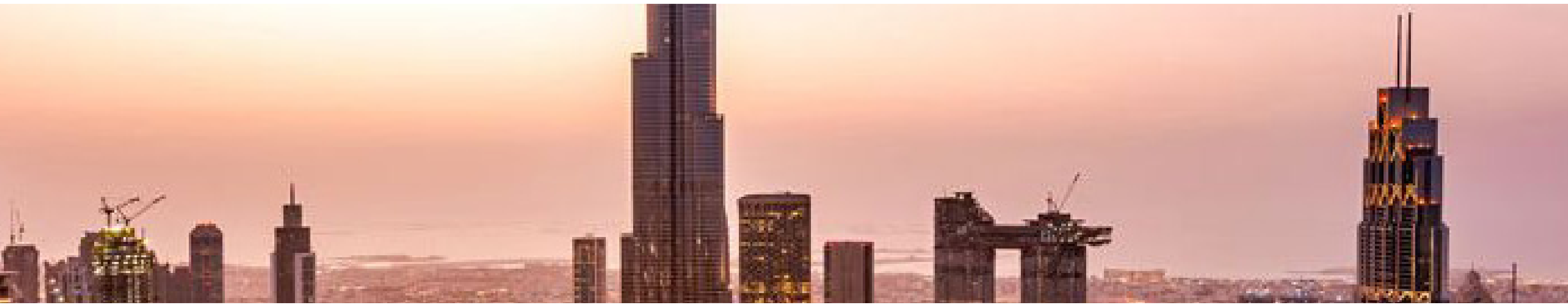
CONFERENCE E-BOOK



6th Global Conference & Expo on
Materials Science and Engineering

4th Global Conference & Expo on
Nanoscience and Nanotechnology

June 23-24, 2023 | Dubai, UAE

Novotel Suites Dubai Mall of the Emirates,
2A Street - opposite Mall of The Emirates - Al Barsha - Al Barsha 1 - Dubai - United Arab Emirates
Conference Code: MKJDCXDG

INOV SCITECH

Inov SciTech is an organization dedicated to organizing conferences, meetings, seminars, and workshops focused on Clinical, Medical, Life Sciences, Engineering, and Technology. We strive to promote the latest research, developments, and issues in the scientific community, providing a platform for leading academic scientists, researchers, and scholars to exchange and share their experiences and research results.

Our primary goal at Inov SciTech is to support research excellence by fostering networking platforms. We are committed to encouraging global communication and collaboration, promoting professional interaction, and facilitating lifelong learning. Additionally, we aim to recognize the outstanding contributions of individuals and organizations within these fields.

Inov SciTech strongly believes in inclusiveness and is committed to affirmative actions that ensure equal opportunities for all. We value diversity and strive to create an environment that welcomes and embraces individuals from various backgrounds.

WHO WE ARE

Inov SciTech specializes in organizing international scientific conferences, meetings, and workshops. Our aim is to encourage networking and facilitate knowledge sharing among scientists, dynamic professors, dedicated academicians, intellectual scholars, leaders, and research fellows. Through these events, we foster opportunities for building and strengthening connections, as well as providing a platform for discussions and demonstrations of the latest technologies in various fields.

WHAT WE DO

Inov SciTech plays a crucial role in revitalizing and enhancing the knowledge of Science, Engineering & Technology. We aim to analyze the past, investigate the present, and formulate innovative approaches for applied science in the future. Our commitment is to provide top-quality content, ensuring an exceptional delegate experience. We offer outstanding networking opportunities, connecting equally passionate professionals in the field. Moreover, we provide a valuable platform for personal interactions, fostering a strong sense of association among individuals.

MISSION

Inov SciTech strives to establish an ideal platform that promotes research by facilitating connections among scientists and researchers across different disciplines. We achieve this through organizing conferences and workshops that foster an environment conducive to information exchange, the generation of novel ideas, and the advancement of technologies in the fields of Science and Technology. Our goal is to provide a dynamic space where collaboration and interdisciplinary discussions flourish, leading to innovative breakthroughs and discoveries.

Upcoming Conferences

2023

Rome, Italy

Global Summit on
Civil, Architectural, and Environmental Engineering.
October 16-17, 2023.
Web: https://inovscitechconferences.com/23/rome/civilarchenveng/

4th International Conference on
Aerospace, Mechanical and Mechatronics Engineering.
October 16-17, 2023.
Web: https://inovscitechconferences.com/23/rome/mechengg/

3rd International Conference on
Robotics and Artificial Intelligence.
October 16-17, 2023.
Web: https://inovscitechconferences.com/23/rome/robartInt/

5th Global Conference & Expo on
Nanoscience and Nanotechnology.
October 18-19, 2023.
Web: https://inovscitechconferences.com/23/rome/nanscitech/

Global Summit on
Nanomaterials and Applications.
October 18-19, 2023.
Web: https://inovscitechconferences.com/23/rome/nanmatapp/

Global Summit on
Chemical Engineering and Catalysis.
October 20-21, 2023.
Web: https://inovscitechconferences.com/23/rome/cheengcat/

6th International Conference on
Biopolymers and Polymer Chemistry.
October 20-21, 2023.
Web: https://inovscitechconferences.com/23/rome/biopolychem/

5th International Conference on
Applied Science, Engineering, and Technology.
October 20-21, 2023.
Web: https://inovscitechconferences.com/23/rome/appsciengtech/

2024

Kuala Lumpur, Malaysia

Global Conference & Expo on
3D Printing & Additive Manufacturing.
April 22-23, 2024.
Web: https://inovscitechconferences.com/24/malaysia/3d-printing/

5th International Conference on
Aerospace, Mechanical and Mechatronics Engineering.
April 22-23, 2024.
Web: https://inovscitechconferences.com/24/malaysia/mechengg/

7th Global Conference & Expo on
Materials Science and Engineering.
April 22-23, 2024.
Web: https://inovscitechconferences.com/24/malaysia/matscieng/

6th Global Conference & Expo on
Nanoscience and Nanotechnology.
April 22-23, 2024.
Web: https://inovscitechconferences.com/24/malaysia/nanscitech/

2nd International Conference on
Optics, Photonics, and Lasers.
April 24-25, 2024.
Web: https://inovscitechconferences.com/24/malaysia/lasoptpho/

International Conference on
Astronomy, Astrophysics and Space Science.
April 24-25, 2024.
Web: https://inovscitechconferences.com/24/malaysia/astrophysics/

International Conference on
Electronics and Electrical Engineering.
April 24-25, 2024.
Web: https://inovscitechconferences.com/24/malaysia/eee/

International Conference on
Renewable and Sustainable Energy.
April 24-25, 2024.
Web: https://inovscitechconferences.com/24/malaysia/rensuseng/

Global Conference on
Public Health and Healthcare Management.
April 26-27, 2024.
Web: https://inovscitechconferences.com/24/malaysia/public-health/

Global Conference on
Nursing and Health Care.
April 26-27, 2024.
Web: https://inovscitechconferences.com/24/malaysia/nursing/

Plenary Forum

(Day 1)

Abdelmageed A. Elmustafa

Old Dominion University, Norfolk and Newport News, USA

Research activities in the Applied Research Center Located inside Thomas Jefferson National Accelerator Facility Including Synthesize and RF Magnetron Sputtering of HEAs and Microelectronic Thin Films

In the first part of my talk, I plan to discuss synthesize and study of RF magnetron sputtered thin films including the effects of composition, grain size, and sputtering temperature. We fabricate multipurpose thin films including HEAs for hypersonic applications, exit-windows for accelerator physics, SAC films for microelectronic solder joints, and single element films for various purposes. We discuss the mechanical/structural properties of the fabricated films including elastic properties, creep/activation volume analysis, and films' structure properties. In the second part of my talk, I plan to discuss results of accelerator physics research with Thomas Jefferson National Accelerator Facility. This work encompasses three independent studies. First, the outgassing rates of three nominally identical 304L stainless steel vacuum chambers were studied to determine the effect of chamber coatings (silicon and titanium nitride) and heat treatments. Second, the high voltage performance of three TiN-coated aluminum electrodes, before and after gas conditioning with helium, was compared to that of bare aluminum electrodes, and electrodes manufactured from titanium alloy (Ti-6Al-4V). Third, the effect of antimony thickness on the performance of bialkali-antimonide photocathodes was studied. Finally, I discuss ongoing research for NASA Langley Research Center for experiments of the effect of the copper donor material-assisted friction stir welding of AA6061-T6 alloy on downward force, microstructure, and mechanical properties. We also discuss the elastic properties of the non-mixing copper donor assisted material in friction stir welding of aluminum alloys using nanoindentation. Using finite element analysis and analytical modeling, we also investigate the strain rate sensitivity of the hardness in indentation creep (mH) and the relationship between m_H and the strain rate sensitivity of the flow stress, m_σ, for cone (self- similar) and spherical (non-self-similar) indenters. m_H/m_σ results extend previous results (Elmustafa et al, 2007a, b) for cones in terms of a universal curve that describes the ratio m_H/m_σ as a function of $H/E^*/\epsilon$.

Biography:

Abdelmageed A. Elmustafa, Professor and Mitsubishi Kasei Endowed Chair, Director, NanoMaterials and Properties Testing Laboratory (NMPTL). Ph.D., Materials Science and Engineering, University of Wisconsin-Madison in 2000. Post- doctoral fellow, Materials Science and Engineering Department, University of Wisconsin-Madison. Principal Investigator and Program Manager at Piezomax Technologies, now NPoint. Senior Research Scientist, NASA Langley Research Center-ConITS, Hampton, Virginia.

Visiting Research Professor, Department of Mechanical and Aerospace Engineering, Princeton University. NJ.

Distinguished research program funded by industry, NSF, NASA, Thomas Jefferson National Accelerator Facility (Jlab), etc.

Principal interests: synthesis and RF magnetron sputtering of thin solid films including HEAs, study of Nanoscale Mechanical Behavior of solids researching plastic flow properties and the fundamental atomic scale mechanisms. Study of computational and experimental nanoscale mechanical properties

M.P.F. Graca*, J.S. Regadas, S.R. Gavinho
University of Aveiro, Portugal

Influence of the particle size on the physical and biological properties of a modified 45S5 Bioglass®

Bioglasses are used since the past century as a biomaterial in the bone regeneration field. However recent studies are trying to use them also as a therapeutic material mainly in the treatment of osteosarcomas. The most known bioglasses is the 45S5 Bioglass®, invented by Larry Hench et al., presenting a higher bioactivity. A possible application of this bioglass in the treatment of osteosarcomas can be accomplished by adding specific ions, such as iron oxide, that will allow the use of magnetic hyperthermia and the Fenton reaction as therapeutic mechanisms. In this study, a 45S5 glass modified with specific metal ions (ex.: Zn, Cu, Ce, Fe, etc) were produced by the melt-quenching. A group of samples were prepared by changing the overall ball milling time, from 1h up to 48 h. The objectives are to analyze the effects of the metal ion in the bioactive glass matrix and evaluate the influence of particle size on their physical and biological properties.

The studied glasses showed no evidence of structural changes compared to the 45S5 pure glass. The reduction of the particle's size influences cytotoxicity and bioactivity. The samples with lower particle sizes showed a higher level of cytotoxicity. The formation of the apatite layer on the surface of the bioglass can be retarded due to the metal ion inserted, which can be overcome by the reduction of the particle size.

Biography:

Manuel P. Graça, Professor

Manuel Pedro Fernandes Graça (M.P.F. Graça) graduated in Physics Engineering, Master's degree in Science and Materials Engineering and PhD in Physics. He is a professor at the Physics Department of the University of Aveiro. MPFG is the author and co-author of 2 books, 30 chapter books, and +300 articles in international peer-review journals, plus 14 in conference proceedings, more than 4500 citations, and an h-index of 35 based on the Scopus platform. MPFG gave +50 oral communications including international plenary sessions. He is a co-author of more than 230 posters in international scientific meetings and 3 patents/utility models. MPFG was Editor Chief at the Nova Science Publishers of the book "Electrical Measurements: Introduction, Concepts, and Applications". His research team comprises 26 post-doc projects, 11 Ph.D. students. He completed the supervision of 31 final course project theses and 33 master dissertations.

Keynote Forum

(Day 1)

Ananta R. Adhikari

State University of New York, Potsdam

Microwave Radiation-Based Modification in Material Science Engineering

In the modern world, the use of polymer composite has been increasingly adapted in every arena of material science development. There are many highly advanced technologies developed for material synthesis and modification of polymer composites. Still, a search for simple, energy efficient, easy-to-control, cheap, time-saving, and eco-friendly technology is continued.

Microwave technology has taken place as one of the major techniques in material synthesis and modification for its unique characteristics such as fast, selective heating, uniform heating, and particularly direct heating based on molecular interaction. In this talk, the use of microwave energy as an alternate important material processing technique will be discussed. I will cover some of the work that has been undergoing in our lab. The emphasis will be given to their application in the medical world and their shortcomings.

Biography:

Ananta R. Adhikari, Assistant professor of Physics.

Dr. Ananta Adhikari was born and raised in Nepal, Southeast Asia. He received a master's degree in physics and a Ph.D. in Nanoscale Science and Engineering from the State University of New York, Albany. Dr. Adhikari joined the Department of Physics, State University of New York, Potsdam in Fall 2019 as an Assistant Professor of Physics. Since then, he has been teaching primarily different introductory physics and undergraduate senior-level physics courses along with research involving undergraduate students. Dr. Adhikari's research interest is in Nanomaterials and Polymer Nanocomposites. His current research focus is on the modification of soft material Polymer nano-composites primarily for their application in biomedicine such as biosensors and bioscaffolds.

Roberto Termine*[1], Vincenzo Caligiuri,[1,2], Svetlana Siprova[2], Aniket Patra[2,3], Giuseppe E. Lio[4], Simona Cilurzo[2], Attilio Golemme[1,2] and Antonio De Luca[1,2]

[1]Institute of Nanotechnology CNR-NANOTEC, SS di Rende (CS), Italy
[2]Department of Physics, University of Calabria, via P. Bucci, 31C, 87036, Rende (CS), Italy
[3]Istituto Italiano di Tecnologia, via Morego 30, 16163 Genova (GE), Italy
[4]CNR-INO and European Laboratory for Non Linear Spectroscopy (LENS), Via Nello Carrara, 1 - 50019, Sesto Fiorentino, Firenze (FI), Italy

Coexisting and Cooperating Light-Matter Interaction Regimes in Meta-Voltaic Systems

Usually in the quantum framework formed by light-matter coupling the interaction between an atom and a cavity follows a single feedback channel: the exciton relaxation is observed by the emission of a photon that will be stored in the cavity for several roundtrips. After that, another exciton can be created after the photon re-absorption and so on. Until now the possibility that the excited system could relax through other channels, belonging to different regimes has not been considered.

We prepared a photovoltaic cell specifically engineered to behave as an optical cavity tuned to the excitonic transition of the embedded active material (CH3NH3PbI3 perovskite) in order to study how the cooperation of the strong coupling regime and the photovoltaic effect can lead to the an enhancement of the External Quantum Efficiency (EQE), i.e the wavelength-dependent photocurrent conversion efficiency, We studied the angular dispersion of such photovoltaic cell and observed that the strong coupling regime is achieved when the cavity mode approaches the energy of the exciton, as demonstrated from the significant enhancement of the EQE respect to a classic configuration serving as a benchmark.

This constitute a proof-of-principle experimental demonstration of how the generation of polaritons can positively influence the properties of a photovoltaic cell. Nonetheless, such a peculiar cooperating dual-light- matter interaction could be exploited in future polaritonic photovoltaic architectures.

Biography:

Roberto Termine, researcher at Nanotechnology Institute of Italian National Research Council (NANOTEC CNR) has completed his PhD on Science and Technology of Mesophase and Molecular Materials at the University of Calabria (ITALY) in 2004, and from 2005 he is a researcher at Institute of Nanotechnology of Italian National Research Council. His research activities includes the study og orgamic semiconductor for optoelectronic application, the development and basic study of organic and hybrid innovative photovoltaic cells, the application of nanomaterial to optoelectronic device. He is the author of more than 50 peer-reviewed papers and serves as a reviewer and editor for international journals.

Umapada Pal

Institute of Physics, Autonomous University of Puebla, Puebla 72570, Mexico.

Developing Interface-Tuned Heterostructures at Nanoscale for Catalytic and Photocatalytic Applications

The development of efficient catalysts become an emerging research topic to tackle environmental and energy issues the world is facing at present. While for tackling the high carbon dioxide (CO2) content in the earth´s atmosphere, researchers are using photo- and electrochemical processes to reduce CO2 and produce value-added chemicals, for the reduction of toxic emissions from combustion engines, we need to enhance the corresponding oxidation/ reduction processes. For the efficient execution of all the above-mentioned processes, we need suitable heterogeneous catalysts. The catalysts should be designed and fabricated targeting the specific usage, keeping in mind their production cost and reusability. In the present talk, I will discuss some specific aspects of the design and synthesis of heterostructure nano-catalysts, effective for the photocatalytic reduction of CO2 and the production of biodiesel from edible and non-edible oils. To highlight the efficiency of such tailor-made nano-catalysts, I will present two specific examples: i) GO grafted CeO2-NiO nano-heterostructures and ii) Pt nanoparticle-decorated Cr2O3, which have been utilized for photocatalytic reduction of CO2 and total oxidation of methane, respectively. While the earlier heterostructure nano-catalyst was efficient for reducing CO2, producing formaldehyde at a rate of 421.09 μmol g−1 h−1, the later catalyst could oxidize methane at low-temperature with T50 as low as 350 oC. Both the catalysts were highly stable with good performance in reusability tests.

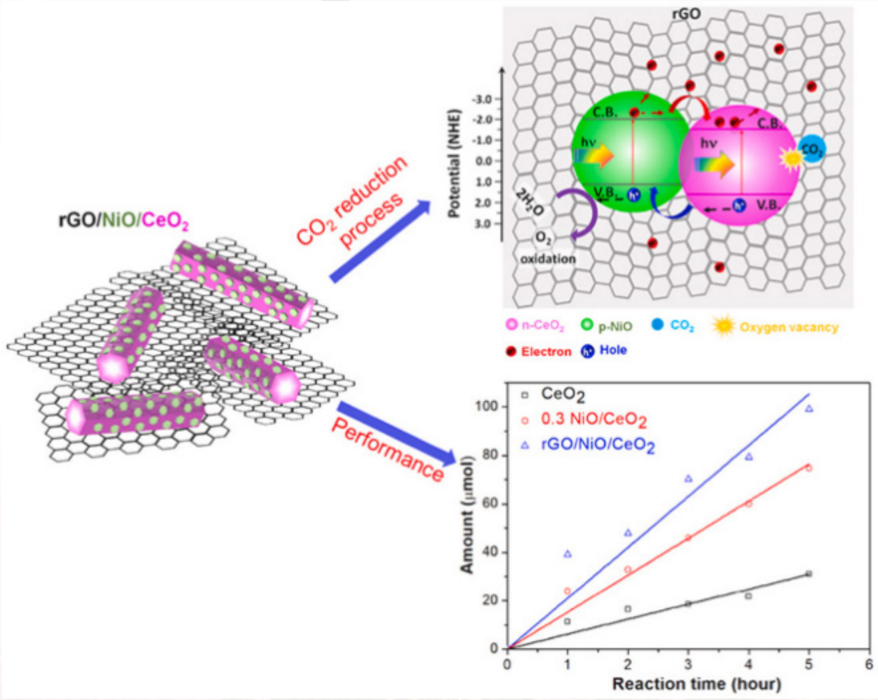


Fig.1 GO-grafted CeO2-NiO nano-catalyst and its CO2 reduction performance.

Biography:

Umapada Pal, Professor, Institute of Physics, Autonomous University of Puebla, Mexico.

Prof. Pal received his Ph.D. degree from the Indian Institute of Technology, Kharagpur in 1991. After a postdoctoral stay at the Complutense University of Madrid, he joined as a professor at the Autonomous University of Puebla in 1995. He was an AIST, JSPS, and STA fellow of the AIST Japan. During 2009 and 2019, he was a Brain Pool Fellow of the Ministry of Science and ICT, South Korea. Prof. Pal´s research includes the design and fabrication of functional nanomaterials for energy and environmental applications. He published more than 300 research articles in international journals, 14 book chapters, and registered 5 Mexican patents. Prof. Pal is the Editor-in-chief of the Journal of Phase Change Materials, and Journal of Biomedical Engineering Theory and Practice; Associated editor of the journal Advances in Nano Research; and editorial board member of 4 other international journals.

Isham Alzoubi

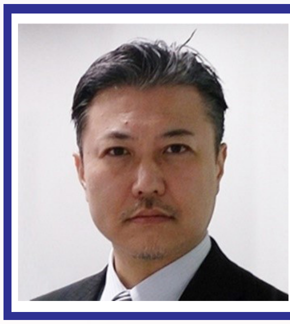
School of Surveying Geospatial Engineering Department of Surveying and Geomatics Engineering, Syria

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.



Soshu Kirihara
Osaka University, Japan

Lithographic Additive Manufacturing Using Nanoparticles Paste

In stereolithographic additive manufacturing (STL-AM), 2-D cross sections were created through photo polymerization by UV laser drawing on spread resin paste including nanoparticles, and 3-D models were sterically printed by layer lamination. The lithography system has been developed to obtain bulky ceramic components with functional geometries. An automatic collimeter was newly equipped with the laser scanner to adjust the beam diameter. Fine or coarse beams could realize high resolution or wide area drawings, respectively. As the row material of the 3-D printing, nanometer sized metal and ceramic particles were dispersed into acrylic liquid resins at about 60 % in volume fraction. These materials were mixed and deformed to obtain thixotropic slurry. The resin paste was spread on a glass substrate with 50 μm in layer thickness by a mechanically moved knife edge. An ultraviolet laser beam of 355 nm in wavelength was adjusted to 50 μm in variable diameter and scanned on the spread resin surface. Irradiation power was automatically changed for an adequate solidification depth for layer bonding. The composite precursors including nanoparticles were dewaxed and sintered in the air atmosphere. In recent investigations, ultraviolet laser lithographic additive manufacturing (UVL-AM) was newly developed as a direct forming process of fine metal or ceramic components. As an additive manufacturing technique, 2-D cross sections were created through dewaxing and sintering by UV laser drawing, and 3-D components were sterically printed by layer laminations with interlayer joining. Through computer-aided smart manufacturing, design, and evaluation (Smart MADE), practical material components were fabricated to modulate energy and material transfers in potential fields between human societies and natural environments as active contributions to Sustainable Development Goals (SDGs).

Biography:

Soshu Kirihara is a doctor of engineering and a professor of Joining and Welding Research Institute (JWRI), Osaka University, Japan. In his main investigation "Materials Tectonics as Sustainable Geoengineering" for environmental modifications and resource circulations, multi-dimensional structures were successfully fabricated to modulate energy and materials flows effectively. Ceramic and metal components were fabricated directly by smart additive manufacturing, design and evaluation (Smart MADE) using high power ultraviolet laser lithography. Original stereolithography systems were developed, and new start-up company "SK-Fine" was established through academic-industrial collaboration.

Suresh Aluvihara
University of Peradeniya, Peradeniya, 20400, Sri Lanka

Preliminary Analysis of Sri Lankan Clay Species on behalf of the Water Treatments and Subduing of Microorganisms

Water pollution is a compelling problem around the world with the increasing of water consumption and the accretion of the circumstances of water consuming. As a limited resource, it is necessary to be treated the contaminated water while undergoing some appropriate techniques. According to the environmental rules and regulations, there were enacted a set of rules and regulations for the releasing of consumed water to the environment. In the categorization of water treatment methods, the disinfection has been identified as a critical stage especially in drinking water treatments. The adsorption capacity is a leading characteristic of clay which is much useful in the water treatment applications. In the existing research there were expected to characterize three of selected clay varieties based upon the purpose of the investigation of the preliminary characteristics of those clay types. The representative clay samples were collected from Matale, Maduragoda and Dankotuwa areas which are recognized as the abundant area of fine grained clays that much suitable for roof tile industry. The collected clay samples were chemically analyzed using X-ray diffraction (XRD) spectrometer, X-ray fluorescence (XRF) spectrometer and Fourier transform infrared (FT-IR) spectrometer. The obtained results showed the presence of Fe, Zr, Ba, Ti and K as the major elements, kaolinite, quartz, glauconite, muscovite and marcasite as the common minerals in such clays. In the considerations of advanced characteristics of such minerals, kaolinite, glauconite and marcasite have been identified as strong adsorbents for some specific compounds such as some heavy metals, radioactive elements and pathogens and some of ferrous minerals may have the supporting capacities in the catalytic activities for some chemical reactions that combining with some specific solid compounds such as activated carbon. Therefore, as the suggestions, it is possible to recommend the developments and enhancements for such clays for the uses in the waste water treatment applications and catalytic activities as a supporting material in various forms such as the bulks, composite materials or nano-materials.

Keywords: Water pollution, Clay, Clay mineralogy, Adsorption, Water purification

Keynote Forum

(Day 2)

Yung-Chun Lee*, Wei-Shen Chen, and Chih-Jung Lin
National Cheng Kung University, Taiwan

Advanced Nano-Imprinting Lithography for Fabricating Plasmonic Metasurfaces with Optical Applications

This presentation describes the development of an innovative nano-fabrication method aimed at producing new types of metasurfaces with specific optical applications. Metasurfaces, which stem from metamaterials, have shown great potential for advanced optic and optoelectronic applications in emerging high-tech devices. However, the feature sizes of nanostructures used in metasurfaces to manipulate electromagnetic behaviors of optical light are typically around 100 nm or less, making them challenging to manufacture. Nano-imprinting lithography (NIL) is a powerful tool for mass-producing nanostructures with the benefits of large patterning areas, high throughput, and low cost. In this work, a new type of NIL system and imprinting methods were developed to meet the requirements for fabricating metasurfaces.

The targeted metasurface discussed in this work is a tri-layered plasmonic system composed of two orthogonally oriented metallic nano-wire gratings sandwiching a layer of metallic nano-antennas, with two dielectric layers made of spin-on-glass in between the three layers of metallic nano-structures. Three different designs were proposed in this tri-layered plasmonic metasurface so that they can function as half-wave plates, optical beam refractors, and metalenses. Efforts have been focused on improving the NIL system and its processes to meet the required high aspect ratio on the fabricated metallic nano-structures. The presentation will detail experimental results on the NIL-fabricated metasurfaces as well as measurement results on their optical performance.

Biography:

Yung-Chun Lee, Distinguished Professor

Yung-Chun Lee received the Ph.D. degree in Theoretical and Applied Mechanics from Northwestern University, USA, in 1994. From 1994 to 1996, he was a post-doctoral researcher at the Department of Engineering and Applied Physics, Cornel University, USA. After working in industry for one year, he joined the Mechanical Engineering Department, National Cheng Kung University, Tainan, Taiwan, in 1997 and is now a distinguished professor at the same institute. His research interests include solid mechanics, ultrasonic non-destructive evaluation, laser micromachining, nano-imprinting lithography, contact printing lithography, roller imprinting, and maskless lithography based on digital light processing. He was awarded twice (2017, 2020) the Outstanding Research Award from the Ministry of Science and Technology (MOST), Taiwan.

Sílvia R. Gavinho* and Manuel Pedro F. Graca
University of Aveiro, Portugal

Influence of Cationic Ions on Bioactive Glasses to Enhance the Biological Response in Bone Regeneration

Nowadays, the treatment of damage or the replacement of some bone structures prioritises the body's natural healing process. Some biomaterials have been developed with specific compositions in order to enhance desired biological responses such as antibacterial, antioxidant, anti-inflammatory, and antitumour, among others. In this way, the use of bioactive glasses has been an alternative for application in bone regeneration and metallic implant coatings for its high bioactivity and the possibility of inserting therapeutic ions with specific properties. Thus, in this work bioglasses with ions such as cerium, strontium and magnesium were developed. The materials were characterized at thermal (DTA), structural (XRD, FTIR, Raman), morphological (SEM) and biological (cytotoxicity, antibacterial activity and bioactivity) levels. The presence of the ions in the bioglass network did not favour the formation of crystalline phases, maintaining the typical amorphous behaviour. All the glasses with the therapeutic ions inserted presented a higher antibacterial effect compared to the base bioglass, and their addition had a positive effect on the cell viability of Saos-2 cancelling the cytotoxic effect of the base bioglass. Furthermore, cerium showed potential application as an antioxidant by the impedance spectroscopy results.

Biography:

Silvia Gavinho has a master's degree in Biophysics and Bionanosystems and is finishing her PhD in Physical Engineering. She was a research fellow in 2017 on a project with biomaterials for dental implant coatings and in 2019 she won a PhD scholarship funded by the Science and Technology Foundation in Portugal in the same area. She has been working for 6 years with biomaterials (cements, hydroxyapatite and bioglass) for bone regeneration and in metallic implant coatings.

She has published 5 book chapters as first author (+1 accepted for publication), 11 papers (5 as first author) and 21 oral presentations (14 as first author). She has also experience in mentoring undergraduate projects and Erasmus+ students in the field of Biomedical Engineering.

Paata J. Kervalishvili
Georgian Technical University, Georgia

Recent Developments of Laser-Plasma Method of Nanomaterials and Nanosystems Preparation

The usage of laser technologies for different materials manufacturing has more than half century history when Soviet, American, Japanese and British researchers demonstrated the light sources applicable for novel materials production. Today lasers applications in material science and technology are broad and diversified. Various laser technologies have started integrating into major materials preparation processes, including laser cutting, drilling, welding, bonding, marking, patterning, measurement, deposition, etc. Drivers of laser technologies differ from one process step to another. However, there are similar and common methods for applicability of lasers to nano-sized structures processing and the choice of the most suitable laser technology type strongly depends on material to be processed, processing parameters, and the manufacturing process step. The most suitable and prospective method for preparation of nanosystems having different origin – from elementary nanoparticles to nanostructured compounds is laser plasma deposition technology. The properties of nanomaterials prepared by laser plasma technic are unique, and they are not reproducible by any other method including chemical ones Despite of the fact that material's preparation methods based on laser usage have a wide applications today there are still many things to do.

Pulse Laser Deposition, Laser Plasma Deposition and related technologies need farther deep investigations from theoretical point of view (e.g. Bose – Einstein condensate models, Quantum Dots and Quantum lines formation, electron and ion scattering problems, etc.) to comprehensive experimental works (parameters of laser beam, thermal characteristics of plasma, ions distribution and their density, etc.) as well. And finally, we are aware that laser based technologies will open the new possibilities for preparation of super pure materials with manageable structural perfectness as well as their nanosystems useful for novel nanoelectronics, solar cells, capacitors, and for wide application in different direction of nanomedicine.

Biography:
Prof. Paata J. Kervalishvili
Georgian Technical University, Tbilisi, Georgia President of Euro Mediterranean Academy of Arts and Sciences (Sparta Greece), Greece. From 1970 until 1992 Prof. Kervalishvili was a researcher and a director in different research and technology centers within the Middle Machinery Ministry (State Committee for Atomic Energy) of former USSR main body of the Soviet atomic energy and weapon industry. Currently he is the President of Georgian Academy of Natural Sciences and President of Euro Mediterranean Academy of Arts and Sciences.

Selcuk Poyraz
Adiyaman University, Turkey

Preparation and Characterization of a Hybrid Nanomaterial Through a Novel Microwave Energy-based Approach

The aim of this study is to obtain carbonized conducting polymer (CCP), i.e. polypyrrole (PPy), nanostructures with carbon nanotube (CNT) and metal oxide nanowire (MONW) growth on their surface with a great potential as a building material for electrochemical energy storage applications. Through a well-established, in-situ polymerization/coating method and a simple and straightforward ex-situ microwave (MW) energy-based carbonization approach, i.e. PopTube, are systematically combined to prepare this novel material. This simple, facile, yet highly efficient, affordable and easily scalable combined synthesis method, it becomes possible to produce such CCPs with unique morphological, spectroscopic, thermal and elemental features, all of which are strongly supported by both various material characterization test results and the relevant literature data. It is believed that such CNT and MONW decorated CCPs (CNT&MONW@CCP), obtained via the above-mentioned approach, would soon become a material of preference for a large span of advanced applications including electrochemical energy storage.

Biography:

Selçuk Poyraz, PhD, Associate Professor of Department of Textile Engineering at Adiyaman University.
Dr. Poyraz earned his PhD in 2014 from the Department of Polymer and Fiber Engineering at Auburn University, Auburn, AL 36849, USA. His research interest is focused on the synthesis, characterization, and applications of nanostructured conducting polymers. So far, he has published 25 scientific papers, and they have been cited more than 900 times.

Matthew M. Kratzer[1], Suresh K. Bhatia[2], Alexander Y. Klimenko[*1]

[1]University of Queensland, School of Mechanical and Mining Engineering
[2]University of Queensland, School of Chemical Engineering, Australia

On the Influence of Membrane Thickness on Hydrogen Gas Separation

Due to the increasing global requirement of the decarbonization in energy grids, the utilisation and storage of green energy is set to increase dramatically over the coming decades. A potential method to accommodate such a large-scale utilisation of renewable energy is the development of a "hydrogen economy" which would require a manyfold increase of the storage and processing capability of hydrogen.

Membrane separation is one of the key methods currently utilised for the extraction of hydrogen from gas mixtures. The development of nanoporous membranes, such as vertically aligned carbon nanotube arrays and zeolites, permits the design of highly selective membranes which may exhibit ultra-fast gas transport.

Currently applicable numerical models for such systems, such as molecular dynamics simulations, remain prohibitively expensive for the analysis of long nanopores, as such, theoretical analyses are valuable to elucidate the underlying physics. While classical models primarily focus on infinite length systems, experimental data implies that finite-length effects may lead to increased species-specific interfacial resistance and hence alter the efficacy of gas separation in real nanoscale membranes.

This work reviews current models the transport through atomically smooth nanopores and discusses the utilisation of stochastic models. Combined with a recently developed model for species-dependent tangential momentum accommodation, effect of membrane length on the separation of a H2–CH4 mixture is investigated.

Biography:

Matthew M. Kratzer, PhD Candidate. Matthew received his BE/BSc from UQ in 2018 and is currently completing his PhD. Matthew's research interests are in the theoretical modelling of nanoscale fluid transport and models of hydrogen energy systems.

Prof. Suresh K. Bhatia, Emeritus Professor. Prof. Bhatia is a fellow of the Indian Academy of Sciences and the Australian Academy of Technological Sciences and Engineering. His main research interests are in the modelling and simulation of adsorption and transport in nanoporous materials.

Dr Alexander Y. Klimenko, Reader. Dr Klimenko is a Fellow of the Combustion Institute and the director of the Centre for Multiscale Energy Systems (CMES) within UQ. His research interests lie in the advanced modelling of complex systems including reacting and turbulent flows, multiscale phenomena and energy systems.

Ruxandra Mihaela Botez

École de technologie supérieure, Université de Québec, Canada

Morphing Green Aircraft Design Technologies for Fuel Consumption Reduction

Green aircraft technologies are used to reduce fuel consumption, therefore flight time, to bring therefore important savings to the airlines, and benefits to the environment. One of these technologies is related to morphing wing design and experimental validation. The Italian-Canadian multidisciplinary project called "Morphing Architectures and Related Technologies for Wing Efficiency Improvement" was led at the ÉTS in Canada, in collaboration with other Canadian partners from Bombardier, Thales, IAR-NRC and Ècole Polytechnique, and with Italian partners from Alenia, CIRA, and University Federico II in Naples.

In this project, a new morphing technology was used to change the shape of the upper surface composite skin of a transport aircraft wing-tip with the aim to improve its aerodynamic performances (drag reduction, increase in lift to drag ratio, flow transition delay). The upper surface skin of the morphing wing-tip was equipped with thirty-two piezoelectric kulite type pressure sensors; they were used to measure pressures, and thus, aerodynamic loads acting on the morphing wing-tip for different flight cases expressed in terms of Mach numbers between 0.15 and 0.25, wing angles of attack between – 3 deg. and 3 deg., and aileron deflection angles between – 6 deg. and 6 deg. Therefore, optimal airfoils shapes were designed for almost 100 flight cases.

Four actuators were used to obtain the morphed optimized wing-tip shapes. The optimal shapes for aerodynamic performances increase were obtained using aero-structural design studies. The flow transition point position for each optimal shape was evaluated experimentally using the infra- red thermography. The designed optimal shapes of the wing-tip were validated using various new controller techniques that were applied during wind tunnel tests at the IAR-NRC, that were based on artificial intelligence techniques (neural networks, fuzzy logic). These multidisciplinary aero- structural-control methodologies were experimentally validated using wind tunnel tests.

Biography:

Ruxandra Mihaela Botez, Full Professor, PhD, Eng., Canada Research Chair Holder Tier 1 in Aircraft Modeling and Simulation Technologies and Head of the Laboratory of Applied Research in Active Controls, Avionics and AeroServoElasticity LARCASE.

Dr Ruxandra Botez is Full Professor at ÉTS in Canada since 1998. Ruxandra is AIAA Associate and CASI, CAE and RAeS Fellow. She is Editor-in-Chief of the INCAS Bulletin. Ruxandra graduated more than 400 students. Ruxandra published more than 200 journal articles, 300 conference papers and 7 invited book chapters. Ruxandra and her team have obtained more than 60 awards; she also gave more than 50 invited speaker presentations. Ruxandra works in collaboration with international aerospace companies, such as Bombardier Aerospace, CAE Inc., Esterline CMC Electronics, Bell Helicopter Textron, Thales Aerospace, GlobVision, FLIR Systems and IAR-NRC, in the USA with Presagis and NASA, in Italy with Alenia and CIRA, in Mexico with Hydra Technologies, in Germany with DLR.

M.T.Todinov
Oxford Brookes University, UK

The Method of Algebraic Inequalities and Its Application for Optimising Systems and Processes in Engineering

Algebraic inequalities have huge potential for modern science and technology. They do not require data associated with the values or the distributions of the variables entering the inequalities and are capable of handling deep unstructured uncertainty.

This talk introduces the method of algebraic inequalities and demonstrates that the application potential of algebraic inequalities in engineering is far-reaching and certainly not restricted to determining bounds and specifying design constraints. The method of algebraic inequalities is introduced with its two fundamental approaches: the forward and the inverse approach. It is demonstrated that the method of algebraic inequalities is capable of ranking systems and processes in total absence of knowledge related to the values and the variation of the controlling variables. Powerful new knowledge about systems and processes in all areas of engineering and technology can be generated through the inverse approach, involving meaningful interpretation of non-trivial algebraic inequalities. Subsequently, this knowledge can be used for optimising the systems and processes. Depending on the specific interpretation, knowledge, applicable to systems from different application domains can be extracted from the same algebraic inequality.

The talk also introduces the fundamental principle of non-contradiction on which the inverse approach is based and an important class of algebraic inequalities that can be used in any area of science and technology provided that the variables and the separate terms of the inequalities are additive quantities.

Suresh Aluvihara
University of Peradeniya, Peradeniya, 20400, Sri Lanka

The Advanced Applications of Earth Materials based upon the Adsorption and Absorption Processes

Earth materials are unevenly distributed in the world in different forms and phases. Solid earth materials play an outstanding preface among earth materials in other phase because of the availabilities in their manifold forms both natural or manmade forms such as the bulky forms and powdered forms. Adsorption is an outstanding characteristic regarding some solid materials based upon the adsorption capacities of such materials with respect to some specific compounds that presence in liquids and gases. Clays and dolomites are predominantly having multi physic-chemical characteristics. As the general outcomes of most of recent researches regarding earth materials, there were observed some specific characteristics from clays, dolomites, feldspar and some other minerals including the adsorption character. In the existing research there were expected to characterize three different selected clay verities and a selected dolomite variety in microscopically and chemically. The clay samples and dolomite samples were collected from the relevant locations in Sri Lanka and a few of representative samples were characterized using X-ray fluorescence (XRF) spectrometer, Fourier transforms infrared (FT-IR) spectrometer and scanning electron microscope (SEM). Our results confirmed that the presence of Fe as the most abundant element in three different clay types and Ca as the most abundant element in dolomite according the XRF characterization, presence of kaolinite, montmorillonite and some other Fe minerals in all of clays such as muscovite and calcite as the major mineral in dolomite according to the FT-IR characterization and there were observed some porous structures in all of clays and some cleavage planes in dolomites according to the SEM micrographs. Based upon above results and literature reviews of them, it is possible to recommend some clay species and dolomites with similar compositions of these clays and dolomites for the developments in water treatment applications to remove some heavy metals, pathogens, organic pollutants and hardness from different types of waste water due to the adsorption capacities of such clays and dolomite which can also be enhanced with some possible alterations such as the nano-particles, nano-filters and pallets.

Keywords: Earth materials, Compositional characterization, Microscopic characterization, Industrial developments and uses

Plenary Forum

(Day 2)

James J Tanoos* and Taylor Bailey

Purdue University, USA

The Facilitation of Efficient Production Planning for Multinational Automobile Organizations: Forecasting import vehicle sales via macroeconomic trade policy

There is intense competition for market share between multinational automobile organizations (MAO) in areas such as innovative technology, branding, and of course total global vehicle sales. While increasing the total number of vehicles sold is a major goal of any MAO, sheer vehicle sales may not enhance the bottom line of an automobile organization if production is higher or lower than actual consumer demand. Both overproduction and underproduction can ruin the bottom line. Accurate sales must match forecasted production schedules, which are done a year in advance, to achieve the most efficient earnings. The most successful MAOs spend much time and resources on these forecasts so that parts, machining, energy usage, and training can be planned accordingly. Accurate estimated vehicle sales projections are vital to production planning. Even non-MAO stakeholders such as economic policy experts routinely use a variety of variables to attempt to predict estimated vehicle sales in the following year due to the automobile industry's impact on national GNP. Public trade policy has been increasingly affected by the automotive industry, especially for industrialized countries as numerous fiscal tools such as tariff rates have been manipulated depending on the goal of enhancing vehicle imports and/or exports as imported vehicles become more available, and various economic strategies have been utilized by federal governments to manipulate the likelihood of imports. This study will build models based on economic variables that affect the vehicle sales of imports to better predict the likelihood of sales of imported vehicles for 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.

Soshu Kirihara
Osaka University, Japan

Stereolithographic Additive Manufacturing of Ceramic Components with Fine Microstructures

In stereolithographic additive manufacturing (STL-AM), 2-D cross sections were created through photo polymerization by UV laser drawing on spread resin paste including nanoparticles, and 3-D models were sterically printed by layer lamination. The lithography system has been developed to obtain bulky ceramic components with functional geometries. An automatic collimeter was newly equipped with the laser scanner to adjust the beam diameter. Fine or coarse beams could realize high resolution or wide area drawings, respectively. As the row material of the 3-D printing, nanometer sized metal and ceramic particles were dispersed into acrylic liquid resins at about 60 % in volume fraction. These materials were mixed and deformed to obtain thixotropic slurry. The resin paste was spread on a glass substrate with 50 μm in layer thickness by a mechanically moved knife edge. An ultraviolet laser beam of 355 nm in wavelength was adjusted to 50 μm in variable diameter and scanned on the spread resin surface. Irradiation power was automatically changed for an adequate solidification depth for layer bonding. The composite precursors including nanoparticles were dewaxed and sintered in the air atmosphere. In recent investigations, ultraviolet laser lithographic additive manufacturing (UVL-AM) was newly developed as a direct forming process of fine metal or ceramic components. As an additive manufacturing technique, 2-D cross sections were created through dewaxing and sintering by UV laser drawing, and 3-D components were sterically printed by layer laminations with interlayer joining. Through computer-aided smart manufacturing, design, and evaluation (Smart MADE), practical material components were fabricated to modulate energy and material transfers in potential fields between human societies and natural environments as active contributions to Sustainable Development Goals (SDGs).

Biography:

Soshu Kirihara is a doctor of engineering and a professor of Joining and Welding Research Institute (JWRI), Osaka University, Japan. In his main investigation “Materials Tectonics as Sustainable Geoengineering” for environmental modifications and resource circulations, multi-dimensional structures were successfully fabricated to modulate energy and materials flows effectively. Ceramic and metal components were fabricated directly by smart additive manufacturing, design and evaluation (Smart MADE) using high power ultraviolet laser lithography. Original stereolithography systems were developed, and new start-up company “SK-Fine” was established through academic-industrial collaboration.

Acceted Abstracts

Osman Adiguzel
Firat University, Turkey

Shape Reversibility and Fundamental Characteristics of Shape Memory Alloys

A series of alloy system take place in a class of functional materials due to stimulus response to external effect. Shape memory alloys take place in this class by exhibiting a peculiar property called shape memory effect. Fundamental characteristics of these alloys are shape reversibility, thermoelasticity and superelasticity. These phenomena are characterized by the recoverability of two certain shapes of material at different conditions. Shape memory effect is initiated on cooling and deformation processes and performed thermally on heating and cooling, with which shape of material cycle between original and deformed shape in reversible way. Therefore- this behavior can be called Thermoelasticity. These alloys are used as shape memory devices in many fields such as medicine, metallurgy, building industry. This property is result of successive thermal and stress induced martensitic transformations. Thermal induced martensitic transformation occurs on cooling with cooperative movements of atoms by means of lattice invariant shears in two opposite directions, <110 > -type directions on the {110} - type planes of austenite matrix and ordered parent phase structures turn into the twinned martensite structures, and the twinned structures turn into the detwinned structures by means of stress induced martensitic transformation, by stressing material in the martensitic condition. Shape memory alloys become noticeable as smart materials in mechanical applications in many fields of industry. These alloys exhibit another property called superelasticity, which is performed by stressing and releasing material at a constant temperature in parent phase region, and shape recovery is performed simultaneously upon releasing the applied stress. Superelasticity is performed in non-linear way; stressing and releasing paths are different in the stress-strain diagram, and hysteresis loop refers to energy dissipation. Superelasticity is also result of stress induced martensitic transformation and ordered parent phase structures turn into detwinned martensite structure with stressing.

Copper based alloys exhibit this property in metastable β-phase region, which has bcc-based structures at high temperature parent phase field. Lattice invariant shear and twinning is not uniform in copper based ternary alloys and gives rise to the formation of complex layered structures, depending on the stacking sequences on the close-packed planes of the ordered parent phase lattice. The layered structures can be described by different unit cells as 3R, 9R or 18R depending on the stacking sequences on the close-packed planes of the ordered lattice. The unit cell and periodicity is completed through 18 layers in direction z, in case of 18R martensite, and unit cells are not periodic in short range in direction z.

In the present contribution, x-ray diffraction and transmission electron microscopy (TEM) studies were carried out on copper based CuAlMn and CuZnAl alloys. X-ray diffraction profiles and electron diffraction patterns exhibit super lattice reflections. X-ray diffractograms taken in a long-time interval show that diffraction angles and intensities of diffraction peaks change with the aging duration at room temperature. This result refers to the rearrangement of atoms in diffusive manner.

Keywords: Shape memory effect, martensitic transformation, thermoelasticity, superelasticity, twinning, detwinning.

Biography:

O. Adiguzel, Prof. Dr

Dr. Adiguzel graduated from Department of Physics, Ankara University, Turkey in 1974 and received PhD- degree from Dicle University, Diyarbakir-Turkey. He has studied at Surrey University, Guildford, UK, as a post-doctoral research scientist in 1986-1987, and studied were focused on shape memory effect in shape memory alloys. He worked as research assistant, 1975-80, at Dicle University and shifted to Firat University, Elazig, Turkey in 1980. He became professor in 1996, and he has been retired on November 28, 2019, due to the age limit of 67, following academic life of 45 years. He supervised 5 PhD- theses and 3 M. Sc- theses.

He published over 80 papers in international and national journals; He joined over 120 conferences and symposia in international and national level as participant, invited speaker or keynote speaker with contributions of oral or poster. He served the program chair or conference chair/co-chair in some of these activities. In particular, he joined in last six years (2014 - 2019) over 60 conferences as Keynote Speaker and Conference Co-Chair organized by different companies. Also, he joined over 70 online conferences in the same way in pandemic period of 2020-2021.

Dr. Adiguzel served his directorate of Graduate School of Natural and Applied Sciences, Firat University, in 1999-2004. He received a certificate awarded to him and his experimental group in recognition of significant contribution of 2 patterns to the Powder Diffraction File – Release 2000. The ICDD (International Centre for Diffraction Data) also appreciates cooperation of his group and interest in Powder Diffraction File.

Tofik Nagiev
Nagiev Institute of Catalysis and Inorganic Chemistry, Baku, Azerbaijan

Conjugated Reactions in Chemistry and Biology in the Context of Modern Ideas

Various types of possible interactions between reactions are discussed. Some of them are united by the general idea of chemical reaction interference. The ideas on conjugated reactions are broadened and the determinant formula is deduced; the coherence condition for chemical interference is formulated and associated phase shifts are determined. It is shown how interaction between reactions may be qualitatively and quantitatively assessed and kinetic analysis of complex reactions with under-researched mechanisms may be performed with simultaneous consideration of the stationary concentration method. Using particular examples, interference of hydrogen peroxide dissociation and oxidation of substrates is considered.

Biography:
Tofik Nagiev is a Vice-president of Azerbaijan National Academy of Sciences, Director of Research Center of "Azerbaijan National Encyclopedia" and Department chief of Nagiev Institute of Catalysis and Inorganic chemistry of ANAS. The Professor of the department of the Physical and Colloid chemistry of Baku State University.

Andrey V. Brazhnikov
Siberian Federal University, Russia

Requirements for Materials in Implementation of the Energy-Differential Principle of Lift Creating in Aero-and-Hydromechanical Apparatuses

A few years ago at the Siberian Federal University (Krasnoyarsk, Russia) a new principle of creating an aero/hydro-dynamic lift was developed. It was called the "Energy-Difference Principle of the Aero/Hydro-Dynamic Lift Creation". Its essence can be explained by the example of an aircraft wing. If the air flow flowing around this wing from below has more energy than the air flow flowing around this wing from above, then a force will appear that pushes the wing upward, i.e. lift force. This follows from the well-known Bernoulli's equation. The energy-difference principle can be used not only in airplanes, but also in various other aircrafts, underwater vehicles, wind generators, hydro generators, turbo generators and other technical devices. In this case, the energy difference between the flows of air, water, etc., flowing around the wings and blades of the above-mentioned devices from opposite sides, can be carried out, in particular, by the use of materials and coatings with different coefficients of heat absorption and / or sound absorption (in materials, which have the ability to absorb sounds, acoustic energy is converted into heat). For example, if the underside of an airplane wing is covered with a material that has a higher heat or sound absorption coefficient than the material with which the top surface of that wing is covered, then the bottom surface will heat up more than the top surface. In this case, the air flow flowing around the wing from below will be warmer (i.e., it will have more energy due to its contact with the lower surface of the wing) than the air flow flowing around the wing from above. As a result, the lifting force will appear. Obviously, in order to obtain the maximum possible lift in this case, it is required to use materials for opposite wing surfaces that have the most opposite properties in terms of heat absorption and / or sound absorption. Perhaps the further development of this R&D direction will require the development of special materials and coatings.

Biography:

Andrey V. Brazhnikov was born on 1959. He is presently an Associate Professor of the Department of Electrical Engineering, Siberian Federal University (Krasnoyarsk, Russia) and a Professor of the Russian Academy of Natural History. He had his graduation in Electrical Engineering from the Krasnoyarsk Polytechnic Institute (Krasnoyarsk, Russia) in 1982 (major in Automatics and Telemechanics, Honors Degree). He received Ph.D. degree in Electromechanics from the Tomsk Polytechnic Institute (Tomsk, Russia) in 1985. In 1991-1995 he was the Russian Manager of two international (Russian-Bulgarian) research projects in the field of multiphase inverter-fed AC electric drives. In 2019 he was a Visiting Professor of Munich Technical University (TUM), Munich, Germany. Now he has more than 220 published research works and inventions.

Behzad Shahmoradi
University of Medical Sciences, Sanandaj, Iran

Magnetized Metal Oxide-Doped ZnO Nanocomposites: Synthesis, Characterization, and Photocatalytic Applications

The need for eco-friendly synthesis of nanomaterials has attracted scientists to develop new materials recoverable to reduce their release into the environment. Doping ZnO can enhance its photocatalytic properties by reducing its bandgap energy and activating it under sunlight illumination. In addition, magnetization would make it easily recoverable. Metal oxide-doped ZnO nanoparticles were synthesized through a one-step hydrothermal process with mass ratios of 0.5, 1, and 1.5 wt%. Synthesis of magnetized metal oxide ZnO nanocomposite was performed by reflux process. Different methods of FESEM, EDS, FTIR, DLS, UV-Vis Spectrophotometer, XRD, and Zeta potential were used to characterize the synthesized nanocomposite. The influence of operational parameters studied was time, type of nanocomposite, nanocomposite dosage, and the initial concentration of the model pesticides. In this talk, the main results of characterization and photodegradation will be presented and explained in detail.

Biography:

Prof. B. Shahmoradi was born in 1976 in Sanandaj, Kurdistan, Iran. After completing his B.E., he joined M.Sc. at the University of Mysore, India in 2004 and he was awarded Ph.D. from the same university in 2010. Later, he joined the Kurdistan University of Medical Sciences, Sanandaj, Iran. His work focuses on the synthesis and photocatalytic application of metal oxide ZnO/TiO2 nanomaterials/nanocomposites. He has published more than 125 papers in reputed scientific journals and has also written some book chapters related to material science. At present, he is working on the synthesis of magnetized metal oxide doped ZnO nanocomposites, assessing their photocatalytic application, and evaulating toxicity of the nanocomposites fabricated.

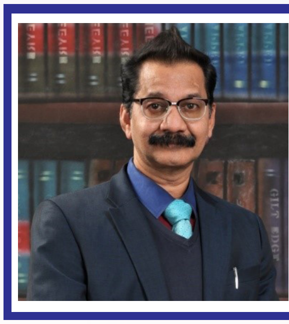
Zeinab Sanaee
University of Tehran, Tehran, Iran

Synthesis of Silicon Nanowires as a High Performance Anode material for Lithium Ion Battery

Today, Lithium ion batteries have been used extensively in mobile electronic devices. Especially for electric vehicles, usually these kind of batteries are widely implemented. These intensive applications of Lithium ion batteries have motivated the researchers to focus a great deal of attention on their performance improvement. Anode is one of the main components of these batteries, and for a long period of time graphite has been used for this section, offering a specific capacity of 372 mAh/g. On the other hand, Silicon is a high potential material for anodes of Lithium ion batteries, presenting a very high theoretical capacity of 4212 mAh/g, more than 10 times that of graphite. This ability to accept huge amount of Lithium inside its material, results in a high volumetric expansion for Silicon after lithiation that can lead to cracking of the active material, loosing its contact with current collector and finally degrading the battery performance. Nanostructures of Silicon can significantly help to solve this problem, by providing enough void space between nanowires, in addition to their better tolerance to the volume expansion compared to the bulk material. Here we have synthesized Silicon nanowires on stainless steel substrate, using VLS approach. This structure has been used as a binder-free anode material for Lithium ion battery application. 1 M LipF6 in EC/DEC with 5% FEC have been used as the electrolyte. Lithium ion half-cell have been assembled in a Glove box with Ar ambient with Oxygen and humidity of less than 0.1 ppm. The results show high specific capacity of about 2400 mAh/g.

Biography:

Zeinab Sanaee received her BSc, MSc and PhD in 2005, 2009, and 2011, all in Electrical Engineering from University of Tehran. Then she started working at University of Tehran as an assistant professor in 2012. Her research interest is focused on fabrication of Lithium ion batteries and supercapacitors, and synthesis and implementation of nanostructured materials for their performance improvement. She is also director of “Energy Storage Laboratory”, where “Silicon based anode for Lithium ion batteries” is followed as one of the main research subjects of the lab.



M.K.A.Ahamed Khan
UCSI University, Malaysia

Robotic in Health care

Since 2010, the demand for industrial robots has accelerated considerably due to the ongoing trend toward automation and the continued innovative technical improvements in industrial robots. In the last 10 years, the uptake of surgical robots, throughout the world especially in US, Europe including UK and Australia is extensive. In Asia, these machines are becoming popular with the hospitals in major cities and the usage is progressively increasing. The surgical robot has three components; console, patient cart and vision cart. The operation is performed by the surgeon through the robot. Robotic surgery has distinct advantages. It gives the surgeon a magnified 3D vision of the part requiring the operation and allows surgeons to do the procedure with great precision. Overall, robotic surgery allows the surgeon to perform a high quality operation for their patients. The introduction of minimally invasive techniques has transformed surgery in the past three decades. Patient benefits from mini-invasive surgery include less operative blood loss, less postoperative pain and consequently, reduced requirement of narcotics. RS for gastric cancer has been demonstrated to overcome intrinsic limitations of conventional laparoscopic surgery, thanks to the wristed instruments that allow multiple degrees of freedom, tremor filtering, three-dimensional vision, and a steady image, thus minimizing blood losses and surgical trauma and improving the surgeon's dexterity when fine manipulation is required. This can be especially helpful during maneuvers in restricted fields and around major vessels, such as in extended lymphadenectomy. Many of these issues could explain the shorter learning curve of robotic gastric surgery compared to laparoscopy. In this talk the Trends in the evolution of modern techniques using Robotics in Surgery will be shared and potential future directions will be proposed.

Biography:

M.K.A.Ahamed Khan obtained his PhD in Robotics, Power electronics and controls from USA ,holds his Professional Engineer Certification from IAO, USA and CEng (UK) also a Senior member in IEEE USA and MIET UK. He was with Rohde and Schwarz, Germany as Sales and service engineer from 1983-1987. , He served as a Senior lecturer in the faculty of engineering at the Madras university for seven years and has been with the faculty of Electronics Engineering, TAFE Australia, Malaysia campus during the year 1995 to 1997., he served as a Program coordinator for Malaysia France – University Nice, France between 1997 to 2006.He has been a consultant and trainer for multinational companies like Schneider electric, France., Vivendi Water supplies, France., and many Malaysian and Singapore companies. Also, he worked as an Assistant professor at UNISEL, Malaysia from 2006 to 2017. Currently he is working as an Assistant Professor in the faculty of engineering at UCSI University, Malaysia. He served as a IEEE RAS, Malaysia chapter executive committee member during the year 2013 and won the 2013 best IEEERAS Executive member award. Currently he is the Chairman for IEEERAS, Malaysia chapter and also an IEEE UCSI Student branch counselor. His current research is in the area of Power Electronics, Motor drives, Robotic and Controls. Along with many awards and more than 90 papers or research notes published in journals and conference proceedings, M.K.A. Ahamed khan has served as a Reviewer and Session Chairman for several conferences and project competitions. His main hobby is playing tennis, table tennis, cricket, travelling and reading books.