Conference Program

Moscow, Russia

May 20–22, 2020

* ICIEM 2020

2020 4th International Conference on Innovative Engineering Materials

* ICCPE 2020

2020 9th International Conference on Chemical and Process Engineering

Co-organize by

RUDN university

CMS Chemistry and Materials Society

Technical Support by

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Welcome Message from Conference Chair

Professor Makhmud Kharun

Peoples' Friendship University of Russia (RUDN University)

On behalf of the Peoples' Friendship University of Russia (RUDN University) it is my honor to welcome you to the 2020 4th International Conference on Innovative Engineering Materials and the 2020 9th International Conference on Chemical and Process Engineering organized by the Chemistry and Materials Society.

Chemistry and Materials Society is an independent, non-political, non-governmental organization of distinguished scientists dedicated to advancing science.

RUDN University is one of the leading state higher educational institution of Russia, and the only university in the world training students from more than 150 countries and of more than 500 nations and ethnicities.

Both institutions have joined their efforts in organizing this important event dedicated to integrating research activities of the world scientific community.

Due to the outbreak of COVID-19, we decided to organize this event online. We believe that science has no boundaries, and that knowledge unites people of different cultures.

I would like to thank all the International Scientific Committee members for their high competence and professional advice that enabled us to organize this event. For the participants, we hope all of you have a wonderful time at the conference.

We believe that by this excellent conference, you can get more opportunity to meet and exchange new ideas in the various areas of science.

In order to hold more professional and significant international conferences, your uggestions are warmly welcomed. And we are looking forward to meet you again in our future conferences.

Sincerely Yours,

Dr. Makhmud Kharun
Professor, Department of Civil Engineering
Peoples' Friendship University of Russia

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Presentation Guideline

- **Equipment needed:**

1. A computer with an internet connection (wired connection recommended)
2. USB plug-in headset with a microphone (recommended for optimal audio quality)
3. Webcam: built-in or USB plug-in

- **Environment requirement**

1. Quiet Location
2. Stable Internet Connection
3. Proper lighting

- **Zoom skill learning**

1. The instructions about Zoom, please visit:
https://support.zoom.us/hc/en-us/articles/201362033-Getting-Started-on-Windows-and-Mac
2. To get the Zoom Video Tutorials, please go to: http://www.iciem.org/zoom/guidelines.html

- **Join Zoom Meeting Room**

https://zoom.com.cn/j/96648732341
Meeting ID: 966 4873 2341

Presentation Guideline

- **How to access the Zoom meeting room**

1. Open Zoom app and create account firstly, then log in with your account.
2. Choose “JOIN A MEETING”, and copy the Meeting ID directly and then click “JOIN” button.
3. Rename your name with this format (Paper ID + Name) before entering the Zoom meeting room.
4. Turn on your Microphone and adjust Webcam.

- **Attention**

1. To effectively control the time and avoid some unexpected situations, we advise you to record your presentation in advance as a backup. Each author have 12 minutes for presentation and 3 minutes for Q&A.
2. May 20, 2020 is for test presentation, please don’t forget to test in order to guarantee the formal sessions goes smoothly.
3. For the conference time, it is arranged by Russia time (GMT+3), please double check your test time and formal time to make sure that you won’t miss the time.
4. The conference will be recorded, we will appreciate your proper behavior.

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Prof. Arcady Zhukov, University of Basque Country, Spain

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Prof. Jabbar H. Al-Baidhani, Unversity of Al-Nahrain, Iraq

Speakers Introduction

Prof. Arcady Zhukov

University of Basque Country, Spain

Arcady Zhukov is an Ikerbasque Research professor at the University of Basque Country, Spain. He was graduated in 1980 from the Moscow Steel and Alloys Institute (presently National University of Science and Technology). In 1988 he received Ph.D. degree from the Institute of Solid State Physics of the Russian Academy of Science, in 2010- Doctor of Science (habilitation) in Moscow State "Lomonosov" University. After postdoctoral stay at the Insituto de Magnetismo Aplicado, he obtained a Ramón y Cajal Fellowship and permanently joined the Ikerbasque in 2011. Fields of interest: amorphous and nanostructured magnetic materials, giant magnetoimpedance, giant magnetoresistance, sensors. He has published above 500 papers and 4 books (H-index = 43). Zhukov can be reached by email at arkadi.joukov@ehu.es.

Speech Title: Soft Amorphous Magnetic Microwires for Sensor Applications

Abstract: Studies of amorphous magnetic wires have attracted great attention owing to excellent magnetic, mechanical and corrosion properties. Versatile magnetic properties such as magnetic bistability or Giant Magnetoimpedance (GMI) effect are suitable for magnetic sensors applications [1]. Recent tendency in devices miniaturization stimulated development of thin (few micrometers diameters) microwires.

Superior soft magnetic properties and GMI effect have been reported for Co-rich microwires [1]. However, less expensive Fe-rich microwires are preferable for the applications. But amorphous Fe-rich materials exhibit rather high magnetostriction coefficient and consequently present quite low GMI effect [1]. Magnetic softness and GMI effect of Co-rich microwires can be also further improved. The most common method for magnetic softness optimization is the annealing.

Consequently, the purpose of this paper is to present our recent experimental results on influence of preparation and processing conditions on magnetic properties of Fe- and Fe-Co based glass-coated microwires.

We observed that stress-annealed at appropriate conditions (time and temperature) microwires can present considerable magnetic softening and enhanced GMI effect. For interpretation of observed stress-annealing induced anisotropy we considered internal stresses relaxation and different mechanisms of stress-induced anisotropy. Observed versatile properties of stress annealed glass-coated microwires make them suitable for magnetic sensors applications.

Speakers Introduction

Prof. Sergei Alexandrov

Beihang University, China & Russian Academy of Sciences, Moscow, Russia

Dr. Sergei Alexandrov is a Visiting Professor at Beihang University (Beijing, China) under the program “Recruitment Program for Global Experts” (“1000 Talent Plan”) and a Research Professor at the Laboratory for Technological Processes of the Institute for Problems in Mechanics of the Russian Academy of Sciences. He received his Ph.D. in Physics and Mathematics in 1990 and D.Sc. in Physics and Mathematics in 1994. He worked as a Professor at Moscow Aviation Technology Technical University (Russia), a Visiting Scientist at ALCOA Technical Center (USA), GKSS Research Centre (Germany) and Seoul National University (South Korea), and was a Visiting Professor at Aveiro University (Portugal), University of Besancon (France) and Technical University of Malaysia (Malaysia). He is a member of the Russian National Committee on Theoretical and Applied Mechanics. Sergei Alexandrov has published more than 400 papers in journals, books and conference proceedings, including three monographs and around 230 papers in journals indexed in the Web of Science. He has participated in the scientific committee of several international conferences and served as a reviewer in a wide range of international journals. He is on the editorial board of several journals including Continuum Mechanics and Thermodynamics (Springer) and Structural Engineering and Mechanics (Technopress). His research areas are plasticity theory, fracture mechanics, and their applications to metal forming and structural mechanics.

Speech Title: Ideal Flow Theory for Pressure-Dependent Materials

Abstract: Ideal flows are solenoidal smooth plastic flows in which an eigenvector field associated everywhere with the greatest principal strain rate and stress is fixed in the material. The technological value of the ideal flow theory comes from its potential to provide rapid preliminary designs of deformation processes. The available theory of ideal flows is restricted to the rigid perfectly plastic Tresca solid (i.e. solids obeying Tresca’s yield criterion and its associated flow rule). In the present paper, the double shearing model and the double slip and rotation model of pressure – dependent plasticity based on the Coulomb – Mohr yield criterion are considered under the conditions of plane strain and axial symmetry. It is assumed that the material is incompressible and material flow is stationary. Under these conditions it is shown that ideal flows exist. In particular, methods for calculating ideal flows developed for the rigid perfectly plastic Tresca solid are extended to the aforementioned models of pressure – dependent plasticity.

Speakers Introduction

Assoc. Prof. Ouyang Jianyong

National University of Singapore, Singapore

Prof. Jianyong Ouyang received his PhD, master and bachelor degrees from the Institute for Molecular Science in Japan, the Institute of Chemistry of the Chinese Academy of Science, and the Tsinghua university in Beijing, respectively. He worked as an assistant professor at the Japanese Advanced Institute of Science and Technology and a postdoctoral researcher at the University of California, Los Angeles (UCLA) before joining the National University of Singapore (NUS) as an assistant professor in 2006. He was promoted to associate professor in 2012. His research interests include flexible electronics and energy materials and devices. He invented the first polymer-nanoparticle resistive memory, and his lab at NUS continuously reported world-record conductivities and thermoelectric properties of solution-processable intrinsically conductive polymers.

Speech Title: Intrinsically Conductive Polymers as Flexible or Stretchable Electrode of Electronic Devices

Abstract: Intrinsically conducting polymers were discovered in 1970s. Recent progress in conducting polymers demonstrated their new important application in important areas, such as the next-generation transparent electrode of optoelectronic devices and stretchable electrode of wearable devices. Optoelectronic devices require at least one electrode to be transparent. Indium tin oxide (ITO) is traditionally used as the transparent electrode of optoelectronic devices. But ITO has problems of scarce indium on earth and poor mechanical flexibility. Conducting polymers, carbon nanotubes, graphene and metal wire grids have been proposed to be the transparent electode materials. Among them, poly (3,4-ethylenedioxythiophene): poly (styrenesulfonate) (Chemical structure shown in Figure 1) is promising to be the next-generation transparent electrode material due to its solution processability, low cost and high transparency in visible range. However, the as-prepared PEDOT:PSS film obtained from PEDOT:PSS aqueous solution usually has conductivity below 1 S cm-1, remarkably lower than ITO. Here, I will present several novel methods to significantly enhance the conductivity of PEDOT:PSS. The conductivity can be enhanced to be more than 3000 S cm-1, which is higher than that of ITO on plastic and comparable to ITO on glass. Moreover, PEDOT:PSS have good biocompatibility. Moreover, PEDOT:PSS can have important application in biomedical engineering as well because of its excellent biocompatibility and high mechanical flexibility. However, it has limited mechanical stretchability due to the rigid conjugated backbone. Here, I will present some of our recent results on improving the stretchability of PEDOT:PSS. We obtained biocompatible PEDOT:PSS with a conductivity of >1000 S/cm and stretchability of >60%.

Program at a Glance

May 20, 2020		May 21, 2020		May 22, 2020	
10:00 - 10:40	Test Speakers & Committee	09:30 - 09:40	Opening Remarks Prof. Makhmud Kharun	08:30 - 10:30	Invited Speeches Replay
10:40 - 11:00	Break	09:40 - 10:20	Speech I Prof. Arcady Zhukov	10:30 - 15:00	Session I & II Replay
11:00 - 11:40	Test Session I	10:20 - 10:30	Morning Break		
11:40 - 12:30	Test Session II	10:30 - 11:10	Speech II Prof. Sergei Alexandrov		
		11:10 - 11:50	Speech III Assoc. Prof. Ouyang Jianyong		
		11:50 - 13:00	Lunch Break		
		13:00 - 15:00	Formal Session I		
		15:00 - 15:15	Afternoon Break		
		15:15 - 17:30	Formal Session II		

Test Sessions on May 20, 2020

****To show the respect to other authors, we strongly advise you to attend the whole session whether you are in test or formal session. Please enter the meeting room 10 minutes in advance.**

Speaker & Committee Test 10:00-10:40		Test Session I 11:00-11:40		Test Session II 11:40-12:30	
10:00 - 10:10	Prof. Makhmud Kharun	11:00 - 11:05	EC20-310-A+Wenqian Wu	11:40 - 11:45	EC20-1010+Oleg Sidoryuk
10:10 - 10:20	Prof. Arcady Zhukov	11:05 - 11:10	EC20-1006+Shuai Li	11:45 - 11:50	EC20-316-A+Sofia Louloudi
10:20 - 10:30	Prof. Sergei Alexandrov	11:10 - 11:15	EC20-1008+Konstantins Savkovs	11:50 - 11:55	EC20-1021+Blanka Bartova
10:30 - 10:40	Assoc. Prof. Ouyang Jianyong	11:15 - 11:20	EC20-313+Xiao-Qiao Zhao	11:55 - 12:00	EC20-1003E+Faramarz Djavanroodi
		11:20 - 11:25	EC20-305E-A+Arie Gruzman	12:05 - 12:10	EC20-307+Michael Moses Aba
		11:25 - 11:30	EC20-312-A+Hua-Bo Li	12:10 - 12:15	EC20-1004E+Faramarz Djavanroodi
		11:30 - 11:35	EC20-301E-A+Arie Markus	12:15 - 12:20	EC20-1005E+Badaoui Azhar
		11:35 - 11:40	EC20-311+Jun Zhang	12:20 - 12:25	EC20-1026+Aleksandra Victorovna Frolovskaia
				12:25 - 12:30	EC20-1027+Taha Waqar

Formal Sessions on May 21, 2020

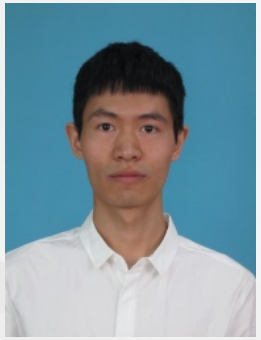
****To show the respect to other authors, we strongly advise you to attend the whole session whether you are in test or formal session. Please enter the meeting room 10 minutes in advance.**

Opening Remarks & Invited Speeches 09:30-11:50		Formal Session I 13:00-15:00		Formal Session II 15:15-17:30	
09:30 - 09:40	Prof. Makhmud Kharun	13:00 - 13:15	EC20-310-A+Wenqian Wu	15:15 - 15:30	EC20-1010+Oleg Sidoryuk
09:40 - 10:20	Prof. Arcady Zhukov	13:15 - 13:30	EC20-1006+Shuai Li	15:30 - 15:45	EC20-316-A+Sofia Louloudi
10:20 - 10:30	Morning Break	13:30 - 13:45	EC20-1008+Konstantins Savkovs	15:45 - 16:00	EC20-1021+Blanka Bartova
10:30 - 11:10	Prof. Sergei Alexandrov	13:45 - 14:00	EC20-313+Xiao-Qiao Zhao	16:00 - 16:15	EC20-1003E+Faramarz Djavanroodi
11:10 - 11:50	Assoc. Prof. Ouyang Jianyong	14:00 - 14:15	EC20-305E-A+Arie Gruzman	16:15 - 16:30	EC20-307+Michael Moses Aba
11:50 - 13:00	Lunch Break	14:15 - 14:30	EC20-312-A+Hua-Bo Li	16:30 - 16:45	EC20-1004E+Faramarz Djavanroodi
		14:30 - 14:45	EC20-301E-A+Arie Markus	16:45 - 17:00	EC20-1005E+Badaoui Azhar
		14:45 - 15:00	EC20-311+Jun Zhang	17:00 - 17:15	EC20-1026+Aleksandra Victorovna Frolovskaia
				17:15 - 17:30	EC20-1027+Taha Waqar

Session I
Time: 13:00-15:00, May 21, 2020
Topic: Chemical Reaction Engineering and Material Properties
Session Chair: Prof. Arie Gruzman, from Bar-Ilan University, Israel

EC20-310-A Time: 13:00-13:15
Wenqian Wu
Nanjing University of Science and Technology, China
Title: DSC Curves of Different Temperature Rise Rate to Distinguish Autocatalytic Decomposition Reaction Types

Abstract-- In the field of thermal analysis, autocatalytic decomposition reactions have the characteristics of intense decomposition, strong exotherm, high thermal risk and difficult control. At present, the methods of using thermodynamic analysis to determine whether a reaction belongs to autocatalytic decomposition include the activation energy method, the interrupted retrace method, and the isothermal method. The application of the activation energy method is relatively limited, and the interrupted retrace method is not clear for substances with lower degree of autocatalysis. For some materials, the isothermal method is not effective in isothermal experiments. For the DSC dynamic curves at different temperature rise rates of different types of decomposition materials, we will find that the curves of both will tend to the higher temperature region with the temperature rise rate increasing. The difference is that curves of the former will "overlap" within a certain conversion rate under different temperature rising rates.



EC20-1006 Time: 13:15-13:30

Shuai Li
Fujian University of Technology, China

Title: $LaFeO_3$ Modified RuO_2 for Enhancing Electrochemical Performances

Abstract-- $LaFeO_3$ nanoparticle-modified RuO_2 and RuO_2 samples were fabricated by a thermal decomposition and was characterized by powder X-ray diffraction (XRD), energy-dispersive X-ray spectroscopy (EDS) and cyclic voltammetry tests.

XRD results reveal that the RuO_2 and RuO_2-$LaFeO_3$ samples are mainly a rutile structure. Compared with the RuO_2 sample, the RuO_2-$LaFeO_3$ sample has smaller crystalline grain size. Cyclic voltammetry analysis shows the voltammetric behaviour and the characteristic potentials of the RuO_2 and the RuO_2-$LaFeO_3$ samples are similar in 1.0 M KOH solution. Voltammetric charge analysis reveals that the RuO_2-$LaFeO_3$ sample have higher concentrated of surface active species and larger exposed surface area than the RuO_2 sample. Capacitive measurement results show the Double-layer capacitance (C_{dl}) and the electrochemical surface area (ECSA) values of the RuO_2-$LaFeO_3$ sample are approximately 2 times larger than those of the RuO_2 sample, indicating that the electochemical active surface area increase when integrating of RuO_2 with $LaFeO_3$ nanoparticle.

EC20-1008 Time: 13:30-13:45

Konstantins Savkovs
Riga Technical University, Latvia

Title: Determining High-temperature Oxidation Resistance of Ti-Al-Cr-Si-N Based Nitride Thin Coatings Deposited on Titanium Alloys

Abstract-- This article considers the possibility of applying thin Ti-Al-Cr-Si-N based nitride thin coatings (up to 10 microns) for increasing the heat-resistance of titanium alloy blades without altering their aerofoil. It presents the results of testing samples, which were coated by using different ratios of the parameters of main element deposition simultaneously from various sputtering sources, as well as an assessment of the efficiency of these coatings in terms of oxidation at temperatures of 750–850°C.

EC20-313 Time: 13:45-14:00

Xiao-Qiao Zhao
Nanjing University of Science & Technology, China

Title: Conjugate Direction Particle Swarm Optimization Based Approach to Determine Kinetic Parameters from Part of Adiabatic Data

Abstract-- Due to the limited detection range of the adiabatic equipment, it is difficult to get complete experimental curve of some materials and calculate the kinetic parameters. In this work, the conjugate direction particle swarm optimization (CDPSO) approach, as a global stochastic optimization algorithm, is proposed to estimate the kinetic parameters and complete experimental curve from part of adiabatic calorimetric data. This algorithm combines the conjugate direction algorithm (CD) which has the ability to escape from the local extremum and the global optimization ability of the particle swarm optimization (PSO) which finds the globally optimal solutions. One case was used to verify this method: 20% DTBP in toluene decompositions under adiabatic conditions. Comparing the experimental and calculated complete temperature curve, the accuracy of the fitted kinetic parameters calculated by no less than 70% temperature rise rate proportion of data is verified. The value of TD24 is well-deviated even used 10% proportion of data. The case reasonably proves the effectiveness of CDPSO algorithm in the estimation of kinetic parameters from part of adiabatic data.

EC20-305E-A Time: 14:00-14:15

Arie Gruzman
Bar-Ilan University, Israel

Title: Mimicking Neuroligin-2 (NL-2) Function in Pancreatic β-cells by Nanocomposites as a Novel Approach for Antidiabetic Therapy

Abstract-- Both pancreatic β-cell membrane and presynaptic active zones of neurons are the assembly sites of similar protein complexes mediating regulated secretion of bioactive molecules. These synapse-inducing proteins include neuroligins and their binding partners: neurexins. These proteins participate in trans-cellular protein-protein interactions across the synaptic cleft. It was shown that β-cells express both neuroligins and neurexins on their plasma membrane. It was also found that insulin secretion and the proliferation rate of β-cells increased when β-cells were co-cultured with cells overexpressing neuroligins. We propose that neuroligin-derived molecules arranged in clusters can enhance β-cell function and functional maturity, as well as protecting β-cells in stress conditions. To test this hypothesis, several peptides were derived from crystal structures of different neuroligins and neurexins using molecular modelling methods. These peptides were conjugated with nanoscale composites; (Yb(III)-γ-Fe_2O_3 nanoparticles, polyamine based dendrimers and PEG based hydrogels). Covered by NL-2 derived peptide nanocomposites (HSA-28D) enhanced β-cell functions in terms of glucose-stimulated insulin secretion and protects them under stress conditions in vitro and ex vivo. Recruiting the β-cells' "neuron-like" secretory machinery as a target for diabetes treatment is a novel approach. Such nanoscale composites might therefore provide a unique starting point for designing a novel class of antidiabetic therapeutic agents.

EC20-312-A Time: 14:15-14:30

Hua-Bo Li
Nanjing University of Science & Technology, China

Title: Research on Thermal Decomposition Kinetics of 2,2'-Azobisisoheptonitrile with Ferric Nitrate

Abstract-- In order to research the effect of ferric nitrate on the decomposition reaction of 2,2'-Azobisisoheptonitrile (ABVN), Differential Scanning Calorimeter (DSC) was used to study the effect of different mass of ferric nitrate on the decomposition reaction of ABVN. And then, the dynamic DSC was carried out to the sample 4. The dynamic DSC results which have the phenomenon of heat absorption and generation was decoupled, obtaining a complete exothermic curve. A kinetic model and kinetic parameters were further obtained by the Friedman method and model fitting method through fitting decoupling exothermic curves and verified by the ARC test. The result shows the N-order model could characterize the decomposition course of the sample 4. The activation energy is 120.82 kJ/mol, the pro-exponential factor is 8.97×10^{14} (1/s), and reaction order is 1.02. The parameters based on the model have certain safety guiding significance for production, transportation and storage.

EC20-301E-A Time: 14:30-14:45

Arie Markus
Ben Gurion University of the Negev, Israel

Title: New Formulation of Pesticides for Decreasing Toxicity and Environmental Damage without out Loss of Pesticidal Efficacy

Abstract-- In the recent years many pesticides have been banned for use in the western countries and in Europe. These include pesticides based on organophosphate like Temphos Malathion, Bromex etc. and carbamates like Propoxur etc. In many developing, however, such as African countries they are still using organophosphate pesticides and even organochlorine pesticides like D.D.T and Lindane against Malaria and Yellow fever. Their use is motivated by the fact that hundred of thousands of people are dying every year from these diseases. Pesticide products that remain in use in the western and European countries, however, are based on the pyrethroid family. The most commonly used commercial pyrethroid formulations are based on Permethrin, Bioalethrin and Cypermethrin etc.

EC20-311 Time: 14:45-15:00

Jun Zhang
Nanjing University of Science and Technology, China

Title: Thermal Decomposition and Safety Assessment of N-Nitrodihydroxyethyl Dinitrate by DSC and ARC

Abstract-- N-Nitrodihydroxyethyl dinitrate (DINA), an explosive as well as high-energy plasticizer, was widely used in double-base propellant production. In this paper, the thermal explosion hazard and decomposition progress of DINA under dynamic and adiabatic conditions were investigated using differential scanning calorimeter (DSC) and accelerating rate calorimeter (ARC) respectively to acquire thermodynamic parameters (e.g. T_{onset}, T_p and ΔH_d) for self-heat reactions. The specific heat capacity was calculated based on a linear ramp method using DSC. Futhermore, we carried out these tests, which can provide more useful information for determining the decomposition kinetic parameters (E_a and A) and thermal hazard parameters ($\Delta G^{\neq}$, $\Delta H^{\neq}$, $\Delta S^{\neq}$, T_b and T_{D24}) under the non-isothermal and adibatic conditions, respectively. The SADT predictions for the 5, 20 and 50 kg packages of DINA and some simulation for spatial distribution of T and α have been performed using the finite element analysis method of AKTS software, which can help us to optimize the conditions of storage and transportation for chemical, also minimize industrial disasters.

Session II
Time: 15:15-17:30, May 21, 2020
Topic: Manufacturing Engineering and Building Materials
Session Chair: Prof. Arcady Zhukov, from University of Basque Country, Spain

EC20-1010 Time: 15:15-15:30
Oleg Sidoryuk
M.F.Stelmakh “Polyus” Research Institute, Russia
Title: The Use of Additive Laser Technology for the Synthesis of Silicate Coatings in the Correction of the Shape of Precision Optical Surfaces

Abstract-- The work is devoted to the development of the technology for the formation of the required microrelief of the optical surfaces of glass-ceramic substrates. The solution of the problem using a controlled local deposition of silicon dioxide on the polished surface by laser pyrolysis of tetraethoxysilane vapor in the presence of ozone is shown. The characteristics of the experimental samples, their comparison with the data of mathematical modeling of the results of technological processes are presented. The possibility of using the developed technology for the production of substrates of optical parts with a defined wedge-shaped value is shown.

EC20-316-A Time: 15:30-15:45

Sofia Louloudi
Hyperion Systems Engineering, Cyprus

Title: Software for Real-time Tracking, Analysis & Visualization of Polymer Data in Production Plants

Abstract-- Polymer-based products have become a fundamental part of modern life. Due to the huge quantities of polymer produced every year (in 2018 alone, the EU produced an estimated 51.2 megatons of polymer), there is a need for production processes to be constantly improved in terms of efficiency and reduction of waste.

This overview focuses on an integrated, quick-to-configure, decision-support tool designed to provide online/real-time, operations-specific analysis, and classification of material. Hyperion Production Online Software (HYPPOS) is coupled with advanced material tracking capabilities for the rapid categorization and visualization of material as it flows through the production process; providing the most up-to-date data about product quality to all production staff, allowing effective collaboration and timely response to production quality issues.

Customers, who have deployed early versions of this system's individual components, noticed savings of up to 40% in production losses, a 0.5% to 1.5% increase in revenue, and a 25% reduction in equipment changeover time. Based on this, HYPPOS is expected to have a significant positive impact on production efficiency, profitability, and competitiveness while also reducing waste, with a consequential contribution in lowering the carbon footprint. Therefore, HYPPOS addresses the United Nations Sustainable Development Goals (SDG) 9 (industry, innovation & infrastructure) and SDG 12 (responsible consumption & production) and it further supports the European Union strategy for plastics in a circular economy.

EC20-1021 Time: 15:45-16:00

Blanka Bartova
University of Economics in Prague, Czech Republic

Title: Data Mining Methods Used for Quality Management – A Bibliometric Analysis

Abstract-- Nowadays, the most significant trend regarding Industry 4.0 in manufacturing appears to be smart factories. In Smart factories, manufacturing is mostly lead by robots with the use of a wide range of sensors, QR codes, etc. Factories can monitor all the manufacturing processes and store huge amounts of data. From this data, they can mine information that can be beneficial for a company's revenues, costs, or product quality, which is mainly in our interest. In this state-of-the-art paper, we have performed bibliometric analysis and an extensive survey on recent developments in the field of Data mining techniques application in quality management in manufacturing. This study collected research papers, journal articles, and conference proceedings from Web of Science (WoS) for all history until 2019. A total of 372 papers from WoS were found. We also analyzed papers from the Scopus database from which we selected 660 papers. This paper summarizes the increasing structure of Data mining applications for quality management and provides a concise background overview of various Data mining techniques frequently used in the last 20 years. In the bibliometric analysis, different performance metrics are extracted, such as total papers, total citations, and citations per year. These metrics are analyzed within three main areas: Productivity, Sustainability and Index. Further, top of the most productive and highly cited authors, major subject areas, sources or journals, and countries are evaluated. A list of highly influential papers is also assessed.

EC20-1003E Time: 16:00-16:15

Faramarz Djavanroodi
Prince Mohammad Bin Fahd University, Saudi Arabia

Title: Strain Homogeneity of Nano Structured Titanium Via ECAP

Abstract-- Equal channel angular pressing (ECAP) technique have been successfully employed to produce Ultra-fine/Nanostructure grain (UFG/NSG) materials, but some hexagonal closed-packed (HCP) materials are difficult to process by ECAP at room temperature. In this work, the homogeneity of ultra-fine/ nanostructured commercial purity titanium samples fabricated by equal channel angular press (ECAP) was assessed using micro hardness measurements. The ECAP die with the channel angle of 90° was used and the process done at the 450 ℃ temperature by route BC. The Vickers microhardness was investigated on both cross-sectional and longitudinal planes of annealed, 1, 2, 4 and 6 passes ECAPed samples. It is concluded that a desirable homogeneity can be attained after 6 passes of ECAE process on both cross-sectional and longitudinal planes of CP Ti.

EC20-307 Time: 16:15-16:30

Michael Moses Aba
Universidade de Sao Paulo, Brazil

Title: Strategic Planning Of Integrated Biofuel and Petroleum Fuel Supply Chains

Abstract-- Rising energy demand, dwindling petroleum resources and climate change are the foremost drivers of the energy revolution leading to development of alternative fuels to replace fossil derived energy sources. Biofuels as one of the viable solutions is increasingly becoming part of the energy mix of many nations whose market has become established by biofuel policies and mandates. However, investments in biofuel supply chains can be expensive and several supply chain models have been developed to demonstrate its cost-effectiveness with few models considering coordination with existing petroleum infrastructure and tactical management of feedstock and products. This consideration could have significant impact on cost reduction and effective coordination of both supply chains. Hence, this article presents a multi-period multiscale strategic design and planning model for an integrated ethanol and gasoline supply chain which composes a superstructure that combines all the components of the biofuel and petroleum supply chain. The model presented is a Mixed Integer linear Programming (MILP) model used to identify regions where investments are required and the optimal configuration of the network while also taking into consideration inventory management and transportation logistics. The application of a dynamic capacity strategy also provides information on strategic capacity additions, expansions, contractions and closures. A case study of northeast of Brazil where investments in ethanol bio-refineries is required to equalize the market demand is considered.

EC20-1004E Time: 16:30-16:45

Faramarz Djavanroodi
Prince Mohammad Bin Fahd University, Saudi Arabia

Title: A New Approach to Manufacture Functionally Graded Pure Titanium

Abstract-- A new approach to manufacture functionally graded pure titanium has been proposed and experimented. In this approach a combination of equal channel angular pressing (ECAP) and surface mechanical attrition treatment (SMAT) are employed to produce functionally graded pure titanium. Four passes of ECAP process at elevated temperature were applied to form bulk ultrafine-grains followed by SMAT to produce nanostructured surface region. Electron back scatter diffraction (EBSD) was employed to investigate the microstructure and nanoindentation microhardness test were used to examine the through-thickness profile of the material. EBSD showed average grain size of 500nm were achieved after 4 passes of ECAP followed by further grain refinement on the subsurface regions to a depth of 112 μm by SMAT. The nanoindentation hardness results indicated the formation of graded zones. The surface of combined ECAP and SMAT process sample attained a 75% hardness improvement and 89% grain refinement as compared with ECAP sample. The combined use of ECAP and SMAT has shown a good potential for production of functionally graded pure titanium.

EC20-1005E Time: 16:45-17:00

Badaoui Azhar
Ecole Nationale Supérieure des Travaux Publics, Algeria

Title: Probabilistic Carbonation Simulations in Concrete Based on Marble Powder

Abstract-- The aim of this paper is the evaluation of concrete carbonation depth from a probabilistic analysis, focusing specifically on the study of the marble powder diameters randomness effect on the reinforced concrete carbonation. Monte Carlo simulations are realized under the assumption that the marble powder diameter (Dmp) is random variable with a log-normal probability distribution.

EC20-1026 Time: 17:00-17:15

Aleksandra Victorovna Frolovskaia
Siberian Federal University, Russia

Title: Studies of Bearing Elements of the Frame of Hinged Facade Systems, Taking into Account the Progressive Destruction and Temperature Effects

Abstract-- The authors on the basis of numerical studies have analyzed the effect of progressive destruction and temperature influence on the operation and stress-strain state of the bearing elements of the frame of hinged facade systems.

EC20-1027 Time: 17:15-17:30

Taha Waqar
Prince Mohammad bin Fahd University, Saudi Arabia

Title: Investigating States of Locally Manufactured Steel Reinforced Bars through Mechanical & Chemical Analysis

Abstract-- Steel reinforced bars are increasingly becoming important and demanding for their role in reinforced concrete structures for which accurate information about their properties and chemical composition is becoming essential during the manufacturing stage. The minimum required properties of the bars is determined with the aid of international standards such as ASTM A615 within Saudi Arabian manufacturers. In this work, the variation within the mechanical properties and chemical composition of various reinforced steel produced in KSA was evaluated. Experimental tests were performed on ASTM A615 Grade 60 samples to obtain their yield, tensile strength, elongation and chemical composition. Statistical analysis showed the selected properties follow different types of continuous distributions for their respective cases. Finally, control charts have been generated to identify results falling above and below 3-sigma. Results showed that 1.5%, 3% and 7.3% of samples failed to meet the minimum ASTM criteria for yield, tensile strength and weight; while less than 3% of steel bars failed to meet ASTM standards for chemical composition.

Listeners List

Symeon Kassianides, from Hyperion Systems Engineering, Cyprus
Symon Doe, from Hyperion Systems Engineering, Cyprus
Michalis Michael, from Hyperion Systems Engineering, Cyprus
Sanja Jovanovic-Micunovic, from Hyperion Systems Engineering, Cyprus
George Komodromos, from Hyperion Systems Engineering, Cyprus
Polina Kestora, from Hyperion Systems Engineering, Cyprus
Antonis Charalambous, from Hyperion Systems Engineering, Cyprus
John-Zacharias Theophanous, from Hyperion Systems Engineering, Cyprus