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World Nanotechnology Conference

April 15-17, 2019
Dubai, UAE

Theme: *Presenting Excellency of Nanotechnology to Transform the World*

Venue

Millennium Airport Hotel Dubai
Casablanca St. Al Garhoud, P.O.Box 13018, Dubai, UAE

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World Nano 2019

BOOK OF ABSTRACTS

WORLD NANOTECHNOLOGY CONFERENCE

Theme:

Presenting Excellency of Nanotechnology to Transform the World

April 15-17, 2019
Dubai, UAE

INDEX

Adam Januszko
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Anna Pajor-Swierzy
Jerzy Haber Institute of Catalysis and Surface Chemistry, Polish Academy of Sciences, Poland

Ashoka S
Dayananda Sagar University
India

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Bogdan Kuchta
Aix-Marseille University
France

Bozena Sikora
Polish Academy of Sciences
Poland

Chang-An Wang
Tsinghua University
China

Chen Wang
National Center for Nanoscience and Technology
China

Christoph Alexiou
University Hospital Erlangen
Germany

Dawid Pakulski
Adam Mickiewicz University in Poznan, Poland

Dhananjay R. Mishra
Jaypee University of Engineering & Technology
India

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Chinese Academy of Sciences
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AinShams University
Egypt

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Islamic Azad University
Iran

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University Of Sao Paulo
Brazil

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Slovak Academy of Sciences
Slovakia

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Saudi Arabia

Jing Xu
Zhengzhou Univeristy
China

Jose Anzaldo Hernandez
Universidad de Guadalajara
Mexico

Jose Higino Correia
University of Minho
Portugal

Julia Xiaojun Zhao
University of North Dakota
USA

Karel Havlicek
Technical University of Liberec
Czech Republic

Magda Nechanicka
Technical University of Liberec
Czech Republic

Mahmoud Khodari
South Valley University
Egypt

Manjunatha. C
R.V. College of Engineering
India

Maria Luisa Di Vona
University of Rome Tor Vergata, Italy

Maxim Ryzhii
University of Aizu
Japan

MayReda Mohamed
Ajman University
UAE

Mohammed Amer
University of California
USA

Mohsin Ali Raza
University of the Punjab
Pakistan

Muhammad Waseem
COMSATS University
Pakistan

Olugbenga Falode
University of Ibadan
Nigeria

Philippe Knauth
University Aix-Marseille
France

Przemysław Kowalik
Polish Academy of Sciences
Poland

Remya Simon
Stella Maris College
India

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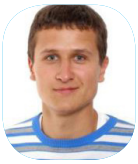

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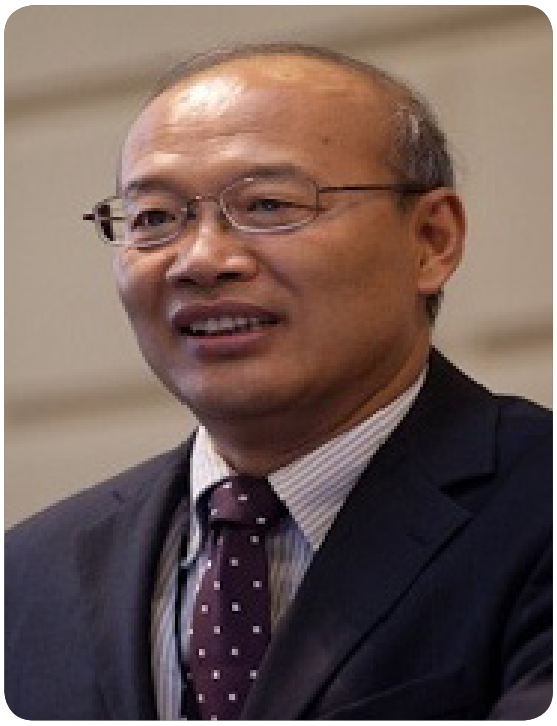
Thank You
All...

Welcome Message



Dear colleagues,

I am very grateful to be a member of the Organizing Committee of World Nano 2019 and feel a great honour to write this welcome message. On behalf of the Organizing Committee I would like to welcome you to Dubai City as well as the Conference itself, where you will have the opportunity to listen to internationally recognised Speakers on Nano-science and Nano-technology. There will also be an opportunity for fellow researchers to present their research to their colleagues, which in turn will help foster cooperation between colleagues across the research world. I hope that you will not only enjoy your time in the conference and the city, but also develop friendship for future research.

Enge Wang
Peking University & Chinese Academy of Sciences
Beijing, China

Welcome Message

Dear colleagues,

On behalf of the organizing committee I have the honour to welcome you to the World Nano 2019. which takes place from the 15 to 17 of April in Dubai, Emirate as the conference itself. The conference discuss one of the most important scientific trend

The nano-materiales synthesis, characterization and applications.

I myself will lecture about some application of nano-materiales in Analytical chemistry and removal of pollutants. The conference give us the chance to exchange the experience, build a friendship and future cooperation. I hope that you will enjoy the conference and the city and establish good links for future research

Mahmoud Khodari
Chemistry Department
SVU. Qena, Egypt

Welcome Message

Dear congress visitors, welcome to this prestigious world nano meeting.

Nano-energy is a dynamic research field on the science and engineering of nano-materials and nano-devices used in different energy technologies. Nano-energy topics comprise the application of nanostructured materials and nano-dimensional processes for energy storage and conversion. With the increasing ability to engineer materials at the nanoscale, electrochemical phenomena have an enhanced impact. This observation is related to the increased interface/volume ratio and the fact that even modest voltages can produce large electric fields over nanoscale distances, which enhance ionic motion and electrochemical processes. Electrochemical synthesis is a powerful tool for the preparation of thin solid electrolyte separators or nanostructured electrodes, particularly with complex shapes, such as nanotubes, nanowires etc.

This conference will highlight examples of such work and open fascinating discussions on nano-energy topics.

P. Knauth

DR. PHILIPPE KNAUTH
MARSEILLE, FRANCE

keynote speakers

Bogdan Kuchta
University Aix-Marseille
France

Thomas Mensah
Georgia Aerospace Systems
USA

Maria luisa di vona
University of Rome Tor
Vergata, Italy

Philippe Knauth
University Aix-Marseille
France

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National Center for
Nanoscience and Technology
China

Enge Wang
Chinese Academy of Sciences
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About MAGNUS GROUP

Magnus Group (MG) is initiated to meet a need and to pursue collective goals of the scientific community specifically focusing in the field of Sciences, Engineering and technology to endorse exchanging of the ideas & knowledge which facilitate the collaboration between the scientists, academicians and researchers of same field or interdisciplinary research. Magnus group is proficient in organizing conferences, meetings, seminars and workshops with the ingenious and peerless speakers throughout the world providing you and your organization with broad range of networking opportunities to globalize your research and create your own identity. Our conference and workshops can be well titled as 'ocean of knowledge' where you can sail your boat and pick the pearls, leading the way for innovative research and strategies empowering the strength by overwhelming the complications associated with in the respective fields.

Participation from 90 different countries and 1090 different Universities have contributed to the success of our conferences. Our first International Conference was organized on Oncology and Radiology (ICOR) in Dubai, UAE. Our conferences usually run for 2-3 days completely covering Keynote & Oral sessions along with workshops and poster presentations. Our organization runs promptly with dedicated and proficient employees' managing different conferences throughout the world, without compromising service and quality.

About World Nano 2019

Magnus Group takes prodigious pleasure to invite you to participate in the 'World Nanotechnology Conference' scheduled on April 15-17, 2019 in Dubai, UAE.

On this prosperous occasion, our committee takes immense privilege to invite the participants from all over the world to take part in this conference with the theme "Presenting Excellency of Nanotechnology to transform the World". The conference aims to review their knowledge, experience and share new ideas amongst the professionals, Industrialists and students from research areas of Nanoscience and Nanotechnology and take active part in the interactive discussions and technical sessions at the conference. The conference also provides a space for the companies and the institutions to present their services, products, innovations, innovative ideas and research work & results.

Scope of the congress: World Nano 2019 will furnish you on the latest trends and keeps you up to date on the newest advances in Nanotechnology. A unique aspect of the event is to emphasize research and clinical practice that include Nanobiotechnology, Nanomaterials, Nanomedicines and many more offering deeper coverage of interventional procedures for those in the field of Nanoscience.

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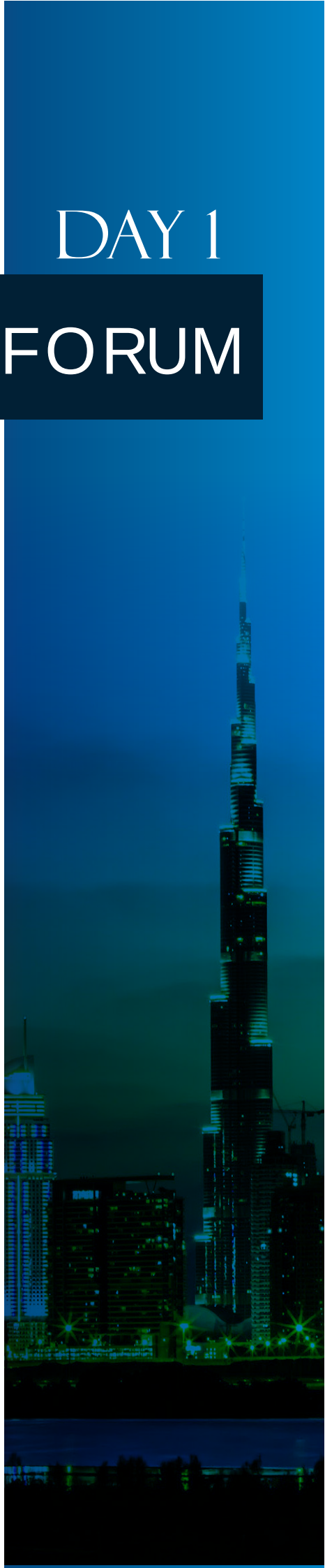
DAY 1

KEYNOTE FORUM

WORLD NANO TECHNOLOGY CONFERENCE

APRIL
15-17, 2019

DUBAI, UAE



World Nano 2019

Biography:

Pr. Knauth studied Chemistry at the Saarland University, Germany and graduated in 1984. He then received his PhD degree in 1987 from the Institute of Physical Chemistry at the same institution. After two years postdoctoral fellowship at the Centre for Thermodynamics and Microcalorimetry, France, and one year in industry at Bayer Co., he became CNRS researcher in 1990. He got his habilitation in 1996 and a Full Professor position at Aix Marseille University in 1999, where he is currently director of the Chemistry Department. He has published more than 180 research articles in international journals.

Thin ion-conducting membranes for energy technologies: Advanced conformal deposition by electrochemistry

Philippe Knauth, Ph. D.

[1]Department of Chemistry, Aix-Marseille University, Marseille, France
[2]Department of Industrial Engineering, University of Rome Tor Vergata, Rome, Italy

Electrochemical synthesis is a powerful tool for the preparation of conformal, thin solid electrolyte membranes directly on the electrodes, particularly with complex shapes, such as nanotubes, nanowires etc.

Such separators should present the highest possible conductivity by the electrochemically active ions, negligible electronic conductivity, combined with high chemical and mechanical stability.

These requirements drive our development work: we use aromatic polymers, given their excellent mechanical properties (large stiffness and strength), which are decisive for a high durability of the separators and the devices. Single-ion conductivity is assured by grafting the counter-ions on the polymer chain (ionomers).

The talk will present examples of electrodeposition of ionomer membranes and report structural, microstructural and electrical properties of the ionomers, including relevant applications, such as Li microbattery cycling data.

1. Cation-conducting membranes

We synthesized several ionomers containing grafted sulfonate groups. These ionomers (including poly(styrene sulfonate), PSS) can be used for proton exchange membrane fuel cells or enzymatic fuel cells and Li batteries.

2. Anion-conducting membranes

These ionomers contain quaternary ammonium as fixed cationic groups. They can be applied for example in hydroxide exchange membrane fuel cells, enzymatic fuel cells or solid-state water electrolysers.

Thin ionomers separators are a valuable asset for the realization of micropower devices, especially microbatteries and microfuel cells. Furthermore, anodic and cathodic deposition conditions were explored, which opens perspectives for the realization of deposits on various semiconducting substrates and simultaneous or sequential co-deposition with noble or non-noble metals for the realization of catalytic electrodes.

Audience Take Away:

- Eletrochemical synthesis can be used as innovative method for the synthesis of many different nanostructured materials, including thin-film solid electrolytes.
- The bottom-up approach for the one-pot synthesis of nano-objects is determined by the control of the electrodeposition parameters, such as current and voltage or electrolyte composition.
- Many other polymers can be obtained with conformal and thin shape by using electrodeposition.

Biography:

Thomas O. Mensah was born around 1950, is a Ghanaian-American chemical engineer and inventor. His works are in fields relating to the development of fiber optics and nanotechnology. He has 14 patents, 7 of which awarded within a period of six years, and was inducted into the US National Academy of Inventors in 2015. In 2017 Dr. Mensah served as Editor-in-Chief of the international textbook Nanotechnology Commercialization published by AIChE and John Wiley & Sons.

Commercializing Nanotechnology

Dr. Thomas Mensah

Silicon Valley of Ghana and Georgia Aerospace Systems ATLANTA GA, USA

Commercializing Nanotechnology in the 21st century is a major challenge for Industry, Academia, and National laboratories in many countries. Billions of dollars have been invested by many advanced countries because of the expected Trillions of Dollars that such commercialization of Nanotechnology Products can bring, these products include Nanotechnology Batteries for Cell phones, laptops, tablets Etc. that can stay charged after one week of use. Other products can be used in Space, such as Satellites structures and other materials that can withstand the high temperatures for space shuttle engines. In this paper, we have focused on novel approaches for surmounting technical challenges needed to scale up processes from the laboratory to commercial environment. Mathematical models backed by experimental results will be used to explain processes in the High Temperature Ablative of Rocket Motors.

Biography:

Bogdan Kuchta graduated from the Wroclaw University of Technology, Poland, where he also received his PhD (1982) and habilitation (1990) degrees. Full Professor from 1996, he moved to Aix-Marseille University in France in 2001, where he is faculty member at the Department of Chemistry, MADIREL laboratory. Main interests in computer simulation methodology for interpretation of microscopic mechanism of materials transformations.

Adsorption induced low temperature transformations of methane adsorbed in IRMOF microporous structures

Bogdan Kuchta, Ph. D.

Laboratoire Madirel, University Aix-Marseille – CNRS, Marseille, Faculty of Chemistry, Wroclaw University of Science and Technology, 50-370 Wroclaw, Poland

We discuss the mechanism of the structural transformations of gas adsorbed in microporous crystalline solids. We show that it is possible to induce structural transformations in a confined system by simply varying the number of molecules adsorbed in the pore. We found that the mechanism of these novel, adsorption-induced structural transformation in nano-pores differs from the capillary condensation. First, the structure of the confined gas is determined by a competition between adsorption sites attractive forces and intermolecular interaction. Second, at low temperature, the transformation is discontinuous because it is defined by limited number of accessible adsorption sites. In the case of methane adsorbed in IRMOFs porous structures the character of transformation depends on temperature but also on the IRMOF structure: it changes from strongly discontinuous (especially at low temperatures), to continuous transition. The mechanism of the transformation is also modified by the size of the gas molecules and the strength of interaction. However, even discontinuous transition can produce continuous isotherms. We will show that the continuous isotherm can be the effect of statistical dynamical switching between two phase, characterized by different number of adsorbed molecules. We show the simulated microscopic mechanism and experimental observations support such statistical interpretation.

This work was supported by the Polish National Science Centre (NCN, grant no. 2015/17/B/ST8/00099). The calculations have been partially performed at the WCSS computer center of The Wroclaw University of Science and Technology, grant no 33.

Audience Take Away:

- Mechanism of methane adsorption in microporous systems at low temperature.
- New type of structural transformations.
- Microscopic interpretation of adsorption.

Biography:

Maria Luisa Di Vona, Laurea in Chemistry cum Laude, University of Rome La Sapienza. Professor of Chemistry at the University of Rome Tor Vergata (Unitov). Responsible of the International Associated Laboratory "Ionomer Materials for Energy" at the Dep of Industrial Engineering. Unitov responsible of Erasmus Mundus Joint Master Degree "Chemical Nano-engineering". Invited professor at Aix-Marseille University and Nat. Inst. Mater. Sci. NIMS, Japan. Principal investigator of several Research Projects (HORIZON 2020, EU FP7, MIUR). Principal organizer of 10 international symposia. Field of expertise: Synthesis of organic-inorganic materials. Development of ionic polymeric conductors. 145 international publications, 35 invited congresses, 3 patents.

Composite ion exchange membranes with nanometric building units

Maria Luisa Di Vona

[1] University of Rome Tor Vergata (URoma2), Dep. Industrial Engineering, 00133 Roma, Italy

[2] International Associated Laboratory (L.I.A.): Ionomer Materials for Energy (AMU, URoma2, CNRS), France, Italy

Main challenges for ion exchange membranes (IEM) are stability and durability. Various strategies have been developed to increase the IEM performances. Among them hybrid organic-inorganic materials show many interesting features: they have the ability to combine the functionality of organic compounds with the stability of inorganic materials. It is possible to distinguish between class I and II hybrids. Class I hybrids (or composites) are obtained dispersing inorganic components in a polymeric matrix. This approach was applied in many protonic membranes and in the last years also in a few anion exchange membranes. The composites are usually obtained mixing preformed nanoparticles or forming nanoparticles via in situ sol-gel reactions. The results are a stabilization of the polymeric phase and a decrease of the fuel crossover. However, a decrease of the conductivity is mostly observed due to the presence of a second phase. The reduction of the conductivity can be mitigate by the use of conducting fillers: the addition of layered double hydroxides containing ionic liquid to ionomer membranes improves the ionic conductivity at low and high humidity. In this presentation an overview of the different methods used to achieve composite IEM will be given.

Audience Take Away:

- Expertise in the synthesis of ion exchange membranes for different applications.
- Ion exchange membranes are very flexible soft materials. The study of nanocomposites opens new opportunities.
- Properties tuning is possible by variation of synthesis conditions.

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DAY 1

SPEAKERS

WORLD NANO TECHNOLOGY CONFERENCE

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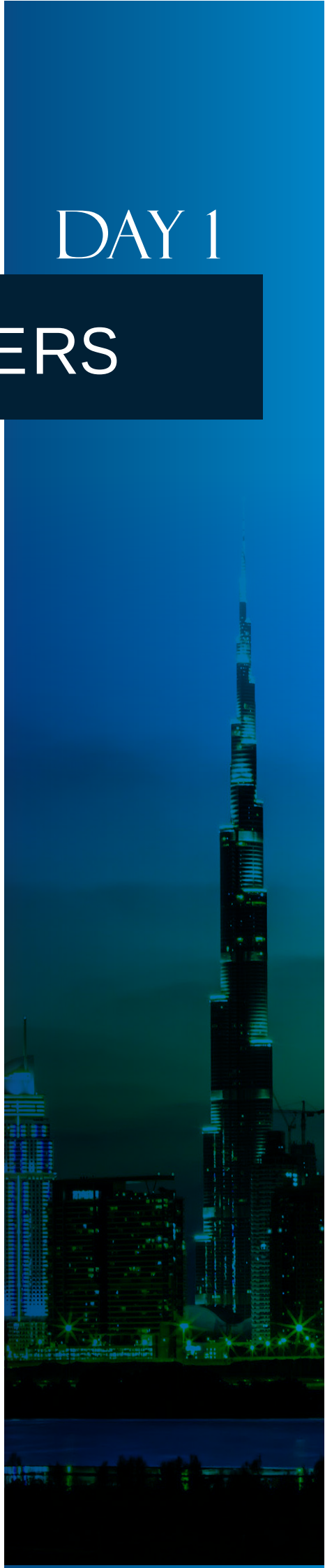
DUBAI, UAE



World Nano 2019

Emerging new Van der Waals semiconductor devices: Opportunities and challenges

Moh. R. Amer*[1,2]
[1]Center of Excellence for Green Nanotechnologies, King Abdulaziz City for Science and Technology, Riyadh, Saudi Arabia
[2]Department of Electrical Engineering, University of California, Los Angeles

Low dimensional materials have been under extensive investigations due to their exceptional electrical, mechanical, thermal, and optical properties at the nanoscale. Scientist and engineers have focused their attention on Graphene and related materials in the past few years. However, due its gapless feature, semiconductor devices based on graphene are facing major challenges. Nevertheless, new emerging layered 2D transition metal dichalcogenide (TMDCs) such as MoS_2 can offer tunable band gaps by changing only the number of layers. Due to weak van der Waals force between their layers, TMDCs enable us to exfoliate atomically thin layers from their bulk forms, analogous to graphene. In my talk, I will discuss the properties and our recent results of these TMDCs, along with the opportunities offered and the challenges faced in creating van der Waals devices. First, I will show the environmental effects due to air exposure on 2D nanosheets using confocal Raman spectroscopy technique and show how degradation can be prevented for future device processing techniques. Also, I will show that these new emerging materials exhibit exceptional electronic properties. For instance, $HfSe_2$, which has been widely known to as a n-type semiconductor, can be tuned to exhibit p-type behavior by applying different treatments. Moreover, I will show our recent tunable light emission black phosphorus nanosheet which exhibits a broadband light emission between 590nm-720nm at the nanoscale. This broadband emission can be tuned within 5nm spectral resolution. Finally, I will discuss the challenges related to these emerging 2D materials and how these they can play a role in various nanoelectronic and optoelectronic applications.

Audience Take Away:

- What are 2D materials and their related properties.
- New experimental results of 2D semiconductor devices showing tunability between n-type and p-type.
- New experimental results of Black phosphorus nanosheets, a new emerging material, that exhibit a broadband tunable light emission.
- Challenges facing 2D materials.

Biography:

Dr. Amer currently serves as the director of Center of Excellence for Green Nanotechnologies (CEGN) at University of California, Los Angeles (UCLA) and King Abdulaziz City for Science and Technology (KACST). He is also an assistant research professor at KACST where he is the principal investigator various technical projects. Dr. Amer is the co-recipient of the 2016 Arab-American Frontiers fellowship sponsored by the U.S. National Academy of Sciences, Engineering, and Medicine. Prior to his appointments at UCLA and KACST, Dr. Amer served as a research assistant in the Center of Energy Nanoscience (CEN) at University of Southern California. His current research focuses on low dimensional devices such as graphene and 2-D materials for industrial applications. Dr. Amer has authored and co-authored many scientific papers.

Development of graphene-based nanomaterials for biomedical applications

Dr. Julia Xiaojun Zhao*[1], Dr. Xu Wu[1], and Dr. Min Wu[2], Dr. Ying Zhang[1], Dr. Diane Darland[3]
[1]Department Chemistry, [2]Department of Biomedical Sciences, [3]Department of Biology, University of North Dakota, Grand Forks

We have developed a few new graphene-based nanomaterials, including graphene-based fluorescent quantum dots, reduced graphene oxide (RGO)/metal (oxide) (e.g. RGO/Au, RGO/Cu_2O, and RGO/Ag) nanocomposties, graphene-silica core-shell nanostructures, and 3-D graphene scaffold. In this presentation, the methods of making these new graphene-based materials will be introduced. A series of characterizations of these nanomaterials using STEM, FE-SEM, EDS, UV-vis absorption spectroscopy, XRD, FT-IR and Raman spectroscopy will be discussed. Finally, the applications of these nanomaterials in the fields of biomedical study will be reported including fluorescence imaging using graphene quantum dots, cell culture using 3D graphene, anti-bacterial applications of graphene-metal nanocomposite, and photothermal therapy and drug delivery of the graphene nanostructures. For example, a facile bottom-up method for the synthesis of highly fluorescent graphene quantum dots (GQDs) will be discussed using a one-step pyrolysis of a natural amino acid, L-glutamic acid, with the assistance of a simple heating mantle device. The feasibility of using the GQDs as a fluorescent biomarker was investigated through in vitro and in vivo fluorescence imaging. The results showed that the GQDs could be a promising candidate for bioimaging.

Audience Take Away:

- Application of the new graphene based nanomaterials.
- New methods for making new graphene based nanomaterials.
- New properties of the graphene based nanomaterials that will be useful for bioapplications.

Biography:

Dr. Zhao is a professor in the Department of Chemistry at the University of North Dakota, USA. She has worked in the field of nanoscience and nanotechnology for 18 years. She has authored for more than 90 publications and holds seven issued patents. Currently, she is the Principle Investigator for three major research grants from the US National Science Foundation, the US Department of Energy, and the North Dakota Industrial Commission. Dr. Zhao's research group is focused on the development of various nanomaterials and applications of these nanomaterials in biological studies. Dr. Zhao received both her BS and Ph.D. degree from Jilin University, China.

Iron nanoparticles for Biomedical applications – The SEON concept

Christoph Alexiou*[1], Harald Unterweger[1], Marina Mühlberger[1], Ralph Heimke-Brinck[2], Frank Dörje[2] and Raine Tietze[1]

[1]ENT Department, Section for Experimental Oncology & Nanomedicine (SEON), Else Kröner-Fresenius-Stiftung Professorship, University Hospital Erlangen, Erlangen, Germany.

[2] Iron nanoparticles for Biomedical applications – The SEON concept

Nanoscience has now matured and has been transitioned from bench science to applied technology; superparamagnetic iron oxide nanoparticles (SPIONs) are widely used in various scientific fields, not only on commercial scale but their wide use in biomedical science are more significant. Due to their tremendous behavior and applications, much effort has been invested for more than a decade, but unfortunately, successful pharmaceutical developments are still rare, despite very promising results. The main stumbling blocks are insufficiently addressed toxicity and the lack of appropriate particle stability in biological media. Even if these factors are adequately addressed, another important challenge which hampers the way to the clinic is the need to upscale the synthesis process from the milliliter lab scale to the liter scale and by doing so to meet the requirements from the regulatory authorities. At SEON we tackle exactly this issue and developed in the past a couple of iron oxide based formulations for drug targeting and contrast agents for MRI. These systems are well-designed to conform the physicochemical and toxicological requirements for their respective application. Due to a close collaboration with the Pharmacy Department of the Erlangen University Hospital, we are currently producing nanoparticles in the scaled up liter measure according to the highest possible international quality standard – the Good Manufacturing Practice (GMP) Guidlines. Based on the very promising preclinical results we are planning to bring our nanoparticle-based formulations to the clinic in the near future, if the respective funding is existing.

Audience Take Away:

- Iron nanoparticles can be used in medicine for diagnostics (Imaging) and therapy (Drug Targeting, Precision Medicine).
- No adverse side effects due to innovative and intelligent nanoparticle based drug delivery.
- Translation into clinics using the SEON-concept becomes concrete reality if the respective funding is existing.
- High scientific, medical and economic adding value.

Biography:

Prof. Dr. Christoph Alexiou, received his Ph.D. in 1995 from the Technical University of Munich, Medical school. After finishing his internship in the Gastroenterology Department at the University hospital of the Technical University he started as a physician and researcher at the Department of oto-rhino-laryngology, head and neck surgery and founded a research group working on the field of local chemotherapy with magnetic nanoparticles (Magnetic Drug Targeting). In the year 2000 he received his degree as an ENT-Physician and 2002 he changed to the ENT-Department in Erlangen, Germany, where he performed his postdoctoral lecture qualification (Habilitation). He is working there as an assistant medical director in the clinic and leads the Section for Experimental Oncology and Nanomedicine (SEON). Since 2009 he owns the Else Kröner-Fresenius-Foundation-Professorship for Nanomedicine at the University hospital Erlangen. He receives grants from the European Union, German Research Community (DFG), Ministry of Education and Science (BMBF) and Bavarian State Ministry of the Enviroment and Consumer Protection and is a member of the Executive Board of the European Technology Platform for Nanomedicine (ETPN). His research is addressing the emerging fields of Diagnosis, Treatment and Regenerative Medicine using magnetic nanoparticles and the translation from basic research into clinical trials and published >150 papers in peer reviewed journals. He received for his research several national and international renowned awards.

Real-space transfer in graphene-phosphorene heterostructures: Physics and prospective applications

M. Ryzhii[*1], T. Otsuji[2], D. S. Ponomarev[3], V. Ryzhii[2,3,4,5], V. Mitin[6], and M. S. Shur[7]
[1]Department of Computer Science and Engineering, University of Aizu, Aizu-Wakamatsu, Japan,
[2] Research Institute of Electrical Communication, Tohoku University, Sendai 980-8577, Japan
[3] Institute of Ultra High Frequency Semiconductor Electronics of RAS, Moscow 117105, Russia
[4] Center for Photonics and Infrared Engineering, Bauman, Moscow State Technical University, Moscow, Russia
[5] Center for Photonics and 2D Material, Moscow Institute of Physics and Technology, Dolgoprudny, Russia
[6] Department of Electrical Engineering, University at Buffalo, SUNY, Buffalo, NY, USA
[7] Departments of Electrical, Electronics, and Systems Engineering, Rensselaer Polytechnic Institute, Troy, USA

The gapless energy spectrum and high carrier mobility in graphene (G) the flexibility of the energy spectrum in few-layer black phosphorus, i.e., phosphorene (P), the impressive advances in their technology present a new opportunity for developing different new devices on the base the G-P heterostructures.

In this work, we analyse theoretically the lateral carrier transport in these heterostructures, particularly at sufficiently strong electric fields resulting in a substantial carrier heating. We show that the carrier heating can enable effective transfer of light carriers from the G-layer to the P-layer (real-space transfer or RST), where the carrier effective masses are rather large.

We consider the application of the effect of RST in the G-P heterostructures in the field-effect transistors (FETs) with the G-P channel. In particular, we show that due to the RST in such GP-FETs the source-to-drain current can drastically drop with increasing voltage, exhibiting the negative differential conductivity (NDC). The instability of the steady-state source-drain dc current associated with the NDC might be used for generation of electromagnetic oscillations and in logical circuits.

The RST effect can also be used for the electro-optical modulation of terahertz radiation propagating in a waveguide integrated with the GP-FET, employing the variation of the G-P-channel conductivity by the source-to-drain voltage.

Audience Take Away:

- The audience attention will be drawn to new type of interesting heterostructures based on graphene.
- The heterostructures under consideration can be used for the development of novel effective electronic and optoelectronic devices.

Biography:

Dr. M. Ryzhii received the MS degree in quantum electronics from the Moscow Institute of Physics and Technology, Russia, in 1992, and the DEng degree in physical electronics from the Tokyo Institute of Technology, Japan, 2001. From 1993, he has been with the University of Aizu, Aizu-Wakamatsu, Japan, where he is currently an Associate Professor at the Complex System Modeling Laboratory. His research activity includes physics and computer modeling of optoelectronic and terahertz nanostructure devices, and computational modeling of biophysical systems.
He is the author or coauthor of more than 120 research articles.

Optogenetic neural interfaces

J.H. Correia*, S.B. Goncalves, S. Pimenta, J.F. Ribeiro
CMEMS-UMinho, Dept. of Industrial Electronics, University of Minho, Guimaraes, Portugal

Optogenetics is a relatively new technology to achieve cell-type specific neuromodulation with millisecond-scale temporal precision. Optogenetic tools are being developed to address neuroscience challenges, and to improve knowledge of the brain networks with the ultimate aim of catalyzing new treatments for brain disorders and diseases. The accomplishment of this ambitious goal requires the implementation of mature and reliable engineered tools. In the last decade, several efforts have been made to provide full developed devices with photostimulation capability for neural tissue activation or inhibition. The success of optogenetics relies on optical tools (referred to as optrodes) which are in contact with the neural tissue. First, the design and manufacturing approaches available are reviewed, and the current challenges to accomplish appropriate multimodality, wireless optical devices are discussed. Finally, a single LED optrode with electrophysiological recording sites in a silicon probe is presented.

Audience Take Away:

- Audience related with biomedical engineering will appreciate a silicon neural probe avoiding overheating process.
- A manufacturing methodology relies on standard microfabrication technologies: lithography, thin-film depositions and low-cost traditional mechanical blade dicing technology.
- Fabrication results suggest a robust probe design, with 8 mm long single-shaft with a sharp tip. The 2D dicing methodology, applied to silicon wafers, facilitates the integration with patterning process, frequently used in MEMS and CMOS industry.
- Low impedance values of recording sites and sufficient light power results show great potential for this design to modulate neural activity in both cortical and deeper brain regions.

Biography:

J. H. Correia graduated in Physical Engineering from University of Coimbra, Portugal in 1990. He obtained in 1999 a PhD degree at the Laboratory for Electronic Instrumentation, Delft University of Technology, The Netherlands, working in the field of microsystems for optical spectral analysis. Presently, he is a Full Professor in Department of Industrial Electronics, University of Minho, Portugal. He was the General-Chairman of Eurosensors 2003 and MME 2007, Guimaraes, Portugal. His professional interests are in micromachining and microfabrication technology for biomedical microsystems.

Biofunctionalized multifunctional nanoparticles as a potential strategy for a targeted cancer therapy

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The main goal of our research was to design, synthesize and characterize the multifunctional nanosystems with a wide potentials for functionalization. We aimed on two kind of materials: the up-converting nanoparticles (UCNPs) of yttrium sodium fluorides and the superparamagnetic iron oxide nanoparticles.

The first kind of nanoparticles – NaYF4:Yb,Tm, characterized by up-converting properties generated by near infra-red light (NIR) excitation. The material can be applied in photodynamic therapy (PDT) and medical imaging. The UCNPs irradiated by 980 nm light convert this radiation to visible and ultra violet light. At the same time, due to a high energy generated light (UV-VIS), in aqueous environment the UCNPs generate reactive oxygen species (ROS) which are toxic for cancer cells. Furthermore, near Infra Red light (NIR), compared to visible and ultra violet light, penetrates deeper biological tissues. Thus, can help to expand the application area for a potential PDT. Second type of nanoparticles – Fe_3O_4 – represent an alternative therapeutic strategy: magnetic hyperthermia. The nanoparticles have superparamagnetic properties (SPIONs) therefore, after exposition to an alternating magnetic field, generate heat. Local temperature enhancement can be toxic to selected pathological cells. Additionally, the nanoparticles do not self aggregate.

The surface of UCNPs, after encapsulation by silica shell, allows to prepare multifunctional nanoconstructs for a future molecular targeted therapy. Thanks to the attachment of protein molecules, they could gain specificity and selectivity. Our preliminary studies reviled relatively low cellular toxicity, in vitro, which indicates their potential application in biology and medicine.

Audience Take Away:

- Connection between different fields of science (physics, chemistry and biology) in one nanosystem;
- Practical knowledge how to design, make and characterize multifunctional nanocomponents;
- Modern point of view for cancer treatment;
- Optimalization of nanoparticles by biofunctionalization for targeting cancer therapy.

Biography:

M. Sc. Eng Przemysław Kowalik graduated Biotechnology at the University of Rzeszów (Poland) in 2014. Than he begin doctoral studies in group of Prof. Danek Elbaum at Laboratory of Biological Physics (Institute of Physics, Polish Academy of Sciences, Warsaw, Poland). The main aim of his work was to design, optimize potential nanomaterial for photodynamic therapy (results already published) and biofunctionalization of investigated material for targeting therapy (work was finished with success and waiting for publication).

On-site gas sensing by Surface-Enhanced Raman scattering

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Advanced Materials Laboratory, School of Materials Science and Engineering, Tsinghua University, Beijing 100084, China.

Ag nanorods coated with an ultrathin HfO_2 shell (AgNRs@HfO_2) were prepared for the synthesis of a versatile, robust, and easily recyclable surface-enhanced Raman scattering (SERS) substrate. This substrate maximizes the high melting point of HfO_2 shell and thus ensures the plasmonic efficiency of AgNRs. Therefore, it possesses extraordinary thermal stability and SERS activity, which could act as a reusable and cost-effective SERS detector. After SERS detection, the regeneration of AgNRs@HfO_2 was achieved by annealing the substrate within several seconds. This procedure led to the thermal release of adsorbed molecules and resulted in a refreshed substrate for subsequent measurements. The composite substrate maintained its SERS efficiency well during multiple "detection–heating" cycles, exhibiting good stability and recyclability. Furthermore, in addition to revealing the feasibility of SERS sensing in liquids, AgNRs@HfO_2 also provided continuous real-time monitoring of gas targets at ultralow concentrations. This work provides a robust and renewable SERS sensor with advantages of high sensitivity, stability, cost effectiveness, and easy operation, which can be implemented for both aqueous and gaseous analyte detection and is thus an intriguing candidate for practical applications in environmental, industrial, and homeland security sensing fields.

Audience Take Away:

- Localized surface plasmon resonance (LSPR) of metallic nanostructures.
- Surface-enhanced Raman scattering (SERS) for trace level sensing.
- Fabrication of thermally stable metallic nanostructures.

Biography:

(Dr. Zhang studied Materials Science and Engineering at Tsinghua university, China, and received his BS, MS and Ph.D. degrees in 1991, 1993 and 1995, respectively. He then stayed as an Alexander von Humboldt research fellow and STA research fellow in Germany and Japan and a postdoctoral researcher in the US from 1996 to 2001. He is now a full professor at School of materials Science and Engineering, Tsinghua university.)

The optimization of methods of synthesis of nickel nanoparticles with silver nanoshell as component of conductive materials

Anna Pajor-Świerzy*[1], Dorota Gaweł[1], Robert Socha[1], Radosław Pawłowski[2], Piotr Warszyński[1], Krzysztof Szczepanowicz[1]

[1]Jerzy Haber Institute of Catalysis and Surface Chemistry Polish Academy of Science, Kraków, Poland,
[2] Helioenergia Sp. z o.o., Czerwionka-Leszczyny, Poland

Conductive inks based on nickel nanoparticles (NPs) have attracted much attention as a low-cost replacement for the currently used silver and gold NPs for fabrication of printed electronic circuits and devices. The nickel NPs as a component of conductive inks should be stable against oxidation process at all stages of preparation of conductive patterns: ink formulation and storage, printing, and post-printing treatment. In the present study, spontaneous oxidation of nickel was prevented by the formation of a silver shell on their surface, which results in the formation of nickel-silver core-shell (Ni@Ag) NPs. Those NPs were formed in the two-step process: (1) the formation of a dispersion of Ni nanoparticles; and (2) the transmetalation (galvanic displacement) reaction, where the surface of the Ni NPs acted as the reducing agent of silver ions. In the optimal condition of synthesis, Ni@Ag nanoparticles with about 50 and 210 nm-diameter Ni core coated with a thin (~10-20 nm) silver shell, were obtained. Finally, the stability of the synthesized spherical shaped Ni@Ag NPs was tested and the results indicate long-term stability against aggregation and nickel oxidation. Thick films composed of Ni@Ag NPs were deposited on a glass substrate and then sintered at temperatures ranging from 250°C to 370°C. The conductivity of Ni@Ag based coatings after sintering at 350°C was high, 11% of that for a bulk nickel. The obtained results clearly indicate that prepared metallic ink based on Ni@Ag NPs possess promising properties for its application in the printing technology of circuit board.

Audience Take Away:

- The simple and fast methods of synthesis of air-stable Ni@Ag NPs.
- The implementation of obtained results will allow fabricating convenient and low-cost material for application in conductive features.
- This approach is very important from an economic point of view and will make possible preparation of metallic conductive materials for large scale commercial application.

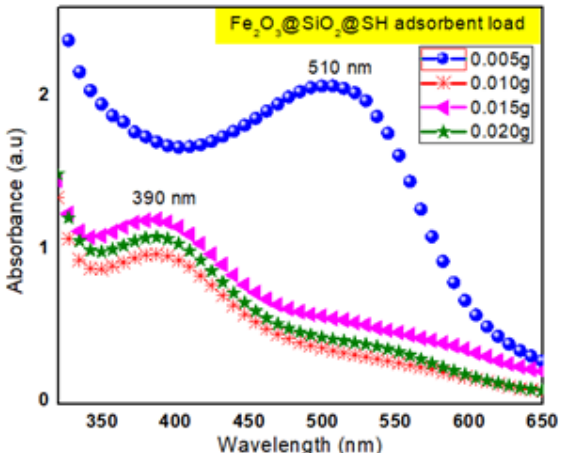
Biography:

Anna Pajor-Świerzy has completed her PhD from the Jerzy Haber Institute of Catalysis and Surface Chemistry Polish Academy of Sciences and postdoctoral studies from Casali Center for Applied Chemistry of the Hebrew University of Jerusalem. She is the assistant of professor (adiunkt) of Jerzy Haber Institute of Catalysis and Surface Chemistry PAS. The field of her research is the synthesis of metallic nanoparticles for preparation of conductive materials. She has published more than 11 papers in reputed journals.

Fabrication of thiol-functionalised core shell magnetic iron oxide nano-particles for Hg^{2+} ion removal in water

Manjunatha. C*[1], Sham Aan M.P[1], Subana P.S[2]
Department of 1Chemistry, 2Chemical Engineering,
R.V. College of Engineering, Bengaluru-560059, Karnataka, INDIA

Mercury is a specific concern worldwide because of its high toxicity. Exposure to mercury, even at very low concentrations, induces digestive, brain, kidney and endocrine system diseases, and it especially causes neurological diseases. Therefore, there is an urgent need for developing suitable technique to remove Hg^{2+} ion in water. In the conference, I would like to discuss the one step solution combustion synthesis of Iron oxide nanoparticles using various fuels such as oxalic acid, citric acid, urea, D-glucose, and glycine and its surface modification by silica coating followed by thiol (-SH) functionalization using L-Cysteine by ultra-sonication technique. Characterisation of thiol-functionalised core shell magnetic iron oxide nano-particles using XRD, FESEM, FT-IR, and UV-Vis technique is also discussed. Further, the effective removal of Hg^{2+} ion in aqueous solution using various amounts of functionalised core-shell magnetic will be revealed. After the adsorption processes, the Fe_2O_3@SiO_2@SH nanoparticles recovery from the aqueous solution will also be highlighted. By utilising UV-Vis spectroscopic technique and a complexing agent dithizone ligand, the effective adsorption behaviour of Fe_2O_3@SiO_2@SH nanoparticles for removal of Hg^{2+} ion in water will be discussed.



Audience Take Away:

- Audience are enlightened about mercury ion ill effects and are made cautious about mercury ion contaminated water.
- The audience will be able to learn a very simple synthesis method for preparing core shell magnetic nanoparticles.
- It would definitely help the researcher to expand their research and the faculty for effective teaching about the applications of nanomaterials for water treatment. Further, it would be very useful for the delegates come from water purification industry.
- It creates new concepts, ideas, curiosity, for more effective utilisation of magnetic nanoparticles for toxic metal ion removal.

Biography:

Manjunatha. C, has completed his Ph.D in (Applied Science-Chemistry, 2009 to 2013) at Visvesvaraya Technological University, Belagavi-590018, Karnataka, INDIA. He is presently working as an Assistant Professor in Chemistry Department, R. V. College of Engineering, Mysore road, Bengaluru-560059, INDIA (From January 2009). He is teaching Chemistry for engineering students from 2009. He has published several research papers in reputed international journals and presented his research work in more than 20 national and international conferences, seminars and workshops. He is also a recognised reviewer for three reputed journals in the field of Nano materials Chemistry. He is also guiding the Ph.D, M.Tech and B.E student projects.

Oxygen on rutile TiO_2(110) surface: AFM manipulation of charge state and molecular bond

I. Štich*[2], Y. Adachi[1], Q. Zhang[1], J. Brndiar[2], L. Kantorovich[3], Y. J. Li1, Y. Sugawara[1], I. Štich[2]
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[2]Center for Computational Materials Science, Institute of Physics, Slovak Academy of Sciences, 845 11, Bratislava, Slovakia
[3]Department of Physics, King's College London, The Strand, London, WC2R 2LS, United Kingdom

We show that charge states of adsorbed oxygen adatoms on rutile TiO_2(110)-1×1 surface can be measured and deliberately manipulated by a combination of noncontact atomic force microscopy and Kelvin probe force microscopy at 78 K in ultrahigh vacuum and interpreted by extensive density functional theory modeling. Several kinds of single and double oxygen adatom species are clearly distinguished and assigned to three different charge states: O_{ad}-/2O_{ad}-, O_{ad}^{2-}/2O_{ad}^{2-} and O_{ad}--O_{ad}^{2-}. We also show that a single double charge manipulation on individual oxygen adatoms can be performed simply by modification of frequency shift (tip-sample distance) and the role of the excess charge (polarons) due to the defect presence understood. In addition, for the first time, we show, by means of AFM experiments, that two single oxygen atoms placed on rutile TiO_2 (110) surface undergo a series of reversible chemical reactions or adatom charging in a controlled manner, depending on precise tip placement and voltage applied. We observe the reversible bond formation (association) and destruction (dissociation) between two oxygen atoms ($2O_{ad}^{2-} \leftrightarrow O2^{2-}$) by simply removing or adding (two) tunneling electrons to or from the AFM tip, respectively. We unambiguously prove that the observed processes are indeed due to charge rather than atom manipulation, i.e. are electron-mediated. The reliability of the observed bond formation will qualify this simple manipulation method as a new atom-molecular switch system on a semiconductor surface.

Audience Take Away:

The talk will introduce an important catalytic system, rutile TiO_2, where the defects feature charged polarons crucial for catalysis.

- We will show that oxygen can form different charge states on the surface and the charge states can be manipulated via AFM/KPFM.
- In addition to charge manipulation we will also show a reversible AFM/KPFM bond manipulation allowing for novel atom-molecular switch.
- We will show how the experimental observations can fully be rationalized via atomic-scale modeling.
- These top-end of the line manipulations are stretching the limits of current nanotechnologies.

Biography:

Prof. Štich graduated from Slovak University of Technology in condensed matter physics in 1983. He got his PhD. again in condensed matter physics at International School for Advanced Studies in Trieste, Italy. Worked later as post-doc in first-principles modeling at Cavendish laboratory, University of Cambridge, U.K. and as senior researcher at Joint Research Center for Atom Technology, Tsukuba, Japan. From 1997 he started working as assistant professor, later associate and full professor at the Slovak University of Technology. 2007-2011 he served as director of Institute of Physics, Slovak Academy of Sciences in Bratislava, Slovakia. Currently head of the Center for Computational Materials Science at the Institute of Physics. He works both in density functional modeling as well as in many-body quantum Monte Carlo. His current professional interests include surface probe techniques, AFM, STM, nanotribology, and 2D systems. He published well in excess of 100 research papers, including those from Nature family, ACS, and APS, which received ~4.000 citations.

A sustainable nanotechnological approach for urban mining and recovery of strategic elements

Henrique E. Toma
Institute of Chemistry, University of Sao Paulo, S. Paulo, Brazil

Humanity is strongly dependent upon strategic elements, such as copper, nickel, cobalt, the noble metals and the rare earths, but the conventional mining processes are raising serious concerns because of the pollution and damage imparted to the environment. In this sense, a new process named magnetic nanohydrometallurgy (MNHM) has been recently developed in our Laboratory1-2 making use of engineered superparamagnetic nanoparticles for sequestering the elements and confine them, using an external magnet ($Nd_2Fe_{14}B$), directly on the electrode surface. Such nanoparticles exhibit a crystalline magnetite core, protected with a silica coating which is treated with an aminoalkylsilane to link a complexing agent, such as DTPA (diethylenetriaminepentaacetic acid). After extensive characterization by FTIR, DLS, AFM, TEM, and confocal Raman spectroscopy, the nanoparticles can be employed in hydrometallurgy, for sequestering strategic metal ions, including the evaluation of their performance by means of their specific adsorption isotherms. In addition to their complexation performance, the magnetic nanoparticles containing the captured metal ions can be collected onto the electrodes in order to perform direct electrochemical deposition in aqueous solution, at room temperature, without employing polluting organic solvents. After electrodeposition, the magnetic nanoparticles are completely recovered, returning to the process, for a new batch procedure. All the steps can be computer controlled and automated, minimizing the operational scale and improving the yield. In this presentation, the extraction and recovery of strategic metals from urban mining will also be discussed, as well as the application of MNHM in the separation of lanthanide elements. (FAPESP grant 2013/24725-4)

Audience Take Away:

- It will be shown new green nanotechnological strategies which can be applied to the mineral area and environment. Such approach can be useful in water treatment, metal extraction, recycling and recover. It can help launching urban mining, dealing with a worldwide problem represented by the electronic waste.

Biography:

Henrique E. Toma is professor of Chemistry at University of São Paulo, and a distinguished member of The World Academy of Sciences (TWAS) and Fellow of the John Simon Guggenheim Memorial Foundation. He has published 420 journal articles, receiving 10800 citations to date, in addition to 34 patents and 15 books. He is also the recipient of more than 20 international prizes, including the TWAS Award in Chemistry, Simon Mathias Medal (Brazilian Chemical Society), National Order of the Scientific Merit Award (Brazilian Ministry of Science and Technology), and the UNESCO Mercosur Award for Science and Technology.

Facile synthesis of modified Styrene–maleic anhydride/ Zinc oxide polymer nanocomposites for supercapacitor applications

Remya Simon*[1], Sohini Chakraborty[2], M Amalraj[3], Mary N.L[1]
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[2] Department of Chemistry, Stella Maris College, Chennai, India
[3] Department of Chemistry, Loyola College, Chennai, India.
* Department of Chemistry, Stella Maris College, Chennai, India.

Styrene-maleic anhydride (SMA) is widely used for electrochemical and biological applications because of its high heat resistance and dimensional stability along with good specific reactivity of the anhydride groups. In order to achieve highly stable cycling performance and high capacitance values, $-NH_2$ group is introduced into the polymer matrix by functionalizing it with a diamine moeity. Zinc oxide nanoparticles were prepared by chemical reduction method and loaded at different wt % into the diamine modified Styrene-maleic anhydride (SMA-DDM) polymer matrix. To prepare materials having large surface area is an important aspect for increasing the efficiency of supercapacitors by adding Zinc oxide in higher weight percentages. The surface chemistry of these materials was characterized by Scanning electron microscopy(SEM), Transmission electron microscope (TEM) and Brunauer–Emmett–Teller (BET). Functional groups and their interactions were studied using Fourier Transform Infrared Spectroscopy (FTIR) and Ultraviolet–Visible spectrophotometry (UV). The crystal structure of the polymer nanocomposites was determined using Powder X-ray diffraction (XRD) technique .Thermal stability of the composites were evaluated from the Thermogravimetric Analysis (TGA) and Differential Scanning Calorimetry (DSC) results. The composite acts as an electrode material on forming active slurry with activated charcoal (AC) powder and Nafion binder. The prepared polymer nanocomposite electrodes have been electrochemically characterized using cyclic voltammetry (CV) at different scan rates and A.C impedance techniques at various frequency ranges. Charge–discharge (CD) techniques confirmed the cycling stability of the prepared polymer nanocomposites..

Audience Take Away:

- This work will help to extrapolate the already existing literature available on the use of Zinc oxide as supercapacitors.
- Functionalisation of polymers with different moieties to increase its conductivity and electrochemical performance.
- Green synthesis techniques can be carried out as an extension to this work and a comparison can be drawn with respect to the results obtained.

Biography:

Remya Simon has completed her graduation and post graduation from Stella Maris College, Chennai, India. She has then registered for Ph.D under Dr. Mary N.L at the University of Madras, India. She did her M.Sc Internship project "nanotube based chelating polymer" under the guidance of Dr. Beena Mathew at the School of Chemical sciences, Mahatma Gandhi University, Kottayam, Kerala from April-June 2014. Her M.Sc project titled, "Novel synthesis, characterization and photocatalysis studies of nanoparticles derived from transition metal complexes" was carried out under the guidance of Dr. Mary N.L. Stella Maris College Chennai. She was able to publish her work on the same in the 'International Journal of Recent Scientific Research'. She has two years of teaching experience in BCM College for Women, Kottayam ,Kerala ,India. Currently she is assisting for the nano certificate course held at the Centre for research and science and technology in collaboration with IIT Madras India.

Fabrication of Styrene-maleic anhydride /CNT nanocomposites for Supercapacitor Electrodes

Sohini Chakraborty*[1] , Remya Simon[2], M Amalraj[3], Mary N.L[1]
[1,] Department of Chemistry, Stella Maris College, Chennai, India.
[2] Department of Chemistry, Stella Maris College, Chennai, India.
[3] Department of Chemistry, Loyola College, Chennai, India.
* Department of Chemistry, Stella Maris College, Chennai, India.

The potentially useful structure of Carbon nanotubes provides the advantage of allowing easy ion diffusion when introduced into a composite polymer matrix. A composite polymer matrix has been formulated with Poly(styrenemaleic anhydride) that has been functionalized with a thiadiazole moiety with the incorporation of Carbon Nanotubes (CNT) to form nanocomposites that effect electrochemical applications. Supercapacitor electrodes have been fabricated and electrochemically characterized using a three-electrode cell assembly. The enhancement in electrochemical performance obtained by the addition of CNT has been extensively studied. On increasing the overall weight percentage of CNT in the polymer matrix, high resiliency is observed which provides good cycling stability and augmented electrochemical activity. The rectangular shaped graph obtained from the Cyclic Voltammetry (CV) measurements confirmed the applicability of the nanocomposites as supercapacitor electrodes. Chronopotentiometric (CP) techniques were employed to determine the cycling stability of the newly synthesized working electrodes. Capacitance-Voltage measurements have been carried out using the Mott-Schottky analysis to determine the doping densities and the type of carriers. The morphological characterization of the composites was carried out using Scanning electron microscopy (SEM) and Transmission electron microscopy (TEM). Fourier Transform Infrared Spectroscopy (FTIR) was used to authenticate the proper functionalization of the polymer and incorporation of nanoparticles in the polymer composite matrix. Ultraviolet Visible (UV-Vis) Spectroscopy determined the band gap of the polymer composites and the nanocomposites. X-ray diffraction (XRD) was performed to find the crystalline structure of the polymer composites. Thermogravimetric analysis (TGA) and Differential Scanning Calorimetry (DSC) results confirmed the thermal stability of the polymer composites.

Audience Take Away:

- This work provides a new platform for exploring the use of commercially available polymers that can be functionalized to affect electrochemical applications.
- Carbon nanotubes has toxic side effects and thus to use it in the form of a nanocomposite will help to reduce the amount used and at the same time will provide enhanced electrochemical performance.
- The future scope of this work includes the fabrication of high performance supercapacitor devices.

Biography:

Sohini Chakraborty has finished her post-graduation from Stella Maris College, Chennai, India and registered for PhD under the guidance of Dr. Mary N.L at the University of Madras, Chennai, India. She has been privileged to be a part of the Summer Training Program in Chemistry (STIC-2016) held at Indira Gandhi Centre for Atomic Research (IGCAR), Kalpakkam,India. As a part of her M.Sc project, she was able to work in collaboration with CavinKare Research Centre, Chennai, India to formulate polymer nanocomposites for cosmetic face mask applications. She published a paper on the same in the 'International Journal for Research in Applied Science and Engineering Technology' and has presented papers at International Conferences on this topic. She has also co-authored publications in the field of silicon adhesives along with her research team. Currently, she is working in the field of polymer nanocomposites for supercapacitor studies and other electrochemical applications.

Nano Drugs: A probable treatment for Alzheimer's Disease

Sara Sheikhlary
BSC of Plant Biology of Kharazmi University, Tehran, Iran

Alzheimer's disease affects more than 35 million people worldwide, and this number is presumed to double by the year 2050. To date, various methods have been used for probable treatment of Alzheimer's Disease; ranging from different drugs including Dopenzil and Hydrochloride Medications called cholinesterase inhibitors, that are prescribed for mild to moderate Alzheimer's disease, to different natural remedies such as coconut oil, Ginkgo biloba, and etc. Currently, there is no efficient therapy for this disorder, but a promising approach is represented by nanotechnology. Nanoparticles (NPs), depending on the particle size, charge, hydrophobicity, and surface functionalization, etc., are being used in wide range of fields and industries among which is medical and treatment of common diseases such as, different types of cancers, diabetes, and…; These phenomena cause nanotechnology to play an important role in science and technology. recently, efforts have been made in presenting a new treatment for Alzheimer's disease using Nano structures and Nano drugs. Up to now, various Nano medicines , such as polymeric and metallic nanoparticles, liposomes, micelles dendrimers, Nano emulsions and carbon Nano-tube etc. , have been investigated for effective brain targeting of the drugs , particularly in the treatment and diagnosis of AD. This article, reviews some of these Nano drugs which have been designed for diagnosis and disease progress prevention are mentioned, and at the end, possible future treatments for this disease, are discussed.

Audience Take Away:

- Audience, will be acquainted with the causes of Alzheimer's Disease & common drugs used for reducing the symptoms of this disease.
- They will be familiar with recent nanostructures used as drugs for detection, prevention of the disease, and these Nano drugs may be the probable treatment in the future.
- By reviewing recent methods used for designment and synthesis, one chooses the most efficient method for synthesizing Nano drugs.

Biography:

Miss Sheikhlary is a BSC. of Plant Biology, studying at the Kharazmi University, Iran.

magnus Group

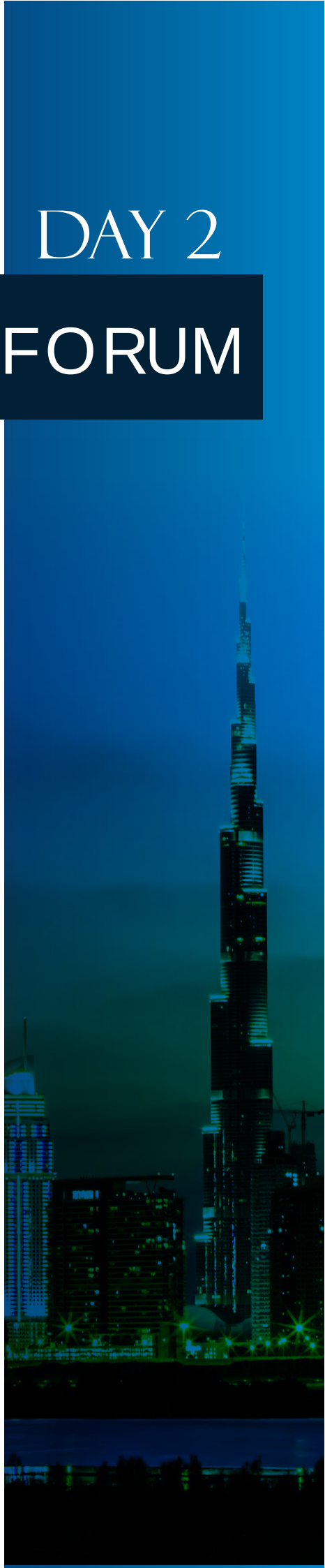
DAY 2

KEYNOTE FORUM

WORLD NANO TECHNOLOGY CONFERENCE

APRIL
15-17, 2019

DUBAI, UAE



World Nano 2019

Biography:

Prof. Chen Wang received his B.S. degree from University of Science and Technology of China in 1986. After obtaining his PhD from University of Virginia in 1992, he joined Arizona State University as a postdoctoral associate. In 1994, he became a professor of Central China Normal University. He was a faculty of the Institute of Chemistry, Chinese Academy of Sciences from 1995 to 2004, and is currently a professor and director of National Center for Nanoscience and Technology of China.

Reflections on Societal Impact of Nanotechnology in China

Chen Wang, Ph. D.

National Center for Nanoscience and Technology, Beijing, China

This contribution reflects the views on the nanoscience and nanotechnology motivated by societal needs. The grand challenges facing the diverse population provide profound obligations and opportunities for scientists, engineers, technicians, entrepreneurs to join the intellectual resources and materials support to achieve maximal societal impact. For example, extra effort should be needed for the developing economies to tackle the long standing societal challenges ranging from environmental to health care that may not be sufficiently supported by imported technologies.

The advances of nanoscience and nanotechnology in both developed and developing economies are closely associated with expectations that the technology can address various societal needs. Nanotechnology encompasses a wide range of functional nanoscale materials, structures, devices and integrated systems with unique properties, with applications across multidisciplinary areas of energy, information and healthcare, etc. Possible broad applications of nanotechnology in various areas, including health, energy, environment, and manufacturing, have generated keen interests of policy makers, academics and industrialists in China. The potential of the technology has been clearly reflected in the prioritizing of nanotechnology development in various science and technology programs. Innovative nanotechnologies are emerging in the areas of production, integration and application of nanomaterials at industrial scale, including lithium battery, green printing technology, selected applications in energy, environmental and healthcare areas, and fundamental infrastructures. However, considering that nanotechnology as a whole is only at the early stage of generating economic impact, challenges should be dealt with during this process of searching for technological breakthroughs. Given the current restraints in resources as well as existing infrastructures in China, we emphasis that exploring technological solutions to meet societal needs is essential for promoting nanotechnology development. Such solution is critical for public R&D investment to benefit society at large.

Biography:

Enge Wang is the Professor of Physics and the President Emeritus of Peking University. He also chairs the Advisor Board of the Institute of Physics, Chinese Academy of Sciences (CAS). He received his Ph.D. from Peking University. He was the Director of the Institute of Physics (CAS) (1999-2007), the Provost and then the President of Peking University (2011-2015), and the Vice President of CAS (2015-2017). He is a fellow of the American Physical Society and has served as an Executive Editor of AIP Advances. He has been elected to the Chinese Academy of Sciences and the World Academy of Sciences (TWAS). Wang researches surface physics with over 300 papers in peer-reviewed journals, 2 books and 1 MRS proceeding. He delivered over 80 invited talks including APS, MRS and IUMRS.

Water: Soft in Nature, Hard in Science

Enge Wang, Ph. D.

International Center for Quantum Materials and School of Physics, Peking University Institute of Physics, Chinese Academy of Sciences

Despite water being a ubiquitous substance, it is surprising that some basic questions are still debated. Here using a combination of experimental (cryogenic STM/AFM) and theoretical (first-principle electronic structures and molecular dynamics) methods, we systematically studied the unusual structure and dynamics of water molecules on NaCl surface. More interestingly, for the first time, we observe the nuclear quantum effect and magic number hydrates of interfacial water. These results shed light on our understanding of water at atomic scale.

Biography:

Professor Mahmoud Khodari Maeila Hamed is Vice President for postgraduate studies and Research at South Valley University. He is also Professor of Analytical Chemistry from 1999 to present. Professor Khodari has had a long and distinguished career at South Valley University. He has served as the Vice president South Valley University from 2006 to 2014 and from 2016 to present. Prior to that, he was the vice dean of faculty of Science. He was also the chair of the chemistry Department. Professor Khodari awarded the State Incentive Award in Chemical Sciences in 1999. He earned Ph.D in Analytical Chemistry from Universte de Bruxelles (ULB) Belgium and Assiut University in 1990. He hold a B.Sc. in general chemistry from Assiut University (May 1980) and M.Sc. in analytical chemistry from Assiut University (1985). He published 58 papers in the field of Electro-analytical chemistry and biosensors. His H-index is 13 and total citations are 398. He contributed to the first and second editions of the Modern Dictionary of chemical terms (2006 and 2015, respectively) . He participated in 22 national and international conferences and meetings. In addition he was visiting professor to Germany in Braunchweig (2005) and Hanover 2010 also he traveled to Germany in 2001 on a scientific mission to Munster University

Applications of Nano-Materials in Chemistry

M. Khodari

Chemistry Department, South Valley University, Qena, Egypt

Recently Nano-materials were applied in different fields as chemistry, medicine and agriculture. the present work aimed to indicate the applications of Nano-materials in the voltammetric determination of some compounds also in the removal of pollutants. The nanomaterial's were synthesized using different method viz chemical, mechanical and biological methods The nano-structure materials were characterized using electron-microscopy and X-Ray Diffraction. The prepared materials used to modify carbon paste electrode. modified electrode were widely used for the electrochemical determination of pollutants, metal ions and pharmaceutical compounds. From other hand the prepared materials were used to remove pollutants. From other hand the prepared materials were used to remove pollutants. Through photocatalytic decomposition A detection limit of about 10-10 M was obtained using voltammetric techniques such as linear sweep voltammetry, differential pulse voltammetry and square wave voltammetry. Modification of the carbon paste electrodes increased the surface area and enhance the sensitivity comparing to non-modified electrode. Another application of nanomaterial's is the removal of some pollutants. A removal of about 80 % from some pollutants was achieved using TiO_2 nano particles. The work report different methods for synthesis nano – materials and applications in the field of chemistry.

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DAY 2

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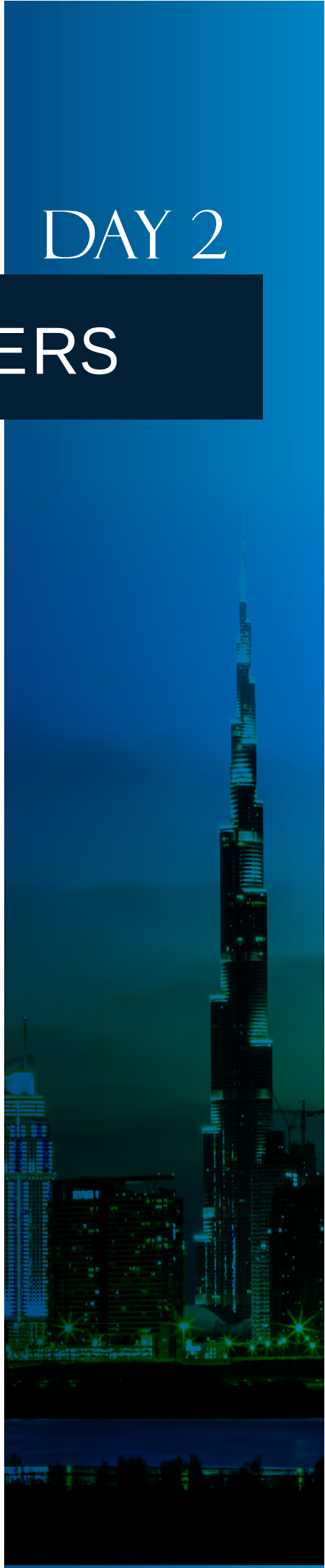
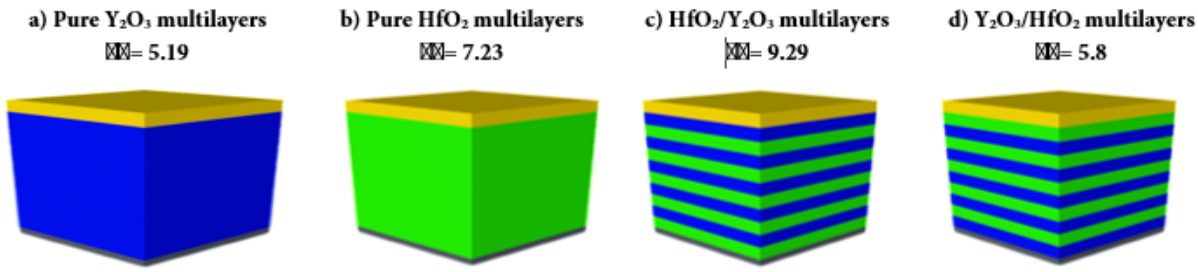


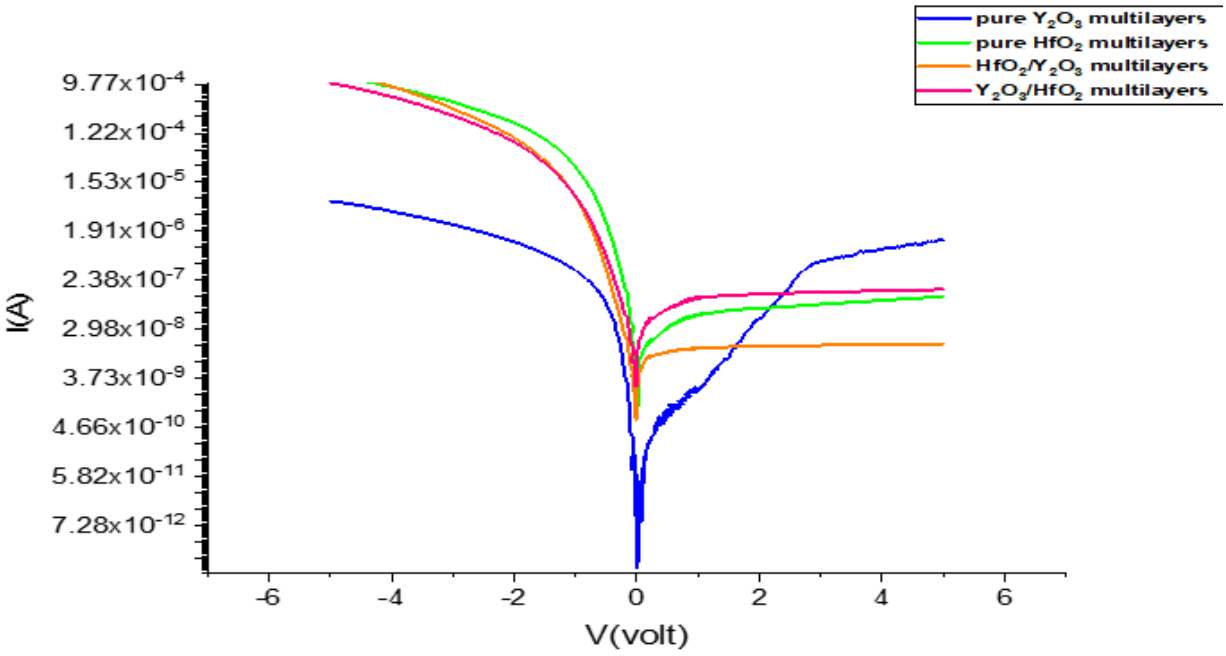
World Nano 2019

Fabrication of multilayer high- dielectric thin films using deep ultraviolet annealing approach

Ashwag Almaimouni*[1], Arwa Kutbee[2] and Hala Al-Jawhari[3]
[1] Physics Department, King Abdulaziz University, Jeddah, Saudi Arabia
[2] Physics Department, King Abdulaziz University, Jeddah, Saudi Arabia
[3] Physics Department, King Abdulaziz University, Jeddah, Saudi Arabia

A photochemical activation method for a solution-processed multi-layer metal oxide semiconductors is proposed in this project for high performance thin film transistors (TFTs) applications. This ultra-fast, simple and cost effective annealing method utilizes ultraviolet light of sufficient energy to be absorbed by the transparent metal oxide layer and provides the sufficient energy for sol-gel condensation in ambient air. On the other hand, the deployment of multi-layer gate dielectric configuration is desirable as it improves the capacitance between the gate electrode and the channel layer, which enhances the subthreshold slope and reduces the operating voltage. Hence, configuration of both single and multilayer high-gate dielectric will be used to estimate the performance of solution-processed metal oxide thin films with deep UV-annealing technique. The performance of the fabricated metal oxide capacitors was optimized according to the number and order of dielectric layers in four different multilayers configurations: a) thin films of pure yttrium oxide Y_2O_3, b) pure hafnium oxide HfO_2, c) alternating layers of HfO_2/Y_2O_3 (HfO_2 at the bottom) and d) Y_2O_3/HfO_2 (Y_2O_3 at the bottom). The electrical and optical analysis for various thin films were investigated to assess the performance of the devices. We have found that the average transmittance of 10 layers of Y_2O_3 film was over 98% in the visible range while it decreases to 75% for HfO_2 films within the same range. However, for the other two dielectric films that were prepared alternately between Y_2O_3 and HfO_2 layers, the transmittance was above 90% for HfO_2/Y_2O_3 and around 85% for Y_2O_3/HfO_2. The electrical properties of films were analyzed by capacitance-voltage (C-V) and current -voltage (I-V) measurements. It was found that the dielectric films with alternative configuration of HfO_2/Y_2O_3 yielded the lowest leakage current 1.49×10-9A at an applied voltage of 1 volt and had a dielectric constant of 9.22 at 100 KHz. This provides particular and compelling possibilities in constituting low-temperature process for applications where the thermal budget becomes a crucial necessity.





Biography:

Ashwag Almaimouni has studied physics at King Abdulaziz University, Saudi Arabia and graduated, in 2008, with a bachelor degree. In 2017, she joined the MSc program at the same University where she is currently doing her research about "Fabrication of multilayer high- dielectric thin films using deep ultraviolet annealing approach" under the supervision of Prof. Hala Al-Jawhari and Prof .Arwa Kutbee .

Nanoparticles based superhydrophobic coatings for water drag reduction

Ivan U. Vakarelski*[1], Sigurdur T. Thoroddsen[1]
[1]Division of Physical Sciences and Engineering, King Abdullah University of Science and Technology (KAUST), Thuwal, Saudi Arabia

In this presentation I will highlight recent developments on the use of nanoparticles based superhydrophobic coating for the reduction of drag and related energy saving on solid objects moving in water. Superhydrophobic textured coating are deposited on metallic spheres using a commercially available product containing organic molecules modified silica nanoparticle. The coating is robust and stable to temperature as high as 400 °C, giving the opportunity to sustain not only a natural air layer on surface in contact with water but a thick vapor layer on the heated sphere surface. Experiment comparing the fall velocity of the original spheres and superhydrophobic spheres in a large water tank are used to evaluate the drag reduction effect of the gas layers. A very significant drag reduction up to 80% is demonstrated for heated superhydrophobic sphere sustaining a thick vapor layer and the same effect is replicated for the thin air layer naturally sustained on the superhydrophobic coating, although for a narrower range of sphere velocities. Finally we show an intriguing phenomenon of air entrapment during the impact of superhydrophobic coating sphere on water resulting in a neat zero drag sphere-cavity object .

Audience Take Away:

- Water repellent coating based on commercially available nanoparticle suspensions
- Naturally sustained and thermally activated gas layers on superhydrophobic interfaces
- Energy saving potential of gas layers on nanoparticle coatings based lubrication

Biography:

Dr. Vakarelski obtained his M.S. in Physics from University of Sofia, Bulgaria and Ph.D. in Chemical Engineering from Kyoto University, Japan. Dr. Vakarelski held research positions at the University of Florida, USA; Kyoto University, Japan; University of Melbourne, Australia, and ICES in Singapore, before moving to King Abdullah University of Science and Technology (KAUST) in 2010 as a senior researcher in the high-speed fluids imaging laboratory. His interests are in the areas of fluid dynamics, and colloidal and interface sciences. Dr. Vakarelski has authored about 70 journal publication including lead author in Nature, Sci. Adv., PNAS, and PRL

Research on solid electrolytes for Lithium batteries

Chang-An Wang
State Key Lab of New Ceramics and Fine Processing, School of Materials Science and Engineering, Tsinghua University, Beijing, P. R. China

Solid electrolytes are the key materials to solve the safety problem of lithium metal batteries and all-solid-state lithium batteries. They can reduce the side reaction and prevent lithium dendritic breaking through electrolytes, and therefore, improve the cycling stability and safety of lithium metal batteries. This presentation briefly shows the research progress on Li-ion solid state electrolytes in my group in recent years, including NASICON-type $LiZr_2(PO_4)_3$, Garnet-type $Li7La_3Zr_2O_{12}$, perovskite-type $Li_{3/8}Sr_{7/16}Hf_{1/4}Ta_{3/4}O_3$ ceramic electrolytes and organic-inorganic composite solid electrolytes. The modification on interfaces between electrolyte and electrodes were also studied.

Biography:

Chang-An Wang is a tenured professor in School of Materials Science and Engineering at Tsinghua University. He received his B.E. in 1992 and Ph.D in 1997 at Tsinghua University. From 2001~2002, he was a post-doctor in School of Materials Science and Engineering, Georgia Institute of Technology, USA. His research is highly focused on advanced ceramics and ceramic matrix composites.

Nanostructured zirconia-based ceramic material fabricated by an oscillatory pressure sintering process

Zhipeng Xie
School of Materials Science and Engineering, Tsinghua University, Beijing, China.

The actual strength of ceramics is much lower than their theoretical value due to considerable flaws appearing during powder consolidation. A straightforward approach to improve their fracture strength is to minimize the quantity and size of flaws within ceramics. Here, we report a sintering strategy to consolidate ultrastrong ceramics by introducing oscillatory pressure. We have fabricated a fully dense ZrO_2 ceramics contained 3mol.% Y_2O_3, ZrO_2 ceramics strengthened by 20wt.% Al_2O_3 with a three-point bending strength of up to 1.81 GPa, 2.1 GPa, respectively, which are the strongest zirconia-based ceramics yet achieved. Strengthening of the material is based on adopting a dynamic oscillatory pressure during sintering to remove various flaws (including agglomerated-pores and micro-pores), strengthen grain boundaries (mainly owing to the formation of a high number density of coherent grain boundaries structure). We believe that this sintering process can be applied to manufacture other ceramics with extremely high strength for structural applications.

Audience Take Away:

- We report a sintering strategy to consolidate ultrastrong ceramics by introducing oscillatory pressure.
- Strengthening of the material is based on adopting a dynamic oscillatory pressure during sintering to remove various flaws and strengthen grain boundaries.
- We believe that this sintering process can be applied to manufacture other ceramics with extremely high strength for structural applications.

Biography:

Prof. ZhiPeng Xie studied material science at the Tsinghua University, Beijing and graduated as Ph.D in 1993. He then joined the research group of Prof. Yong Huang at School of Material Science and Engineering Tsinghua University. After one year postdoctoral fellowship at the Swiss Federal Institute of Technology in 1996, he obtained the position of an Associate Professor at the Tsinghua University followed by professorship in 2002. He also has been a visiting scholar at Monash University. His work over the past 25 years has spanned a broad range of nanostructured ceramics, fabrication science & technologies and 200 papers have been published in recent years..

Synergistic antioxidant capacity of grafting gallic acid onto chitosan nano particles against ochratoxin A toxicity in African catfish, Clarias gariepinus

Heba S. Hamed*[c], Mosaad A. Abdel-Wahhab[a] , Abdulhadi Aljawish[b], Amany M. Kenawy[d], Aziza A. El-Nekeety[a], Sekena H. Abdel-Aziem[e]

[a] Food Toxicology & Contaminants Department, National Research Center, Dokki, 12622 Cairo, Egypt

[b] Université de Lorraine, Laboratoire d'Ingénierie des Biomolécules (LIBio), 2 avenue de la Forêt de Haye, TSA40602-F-54518 Vandœuvre-lès-Nancy, France.

[c] Zoology Department, Faculty of Women for Arts, Science & Education, Ain shams University, 11757 Cairo, Egypt.

[d] Hydrobiology Department, National Research Center, Dokki, 12622 Cairo, Egypt.

[e] Cell Biology Department, National Research Center, Dokki, 12622 Cairo, Egypt .

This study was designed to prepare and characterize enzymatic modified chitosan nanoparticles (CSNPs) with gallic acid (GA) or octyl gallate (OG) in average size around 90 nm , with positive charge and high scavenging activity especially GA-CSNPs and to evaluate their protective role against ochrtoxin A (OTA) toxicity in African catfish, Clarias gariepinus. In the in vivo study, catfish were divided into 8 groups and treated for 3 weeks as follow: the control group, OTA-treated group (1 mg/kg b.w.), the groups treated with CSNPs, GA-CSNPs or OG-CSNPs (280 mg/kg b.w.) alone or in combination with OTA. Blood, liver and kidney samples were collected for different analyses. OTA induced significant biochemical alterations accompanied with oxidative stress in the hepatonephric tissues, DNA fragmentation in the kidney was significantly increased. Co-treatment with OTA plus the different CSNPs resulted in a marked enhancement in all tested parameters, which was more pronounced in the group treated with GA-CSNPs. It conclusion, grafting of GA or its ester enhanced the properties of CSNPs. Moreover, GA-CSNPs showed strong scavenging properties than OG-CSNPs due to the blocking of carboxyl groups responsible of the scavenging activity in OG.

Keywords: Chitosan nanoparticles, Gallic acid, Octyl gallate, Ochratoxin A , Clarias gariepinus , Oxidative stress .

Biography:

Prof. Heba S. Hamed is currently working as Associate Professorof Fish Physiology in Zoology department, Faculty of Women for Arts, Science &Education, AinShams University, Cairo,Egypt. She had her doctorial of Philosophy of Science in 2012 and Master of Science degree in 2010 from Ain Shams University, Cairo, Egypt. Prof. Hamed had a diploma in biochemistry and physiology from Suez Canal University, Faculty of Science, Ismailia, Egypt in2014-2015. She also had a Professional diploma in Quality & Accreditation management systems 2015-2016. Her major research interests include Fish Physiology, Nano toxicology, Reproductive Toxicology, and Aquatic Toxicology. She has been able to prove scientifically that extraction of some medicinal plants and used locally in fish diets contain pharmacologically active principles, capable of ameliorating fish reproductive dysfunctions and enhancing fecundity. Prof. Hamed is an editorial board member of International Journal of Ecotoxicology and Exobiology and Frontiers in physiology Journal. She is also a reviewer in Environmental Toxicology and Pharmacology, Natural Product Research Aquaculture and Fisheries, and many other International Journals.

The production of electrically conductive nanocellulose and its potential

Hatem Abushammala
[1]Fraunhofer Institute for Wood Research, Braunschweig, Germany

Conductive organic materials are the subject of a significantly growing research area. They have a great potential for many applications such as energy solutions, electronics, medicine, pharmacy, environmental monitoring, and many others. Due to their biodegradability, bio-based materials as one group of organic materials have been proposed to help in reducing the massive amounts of electronic waste (E-waste) rising from the revolution in technological products such as mobiles and laptops. About 50 million tons of E-waste are generated annually. Moreover, if the electronic products are human health solutions such as biochips for human body sensing or drug delivery systems, the biocompatibility of bio-based materials is a major advantage. Among bio-based materials, Cellulose Nanocrystals (CNCs) can be extracted from cellulose, the most abundant biopolymer on Earth. They are lightweight rod-like nanoparticles with an elastic modulus higher than that for Kevlar fibers (110-220 GPa for CNCs, 125-130 GPa for Kevlar). They have shown a great potential in a wide range of applications including automotive industry and medicine. Despite of the interesting properties of CNCs, the research on their inclusion in electronics is limited on their use as inactive substrates to hold the conductive components. It is believed that the development of technologies to render them conductive could foster the production of bio-based electronics. Towards this goal, this presentation proposes an approach to convert the electrically-insulate cellulose nanocrystals using the proper chemistry into high-value conductive nanoparticles.

Audience Take Away:

- The audience will have an idea about the current situation regarding electronic waste.
- The audience will visualize the potential bio-based materials have in resolving this problem.
- The presentation will also show that bio-based conductive materials can have superior properties and have a great potential in a wide range of applications.
- The audience may be inspired to use bio-based conductive materials in applications, in which they are interested.

Biography:

Dr. Abushammala obtained his doctorate in 2015 from the University of Freiburg in Germany in the field of bio-based nanomaterials and polymers with a focus on nanocellulose. He then worked at the same university as a research associate and lecturer. Dr. Absuhammala has three patents and tens of journal publications and contributions in scientific conferences. He is the laureate of Leo-Schörghuber Prize 2015 from the Technical University of Munich, Hansjürg-Steinlin Prize 2016 from the University of Freiburg, Gold Medal 2016 from the International Academy of Wood Science (IAWS), and Sigrid- and Viktor-Dulger Prize 2017 from the University of Heidelberg. Since 2017, Dr. Abushammala is the Wilhelm-Klauditz research fellow at the Fraunhofer Institute for Wood Research.

Carbon nanotubes and carbon nanotubes-polymer compositions for photovoltaics and aviation application

Adam Januszko*[1], Agnieszka Iwan[1], Witalis Pellowski[1]
[1]Faculty of Security Science, Military University of Land Forces, Wroclaw, Poland

The properties and application of various carbon nanomaterials such as fullerenes, carbon nanotubes, and graphene are strongly dependent on their atomic structures and interactions with other materials. In our work we are wide investigated all of the carbon nanomaterials for dual use. Fullerenes were wide investigated by us in polymer solar cells based on various conjugated polymers such as poly(3-hexylthiophene) (P3HT), polyazomethines (PAZ) or poly({4,8-bis[(2-ethylhexyl)oxy]benzo[1,2-b:4,5-b]dithiophene-2,6-diyl}{3-fluoro-2-[(2-ethylhexyl)carbonyl] thieno[3,4-b]thiophenediyl}) (PTB7). Moreover, in the past years we extensive analyzed how do graphene and graphene oxide obtained by chemical vapor deposition and modified Hummers method changed electrical and mechanical properties of constructed devices such as polymer solar cells, polymer fuel cells or thermoelectrochromic sensor.

Recently, carbon nanotubes (CNTs) hold the most promise among nanoscale materials. Nanotubes can exist both as a single-walled nanotubes (SWCNTs) and as a multiwall nanotubes (MWCNTs). Depending on the chirality along the graphene sheet, either semiconducting or metallic electronic states are created.

The first goal of this work is shown that CNTs can be applied as electrode or hole transporting layer in organic solar cells. The second goal is created polymer compositions based on CNTs and various polymers such as (sensitive information) towards aircraft application as light (0.5 g/cm3) and mechanically and thermally stable. Specific attention is devoted to analyzed amount and type of carbon nanotubes (SWCNTs and MWCNTs) together with smart technology to create films for selected electrical and mechanical properties of constructed devices.

Biography:

Dr. Adam Januszko, assoc. prof., Vice-rector for Science Affairs. Presently he is working in Military University of Land Forces in Wroclaw, Poland. Since 2008 he is working in Military Institute of Engineer Technology, Wroclaw, Poland. Formerly working at LC-VISION, Boulder, Colorado – LCAS. Author and co-author of more than 80 articles in impacted journals and 18 patents. The management of research grants: 7 (including EU project: FP7-SECURITY, Feasibility Grant: MOD project. Awarded GOLD Award at the 25th and 27th International Invention, Innovation & Technology Exhibition, ITEX 2014 and ITEX 2016; GOLD and SILVER MEDALS at Salon International Des Inventions, Genève, 2016, 2018. Expertise: carbon nanotubes, graphene, liquid crystals and their applications, radiation/sensors, electrochromic materials. Commercialization of scientific products: 2012: Multispectral Camouflage (SUMMER type) contract for Polish MOD; and 2016: Multispectral Camouflage (WINTER type) contract for Polish MOD.

Multifunctional nanoconstructs based up-converting $NaYF_4$ doped rare earth

Bożena Sikora*[1], Przemysław Kowalik[1], Anna Borodziuk[1], Izabela Kamińska[1], Jakub Mikulski[1], Łukasz Kłopotowski[1], Karolina Zajdel[2], Magdalena Duda[1], Krzysztof Fronc[1], Paulina Grzączkowska[1,3], Jarosław Rybusinski[3], Jacek Szczytko[3], Andrzej Twardowski[3], Roman Minikayev[1], Tomasz Wojciechowski[1], Kamil Sobczak[4], Mariusz Łapiński[5], Wiktoria Kasprzycka[6], Elżbieta Trafny[6], Małgorzata Frontczak-Baniewicz[2], Danek Elbaum[1]

[1]Institute of Physics, Polish Academy of Sciences, Warsaw, Poland
[2]Mossakowski Medical Research Centre, Polish Academy of Sciences, Warsaw, Poland
[3]Institute of Experimental Physics, Faculty of Physics, University of Warsaw, Warsaw, Poland
[4]Faculty of Chemistry, Biological and Chemical Research Centre, University of Warsaw, Warsaw, Poland
[5]Department of Hypertension, Medical University of Warsaw, Warsaw, Poland
[6]Biomedical Engineering Centre, Institute of Optoelectronics, Military University of Technology, Warsaw, Poland

NIR-active up-conversion nano-phosphors (UCNPs) based on rare earth ions doped hexagonal β-NaYF4 nanoparticles are of particular interest since they offer the highest quantum yield of up-conversion luminescence. Thus, appropriately functionalized β-NaYF4 nanoparticles can find applications in both photodynamic diagnosis and therapy. Additionally, multifunctional superparamagnetic nanoconstructs based on Fe_3O_4 nanoparticles (SPIONs) can be used for nanoparticles tracking with the external magnetic field, enhanced contrast in magnetic resonance imaging (MRI), as well as for diseased tissue eradication via local heating with alternating magnetic field (AMF), that is by hyperthermia.

In this work, we synthesized opto-magnetic multifunctional nanoconstructs based on lanthanide-doped β-NaYF4 nanoparticles, having sizes about 20 nm. These β-NaYF4 nanoparticles were encapsulated in SiO_2. We also demonstrated that, under illumination with NIR light, the upconverting emission of β-NaYF4 nanoparticles efficiently excited molecules of Rose Bengal photosensitizer, towards reactive oxygen species generation.

The other type of nanoparticles prepared by us was superparamagnetic Fe_3O_4 with size from 6 to 20 nm. The hyperthermia effects were measured as a function of several experimental parameters, including: the time of application of AMF and the size and concentration of nanoparticles. The intrinsic loss power (ILP) factor was determined. The Fe_3O_4 nanoparticles were introduced into several types of the cells which were destroyed in alternatic magnetic field.

Combining PDT with hyperthermia treatment will allow for a more efficient cure of patients than offered by the currently used modalities. In particular, the proposed treatment is definitely less invasive than the presently applied procedures.

The research was partially supported by the project DEC-2014/15/D/ST5/02604. This work has been done in the NanoFun laboratories co-financed by the European Regional Development Fund within the Innovation Economy Operational Program, the Project No. POIG.02.02.00-00-025/09/.

Audience Take Away:

- The implementation of showed results will make it possible to avoid obstacles encountered in traditional immunohistochemistry in cancer desease. The suppression of cell autofluorescence will be achieved by using NIR light for excitation and VIS light for detection.
- Overall, this approach will be very important for future applications in the diagnosis of metastatic diseases. In particular, the usage of upconversion nanoparticles will probably make it possible to detect single cancer cells, which circulate in the blood and are supposed to be responsible for metastasis which can be interested in audience.
- It will be also showed the possibility of eliminating cancer cells using NIR radiation through ROS generation by photosensitizers attached to the surface of the nanoconstructs. Generation of ROS can be combined with the temperature increase in the AMF (hyperthermia), which may allow more effective treatment of cancer.
- Overall, the herein proposed research on the design and characterization of multifunctional optomagnetic nanoconstructs will contribute to the field of novel approaches to efficient methods in cancer therapies and modern theranostic approaches.

Biography:

Dr. Bożena Sikora studied Chemistry at the University of Warsaw, Poland and graduated as MS in 2008. She then joined the research group of Prof. Danek Elbaum at the Institute of Physics Polish Academy of Sciences (IF PAS). Her PhD was awarded in 2014 at the same institution. She obtained PATENT P.401873 "Production of nanopowders with luminescence-magnetic properties and nanopowder produced in this way" in 2014. In the same year she obtained the position of an Associate Professor at the Institute of Physics PAS. She has published more than 15 research articles in SCI(E) journals.

Investigation of some physical properties of pure and doped transparent conducting oxides synthesized on glass substrates by chemical method. Application to ZnO, NiO, MoO_3

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[2] Unité de physique des dispositifs à semi-conducteurs, Faculté des Sciences de Tunis, Université de Tunis El Manar, 2092 Tunis –Tunisia
[3] Centre CINAM, Université d'Aix-Marseille, campus de Luminy, Marseille, France

Pure and doped transparent conducting oxides (TCO) as ZnO, NiO, MoO_3 nanofilms were synthesized on glass substrates using the spray pyrolysis method. The nanometric pure TCO films were prepared from the 10^{-2} $M.L^{-1}$ solution of different powders in distilled water. Sr, Ba and Co-doping at various concentration were used. The structure and the morphology of the films were investigated by means of X-ray diffraction and atomic force microscopy. XRD patterns peaks are corresponding to structure phases of ZnO, NiO and MoO_3. The AFM observations revealed the surface topography and different roughness were determined. Optical properties were investigated through reflectance, transmittance and photoluminescence measurements. The optical band gap, the Urbach energy and the refractive index were deduced from these measurements. The presence of oxygen vacancies was revealed from the interband transitions in the blue and green domains. The photocatalytic degradation of an aqueous solution of methylene blue (MB) under UV irradiation, in the presence of TCO nanomfilms, has been carried out using UV-visible spectroscopy: the intensity of the absorption peak recorded at 660 nm decreased with the increase of the UV-illumination time while the color of the initial MB solution was drastically waned.

Keywords: Spray pyrolysis method, TCO nanofilms; optical properties; magnetic properties; Photocatalytic properties.

Audience Take Away:

- My presentation concerns the effectiveness of chemical growth methods for transparent insulating oxides (TCO). These synthesis techniques are inexpensive compared to physical methods that require heavy and expensive equipment. The results obtained confirm this idea

Biography:

Ghamnia Mostefa is Professor of Physics at Oran University 1 (Oran, Algeria). He is Director of the Laboratory of Condensed Matter Sciences, which mainly studies nanomaterials (structures and properties).

In situ addition of graphitic carbon into $nico_2o_4$/coo composite: Its effect on oxygen evolution reaction

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[a]Department of Chemistry, School of Engineering, Dayananda Sagar, University, Bangalore, India
[b]PG Department of Chemistry, KLE PC Jabin Science College, Hubballi, India
[c]Faculty of Science and Engineering, Manchester Metropolitan University, Manchester, UK

The search of cost-effective, high-performance and long term stable catalyst for the water splitting reaction is gained a significant importance in utilizing renewable energy for futuristic applications very effectively. The objective of the current study is to investigate $NiCo_2O_4$/CoO and graphitic carbon, pooled in to a single composite material, to demonstrate excellent catalytic activity towards oxygen evolution reaction (OER). In this study, $NiCo_2O_4$/CoO composite with varied amount of graphitic carbon has been prepared using a simple one-pot synthesis, wherein the advantages of the proposed method includes rapid synthesis (3 minutes), environmentally benign and in situ retaining of graphitic carbon. The effect of graphitic carbon present in $NiCo_2O_4$/CoO composite on the catalytic performance towards OER was systematically investigated where the $NiCo_2O_4$/CoO composite with highest graphitic carbon exhibits enhanced OER kinetics in terms of lower overpotential (η = 323 mV at 10 mA cm-2), high current density (77 mA/cm2 at 1.5 V) and turnover frequency (1.53 x 10-2), and good long term stability (500 potential cycles) under the present experimental conditions. This overpotential of 323 mV is lower than the potential required by the traditional catalyst IrO2 (340 mV) and RuO_2 (350 mV) to generate current density of 10 mA cm-2. The reason behind this good catalytic activity and stability of the proposed composite was discussed in depth.

Biography:

Dr. Ashoka S, graduated with M.Sc. and Ph.D. Degrees in Chemistry from Bangalore University. He was a postdoctoral fellow at various prestigious universities in India and abroad: the Warsaw University of Technology, Warsaw, Poland, University of Quebec, Canada, and Indian Institute of Science, Bangalore. He has 8 years of teaching and 14 years of research experience. He published 52 research articles in reputed international journals. He has one National patent on fluoride and arsenic removal form drinking water. He has a h-index of 18 with ~1500 citations. He was awarded the Indo-Quebec postdoctoral international merit scholarship in the year 2012-13. Four of his research articles have been selected in the top 25 hottest articles among Elsevier publications.

Utilization of nanomaterial's for enhancing the productivity of solar distiller units

Dhananjay R. Mishra
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Demand for potable water increasing day by day due to population growth and industrialization. Water is an essential commodity on the earth surface for the survival of human being we cannot imagine our present on this planet in absence of water, so preservation, re-utilization, and recycling of potable water will be highly essential for us. Solar distiller unis are used to harvests the sun's energy, rather than fossil fuels, to generate low-cost, low/zero-emission energy in the form of heating, for residential, commercial, and industrial sectors. Augmentation of nonmaterial in a solar still will enhance its overall efficiency. Fundamental concepts of different thermal energy storage technologies for energy conversion have been reported. Although the nonmaterial's will boost the performance of solar distiller units in all cases it will be accompanied by certain challenges such as production cost, instability, agglomeration, and erosion. Most of the past studies are focused on the enhancement of thermal conductivity and heat capacity, but less attention has been given to the facing challenges. Extensive analysis for selection of nanomaterials for the different solar applications is not available. On the basis of the estimated values selection of the nanomaterials are not made by most of the researchers while utilizing it for the solar thermal application. It seems that technoeconomic optimization considering key parameters, particularly nanoparticle type, size, loading, and shape for enhancing the utilization of nonmaterial in different solar distiller units can give it widespread.

Audience Take Away:

- Application of nonmaterial will pave the way for enhancing the efficiency of solar distiller units.
- Techno-economic optimization considering key parameter will pave the way for its different target based applications. Another faculty could use it for expanding it with the background of nanomaterials. Augmentation of nanomaterials will boost the performance of several solar thermal devices.
- Provided information will improve the accuracy of a new design of solar thermal appliance augmented with the nonmaterial's as it gives assistance for a section of raw material and more clear virtual thermal analysis

Biography:

Dr. Dhananjay R. Mishra at the Jaypee University of Engineering & Technology, Guna, M.P., India and graduated as ME in 2007. . He received his Ph.D. degree in 2016 from National Institute of Technology Raipur, India.Served as an assistant production manager in Suprabha Industries Ltd. Lucknow, 2002-04Served as Lecturer in the Mechanical Engineering Department at Rungta College of Engineering and Technology (RCET), 2005-06. Served as Lecturer in the Mechanical Engineering Department at Shri Shankaracharya College of Engineering and Technology 2006 -07. Served as Sr. Lecturer in Mechanical Engineering Department and Academic Administrator at Disha Institute of Management & Technology, 2007- 12. Presently working as an Assistant Professor (Senior Grade) in the Mechanical Engineering Department of Jaypee University of and Technology, 2012. He has published more than 50 research articles in peer reviewed journals/ international conferences.

Amino acid coated ultra-small nanoparticles as efficient antibiotics

Rokas Žalnėravičius*[1,2], Arūnas Jagminas[1]
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[2]Department of Chemistry and Bioengineering, Vilnius Gediminas Technical University, Vilnius, Lithuania

Over the years, natural and chemically synthesized antibiotics have been used to control infections resulting from community environments. Currently, there is a growing demand for the synthesis of nanomaterials that would replace widely applied antibiotics due to their antimicrobial properties. Available reports show that metal nanoparticles (NPs) such as Ag, Au, Cu, Zn, Si and metal oxide nanoparticles including TiO_2-x, ZnO, CuO, Cu_2O, Co_3O_4, MgO, ZrO_2, Ni_2O_3 or normal spinel structure ferrites $[M^2+][Fe^3+]O_4$ where M^{2+} is the metal ion as Zn^{2+}, Mn^{2+}, Cu^{2+}, Co^{2+} were identified to exhibit antimicrobial activity against multi-drug resistance pathogens. The molecular mechanisms for antibacterial effect of nanoparticles are still being investigated, but there are two more popular proposed possibilities in this regard: (a), free metal ion toxicity arising from dissolution of the metals from the surface of nanoparticles and (b), oxidative stress via generation of reactive oxygen species (ROS) on the surfaces of nanoparticles. We also suspect that this effect could be attributed to amino acid-induced generation of negative curvature at the surface of membrane due to a specific interaction, where the cationic amine groups induce negative curvature wrapping of anionic membranes leading to micellization/vesiculation and disrupt of membrane integrity causing the thinning of membranes. Identifying previously published papers of our research group, we have synthesized quite different antimicrobial agents such as ultra-small gold NPs and nanoclusters; electrochemically deposited Ag NPs in nanoporous alumina matrix; black nanostructured Cu_2O and CuO films on copper substrate; rutile/Cu_2O or anatase nanotubed–Cu_2O heterostructures; different size cobalt ferrite $CoFe_2O_4$ NPs or Fe-substituted cobalt ferrite NPs. The influence of stabilizing shell of superparamagnetic cobalt ferrite NPs on the antimicrobial efficacy were also studied. The antibacterial activities of these nanomaterials were tested in vitro against eukaryotic *Saccharomyces cerevisiaea, Aspergillus versicolor, Candida parapsilosis, Candida krusei, Aspergillus fumigatus, Geotrichum candidum* microorganisms, gram-negative *Pseudomonas aeruginosa, Escherichia coli, Acinetobacter baumannii, Salmonella enterica* and gram-positive *Micrococcus luteus,* methicillin-resistant *Staphylococcus aureus* bacteria.

Audience Take Away:

- New antimicrobial materials and methods will be discussed in this conference;
- The possible antimicrobial mechanism will be presented in this conference;
- The new ideas about most dangerous antibiotic-resistance bacteria inactivation will be delivered in this conference.

Biography:

Mr. Rokas Žalnėravičius received his B degree in Bioengineering at Vilnius Gediminas technical university in 2013 and Magna cum laude M degree in Chemistry of nanomaterials at Vilnius university in 2015. In 2017, he received Theodor Grotthuss memorial stipend for the academic achievement. He is currently pursuing his PhD degree at the Center for physical sciences and technology, Department of electrochemical material sciences, Laboratory of nanostructures in Vilnius, Lithuania. His research interest include antimicrobial surfaces and materials, catalysis, nanomaterials and 2D nano-composites for sensing applications.

Experimental investigation of the influence of nanofluid–alternating-brine (NAB) flooding on oil recovery in niger delta sandstone reservoir rocks

Falode, O.A*[1], Omotoso Y.[1]
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A common challenge to operators in both offshore and onshore oil fields globally is continuous decline in production as these fields reach their maturity stages. This has elicited efforts to exploiting the unconventional reservoirs, and delving into unexplored deep and ultra-deep-water territories, which are highly associated with myriads of risks and uncertainties. Alternatively, and preferably, many countries have begun to channel technical efforts towards maximising recovery from existing fields. This is because this option provides less risk and uncertainty as compared to the green or new fields. Oil recovery by primary and secondary processes yields about 35 to 50% of the Original Oil in Place (OOIP). The remaining is trapped by capillary forces as droplets or ganglia. An Enhanced Oil Recovery process must be able to mobilise the trapped droplets or oil blobs and to create an oil bank that can be efficiently propagated to the production well.

Nanotechnology has proven to offer some solutions to mitigate the present-day challenges of the oil and gas industry. It has the potential to transform EOR processes and mechanisms. Studies have shown that nanoparticles dispersed in injected fluid (such as brine) have the potential to increase recovery beyond the levels recorded for secondary recovery. However, the synergetic effect of flooding nanofluid and brine (secondary recovery) alternately is yet to be explored.

The research investigated three (3) different recovery mechanisms to infer the mechanism that resulted in the maximum oil recovery. The recovery mechanisms examined were brine flooding, nanofluid flooding and nanofluid-alternating-brine (NAB) flooding. The flooding experiments were carried out on typical core samples obtained from Niger Delta sandstone reservoirs. Amorphous (less harmful) silica nanoparticles with a defined range of size dispersed in brine were deployed for the nanofluid flooding.

The results indicated that the overall recovery factor of the NAB flooding was higher than those recorded for both brine and simple nanofluid flooding. More so, the recovery by nanofluid generally improved with increasing concentration of nanoparticles until a threshold limit was reached beyond which no further recovery was achieved. Therefore, the potential of NAB flooding for improved oil recovery needs to be harnessed to ensure cost-effective reserves addition from existing and mature Niger Delta fields.

Audience Take Away:

- The audience would learn the applications of nanotechnology in enhancing oil recovery from some sandstone reservoirs.
- The application of this knowledge gained by oil industry audience would help them develop different nanofluid systems tailor made to improve oil recovery in reservoirs that have been abandoned. Many stranded and thin reservoirs can be exploited using this technology. Thus, more cost-effective reserves addition from existing and mature Niger Delta fields can be achieved.
- Faculty in petroleum engineering and allied courses can use this knowledge in advanced heat transfer, automotive, electronic, biomedical and other applications.
- This work proved the great potential of nanofluids in wettability alteration, reducing interfacial tension, controllable viscosity, disjoint pressure for oil displacement.
- Forming stable foam and emulsion.

Biography:

Olugbenga Falode holds a PhD Degree in Petroleum Engineering from the University of Ibadan, Nigeria. He is currently a Senior Lecturer in the same Department. A common thread running through his research interests is using material engineering in developing inexpensive green materials from renewable sources with enhanced functionalities for flow assurance and hydrocarbon recovery. His research outputs show multidimensional skills in various fields such as- mathematical modeling, interfacial phenomena, multiphase flow, material synthesis, bioengineering, polymer and surfactant chemistry, surfactant chemistry, Enhanced Oil Recovery (EOR), Nanoparticles and etc. He has published more than 80 research articles in reputable journals.

Hydrochar fuctionalized with sulfurous acid of *Agave tequilana Weber* leaves

José Anzaldo Hernández*[3], Lourdes Graciela Cabrera Chavarría[1], Edgar David Moreno Medrano[2], Rodrigo Pérez Pimentel[3], Alejandra Sofia Juárez Villa[3]

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[3]Departamento de Madera, Celulosa y Papel Ing. Karl Agustín Grellmann. Universidad de Guadalajara. Km. 15.5 Carr. Guadalajara-Nogales. Predio las Agujas. Zapopan, Jalisco, 45020 México.

This work studied the obtaintion of a functionalized carbon in a single stage using green leaves of Agave Tequilana Weber var. blue by hydrothermal carbonization (HTC) and a chemical activation with sulfurous acid. The variables studied were the treatment time (8, 16, 24 h) and the sulfonic acid concentration (0, 1.5, 3.0, 4.5% w/v). The functionalized carbon was morphologically characterized by the techniques SEM, TEM, DRX and BET and chemically by the techniques FTIR, ^{13}C, NMR of solids, XPS and elemental analysis, to determine the level of functionalization that has been achieved by this stage. A potential application of functionalized carbon is the adsorption of heavy metals in residual solutions; the research focused on the adsorption of hexavalent chromium (Cr^{+6}) at different pH and Cr^{+6} concentrations were determined by experimentally. With these studies, adsorption kinetics was made using the sample CF-8H-4.5 at pH=2.0 and 50 ppm of Cr^{+6}. This carbon had an uptake of 19.50 mg Cr^{+6} / g CF-8H-4.5, a quite promising result and better than others carbons of this study.

Audience Take Away:

- This work shows how to obtain an hydrochar in one step
- Those hydrochars can be used as a heavy metal removal from water.

Biography:

Jose Anzaldo Hernandez has completed his PhD in Forestry engineering (wood technology) at Federal University of Paraná, Brazil. He completed his degree in Chemical engineer with University of Guadalajara, Mexico. He is a Research Professor in Department of Wood, Cellulose and Paper and head of the Research Centre for Pulp Fibers, Bleaching and Bioenergy at the University of Guadalajara. He is the coordinator of the Master's Degree in Forest Products Science at the University of Guadalajara until 2017 Professor of the University of Brazil from 2015 to 2016. He is a Member of the committee of admission to the PhD in Forest Engineering of the Federal University of Parana.

Graphene oxide coated-glass fibers reinforced unsaturated polyester composites

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Glass fiber/unsaturated polyester (GF/UPE) composites have widespread utilization in the field of construction, aerospace and automobile industries due to their light weight, high strength and chemical/weather resistance. This work aims to study the effect of graphene oxide (GO) coated-glass fibers on the mechanical properties of GF/UPE composites. GO coating of woven glass fiber mats (GF) was developed by soaking GF mats in GO/ethanol suspension followed by vacuum drying. GO coated-GF/UPE and GF/UPE composites were prepared by hand layup technique followed by curing under compression. GF/UPE composites were also prepared by dispersing GO at 0.25 wt.% in UPE matrix. Fourier transform infrared spectroscopy, scanning electron microscopy and energy dispersive x-ray spectroscopy techniques confirmed successful deposition of GO on GF. Mechanical tests of composites such as tensile, bend and impact were carried out to determine the effect of GO coating on the mechanical response of composites. The results showed that GO coated-GF improved mechanical properties of GF/UPE composite compared to equivalent composites developed with uncoated GF and with UPE matrix having GO as dispersed filler attributed to development of stronger interfacial bond between GO, GF and UPE.

Audience Take Away:

A novel technique will be explained in which glass fibers will be coated with graphene oxide. Further, audience will learn how to develop graphene reinforced/ glass fiber reinforced/polymer composites.

- This paper will introduce a novel technique of coating glass fibers with graphene oxide. This will help to eliminate the use of conventional silane coupling agents from the glass fibers reinforced/polyester composites. Graphene oxide synthesis and their subsequent coating on GF will be explicitly explained in this work, this will help other scientists and researchers to do similar research in their labs.
- This research work will help to improve the mechanical properties of glass fiber reinforced polymer composites using graphene oxide coating. As our mechanical testing results showed that graphene oxide improved interfacial bonding between GF and UPE matrix, this strategy will help manufacturers and designers to improve quality of composites

Biography:

Dr. Mohsin Ali Raza obtained Metallurgy and Materials Engineering degree from University of the Punjab, Lahore, Pakistan in 2000. He then joined the same department as Lecturer. He received his MSc. (Engg) degree from KTH, Stockholm, Sweden in 2007. He earned his PhD degree from University of the Leeds, UK in 2012. Currently, he is working as Assistant Professor at Department of Metallurgy and Materials Engineering, University of the Punjab, Lahore, Pakistan. His research interests are polymer nanocomposites, carbon nanofillers and graphene-based coatings/composites. He has published more than 25 research articles in peer reviewed impact factor journals.

Genotoxicity of noscapine nanosuspension prepared by microfluidic reactors on hepg2 cell line

Hedieh Ghourchian*[2], Maryam Azarian,[1]
[1]Department of Biology, Science and Research Branch, Islamic Azad University, Tehran, Iran
[2] Graduated BS in Microbiology, Islamic Azad University, Tehran, Iran

Noscapine is an antispasmodic alkaloid used as antitussive and anti-cough obtained from plants about Papaveraceae family. This benzylisoquinoline alkaloid and its synthetic subsidiaries, called noscapinoids are being assessed for their anticancer potential. The present research aimed to investigate induction of DNA destruction and viability of HepG2 tumor spheroid culture influenced by noscapine and nanosuspention of noscapine. Culture of HepG2 cells as spheroids were treated with different concentrations of noscapine for 24 h on Day 11. Afterwards, viability assay and alkaline comet assay methods were applied to examine viability and induced DNA destruction, respectively. Based on the results, no significant impact was observed from Tween 40 on the viability and DNA damage levels in comparison with the control ($p > 0.05$). Moreover, increasing noscapine concentration resulted in a dose-dependent reduction in viability of hepatic cancer cells and elevation of DNA damages, showing a correlation between rises of DNA damages and viability decline.

Audience Take Away:

- Low solubility in water, or in other words, bioavailability is a common feature among the majority of commonly used chemotherapy drugs.
- Today, the most common method to increase the solubility of drugs is to use nanotechnology methods that reduce particle size to a sub-micron level.
- Production of particles with a small PDI is always one of the major problems in determining a method among common bottom-up and top-down methods.
- Microfluidic tools are considered the most sensitive, inexpensive and controllable method among bottom-up nano-tools.

Biography:

Dr. Azarian studied Biophysics, Islamic Azad University, Science and Research Branch, Tehran, Iran and graduated as MS in 2010. She then joined the research group of Prof. Khoei at the Cellular and Molecular Research Center, Iran University of Medical Sciences and Health Services, Tehran, Iran. She received her PhD degree Nanotechnology/Medicine at the New York International University of Technology & Management (NIUTM), New York, America and Biophysics, Islamic Azad University, Science and Research Branch, Tehran, Iran graduated as (second) PhD in 2018. She then joined the research group of Prof. Xavier Avilés Puigvert at The Institut de Biotecnologia i de Biomedicina (IBB), Universitat Autònoma de Barcelona (UAB). She has published more than 10 research articles in ISI journals.

Effect of silica coating on the physicochemical properties of magnetite nanoparticles: Drug loading and release study

Muhammad Waseem*[1], Awais Aleem[2], Shahzad Hussain[2]
1. Department of Chemistry, COMSATS University Islamabad, Islamabad Pakistan
2. Department of Physics, COMSATS University Islamabad, Islamabad Pakistan

For biomedical applications, magnetic nanoparticles need to be coated with materials which should be inert, biocompatible and nontoxic to the body. The coated magnetite could be a better applicant for drug delivery, cancer treatment and MRI. In present study, magnetite nanoparticles (MNPs) have been prepared by co-precipitation route whereas silica coated magnetite (SMNPs) of various thicknesses were prepared by oil in water (o/w) microemulsion technique. The concentration of coating material was varied 2, 5 and 10 times (w/w) with respect to MNPs. Silica as a coating material was selected due to its biocompatibility and non-toxic nature. The size and shape of the MNPs and SMNPs of various thicknesses was analyzed by field emission scanning electron microscopy (FESEM) equipped with an energy dispersive X-rays (EDX) spectroscopy, transmittance electron microscopy (TEM), X-rays diffraction (XRD) and dynamic light scattering (DLS). The surface functional groups were detected by using Fourier transform infrared (FTIR) spectroscopy, whereas, magnetic properties were tailored by using vibrating sample magnetometer (VSM). Finally the MNPs and SMNPs of various thicknesses were loaded with anticancer drug methotrexate (MTX) and their release study was monitored by dialysis method. The MNPs show rapid release of drug as compared to SMNPs where a sustained drug release was detected. However, 2X SMNPs displayed more sustained release of MTX among the others coated systems.

Audience Take Away:

- To prepare the silica coated magnetite by oil in water microemulsion technique
- The coated system after drug loading and sustained drug release could be effective for biomedical applications.

Biography:

Dr. Muhammad Waseem is serving as Assistant Professor in the Chemistry Department, COMSATS University Islamabad, Pakistan. He received his PhD degree (Physical Chemistry) in 2012 on mixed oxides of iron and silica for cadmium removal with Prof. Dr. S. Mustafa from National Centre of Excellence in Physical Chemistry, University of Peshawar, Pakistan. He worked in 2010 with Prof. Ger Koper on nanosized hematite and magnetite. From 2012 -2013, he remained Assistant Professor in the Department of Chemistry Hazara University Mansehra. His field of interest includes ion exchange/adsorption and synthesis of nanomaterials for environmental and biomedical applications. During his career, he published more than 50 research papers in the reputed journals with cumulative impact factor of135.

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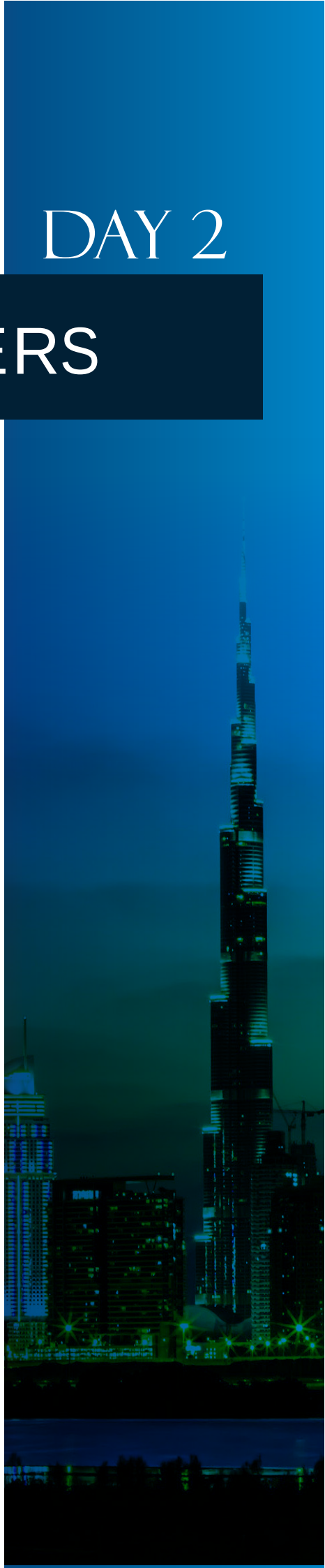

World Nano 2019

Comparative study of antimicrobial activity of various silver nanoparticles synthesized by various green methods

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In recent years, silver nanoparticles (AgNPs) have drawn a great attention globally because of their unique characteristics making them used in a wide of applications in many fields. Lately, researchers have focused on the green synthesis of AgNPs. This type of synthesis is considered as an ecofriendly, low cost, and effective method for preparing nanoparticles; in contrast to chemical reduction methods that depend on using reducing agents which are not environmentally safe. In the present work, aqueous extracts of several plants including green tea, Ghaf, sage, ginger, garlic and capsicum were successfully used for the synthesis of the silver nanoparticles by reducing Ag+ ions (from $AgNO_3$) into nanoparticles. The active constituents of the plants such as polysaccharides, phenolics, terpenoids and flavonoids play an important role as naturally reducing agents. Additionally, these groups of naturally occurring compounds can be used as capping agents for the AgNPs. In this study, we concentrated on the synthesis of AgNPs and compared between different products of AgNPs from different plants in terms of size, zeta potential, and antimicrobial activity. Charge of AgNPs from different plants were characterized using zeta potential analyzer, while UV-Vis spectrophotometer, dynamic light scattering (DLS), and transmission electron microscopy (TEM) were used for size measurement and to study the relationship between absorbance spectra and particle size. Figure 1 shows TEM and DLS results of size analysis of AgNPs synthesized from green tea extract. Moreover, we tested the antimicrobial activity of the synthesized AgNPs products, and they revealed a good activity against gram positive and gram negative bacteria and antifungal activity.

Keywords: AgNPs, green synthesis, plant extract, chemical methods, antibacterial, antifungal.

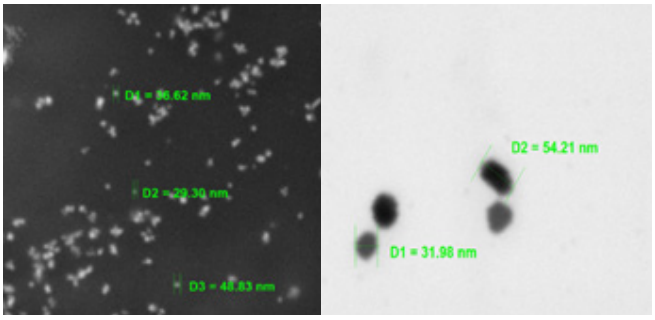

Figure 1: SEM images of AgNPs from green tea extract at two magnification levels. White arrows indicate the presence of a thin organic layer surrounding the AgNPs.

Audience Take Away:

- Explain the difference between Chemical and Green ways for nanoparticles preparation and the advantages and disadvantages of each.
- Provide an eco-friendly ways to prepare nanoparticles to be used in many medical and pharmaceutical applications.
- Introduce ways of characterizations and functionalization of nanoparticles.

Biography:

May Reda was graduated from Faculty of Pharmacy, Alexandria University in 2009 with Degree of Honor. She started her Master Degree at the same year and graduated in 2015. Her Master Thesis focused on nanomaterial preparation and characterization. She joined Ajman University in 2017 as a researcher. In Ajman University, she continued her work in nanoparticles preparation and test their different properties. She now works on various projects on nanotechnology with Dr. Akram Ashames group of research.

Exploring nose-to-brain insulin delivery as a new strategy for the treatment of Alzheimer's disease

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A growing body of evidence shows that Insulin, Insulin Receptor (IR) and IR signaling are involved in brain cognitive functions and their dysfunction is implicated in Alzheimer's disease (AD) degeneration. Thus, administration of insulin could be a strategy for AD treatment. For this aim we designed, synthesized and characterized a nanogel system (NG) to deliver insulin to the brain, as a tool for the development of a new therapy for AD. A carboxyl-functionalized poly(N-vinyl pyrrolidone) nanogel system produced by high energy ionizing radiation was chosen as substrate for the covalent attachment of insulin or fluorescent molecules, relevant for its tracing. Biocompatibility of the naked carrier was verified by absence of cytotoxicity, oxidative stress and mitochondrial dysfunction. Hemocompatibility was demonstrated by hemolysis, coagulation time, leukocyte proliferation and inflammatory response tests. By immunofluorescence measurements we confirmed that insulin conjugated to the NG (NG-In) is protected by protease degradation, is able to bind and activate insulin receptor and triggers the insulin signaling via AKT activation. Neuroprotection of NG-In against dysfunction induced by amyloid β, the peptide mainly involved in AD, was in vitro verified. Finally, the potential of NG-In to be efficiently transported across the Blood Brain Barrier was demonstrated by using an in vitro system. Moreover, we explored the possibility of utilizing the intranasal (i.n.) administration as viable alternative to the parenteral administration that could alter blood glucose levels. By intraperitoneal injection of a fluorescent-labeled nanogel, the biodistribution of NG in the whole body and its clearance through the different organs was demonstrated. The administration of NG-In through the i.n. route to study its brain distribution showed that insulin level is improved in the different brain areas with respect to the administration of free insulin. In addition, the histopathological analysis of the nasal mucosa has not shown any morphological change indicating that the nano-formulation is well tolerated in mouse. These results indicate that the synthesized NG-In enhanced insulin delivery to the brain by i.n. administration, thus strongly encouraging its use as therapeutic agent against AD.

Audience Take Away:

- New application of drug delivery systems.
- Use of alternative administration ways.
- Expansion of knowledge about biocompatibility and biodistribution in vivo.

Biography:

Dr. Cusimano was born in Palermo, Italy. He received his Master's degree in Medical Biotechnologies and Molecular Medicine in 2017 from University of Palermo, Italy. He is currently a fellow in the research group of Dr. Di Carlo at the Institute of Biomedicine and Molecular Immunology "Alberto Monroy", Italian National Research Council (IBIM-CNR). His fields of interest are focused on studying biomaterials biocompatibility and drug delivery systems intended for different applications such as neurodegenerative diseases and wound healing.

Hydrochar fuctionalized with sulfurous acid of *Agave tequilana Weber* leaves

José Anzaldo Hernández*[3], Lourdes Graciela Cabrera Chavarría[1], Edgar David Moreno Medrano[2], Rodrigo Pérez Pimentel[3], Alejandra Sofia Juárez Villa[3]

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This work studied the obtaintion of a functionalized carbon in a single stage using green leaves of *Agave tequilana Weber var*. blue by hydrothermal carbonization (HTC) and a chemical activation with sulfurous acid. The variables studied were the treatment time (8, 16, 24 h) and the sulfonic acid concentration (0, 1.5, 3.0, 4.5% w/v). The functionalized carbon was morphologically characterized by the techniques SEM, TEM, DRX and BET and chemically by the techniques FTIR, 13C, NMR of solids, XPS and elemental analysis, to determine the level of functionalization that has been achieved by this stage. A potential application of functionalized carbon is the adsorption of heavy metals in residual solutions; the research focused on the adsorption of hexavalent chromium (Cr^{+6}) at different pH and Cr^{+6} concentrations were determined by experimentally. With these studies, adsorption kinetics was made using the sample CF-8H-4.5 at pH=2.0 and 50 ppm of Cr^{+6}. This carbon had an uptake of 19.50 mg Cr^{+6} / g CF-8H-4.5, a quite promising result and better than others carbons of this study.

Audience Take Away:

- This work shows how to obtain an hydrochar in one step.
- Those hydrochars can be use as a heavy metal removal from water.

Biography:

Jose Anzaldo Hernandez has completed his PhD in Forestry engineering (wood technology) at Federal University of Paraná, Brazil. He completed his degree in Chemical engineer with University of Guadalajara, Mexico. He is a Research Professor in Department of Wood, Cellulose and Paper and head of the Research Centre for Pulp Fibers, Bleaching and Bioenergy at the University of Guadalajara. He is the coordinator of the Master's Degree in Forest Products Science at the University of Guadalajara until 2017 Professor of the University of Brazil from 2015 to 2016. He is a Member of the committee of admission to the PhD in Forest Engineering of the Federal University of Parana.

Self-assembly by multi-drop evaporation of carbon-nanotube and graphene-oxide-platelet droplets on a polycarbonate substrate for applications in energy and medicine

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[3]Thermodynamics of Irreversible Phenomena, Université de Liège, Liège, Belgium.

Water droplets containing carbon nanotubes (CNTs), SiO_2 (silica) nanoparticles and mixtures of them, are deposited one drop after the other on a polycarbonate substrate. During evaporation of the droplets, the CNTs and silica nanoparticles go through a self-assembly process, forming a nanocomposite. Two types of composites are prepared. The first is a composite prepared by depositing alternately a layer of CNTs and silica nanoparticles. The second is a nanocomposite prepared by depositing a pre-mixed CNT/silica droplet. The former results into a series of alternate layers and the other by a homogeneous nanocomposite of silica nanoparticles embedded in a porous CNT structure. The thickness, thermal and electrical conductivity (in both the perpendicular and parallel direction) of the composites are measured versus the number of depositions. The morphology of the nanomaterials is characterized by scanning electron microscopy (SEM). The one-dimensional confocal probe method is used to measure the thickness of the layers. The pre-mixed composites showed an increase in the values in both the parallel and perpendicular directions of both the electrical and thermal conductivities, making them suitable for electrodes or battery-like applications. The values of the electrical and thermal conductivities in the perpendicular direction for the first composite decrease and increase, respectively, while for the parallel direction the values are significantly constant. As such, they would be useful as electrical insulators for optimal cooling. Thickness measurements showed that the pre-mixed composite is the denser one, due to a better alignment of the carbon nanotubes. The proposed method in this work is of little cost and hardly energy-consuming. With respect to the often-used dip-coating method, the procedure in this work contributes to a better control of depositing pre-mixed solutions. This resulted into silica-induced CNT alignment with a higher density network, improving considerably the thermal and electrical properties in the aligned direction. This work shows that a simple and low-cost procedure is capable of preparing composites out of the same components, but with different properties.

Audience Take Away:

- Drop-by-drop deposition procedure provides efficient low-cost CNT networks.
- Thermal and electrical conductivities are improved due to silica-CNT interaction, being caused by a better alignment of CNT around the silica nanoparticles. This proves to be a way to align CNTs without any external field. The interactions are caused by H-bridges, which align effectively the CNTs.
- Designing experiments can be facilitated with the proposed method, due to the opportunity to control the initial parameters and thereby the outcome of the deposited structure in terms of porosity and conductivity.
- The high degree of control of the initial parameters and the high reproducibility renders this method to be applicable to a wide range of applications in the energetic and medical sectors, such as membranes or electrodes. Future possible applications are supercapacitors and biosensors.

Biography:

Dr. Hatim Machrafi received a Chemical Engineering degree from the Eindhoven University and a PhD in Chemistry and Energetics from the Université Pierre et Marie Curie (Paris 6), with the highest mention. Currently, he works as a senior researcher with teaching activities. He leads research in extended thermodynamics at the Université de Liège for application in nanosystems and systems of high frequency (or short time scales). In parallel, he pursues his research activities in experimental studies of nanoparticle depositions on functionalized substrates and nanoporous systems at the Université libre de Bruxelles for energetic and medical applications.

Research of dye synthesis photovoltaic cells (DSSC) with photoanodes from ceramic nanowfibers

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Institute of Engineering Materials and Biomaterials, Silesian University of Technology, Konarskiego 18a, 44-100 Gliwice, Poland

The dye-sensitized solar cells (DSSC) shows interesting parameters, both due to the high achieved efficiency and the utilities property, among others the possibility of producing large-format flexible devices. DCCS cells can be considered as layered structures in which each layer influences the operation of the entire system.

One of the most important elements determining the efficiency of this kind of cells is the photoanode which should provide: as the greatest surface area, fast electron transport, low interfacial of electron recombination.

Nowadays the research on photoelectrodes are intensively taken. The most important research concerns reduction of the density of the surface states and increase the electron mobility increasing at the same the decreasing the charge recombination.

Considering the above, the authors focused on the production of anodes of DSSC devices from ZnO ceramic nanofibers by using highly specialized electrospinning method.

The purpose of the work include the produced photoanodes from nanofibers which gives the opportunity to obtain significant surface area while maintaining the highest possible electron transport and low electron recombination.

The innovation of the subject is based on the use of the previously non utilizing form of photoanode material and the determination of its impact on the efficiency of the cells.

The produced photoanodes have been deposited substrates in form of glass tiles with a fluorine doped tin oxide (FTO) layer indicates surface resistivity 10 [Ω /]. Nanofibers materials have been applied with use electrospinning on a glass/ FTO substrate and heated. On the thus prepared surface organic dye was embedded.

The structure and surface morphology of the created films, have been determined by atomic force microscope (AFM) and scanning electron microscope (SEM). By use AFM were taken topographic studies with the quantification of the expansion of the surface of the anode, Research conducting by SEM have been used to determine morphology of the surface and chemical composition of the material.

Investigations of optical properties of individual photovoltaic cell layers were made using the UV-Vis spectrophotometer equipped with a xenon lamp with a wavelength range from 190 to 1110 nm. Absorbance A of layers deposited on a glass/ FTO measured before and after dye deposition. Current - voltage characteristics were to determine the basic photovoltaic parameters using a dedicated device.

The tests confirm the possibility of using an innovative material of nanofibers in order to increase the surface area of the photoanodes, while maintaining appropriate structure and electrical and optical properties, and thus to increase the expected efficiency of cells. The research of nanofibers as photoanodes indicates promising direction for the development of DSSC.

Audience Take Away:

- Appropriate development of parameters for the production of individual elements of DSSC cells will increase their efficiency.
- The use of electrospinning as a method of producing elements of DSSC makes it possible to use the specific structure of manufactured structures and the new materials.
- The use of ceramic nanowires as photoanode material in DSSC causes an increase of the surface area, which in turn affects the amount of the absorbed dye and the efficiency of the cell.
- The use of the electrospinning method for producing electrodes in DSSC is to increase their homogeneity as well as reproducibility of their production.

Nanobiointeractions: Nanoparticle induced modulation of immune system

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Engineered nanomaterials are inspiring the interest of life scientists for potential applications to biomedicine. A wide variety of inorganic and organic materials can be used to produce nanostructures with different shapes, physical and chemical features. Among these structures, engineered nanoparticles demonstrated great potential for diagnostic and translational medicine. Their core and surface design are driven by possible applications and it implies a profound study of target cell responses following nanoparticle contact and interaction. The investigation of nano-bio interaction is a crucial topic in nanomedicine, as nanotechnologies that are thought to be deliberately administered to human subjects will be in direct contact with immune cells.

Silica particles can be produced in a very precise manner in the nano-metric scale. Size, shape, and surface properties, such as charge or hydrophobicity, can be finely tuned to increase their biocompatibility. Many features of SiO2 nanoparticles allow them to be used as a model for drug delivery particles. Furthermore, fluorescent dyes or quantum dots can be entrapped or linked to these particles offering useful nano-tools for imaging purposes.

To reduce particle aggregation and increase their availability for target cells, NP-coating polymers can also be an advantage. Among the several biocompatible polymers, poly(ethylene glycol) (PEG) has a wide variety of applications, which often involve its capacity to limit protein adsorption. PEG, immobilized to surfaces, greatly retards protein adsorption and shows anti folding activity. PEGylation of drugs and nanocarriers leads to an increase of their circulation half-lives by decreasing their susceptibility to phagocytosis.

To endow NPs with such "stealth" properties, modification of their surfaces with PEG has become a popular method to reduce nonspecific interactions with serum proteins and reduced cellular uptake.

Pegylated silica NPs were preferred as prototype NP, due to the past and current expertise in Nanobiointeractions and Nanodiagnostics Lab with synthesis and functionalization.

The monocyte/macrophage phagocyte lineage play a key role in the immune defense against foreign bodies, including NPs. They are able to trigger fast protective responses through the release of cytokines and phagocytosis, representing a suitable model to investigate the effects of engineered nano-materials.

Audience Take Away:

- The audience will take advantages form this poster collecting informations on nanoparticle synthesis and functionalization with biological proteins aimed at biomedical applications.
- The audience can observe the poster's informations and compare them with their own work. The presented methods could be extended to other materials and biochemical moieties. The nanoparticle functionalization can improve the selective cell targeting. Nanoparticle induced cell function modulation could be of great advantage for further research and innovation.

Biography:

Dr. Cagliani Roberta studied Pharmaceutical chemistry and technology at the Federico II University in Naples, and graduated in 2014 with 100/100 cum laude. She then joined the research group of Prof. Paolo Antonio Netti at the Istituto Italiano di Tecnologia in Naples. A second experience was obtained in the research group of Prof. Giulia Russo at the Department of Pharmacy, Federico II University of Naples. Then She started her PhD fellowship in 2016 at the Istituto Italiano di Tecnologia in Genova.

Modification of PES membrane through in-situ formed silver nanoparticles to mitigate biofouling

Karel Havlicek*[1], Jan Dolina[1], Lukas Dvorak[1], Jaroslav Nosek[1]
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Significant failure of membrane processes in wastewater treatment is biofouling. By modifying the membranes with silver nanoparticles, their antimicrobial and hydrophilic properties can be enhanced to increase the efficiency of the membrane process, i.e. the filter cycle will be extended without a frequent application of chemical or mechanical cleaning.

Polymer PES (polyethersulfone) was chosen as the most suitable material for modification and subsequent testing. PES is characterized by a suitable mechanical, chemical and thermal stability and it is capable of binding silver nanoparticles in its structure effectively. The commercial product of the membrane module MS® SUF-4040 from hollow fibers (PES) was modified by the incorporation of silver nanoparticles into the surface structure of the membrane by the diffusion-thermal method. The membrane was flushed with AgNO3 solution (3.5% wt.), where the silver ions were captured in the PES polymer matrix and then reduced with ascorbic acid to the elemental silver particles. Nanoparticles are mainly bonded by mechanical bonding, which ensures that they remain in the polymer matrix during the filtration process.

Testing of the modified membrane at the pilot scale was carried out using a filtering apparatus (from Mega a.s., Czech Republic). The primary input and output parameters of the process (pressure, flow, temperature) were continuously measured with the installed sensors. Modified and reference membranes were tested for a given time with wastewater from the settling tank after sand filtration. The biofouling reduction efficiency for the reference and the modified membrane was compared on the basis of pressure, flow and other parameters (point sampling chemical analysis).

The synergistic effects of the antimicrobial properties of silver nanoparticles and the increased surface hydrophilicity reduce the interaction of microorganism and other biological materials which interact with the surface. 30% higher production of permeate (with equal or higher purity) was recorded in the modified membrane as compared to the reference membrane. The modified membrane showed antimicrobial properties and biofouling reduction.

Audience Take Away:

- PES membranes modified through silver nanoparticles and influence for biofouling.
- Methods of testing and evaluation of the membrane process.
- Determination of antimicrobial properties, permittivity and efficiency of modified membrane.
- The modified membrane exhibits better filtration efficiency than the reference membrane.
- Other options for modifying the membranes.

Biography:

Karel Havlicek finished his master's degree at the Technical University of Liberec, Czech Republic in 2017 and since the same year, he is a PhD student at the Technical University of Liberec. Karel is now working in the field of biotechnology. The greatest attention he devotes to the exploration of composite biomass carriers and wastewater treatment processes.

Functionalized graphene oxide as a new, high performance adsorbent of heavy metal ions and organic dyes

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During the last decade, two-dimensional materials (2DMs) have gathered a great attention due to their unique chemical and physical properties which make them attractive platforms for diverse applications in sensing and uptake of heavy metal ions. Metal ions and organic dyes in the aqueous environment have caused various diseases and seriously threaten ecosystem and public health with the rapid development of the industry in recent years. Many efforts have been made to develop portable sensors for monitoring heavy metals and dyes in the environment. The obtained results show a new generation of adsorbents based on two-dimensional materials (2DMs) along with their full spectroscopic and morphological characterization. By mastering supramolecular and (dynamic) covalent chemistry approaches, we functionalized 2DMs sheets with functional molecular units exhibiting high affinity towards various heavy metal ions and cationic dyes. In particular, the growth of 2D covalently functionalized architectures were attained by exploring the functionalization of GO through the ring-opening reaction of epoxy groups and amide formation through functionalization of carboxylic groups of GO. Such an approach will make it possible to control the affinity of GO towards specific metal ions and fabricate robust and highly functionalized 2D architectures, which were used in preliminary studies as adsorbents for removal of heavy metal ions.

Audience Take Away:

The proposed projects significantly contribute to the understanding of the relationship between the oxidation level of GO, its functionalization, and the value of the maximum adsorption capacity of heavy metal ions as well as cationic dyes. Yet, the use of various oxidation levels of graphene oxide has not been explored so far for tuning the functionalization degree. In this context, the fabrication of functional GO materials through covalent linkage between organic molecules and individual GO sheets is extremely appealing, as it could result in a remarkable enhancement of the adsorption capacity. The implementation of proposed research methodologies will contribute to the knowledge of graphene community and will allow synthesis of a wide range of novel, innovative materials that may in the future be used in many different fields of science, including supramolecular engineering and environmental protection.

Biography:

Dawid Pakulski received his MSc degree from Adam Mickiewicz University in Poznan , Poland (2015). He is currently a PhD student in the frame of the "cotutelle" program at Adam Mickiewicz University in Poznan (Poland) and the University of Strasbourg (France). His current research focuses on the design and synthesis of graphene-based materials, with particular emphasis on membranes and foams for water purification and detection of heavy metal ions. He has published 10 research articles in scientific journals (Chemical Society Review, ACS Nano, Journal of American Chemical Society, Advanced Science, Nanoscale).

Evaluation of NZVI injection at the contaminated site using newly developed software

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Nanoscale Zero-Valent Iron (nZVI) has emerged as a promising remediation agent for in situ degradation of chlorinated solvents. Different approaches have been tested to enhance the properties of nZVI (reactivity, migration and stability) for environmental application. For the assessment of nZVI application, it is needed to have a complete overview of remediation processes via molecular-genetic, physicochemical and chemical analysis of the groundwater as well as geological parameters of the site.

In this study, nZVI was injected in combination with a detergent and the application of a DC electric current at a site contaminated by chlorinated ethenes. The monitoring period started before the nZVI application and lasted for six months to study its long-term effects on the site. Physicochemical parameters were measured at site and samples of groundwater were collected for molecular-genetic and chemical analysis. Specifically, the real-time qPCR analysis was used to detect the total bacterial biomass and the presence of key enzymes and microbial consortia involved in the reductive dehalogenation and the gas chromatography-mass spectrometry (GC-MS) was used for analysis of contaminants and products of dechlorination.

The influence of the injection on bioremediation processes was investigated using a newly-developed software focused on bioremediation of chlorinated ethenes. This user-friendly software enables an interpretation of input data, resulting in the evaluation of the potential for natural bioremediation at the contaminated site and also in the assessment of the effects of remediation application. To ensure widespread user availability, the program was created in Microsoft Excel.

Audience Take Away:

- A new application of nZVI in combination with detergent and DC current at the contaminated site.
- The software proved to be an effective tool for the remediation-performance evaluation.
- Combination of nZVI, detergent and DC current had a positive impact on the remediation performance.
- Tested remediation technology did not have a long-term negative effect on tested bacteria.

Biography:

Magda Nechanicka finished her master's degree in Nanotechnology at the Technical University of Liberec (TUL), Czech Republic in 2017. She then joined the Department of nanomaterials in natural sciences at the Institute for Nanomaterials, Advanced Technology and Innovation, TUL. She is currently in her second year of PhD studies supervised by Dr. Dvorak at TUL. Her research is focused on the use of the combination of nanomaterials and molecular-genetic methods to support biotechnology processes. In the last few years, she has participated in the solution of a few R&D projects and has so far published three research articles

Advanced $Li_2S@VO_2$ Cathode for Lithium-sulfur Battery

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Lithium sulfide (Li_2S) is one of the most promising cathode materials for the next-generation advanced Li-ion batteries because of its high theoretical capacity (1167 mA h g-1) and large energy density. However, Li_2S suffers from poor rate performance and short cycle life due to its insulating nature and polysulfide shuttle during cycling. In this work, we have proposed a facile and scalable strategy for the synthesis of nanosized Li_2S particles via a solution-based method. For further application in Li–S batteries, uniform conductive VO_2 nanobelts were deposited on the Li_2S particles to obtain nano-$Li_2S@VO_2$. The average size of the as-prepared nano-Li_2S particles is around 100 nm, and covered by VO_2 nanobelts with a thickness of 20 nm. These nanoscale $Li_2S@VO_2$ particles guarantee a short diffusion distance of lithium ions and the protective layer allows fast electron transport as well as effectively constraining the migration of the soluble polysulfides. As a result, the nano-$Li_2S@VO_2$ cathodes show outstanding electrochemical performance with a high initial discharge capacity of 1083.5 mA h g-1 at 0.2 C and 766.3 mA h g-1 after 200 cycles with a low decay of 0.15% per cycle. The enhanced electrochemical performance is due to the unique architecture with enhanced electrical conductivity and better suppression effect for the polysulfide shuttle

Audience Take Away:

- Get the latest technology in the synthesize of cathode materials in Li-S battery.
- Lay solid foundation for the deep understanding of VO_2 applied in Li-S battery.
- This paper solves the volume expansion of Li-S battery.

Biography:

Dr Jing Xu currently is a lecturer in electrical engineering of Zhengzhou University, she got her Ph.D degree in the University of Technology Sydney, her research mainly focuses on the synthesis of novel, porous, and functional nanomaterials for lithium–sulfur battery.

Genotoxicity of noscapine nanosuspension prepared by microfluidic reactors on hepg2 cell line

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Noscapine is an antispasmodic alkaloid used as antitussive and anti-cough obtained from plants about Papaveraceae family. This benzylisoquinoline alkaloid and its synthetic subsidiaries, called noscapinoids are being assessed for their anticancer potential. The present research aimed to investigate induction of DNA destruction and viability of HepG2 tumor spheroid culture influenced by noscapine and nanosuspention of noscapine. Culture of HepG2 cells as spheroids were treated with different concentrations of noscapine for 24 h on Day 11. Afterwards, viability assay and alkaline comet assay methods were applied to examine viability and induced DNA destruction, respectively. Based on the results, no significant impact was observed from Tween 40 on the viability and DNA damage levels in comparison with the control ($p > 0.05$). Moreover, increasing noscapine concentration resulted in a dose-dependent reduction in viability of hepatic cancer cells and elevation of DNA damages, showing a correlation between rises of DNA damages and viability decline.

Audience Take Away:

- Low solubility in water, or in other words, bioavailability is a common feature among the majority of commonly used chemotherapy drugs.
- Today, the most common method to increase the solubility of drugs is to use nanotechnology methods that reduce particle size to a sub-micron level.
- Production of particles with a small PDI is always one of the major problems in determining a method among common bottom-up and top-down methods.
- Microfluidic tools are considered the most sensitive, inexpensive and controllable method among bottom-up nano-tools.

Biography:

Dr. Azarian studied Biophysics, Islamic Azad University, Science and Research Branch, Tehran, Iran and graduated as MS in 2010. She then joined the research group of Prof. Khoei at the Cellular and Molecular Research Center, Iran University of Medical Sciences and Health Services, Tehran, Iran. She received her PhD degree Nanotechnology/Medicine at the New York International University of Technology & Management (NIUTM), New York, America and Biophysics, Islamic Azad University, Science and Research Branch, Tehran, Iran graduated as (second) PhD in 2018. She then joined the research group of Prof. Xavier Avilés Puigvert at The Institut de Biotecnologia i de Biomedicina (IBB), Universitat Autònoma de Barcelona (UAB). She has published more than 10 research articles in ISI journals.

Development of continuous synthesis of iron oxide nanoparticles for biomedical and clinical applications

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The synthesis of promising single-core iron oxide nanoparticles intended for use in biomedical applications has attracted much interest over the last decade. Several synthetic routes to achieve size, shape, crystallinity, dispersity and magnetic behavior were reported in the literature such as sol-gel synthesis, microemulsion, hydrothermal reactions, etc. Nevertheless, most of them are time-consuming and costly. Therefore, the search for a new and facile synthetic route that is simple, economical, environmentally friendly and rapid is one of the most challenging issues related to the synthesis of well-crystallized and size-controlled iron oxide nanoparticles.

Herein, we report the development of a micromixer-based synthesis platform, which enables, in a very short lapse of time, the production of a large amount of stable, reproducible single-core nanoparticles with narrow size distribution and suitable surface chemistry. Moreover, the particle characteristics can be easily controlled by varying the process parameters, e.g. total flowrate, temperature and mixing ratios. The synthesis platform offers suitable magnetic carriers for specific biomedical and clinical applications.

Audience Take Away:

- Continuous synthesis saves time, cost and effort
- High product quality with scale up feasibility
- The so produced nanoparticles are important candidates for diagnostics (Magnetic Particle Imaging) and therapy (Drug Targeting, Hyperthermia, etc.)
- Easy particle surface modification

Biography:

Mr. Abdulkader Baki studied biomedical Chemistry at the University of Johannes Gutenberg, Mainz. He joined the research group of Prof. Michael Maskos at Fraunhofer Institute to complete his Ph.D. study in 2017.

NOTES

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