluidized layer operation with surface dynamics tracked with a sonar system

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Thermal and thermochemical treatments in a fluidized bed (FBT) are particularly effective on small parts or bulk batches. Treatment regimens are generally based on repeatability. At a proper fluidization setting, very high coefficients of thermal conductivity and chemical diffusion are obtained, which explains the use of this medium. The heat and mass transfer coefficients are dependent on the gas dynamics of the fluidized bed. The paper aims to find a correlation between the gas dynamics of the fluidized bed and the dynamic topography of the surface. An ultrasonic distance measuring system (SONAR) allows identifying the expansion of the bed and then the oscillating changes of the surface as a result of the breaking of the bubbles in the situation of agitated fluidization. The experiments were performed in the laboratory on a fluidized layer of granulated and sorted pellets, with a granulation of 0.10 ... 0.16 mm, using dry air as a fluidizing agent. The fluidization chamber had a diameter D = 0.15m and a height of H = 0.08m. The experiments were performed at ambient temperature. A data acquisition system with Atmel 328U and HC-SR04 (SONAR) ultrasonic sensor module was used to measure distances between 0.1 and 4m. The results confirm the possibility to correlate the fluidization state with the surface using distance measurements in dynamic regime. Keywords: fluidized bed, FBT, SONAR, ultrasound

P2.18 The influence of the number of cup pairs semispheric on the behavior of a wind wind with vertical axis S-rotor

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S-rotor type turbines with spherical buckets offer maximum torque for constructional simplicity. The differences of D drag force between the concave and convex position as well as the low resistance to rotation are premises. Hemispherical cups can be made by plastic deformation of aluminium sheet, plastic or composite materials. Experimental plastic models whose interception area did not exceed 10% of the cross-sectional area of the wind tunnel were used for experiments. Experimental models allow the design and construction of adding cups, changing the force arm and changing their orientation. The mass correction of the models was done. The wind speed changed in steps from 0.5m / s to 10m / s and 10s were expected to stabilize the wind speed and the rotation of the model, respectively. The number of bucket pairs (n = 1 ... 3) and their position, relative to the axis of rotation (force arm) and the angular position of the bucket pairs were changed. Keywords: Savonius Turbine, S-rotor, hemispherical buckets.

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P2.19 History and importance of aerogels over time

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This paper is a review from literature aerogels. They were firstly produced by Kistler with supercritical drying method in the early 1930s, which is not referred to as a specific material, but a group of materials with extraordinary characteristics [1] The definition of aerogel has been given by IUPAC (international union of pure and applied chemistry) as a “gel comprised of a microporous solid in which the dispersed phase is a gas” [2]. There are many materials as silica aerogels, carbon nanotubes and other nanomaterials that are used as aerogels for biomedical application, water decontamination, foods related technologies, electrotchnics and aerospace application.

With the rapid development in materials science, the types of aerogel recognized as matters with special characteristics have been largely extended. Here are presented the most important aerogels that contributed to industry development.

P2.21 Research regarding the partial replacement of aggregates in concrete with a by-product of steel industry

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A continuous increase in demand for natural resources, in a high proportion for the construction sector, creates the necessity to search for alternatives. This work is intended to do so and the aim is the replacement of natural aggregates in some concrete samples with a metallurgical industry by-product. The replacement was gradual and only for one type of the three dimensions utilized. The results of the many tests conducted revealed the possibility of natural aggregate replacement in some extent, keeping the resulted properties of samples within the limits of the standards.
Linz-Donawitz (LD) slag is a type of industrial by-product that was used as partial replacement of aggregate in a former study, and promising results were obtained. The burden of the mentioned study was the weathering of the industrial by-product through the process named carbonation with the purpose to diminish the CaO content, responsible for slag swelling in prolonged contact with water. Different studies regarding mineral carbonation of LD slag also occurred, and the process, although rapid and efficient remains costly. The present study aimed using an already marketed material obtained from the same LD slag, namely LiDonit.

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P2.22 Obtaining Biogas

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BIOGAS is a combustible gas made up of methane and carbon dioxide plus other gases and trace elements. Biofuels are fuels produced from bioregenerable sources from nature, which, after burning in the production engine, have less polluting emissions that affect the environment.
Residues from processing plants in the food industry and agriculture pose major environmental problems. Biogas plants developed by farmers who have large enough farms (over 1500 head of cattle - equivalent to the production of 0.5M ceed and 0.3MWh horsepower) could provide the electricity needed for 1420 homes and heat for 520 homes.
The hydrogen production process based on the steam gasification of biomass in a fluidized bed gasification reactor is analyzed from the perspective of efficient hydrogen producers, global warming determined by the installation and their energy efficiency. the study on the technical, economic and environmental impact implications of biomass co-gasification can be used to trade fully coal-fired hydrogen production plants at a hydrogen production plant using

P2.23 MAGNETIC HYDROXYAPATITE NANOPARTICLES IN FIRE RESISTANCE AND ANTIMICROBIAN APPLICATIONS: A REVIEW

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ABSTRACT

Magnetic nano-materials have been valuable for catalysis, colloidal photonic crystals, magnetic particle imaging, nanofluids, data storage, defect sensor, optical filters, and environmental remediation. Particularly, magnetic nanoparticles have potential use in the biomedical industry because of their unique mechanical, thermal, physical and chemical properties. Hydroxyapatite (HAp) is a highly biocompatible calcium and phosphorus containing bio ceramic material that has the same element ratio (Ca:P ≈ 1.67) as natural bones and teeth. Because of bioactivity, osteo-inductive capability, non-immunogenic behavior, diversity in shapes and biodegradability, HAp has aroused extensive interest for biomedical applications.
In this review we collected data on magnetic hydroxyapatite nanoparticles obtained by hydrothermal and mechanochemical method. The studied applications for this nanoparticles were in fire resistance and as a bone substitute.

KEYWORDS: nanoparticles, hydroxyapatite, fire resistance, antimicrobian

Acknowledgments: This study was supported by the project "ANTREPRENORDOC", Contract no. 36355/23.05.2019, financed by The Human Capital Operational Programme 2014-2020 (POCU), Romania.

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DECEMBER 8-9, 2020, GALATI, ROMANIA

SPECIAL THANKS TO OUR PARTNERS

organized by
Department of Materials and Environmental Engineering, Faculty of Engineering,
"Dunarea de Jos" University of Galati, Romania