6th Global Webinar on

Materials Science and Engineering

February 18, 2023 | Webinar

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Plenary Form

Juan Jose Encinas C.
Ricardo Palma University, Canada

Impact of Mechatronics on Industrial Biotechnology

This research was carried out to determine the impact of mechatronics in the health sector, since currently mechatronics has an impact in multiple areas of the industry, but lately especially in biotechnology. Its development was valued, from the perspective of different researchers, which has allowed its insertion in this sector. This development benefits both patients and physicians, as they have revolutionized the field of medical equipment and devices. Biotechnology has applications in important industrial areas such as: health care, the development of new approaches for the treatment of diseases; agriculture with the development of improved crops and food. Robotics and digital image and signal processing were also found to have a greater impact on medicine. Likewise, an analysis of the mechatronics applied to this science was made, which showed that the surgical and therapeutic areas are the most favored and are nourished by innovative techniques, which are more reliable and less invasive for the patient.

Biography:

Juan José Encinas Cantaro,

He was born in Lima, Peru. He is a Mechatronic Engineer. Session Chair and participant of the 4th North American Industrial Engineering and Operations Management Conference-IEOM 2019 in Toronto, Canada. He received a certificate for attendance and presentation at the 2nd International Conference on Automation Engineering and Intelligent Manufacturing-ICIMA 2018 in Penang, Malaysia. He participated in the X International Symposium on Innovation and Technology-ISIT 2019 in Cusco, Peru. Member of the steering and technical committee of the ISIT. He participated as part of the Peru Section of the IEEE in the XXVI International Congress of Electronics, Electricity, Engineering and Computing-INTERCON 2019 in Lima, Peru. He with experience in research, development and innovation in the fields of mechatronics, medical robotics, telemedicine, aerospace engineering and bioengineering. Researcher in programming by IPCEM agents. Lecturer and Consultant in Mechatronic, Spatial and Biomedical Technologies. He is also a consultant in information and communication technologies in the Peruvian government sector.

Tanoos James
Purdue Uneversity, USA

An Investigation of Industrialized Country Macroeconomic Automobile Industry Trade Policies to Anticipate Production Planning

Accurate internal vehicle sales forecasts for multinational automobile organizations (MAO) are vital to production planning as both overproduction and underproduction can ruin the bottom line if it doesn't match consumer demand. While increasing the total number of vehicles sold international vehicles internationally is a major goal of any MAO, sheer vehicle sales may not enhance the bottom line of an automobile organization. There is intense competition for global market share between MAOs in areas such as innovative technology, branding, and total global vehicle sales. With international supply chains becoming more volatile since the onset of the global pandemic, it is more important than ever that sales correspond to projected production schedules. Since supply chain scheduling is done over a year in advance, the most successful MAOs spend much time and resources on these forecasts so that parts, machining, energy usage, and training can be planned accordingly. This presentation will examine the effects of national tariff rates, exchange rates, and changes in GDP on imported vehicles in order to help MAOs more accurately predict the likelihood of imported vehicle sales in industrialized countries

Biography:

James J. Tanoos, Clinical Associate Professor

Jim is a Clinical Associate Professor at Purdue Polytechnic Vincennes and earned his Bachelor's degree from Purdue University, his Master's degree from Indiana University, and his Doctorate from Purdue University. Before he entered higher education, he worked as the department head for the Sen. Byrd Amendment (Continued Dumping and Subsidy Offset Act of 2000) at US Customs and Border Protection. He has published articles and has presented academic work on a range of disciplines including international economics, supply chain management, educational pedagogy, and industrial technology. Jim participates in editorial review for several global academic journals and is a peer-reviewer for the Higher Learning Commission in Chicago, IL. He has been married to his wife Tricia for 17 years and they have three children: Michael, 16, Lucia, 12, and JJ, 7.

Kunichi Miyazawa
Tokyo University of Science, Japan

HRTEM-EELS Analyses of Carbon Nanostructures for Catalytic Applications

High-resolution transmission electron microscopy (HRTEM) combined with electron energy-loss spectroscopy (EELS) is a powerful method than can reveal the atomic structure of various carbon nanomaterials, including the chemical bonding states of carbon atoms. Pt nanoparticles (NPs) are indispensable for polymer electrolyte fuel cells (PEFCs). We prepared Pt NPs on glassy carbon electrodes and highly oriented pyrolytic graphite (HOPG) substrates using a coaxial arc plasma source that can emit high-energy Pt ions on target materials. The surface of both carbon substrates was disordered by the Pt ion irradiation. The surface of glassy carbon and HOPG substrates were denatured by the Pt ion irradiation and their depth profiles in the chemical bonding states of carbon atoms were clarified through EELS analyses in atomic scale.

On the other hand, hydrogen has attracted increasing interest as a sustainable and environmentally friendly energy source. The catalytic decomposition of methane (CDM) can produce COx-free hydrogen, and is now becoming a very attractive method for hydrogen production. Among various catalysts, nickel is the most promising catalysts for CDM. We investigated the surface of Ni plating catalysts reacted with methane at high temperatures using a LAMMPS molecular dynamic simulation, which indicated the surface disordering of Ni plating film and formation of amorphous carbons on the Ni plating film. The carbons experimentally deposited on a Ni plating film were also analyzed using the HRTEM-EELS method which successfully revealed the depth structural profiles of the amorphous carbons in atomic scale.

Biography:

Dr. Kun'ichi Miyazawa is now working with Nano Alloy Technology Inc., and also with Tokyo University of Science as a visiting researcher. He received a Doctor of Engineering degree from The University of Tokyo in 1987. He was a lecturer in the School of Engineering at The University of Tokyo from 1989 to 2002, and moved to the National Institute for Materials Science in 2002, where he studied the synthesis and application of fullerene nanowhiskers, fullerene nanosheets and fullerene nanotubes as a group leader of Fullerene Engineering Group. From 2016, he has been engaged in the transmission electron microscopy study of carbon and metal nanomaterials at Tokyo University of Science.

Vaino Sammelselg
Institute of Physics, University of Tartu, Estonia

Thin and Ultrathin Protective Coatings Applied from Energetics to Aerospace Industry

Preventing the degradation of materials and the energy and material savings needed to achieve this, while still respecting the environment, are essential principles for the successful functioning of a sustainable society. Therefore, this presentation will focus on new thin and ultra-thin nanostructured composite coatings that can protect different materials against corrosion in both a narrow and a broad sense, in different corrosive environments such as gases, water or space. For the production of the coatings, it is necessary to develop key technologies for the pre-treatment of surfaces and their economical but efficient coating. I will demonstrate the coatings developed in my group for anodizable alloys (AA2024-T3) and stainless steels (AISI 304, 310, 316L). The pre-treatment of the surfaces of the materials varied, e.g. different electrochemical treatments were used for aluminum alloys and chemical treatments for stainless steel, but the deposition of thin oxide films was generally carried out at low temperature (125 °C) by atomic layer deposition resulting amorphous coatings. The coated samples were thoroughly characterized by electron microscopy, X-ray diffraction and mechanical probe techniques and tested by rapid and long-term electrochemical tests and in energetic atomic oxygen flow. The tests showed good corrosion protection for aluminum alloys when using the patented two-step coating technology involving anodizing and ALD processes, and for stainless steel when the metal was coated with a thin film of graphene oxide prior to the ALD process. The presentation will look in more detail at coating technologies and the potential use of coatings in various industrial applications.

Biography:

Väino Sammelselg graduated from the University of Tartu in 1973 with MSc degree in physics. He obtained his PhD degree in physics in 1989 at the Institute of Physics of EAS. Afterwards, he stayed at the institute and had short stays at the Universities of Lund, Turku and Aalto, at MAX-lab, Abo Academy. In 2003, he was elected full professor of inorganic chemistry at the university; he retired in 2020. In 2007-2012, he was Deputy Head of the Materials Science Department, and in 2013-2021 Head. He works currently in the institute and focuses on the research of thin films, (super)thin protective coatings and surface engineering. He is (co-)author of >180 publications, has several patents; his h-index in WoS is 41.

Andrey Belousov

Laboratory of Applied Nanotechnology of Belousov, Ukraine
Kharkov Medical Academy of Postgraduate Education, Ukraine
Kharkov Regional Center of Blood Service, Ukraine

Influence of Nanotechnologically Treated Physiological Saline Solution on Clinical and Physiological Parameters of Preserved Donor Erythrocytes at the Stages of Their Storage in Hypothermia

The researches has proved that now of magnetite nanoparticles are able not only to considerably reduce hemolysis, and thereby prolong storage time of the blood's heparinized, influence on activity of adenosinetriphosphateses of erythrocytes, regulated transmembrane exchange, but also to extracorporeally influence on cellular apoptosis. The above was the basis for the choice of the theme of this study, devoted to the learning of the use of nanotechnology to correct the functional activity of red blood cells at the storage stages at a positive temperature. The main purpose of the first stage of the study is to develop a simple and practical method of additive modernization of preservation solutions that does not violate the compliance requirements, improves the quality, efficiency and safety transfusion of red blood cells. Object of research: red blood cells (RBCs) into bags containing anticoagulant citrate, nutrient phosphate and dextrose (CPD); red blood cells (RBCs) into bags containing anticoagulant citrate, nutrient phosphate, dextrose and adenine (CPDA-1). Materials and methods: magnetite of nanoparticles (ICNB); saline solution of NaCl; MR-tomography; visual analysis of hemolysis; controlled by photometric method hemolysis; microscopic method; Panchenkov's method; pH metric. Results: It was established that saline NaCl which had previously been processed by magnetite nanoparticles (ICNB) had a marked membrane-stabilizing effect, inhibits haemolysis and increasing the sedimentation stability of preserved RBCs. The complex analysis of the obtained data allowed to determine the primary mechanisms effect of the saline NaCl which had previously been processed by ICNB on the preserved RBCs. The proposed method of additive modernization of preserved RBCs was adapted to the production process. The optimisation results were obtained in creating a simple and practical method of additive modernization of preservation solution that does not violate the compliance requirements, improves the quality, efficiency and safety transfusion of RBCs

Biography:

Andrey Nikolaevych Belousov is Doctor of Medicine degree on speciality - Anesthesiology and Intensive Care. Author a new medicine products – nanotechnology preparations based on magnetite nanoparticles (Fe3O4) (www.nanolab.com.ua): Micromage-B (officially registration in Ukraine); Magnet-controlled sorbent brand of MCS-B for extracorporeal detoxication of biological liquids (officially registration in Ukraine and was allowed for medical practice); NanoBiocorrector for intravenous application – ICNB (intracorporal nanosorbent). A.N. Belousov is author new method of extracorporeal hemocorrection using magnet-controlled sorbent (MCS-B). The published more 270 scientific works on results application of nanotechnology preparation in experimental and practical medicine. At now Andrey Belousov - the Head of Laboratory Applied Nanotechnologies in Ukraine, DM, Professor of Department Anesthesiology, Intensive Care, Transfusiology and Hematology Kharkov Medical Academy of Postgraduate Education, Ukraine.

Sam Hsien-Yi HSU
City University of Hong Kong, China

Interfacial Dynamics of Solid-Solid and Solid-Liquid Interfaces for Organic-inorganic Hybrid Materials

In this seminar, I would like to introduce my current research projects involving the material design, imaging technique, and ultrafast spectroscopy for energy-conversion (e.g., photocatalysis and photoelectrocatalysis)and energy-saving applications, aiming to explore fundamental properties and interactions of organic and inorganic materials for developing efficient energy-conversion and energy-saving processes. I have keen interests in photoinduced charge transfer processes, interfacial electron transfer, electrochemical hydrogen generation, and photoredox reactions for electricity generation, solar fuel production, electrochemiluminescence (ECL), wastewater treatment as well as food waste management. The investigations between material phenomena rely heavily on concepts of energy and environmental engineering, consisting of photophysics, electrochemistry, photoelectrochemistry by utilizing scanning photoelectrochemical microscopy (SECM) imaging, ultrafast transient absorption (TA), time-resolved photoluminescence spectra (TRPL) and so forth. Current research interests in my group are divided by four areas, comprising 1) Energy engineering (e.g., solar fuels, photovoltaics, electrochemiluminescence (ECL), and optoelectronic devices); 2) Environmental engineering (e.g., wastewater treatment, food waste treatment, and Organic matter degradation); 3) Material design (e.g., alloy, organometallics, biomaterials, nanomaterials, perovskites, and metallopolymers); 4) Dynamic interfacial interaction by utilizing photophysical, photochemical, electrochemical and photoelectrochemical techniques..

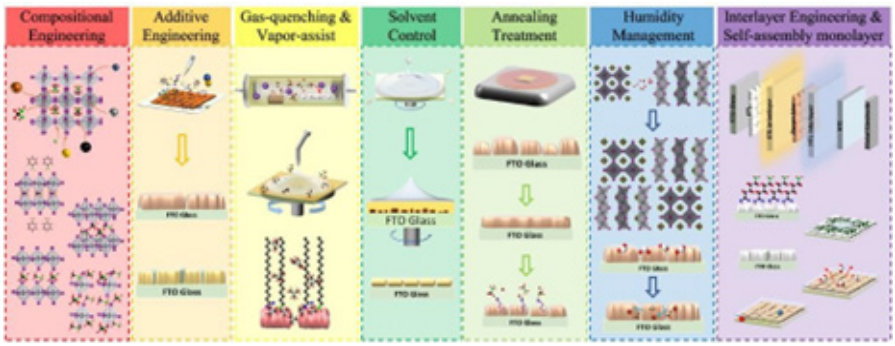

Figure 1. Surface Modification and Interfacial Engineering of hybrid materials.

Biography:

Dr. Sam H.-Y. HSU obtained his PhD degree under supervision of Prof. Kirk S. SCHANZE at University of Florida with focusing on photophysical behaviors of functional metallopolymer materials for solar energy and optoelectronic applications. After that, he received the two-year postdoctoral and research associate's appointments respectively with Prof. Allen J. BARD and Prof. Edward T. YU in Center for Electrochemistry as well as Department of Electrical and Computer Engineering at University of Texas at Austin. During the period of his postdoc and research associate, he completed many outstanding multidisciplinary projects. The area of his expertise stretches from material design to new related disciplines involving material characterization and diverse applications, such as solar fuels, organic and inorganic photovoltaic cells, wastewater treatment and food waste management.

Santanu Ghosh

Indian Institute of Technology Delhi, India

Nanostructured Composite Material as Next Generation Electron Sources

Cold electron emission process by quantum mechanical tunneling under applied electric field, known as field emission (FE) has become an integral part of devices and analytical instruments where high performing electron sources are used. The challenging issues related to FE based electron source is primarily to obtain high emission current density at relatively less threshold electric field with good temporal stability. Recently, nanostructured materials are under extensive research to achieve this goal. We present here field emission (FE) properties of three different nanostructured materials: (i) nanoparticle decorated multi-walled carbon nanotubes (MWCNTs), (ii) metal-insulator nanocomposite thin-films, and (iii) nanostructured hexaborides. FE measurements were carried out in an indigenously developed high vacuum set up in diode geometry. The salient results obtained are: (i) a significant improvement of FE current and temporal stability associated with an appreciable reduction in turn-on field from metal nanoparticle decorated MWCNT-films as compared to only MWCNT films: showing promising use as electron-guns, x-ray sources etc.; (ii) appreciable increase in FE current density with high mechanical durability in metal metal-insulator nanocomposite films, a planar field emission source; and (ii) tuning of FE parameters with nanoarchitecture of hexaborides. The enhanced FE characteristics of these emitters are understood from a combined study based on field emission parameters, modified F-N theory, electronic structure and first-principles based calculations study.

Keywords: Field emission, MWCNT, Metal-insulator nanocomposites, Hexaborides, F-N theory, Density functional theory

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Biography:

Dr. Santanu Ghosh, Professor, Department of Physics, Indian Institute of Technology Delhi,

New Delhi, India is actively involved in the research activities related to magnetic semiconductors, magnetic metal-insulator nanocomposites, nanostructured carbon and silicon rich silicon nitride films. He is also an active researcher in the field of 'Ion-materials interaction. He has about 120 papers published in various international journals, about 17 national and international projects (completed and ongoing), including a prestigious project sanctioned by IAEA, UNO, Vienna. He has authored two books, including one web-based course under NPTEL, and eight book chapters. He has delivered about 50 invited talks in national and international forum and several lectures in a various institute of India and abroad. He was DST-BMBF fellow in the year 2000, DST-DFG fellow in 2006, DAAD-IIT fellow in 2010 and 2013 and delegate for CRP, IAEA, Vienna in 2012, and 2014.

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Keynote Form

Ichiro Imae
Hiroshima University, Japan

Thin and Ultrathin Protective Coatings Applied from Energetics to Aerospace Industry

π-conjugated polymers, which exhibit semiconducting properties in the neutral state and metallic properties in the doped state, are of great interest for energy material applications in various fields such as organic thin film solar cells, smart windows, and thermoelectric devices. In general, non-substituted π-conjugated polymers are insoluble and infusible, and thus lack formability and processability, which has been a major issue in their industrialization. In contrast, when flexible alkyl chains were introduced into the side chains of π-conjugated polymers, the solubility of the polymers was dramatically improved, and they can be applied to various substrates to form thin films by drop-casting or spin-coating methods. This has led to dramatic progress in research and development of organic optoelectronic devices based on π-conjugated polymers. In addition, polythiophene with an electron-donating alkoxy group introduced into the side chain (PEDOT) was found to exhibit excellent electrical conductivity in the doped state, greatly opening up the field of polymer electronics. Thus, the introduction of side groups into π-conjugated polymers has become a useful technique that can greatly extend the application to the field of optoelectronics. In this keynote talk, I will introduce the synthesis of various π-conjugated polymers with side groups that can affect not only solubility but also electronic properties, and their device properties.

Biography:

Dr. Imae received the Bachelor, Master and Doctor degrees (Engineering) from Osaka University in 1992, 1994, and 1997. Then, he joined with Japan Advanced Institute of Science and Technology (JAIST) as an Assistant Professor. Since 2006, he is an Associate Professor of Hiroshima University. Also, he worked as an Adjunct Lecturer of Muroran Institute of Technology and a Visiting Professor of Huazhong University of Science and Technology in 2018. The details are described in his own website: https://home.hiroshima-u.ac.jp/imae/ or his Linked In account: https://www.linkedin.com/in/ichiro-imae-328438149/. If any student wants to study in his group, she should also check the top-page of his website.

Marko P. Rakin
University of Belgrade, Serbia

Structural and Mechanical Behavior of Titanium Based Oxide Thin Layer for Biomedical Application

The Ti-13Nb-13Zr alloy made by conventional methods (coarse-grained, CG) was examined, as well as the alloy and commercially pure titanium (cpTi) after the high pressure torsion (HPT) process (ultra-fine-grained, UFG) performed at room temperature. All materials were subjected to nanostructured surface modification. Nanostructured surface modification was done in 1M H3PO4 + 0.5 wt. % NaF electrolyte during 60 and 90 minutes, for the desired potential of 25V with a scan rate of 100 mVs-1. As the result of the nanostructured surface modification nanotubular titanium based oxide layer was obtained.

Scanning electron microscopy (SEM) and atomic force microscopy (AFM) were used to characterize the homogeneity of nanotubular titanium based oxide layer and dimensions of the formed nanotubes. In order to define the chemical structure of oxide layer, energy dispersive spectroscopy (EDS) was used. The obtained results indicate that the duration of the nanostructured surface modification significantly affects on the homogeneity of the nanotubular titanium based oxide layer morphology, as well as on the dimensions of the nanotubes (diameter and wall thickness of the nanotubes). Also, the effect of the HPT process on the homogeneity and thickness of the nanotubular oxide layer (length of the nanotubes) are shown and discussed.

The mechanical behavior of nanotubular titanium based oxide layer was examined by nanoindentation test. The control of nanoindentation test was done by total displacement. The displacements were 2000 nm for non-modified surface and 10% of the thickness of nanotubular titanium based oxide layer for modified surface. The test was performed on a nanoindenter using as an indenter the Berkovich-type diamond tip. As results, loading-displacement curves and the mean value of ten measurements of the surface modulus of elasticity and nanohardness were obtained. Also, in order to characterize deformation of the oxide layer after nanoindentation SEM was done. Having in mind that nanotubular oxide thin layer can affect tensile properties of metallic materials, tensile testing was performed.

Biography:

Marko Rakin: full Professor, University of Belgrade, Faculty of Technology and Metallurgy. BsC and MsC in Mechanical Engineering, PhD in Metallurgy. Postdoctoral studies in Materials Science, Österreische Akademie der Wissenschaften – Erich Schmid Institut fuer Materialenwissenchaft, Montanuniversität Leoben (Austria).

R&D activities: applied mechanics in materials science. Experimental, analytical and numerical analysis of components and structures in the processing industry. Ti-based biomedical materials: development, characterization, application.

Author of 1 monograph, 1 course book and 5 handbooks. Author or co-author of more than 100 papers in scientific journals and conference proceedings; h-index=20, 1184 citations according to SCOPUS (excluding self-citations). Project leader of two national research projects and one international project. Participant in many national (17) and international (11) R&D projects.

Spomenka Kobe
Jozef Stefan Institute, Ljubljana

New Sustainable Processing of RE-Based Magnetic Materials

Rare-Earth Transition Metals permanent magnets are vital components in the rapidly-developing renewable energy sector, where the motors require strong magnets with the ability to operate at temperatures well above 100°C. To achieve high coercivity, remanence, and, consequently, high energy product at elevated temperatures, the addition of a heavy rare earth (HRE) to the basic Nd-Fe-B composition is needed. HRE are on the very top of the list of Critical Raw Materials.

In our first goal to drastically reduce the use of HRE, we focused on developing a new method, which enabled us to achieve the properties needed for high-temperature applications with the lowest amount of scarce elements. Now, we are focusing on recycling end-of-life magnets EoL to minimize European dependence on China. We managed to minimize the amount of HRE used, down to 0.2 at %, while the improvement of coercivity was 30 % with minimal loss in remanence by developing new inventive techniques further transferred to pilot production. The total saving of the HRE is 16-times less need for the same performance, which is a significant contribution to the world economy and a clean environment. The results presented are based on different processing methods, but mainly focused on HR-TEM which was used to study the mechanism for upgrading the magnetic properties of standard and recycled EoL NdFeB magnets in tailoring the microstructure, phase ratio, and phase composition. They are obtained in the frame of four EU-funded projects, ROMEO (finished), REProMag (finished), MaXycle, and SUSMAGPRO (running). The use of newly developed high energy magnets with a minimum amount of HRE and by using a highly effective HPMS process (Hydrogen Processing of Magnetic Scrap) for recycling is envisaged to enable a circular economy ecosystem for NdFeB magnets in renewable energy and e-mobility sectors.

✶This work is part of the project "SUSMAGPRO" that received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 821114. Project website: www.susmagpro.eu

Biography:

Prof. Dr. Spomenka Kobe, Scientific Advisor, Department for Nanostructured materials, was 16 years acting as a Head of the department. She is a full professor at the International Postgraduate School "Jožef Stefan" and was for 20 years the Leader of the National Research Programme. Until 2017 she was the Slovene director of The International Associated Laboratory between CNRS, Nancy, France, and Jožef Stefan Institute, Ljubljana, Slovenia. She is a member of the Slovenian Academy of Engineering. In 2019 she was the recipient of the prestigious Fray International Sustainability Award for "Leadership in development new technologies that contribute to global sustainable development in the environment, economy, and social points of view."

Lucia Steenkamp
CSIR Chemicals Cluster, South Africa

Biocatalysis as a Means for the Development of Green Manufacturing Technologies and Sustainability

Changes in lifestyle dictate the demand for new greener, environmentally friendly processes to produce products such as flavours and fragrances, pharmaceuticals and cosmetics. Biocatalysis can often be used to replace current chemical processes Some examples of technologies developed and scaled up at the CSIR for Green Manufacturing and sustainability include:

(-)-Ambrafuran, which is a scarce, valuable and sought-after perfumery material. The precursor, Ambergris is a metabolic product produced by the sperm whale (Physeter macrocephatus L.). The current commercial production use chemical synthetic routes in which (-)-ambrafuran is produced from sclareol in up to 8 steps employing harsh and often very toxic chemicals. A new "green" route starting from sclareol which is converted to (-)-ambrafuran in two steps with an overall yield of more than 80% has been invented. The first step involves a fermentation with the second step using a benign zeolite.

Another example is the production of l-menthol using biocatalysis and green chemistry. An eight isomer mix of menthol and its enantiomers were produced by the hydrogenation of thymol. A suitably selective lipase was used to preferentially esterify l-menthol in hexane, hence simplifying separation from this diasteromeric mix through distillation.

A pharmaceutical product (S)-naproxen was produeced using biocatalysis and green chemistry. The (S)-enantiomer is 28-fold more active than the corresponding (R)-enantiomer. The racemate was synthesized using a number of chemical steps and the enantiomeric resolution of (R,S)-naproxen was achieved using an esterase enzyme.

Compounds found in plants can be modified successfully using biocatalysis. Examples include the production of aloesin, a skin lightener for use in the cosmetics industry from a precursor, aloeresin A, present in aloe species. Another powerful example of biocatalysis comes from the production of irones from iridals from the roots of the iris plant. The irones are very sought after fragrance compounds which are normally produced by incubation of the iris roots for 2 to 5 years under specific conditions. A very cheap enzyme was however identified which can accomplish the bioconversion in a mere 40 hours.

Biography:

Lucia Steenkamp, Principal Researcher

Dr Lucia Steenkamp is a Principal Researcher at CSIR specialising in Biocatalysis and has been an author and co-author of numerous peer-reviewed papers and two book chapters. She has developed technologies for industry clients in the pharmaceutical, veterinary, biocides, food, flavours and fragrance industries, leading to five granted patents, nine technology demonstrators and five technology packages licensed to external clients. She has won the South African Women in Science Award (SAWISA) for Research and Innovation in 2018 for her work leading to technologies for commercialisation. She has been a finalist in the NSTF rewards in 2012, 2019 and 2020 for the development of new Green technologies.

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Speaker Form

Isham Alzoubi
School of Surveying Geospatial Engineering, Syria

Smart Spatial Analyses in Land Levelling

The aim of this work was to determine best linear model Adaptive Neuro-Fuzzy Inference System (ANFIS) and Sensitivity Analysis in order to predict the energy consumption for land leveling. In this research effects of various soil properties such as Embankment Volume, Soil Compressibility Factor, Specific Gravity, Moisture Content, Slope, Sand Percent, and Soil Swelling Index in energy consumption were investigated. The study was consisted of 90 samples were collected from 3 different regions. The grid size was set 20 m in 20 m (20*20) from a farmland in Karaj province of Iran. The values of RMSE and R2 derived by ICA-ANN model were, to Labor Energy (0.0146 and 0.9987), Fuel energy (0.0322 and 0.9975), Total Machinery Cost (0.0248 and 0.9963), Total Machinery Energy (0.0161 and 0.9987) respectively, while these parameters for multivariate regression model were, to Labor Energy (0.1394 and 0.9008), Fuel energy (0.1514 and 0.8913), Total Machinery Cost (TMC) (0.1492 and 0.9128), Total Machinery Energy (0.1378 and 0.9103). Respectively, while these parameters for ANN model were, to Labor Energy (0.0159 and 0.9990), Fuel energy (0.0206 and 0.9983), Total Machinery Cost (0.0287 and 0.9966), Total Machinery Energy (0.0157 and 0.9990) respectively, while these parameters for Sensitivity analysis model were, to Labor Energy (0.1899 and 0.8631), Fuel energy (0.8562 and 0.0206), Total Machinery Cost (0.1946 and 0.8581), Total Machinery Energy (0.1892 and 0.8437) respectively, respectively, while these parameters for ANFIS model were, to Labor Energy (0.0159 and 0.9990), Fuel energy (0.0206 and 0.9983), Total Machinery Cost (0.0287 and 0.9966), Total Machinery Energy (0.0157 and 0.9990) respectively, Results showed that ICA_ANN with seven neurons in hidden layer had better. According to the results of Sensitivity Analysis, only three parameters; Density, Soil Compressibility Factor and, Embankment Volume Index had a significant effect on fuel consumption. According to the results of regression, only three parameters; Slope, Cut-Fill Volume (V) and, Soil Swelling Index (SSI) had significant effect on energy consumption. Using adaptive neuro-fuzzy inference system for prediction of labor energy, fuel energy, total machinery cost, and total machinery energy can be successfully demonstrated.

Biography:

Alzoubi has completed his Ph.D. at the age of 40 years at Tehran University and postdoctoral studies from Tehran University School of Surveying Geospatial Engineering-Department of Surveying and Geomatics Engineering. He is the director at the Directorate of Engineering and Transportation, a premier service organization. He has published more than 15 papers in reputed journals and has been serving as an editorial board member of repute. He Opening and studying the financial offers and the organization of the fundamental record, supervising the efficiency of electrical generators at Nseeb border center, and Supervising the efficiency of agricultural machinery at the ministry of agriculture.

Ayman El-Gendi
Canal High Institute of Engineering and Technology,
Ministry of High Education, Egypt

Preparation and Material Selection for Pervaporation (PV) and Membrane Distillation (/MD) Technology

Membrane separation processes are often used since these applications realize high removals of constituents such as charged solutes, uncharged solutes, and organic molecules. The separation is usually performed at ambient temperature by using membrane process; this is allowing temperature sensitive solutions to be produced without the constituents being damaged. In fact, this is very important where temperature sensitive products have to be processed (i.e.: food, drug industry, biotechnology). The main membrane separation processes are pervaporation, Membrane distillation and pressure driven membrane processes. Pervaporation (PV) is a process used to separate mixtures of liquids. During the transport process, the liquid phase change to the vapor phase, therefore PV process is based on a solution-diffusion mechanism. PV deriving force depends on the vapor pressure difference between the feed components and the permeate vapor. Membrane distillation (MD) is a process used both membrane and thermal distillation. The membrane here is neither a selective barrier nor responsible for the rate transport of the components, it is an interface between two phases. The driving force is achieved by the vapor pressure difference results from the temperature difference between liquid-vapor interface Mostly, the membranes preparation methods include phase inversion process (PI), track-etching (for capillary pore membranes-MF), stretching process (for preparing MF), sintering (for preparing MF), interfacial polymerization (IP) , electro-spinning, and phase inversion method.

Keywords: membrane; preparation; characterization; application; Porous structure; performance, pervaporation

Biography:

Ayman Elgendi, Professor in Canal High Institute of Engineering and Technology, Ministry of High Education, Suez, Egypt.

Prof. Ayman Elgendi works a professor in Canal High Institute of Engineering and Technology, Ministry of High Education, Suez, Egypt. He has an experience in the membrane fabrication and application through projects and training in which he participated in a good number of projects. He has 41 international publication articles from 2007 to 2023 in desalination, membrane technology and membrane preparation. He has 8 granted patents from Egyptian Academy of Science & Technology. He has published a book entitled: Ternary phase diagram construction and membrane morphology evaluation, LAB LAMBERT academic publishing, Germany ISBN: 978-3-659-57611-9 (2014). Furthermore, He has published a Chapter 3 in Desalination Updates book, ISBN 978-953-51-2189-3, edited by Robert Y. Ning chapter entitled "Phase Diagram and Membrane Desalination".

Suresh Aluvihara
University of Peradeniya, Sri Lanka

Enhancement of Sri Lankan Clay Varieties for more Strengthen Structures

Clay is an important raw material for the most of building and construction materials because of the relatively strengthen structures of such materials in the raw form or treated form such as the heat treated bricks. The particle size of clay has been identified as a key factor for the variation of such strengths of the structure. The grain sizes of clay are highly depended on the origin of the clay and the different clay types may have different particle sizes even though the particle sizes could be processed purposely using some physical or chemical comminution methods. In the existing research, there were expected to investigate the strengths of the bricks that prepared using three different selected clay types and comparing of the strengths of bricks with their average particle sizes. The clay samples were collected from three different regions in Sri Lanka and those clays were named as anthill clay, brick clay and roof tile clay based upon their uses. A set of brick were prepared with respect to each clay type under the firing temperature of 8000C and the particle size distributions of such raw clays were analyzed using dry sieve analysis methods. The compressive strengths and splitting tensile strengths of prepared bricks were tested using universal splitting tensile strength testing machine. There were obtained the average grain sizes as 0.27mm for bricks clay, 0.25mm for anthill clay and 0.19mm for roof tile, 17.25MPa compressive strength from brick clay brick, 20.88MPa compressive strength from anthill clay brick and 31.68MPa compressive strength from roof tile clay brick, 0.31MPa splitting tensile strength from brick clay brick, 0.44MPa splitting tensile strength from anthill clay and 1.30MPa splitting tensile strength from roof tile clay brick. The above results showed that the strength of the brick structures are increased with the reduction of average grain sizes and it is possible to expect more strengthen structures of bricks in the form of nano-clay particles and it is possible to recommend those clay types for the applications of nano-scale such as the pure nano-materials or composite nano- materials.

Biography:

Mr. Suresh Aluvihara has received his B.Sc. (Hon's) degree in the year 2017 under specializations in Mineral Technology and Earth Science. Currently he is studying for the Masters Degree in Environmental and Pollution Engineering. He has a series of publications in reputed journals and conference proceedings including both abstracts and full papers under the scopes of Chemical Engineering, Earth Science, Petroleum Engineering, Material Engineering and Environmental Engineering. In addition that he has experiences in the reviewing of research papers related to three reputed journals and guest editor experiences regarding some ongoing proposed special issues of a few of reputed journals.

Irmgard Frank
Leibniz University Hannover, Germany

Chemistry in Complex Systems: Ab-Initio Simulation

The Schrödinger equation is incredibly successful in describing matter of any kind. This refers mainly to the time-independent Schrödinger equation applied to the electronic cloud of molecular systems. For the motion of the nuclei during chemical reactions, a different approach is way more successful, namely the classical treatment of nuclear positions as invented by Roberto Car and Michele Parrinello (Car-Parrinello molecular dynamics, CPMD). I propose that this should not be interpreted as an approximation to the Schrödinger equation, but as the more fundamental theoretical approach. There is no reason to describe nuclear motion quantum mechanically. As a result a deterministic version of quantum mechanics is obtained. As examples I will present several applications to complex systems like the photoreactions of rhodopsin and of Feringa's nanorotor. I will demonstrate that different reaction products do not stem from quantum mechanical branching, but from classical chaos.

Biography:

Irmgard Frank studied Chemistry in Munich and then went to Bonn to complete her PhD thesis in the group of Sigrid Peyerimhoff. After a Postdoc stay in the group of Michele Parrinello at the Max-Planck institute in Stuttgart, she went back to Munich and completed her Habilitation in the group of Christoph Bräuchle. Since 2008 she is associate professor in Hannover. Her research field is the ab-initio simulation of chemical reactions, e. g. photochemistry, mechanochemistry, and electrochemistry.

Chin-Tarng Lin
National Taiwan University, Taiwan

Evaluation of the Efficacy of Peptide Targeting Chemotherapy for Different Cancers

The purpose of this abstract was to assess the efficacy of peptide targeted chemotherapy for pancreatic carcinoma. Previously we have constructed four peptides that bind specifically to cancer cell lines, which were derived from three different carcinoma cell lines and their vascular endothelia: L-peptide: (L-P, anti-cancer cell membrane), RLLDTNRPLLPY; SP-94-P (anti-hepato-pancreatic cancer cell membrane), SFSHHTPILP; PC5-52-peptide (anti-tumor endothelia), SVSVGMKPSPRP; and control peptide, RLLDTNRGGGGG. These peptides were linked to pegylated liposomal iron oxide nanoparticles to identify the targeted tumor cells and vascular endothelia using MRI analysis, and were also linked to dextran coated liposomal doxorubicin (L-D) for treatment of non-obese diabetic, severe combined immunodeficiency (NOD-SCID) mice bearing pancreatic cancer cell (PANC-1) xenografts. Our results demonstrated that the tumor intensity of MRI is clearly decreased after SP-94-P-iron oxide was applied, and that in combination of application of L-P linked L-D (L-P-L-D) plus SP-94-P linked L-D (SP-94-P-L-D) and PC5-52-P linked L-D (PC5-52-P-L-D), they could inhibit pancreatic tumor growth with very mild adverse events. The use of the control peptide linked L-D also led to a decrease of the xenograft size, but also induced marked apoptotic change of their visceral organs. It is concluded that the combination of L-P-L-D, SP-94-P-L-D and PC5-52-P-L-D to treat pancreatic cancer xenograft in NOD SCID mice can clearly inhibit pancreatic cancer growth with minimal adverse events.

Biography:

Dr. Chin-Tarng Lin, D.D.S., Ph.D. is an Emeritus professor right now at the College of Medicine, National Taiwan University. He has published more than 92 papers and obtained 12 patents. His research interests include the development of immunohistochemical localization of protein, mRNA and DNA molecules at the light and electron microscopic levels and peptide histochemistry to identify the peptide targeted binding protein. He and his colleague have identified 3 specific peptides to localize their targeted proteins, to identify the cancer xenograft by MRI and to perform peptide-targeted chemotherapy for different cancers with minimal adverse event.

Nipin Kohli
Technische Universitaet Berlin, Germany

Ammonia and Acetone Gas Sensor Based on Nanocomposites of Indium Oxide and Multiwalled Carbon Nanotubes

This work reports the effect of introducing carbon nanotubes in indium oxide on structural, morphological, optical and ammonia sensing properties. Various characterization techniques such as X-ray diffraction, transmission electron microscopy, BET, Fourier transform infra-red, UV-visible and Raman spectroscopy were employed to understand the structural, morphological and optical properties of the synthesized samples. The gas sensors were fabricated out of the synthesized samples to test their response towards ammonia and acetone at different operating temperatures and at different concentrations. The nanocomposite exhibits enhanced sensing performance and is capable of detecting concentration of acetone and ammonia as low as 10 ppm at optimum operable temperature of 300°C and 200°C, respectively.

Biography:

Dr. Nipin Kohli is working as a Scientific Associate in Institute of Solid State Physics, Technical University Berlin, Germany. She received her Ph.D in Physics from Guru Nanak Dev University, Amritsar, India. She has worked as a Scientist in the same department and institute, and also served as an Assistant Professor in reputed institutions of Punjab, India. Her research interest includes gas sensors based on semiconducting oxides and carbon based materials. She has published her work in reputed materials science journals. She has been a scientific committee member of various conferences abroad, and also delivered invited talks.


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