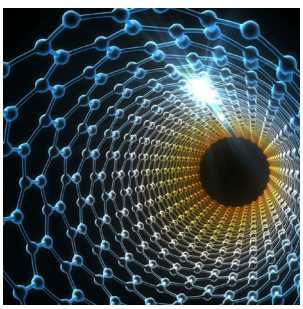
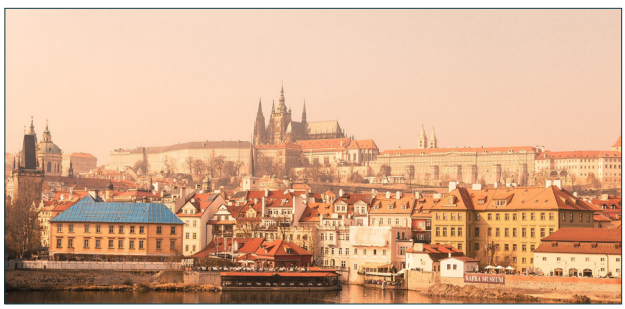
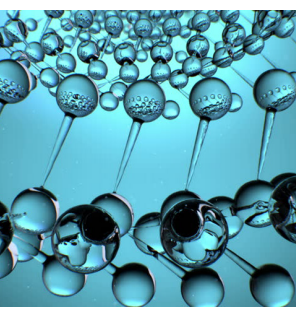
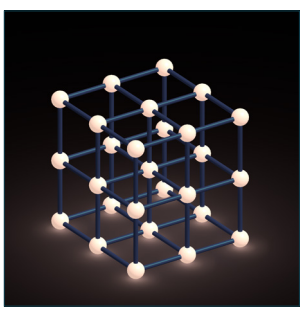
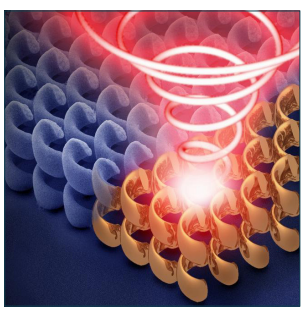
allied academies

Poster Presentation

Nanomaterials 2019
Nanoscience 2019

Joint Event on

2nd International Conference on

Nanomaterials and Nanotechnology

&

22nd International Conference on

Advanced Nanoscience and Nanotechnology

May 16-17, 2019 | Prague, Czech Republic

Fabrication of graphdiyne/CuS heterojunction nanowires for high-performance diodes

Huibiao Liu
Chinese Academy of Sciences, China

We have developed a new method of *in-situ* electrically induced self-assembly technology for preparing the graphdiyne/CuS core/shell semiconductor heterojunction nanowire arrays. The tuning size of the interface of the heterojunction nanowire can be achieved by the growing condition. The strong dependence of rectification ratio and perfect diode performance on the size of the interface has been observed from the graphdiyne/CuS heterojunction nanowires with core/shell structure. It will open a door for controlling the morphology and property of one-dimensional heterojunction nanomaterials.

Speaker Biography

Huibiao Liu is a professor at the Institute of Chemistry, Chinese Academy of Sciences. He received a PhD in Inorganic Chemistry in 2001 at Nanjing University. He once worked as a visiting scholar at School of Materials Science & Engineering, Georgia Institute of Technology in USA, Munster in Germany and Hong Kong University of Science & Technology. He has published over 200 papers in peer reviewed journal articles, such as Acc. Chem. Res., J. Am. Chem. Soc., Angew. Chem. Int. Ed., and Adv. Mater. et al. His research interests in the fields of fabrications and properties of inorganic/organic nanomaterials based on rich carbon (graphdiyne etc.), development of novel methods for tuning the aggregate structures and properties.

e: liuhb@iccas.ac.cn

Notes:

Nanodiamonds thermal probes for intracellular measurement of temperature

Martín Pedroza-Montero, F A Pedroza-Montero, K Santacruz-Gomez, M A Acosta-Elías, E Silva-campa, J A Sarabia-Sainz, A Burgara-Estrella, A Angulo-Molina, B Castaneda, S Navarro-Espinoza and **D Soto-Puebla**
Universidad de Sonora, México

The use of nanodiamonds (ND) in medicine and biology is based on their bio-compatibility in physiologic environments and very low toxicity at the intracellular level. In this regard, the precise measurement of temperature in these environments allows the better knowledge of biologic events, such as cell divisions and cell´s metabolisms alterations. Both processes are important in the pathology of cancer. A thermal nanoprobe made of ND is very plausible because their magnetic, electric and optical properties have a dependence on the temperature in the physiologic range centred at 37.5°C. In this work, we present data on the emission spectra of fluorescent nanodiamonds (FNDs), and we study its behaviour when the temperature changes with a phenomenological model. Here, the FNDs are in solution, and the model included the contributions from the background and spurious luminescent processes associated with impurities or contamination. We obtained the thermometric scales from changes of intensity, semi-width and shift position related to Zero-Phonon Lines of N-V centre with low errors and great precision. The incubation of FND solutions in cellular culture provides the means for reading temperature both *in situ* and in real time, which becomes a useful medical tool for a complementary cancer diagnosis.

Speaker Biography

Martín Pedroza-Montero has completed his PhD from University of Sonora, México and he cofunded three scientific groups devoted to the study synthesis of nanovectors tissue specific, nanoplatforms for bio spectroscopic cell studies and physics of cancer. He is the former director (2014-2018) of Department for Research in Physics of University of Sonora. He has published more than 50 papers in reputed journals and has been serving as referee in specialized journal of nanotechnology, nanoparticles, physics and medicine.

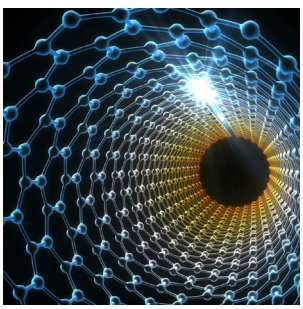
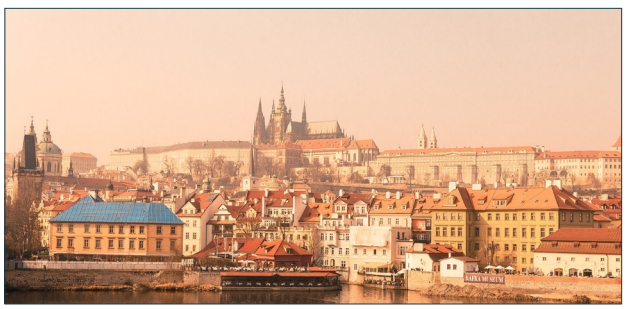
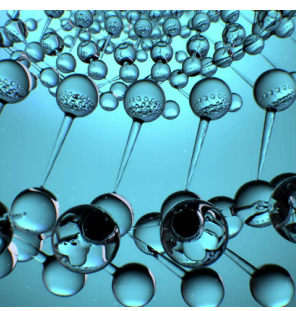
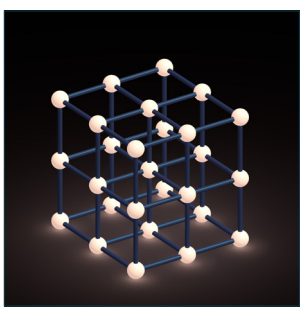
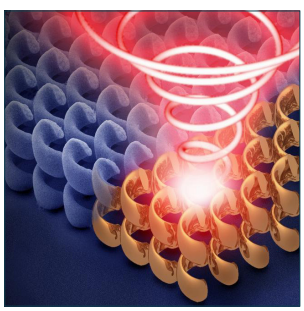
e: martin.pedroza@unison.mx

Notes:

allied academies

E-Poster

Nanomaterials 2019
Nanoscience 2019

Joint Event on

2nd International Conference on

Nanomaterials and Nanotechnology

&

22nd International Conference on

Advanced Nanoscience and Nanotechnology

May 16-17, 2019 | Prague, Czech Republic

allied academies

Joint Event
2nd International Conference on
Nanomaterials and Nanotechnology
&
22nd International Conference on
Advanced Nanoscience and Nanotechnology
May 16-17, 2019 | Prague, Czech Republic

Mater Sci Nanotechnol, Volume 3

Green sustainable natural nanomaterials and their promising applications

Alaa K Al-Khalaf, Mohammed H Al-Jawasim and **Hasan Karkosh**
Al-Qasim Green University, Iraq

Nanomaterials have been widely implemented in a variety of beneficial applications to humanity; however, most of these nanomaterials are not natural and synthesized by complicated industrial processes with dilemmas of being expensive, toxic, inefficient in energy and their potential environmental impact. Therefore, there is a growing need to implement green sustainable natural materials as precursors in nanoparticles synthesizing (nano-organics) by using green methods. The synthesized nanoparticles by green sustainable methods are environmentally benign and safe to use in many applications. There is a world movement towards creation a combination between nanotechnology and green chemistry to create and implement green technologies in synthesizing smart materials. In our green chemistry lab, nano-organics have been synthesized from cellulose and clay by simple green methods and applied in a number of important applications, including desertification treatment, pollutants degradation and drugs delivery.

Green mat for desertification treatment: In 2019, Iraqi invention aimed to create a natural green mat to reclaim sandy lands or fix sand dunes. The invention idea meets with the criteria of sustainable environmental and economic development to overcome the scarcity of water, food and energy especially in the developing countries.

The outer main layer of green mat formed from hydrogel as a coating thin film for the purpose of water absorption falling on it. This film of hydrogel protects the plant seeds (barley) against the drought and atmospheric effects, assist the plants to immerse their roots inside the mat's layers and support the roots extension. The practical results were obtained for the agricultural reclamation of barley plants and stabilization of sand and were compared with local methods to treat desertification in Iraq or international methods, such as the Indian and Japanese companies that carried out projects in the UAE and other countries.

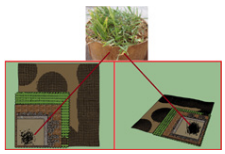


Figure 1. illustration of green cover layers with grown barely plant above the sandy soil.

Speaker Biography

Alaa K Al-Khalaf has a PhD in Physical Chemistry/ Green Chemistry from Cardiff University/School of Chemistry under the supervision of emeritus professor Keith Smith. He has many Iraqi patents and prizes in the field green chemistry and nanotechnology. His research team has been working on using green methods in synthesizing sustainable natural nanoparticles that can be used in many important applications to humanity.

e: dralaa_al-khalaf@hotmail.co.uk

Nanostructured stainless and carbon steels with super strength and good ductility

Peiqing La, Yuehong Zheng and **Min Zhu**

Lanzhou University of Technology, China

The 304 and 316L stainless steels and 1020 and 1045 carbon steels with nano/micro-crystalline structure were prepared by an aluminothermic reaction casting method. The microstructural evolution of the stainless steel after annealed with different time and temperature, rolled with different thickness reduction and temperature, first cogged and followed rolled with different thickness reduction and temperature were studied. The microstructural evolution of the carbon steel after annealed with different time and temperature, rolled with different thickness reduction at 600°C. By analysis the grain size of nanocrystalline austenite, submicrocrystalline austenite and ferrite, and their volume fraction in stainless steels; the volume fraction and lamellar spacing of the pearlite, the shape of the cementite in pearlite in carbon steels. We raised the mechanisms of microstructure evolution.

Speaker Biography

Peiqing La is currently working as a chair professor in College of Materials Science and Engineering at Lanzhou University of Technology, China. He has published more than 10 papers in the international journals. His research areas mainly focus on fabrication, characterization and properties of nanocrystalline materials.

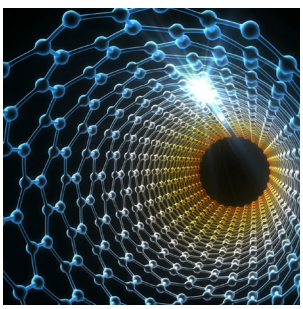
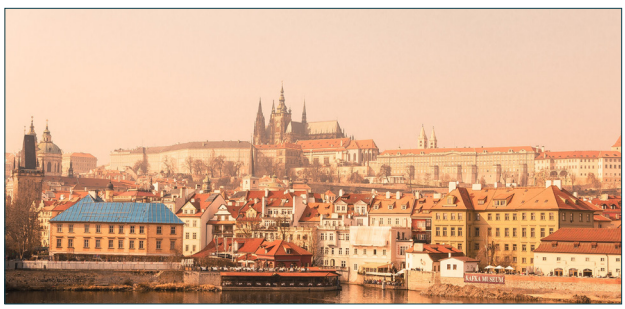
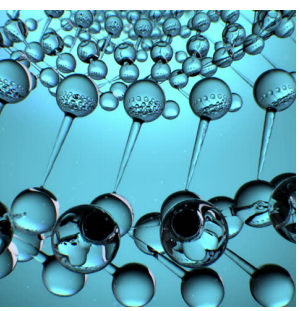
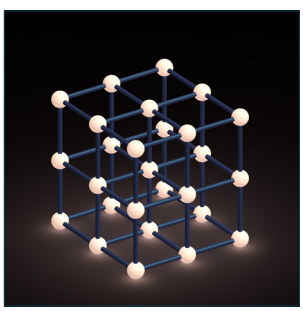
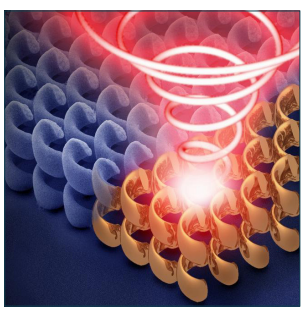
e: pqla@lut.cn

Notes:

allied academies

Accepted Abstracts

Nanomaterials 2019
Nanoscience 2019

Joint Event on

2nd International Conference on

Nanomaterials and Nanotechnology

&

22nd International Conference on

Advanced Nanoscience and Nanotechnology

May 16-17, 2019 | Prague, Czech Republic

Nanomedicine in the treatment of glioblastomas and neurological disorders

Alain L Fymat

International Institute of Medicine and Science, USA

One of the most promising applications of nanomedicine principles is in clinical neuroscience, particularly in the treatment of glioblastomas and neurological disorders (epilepsy, Parkinson disease; Alzheimer disease, etc.). Here, specially-designed nanoparticles (NPs) delivered by specially-designed nanocarriers are able to cross the blood brain barrier to deliver their payload at pre-defined location(s) according to specified time- and dose-fractionations while remaining unnoticed by the immune system. I will discuss the several NPs utilized and their corresponding clinical advantages, including: Nutshells (that can be targeted to bond to cancerous cells by conjugated antibodies or peptides to anopheles' surfaces); platelet-coated NPs (that can deliver higher doses of medication drugs to targeted sites, thus greatly enhancing their therapeutic effects); biocompatible and biodegradable gelatin NPs (that can deliver multiple drugs); and shape-shifting engineered NPs (that can can be tailored to deliver drugs to specified tumors and nowhere else).

e: alain.fymat@fiimas.org

Notes:

Intelligent aerospace composites with integrated nanomaterials-based sensing

Latha Nataraj

U S Army Research Laboratory, USA

Excellent fatigue performance, high specific stiffness and strength and low density of fiber reinforced polymer (FRP) composites have led them to emerge as critical structural materials for a wide range of aerospace applications. However, structural integrity of such composites can be severely compromised by even microscale damage that might normally seem trivial, such as delamination, matrix cracking, fiber debonding or breakage, thus making it critical need to monitor the health of the structure. Identification and detection of early stages of damage formation and evolution could improve reliability and performance of composites and lead to a longer lifetime of the structure while minimizing maintenance efforts. Metal foil strain gauges and optical fiber sensors which are the most popular tools for strain sensing presently pose inherent limitations which are yet to be overcome. Hence, there has been an increased scientific and technical quest for physically stable, quick responding, highly sensitive and cost-effective strain sensing materials, devices, and techniques for applications over a broad range of strain experienced by a structure or system of interest. We pursue *in-situ* detection of damage at the earliest stages of formation and evolution in fiber reinforced composites which have come to be ubiquitous for aerospace applications due to superior damage tolerance through the embedding sensing materials in the advanced aerospace composites. We investigate *in-situ* change in electrical resistivity and Raman spectra in response to mechanical loads, correlating them with the full-field deformation and damage mechanisms using digital image correlation in conjunction with acoustic emission and thermal imaging measurements, advancing science and technology towards superior damage-tolerant and zero-maintenance structural materials.

e: latha.nataraj.civ@mail.mil

Notes:

Roadmap to clinical translation of gold mediated therapeutics

Devika Chithrani
University of Victoria, Canada

Recent developments in nanotechnology has provided new tools for cancer therapy and diagnosis. Among other nanomaterial systems, gold nanoparticles are being used as radiation dose enhancers and anticancer drug carriers. Our studies show that size, shape and surface properties of NPs can play a major role in their interaction with tumor cells. We have a developed a comprehensive research platform which includes monolayer cell models, multilayer cell models (tissue like models), and *in vivo* animal models to test the therapeutic efficacy of gold mediated sensitization. It is important to test NP formulations at all three above mentioned levels to optimize their use in future clinical applications. For example, our previous work at monolayer level showed that NPs of diameter 50 nm had the highest cell uptake among the size range 10-100 nm. However, at tissue-level NPs of diameter lower than 50 nm showed the highest tissue penetration. Once these NPs leave the tumor blood vessels, it important that they should be able to penetrate tumor tissue deeper. Hence, we used smaller NPs for our *in vivo* studies. We were able to achieve more than 12% of the NP formulation within the tumor. We have also shown for the first time that cancer drug loaded gold nanoparticles can reach the nucleus (or the brain) of cancer cells enhancing the therapeutic effect dramatically. Nucleus of the cancer cells are the most desirable target in cancer therapy. In chemotherapy, smart delivery of highly toxic anticancer drugs through packaging using nanoparticles will reduce the side effects and improve the quality and care of cancer patients. In radiation therapy, use of gold nanoparticles as radiation dose enhancer is very promising due to enhanced localized dose within the cancer tissue.

e: devikac@uvsic.ca

Optimization of the $Ni_{80}Fe_{20}$ nanoislands growth for sensor technology

Alex Trukhanov, T I Zubar, D I Tishkevich, A A Solobai, D A Vinnil and **S V Trukhanov**

South Ural State University, Russia

Nickel based alloys have optimal balance of magnetic and functional properties. The particular interest in quasi-2D structures near the percolation region for fundamental investigation and spintronic application is caused by the demonstration of unique magnetic phenomena like skyrmions and vortex-antivortex pairs. The use of pulsed electrodeposition with ultra-short pause duration make it possible to produce nanocrystalline films with controlled grain size and may have impact on the mechanism of their growth. However, the influence of processes, which occur during the pause between pulses, remains important for the growth mechanism. We studied occurring processes during the interpulse relaxation (IPR) time and their influence on the growth mechanism and the structure of the final NiFe films. As a result, three types of NiFe films with an absolutely different structure can be obtained for electrolyte deposition regimes with a fixed pulse duration and with an increase in the IPR time due to controlled conglomeration of nanocrystallines with excess surface energy. So, the uniform nanocrystalline NiFe film with an average grain size less than 10 nm was obtained in the short relaxation (SR) regime (shortest IPR time) of pulsed electrodeposition. The uniformly distributed fraction of grains conglomerations (40 – 50 nm) surrounded by nanosized grains (less than 10 nm) was observed using medium relaxation (MR1 and MR2) regimes. Finally, using large relaxation (LR) regime with the largest IPR time, separate "islands" with a size about 50 nm were formed on the gold sublayer. So, we have shown the possibility of transition of the growth mechanism from the layer-by-layer through the layer-plus-island to island formation by varying only one technological parameter – IPR time. We first showed the ability to control the mechanism of the NiFe films growth by controlled nanocrystallites conglomeration during pulsed electrolyte deposition. This opens broad perspectives for practical applications of this technology.

e: truhanov86@mail.ru

Notes:

Next generation nano antibiotics using C_{60} fullerenes

Martin Quirke

Technological University of Dublin, Ireland

The objective of my research is to design, synthesise and tailor a nanoparticle-antibiotic complex capable of a multi-targeted approach to MDR pathogenic bacterial infections. A C_{60} fullerene complexed with ampicillin had been designed and characterised via SEM, DLS, PDI, Zeta potential, UV-Vis, Raman and IR. Post-synthesis the complex was tested against several strains of bacteria, pathogenic and non-pathogenic with positive results. The complex could reduce the quantity of ampicillin to inhibit bacterial growth for the non-pathogenic strains. The focus of my research is based on the spectroscopic results obtained via the UV-Vis and Raman analysis, as well as the microbiological data. As a result of the spectroscopic analysis, I could observe some very key characteristics about the complexes growth and potential point of binding. This was a potential π-π stack formation between the π electrons on the nano C_{60} system and the aromatic ring on the ampicillin molecule. The deconvoluted Raman spectra from C_{60} and ampicillin showed a drastic change in the aromatic region. The UV-Vis also showed a change in the nano region, hypochromic. This is mainly C_{60}-C_{60} interactions which seems to suggest π-π stack. Couple this with the increase in stability via zeta and DLS particle growth would seem to suggest a π system.

e: C11806745@student.dit.ie

allied academies

Joint Event
2nd International Conference on
Nanomaterials and Nanotechnology
&
22nd International Conference on
Advanced Nanoscience and Nanotechnology
May 16-17, 2019 | Prague, Czech Republic

Mater Sci Nanotechnol, Volume 3

Electrical characteristics of single nanowire TiO_2 memristive devices in air and vacuum at room temperature

Sahar Alialy, John J Boland, Claudia Gomes da Rocha and **Mauro Ferreira**
Trinity College Dublin, Ireland

The performance of memristive devices are of huge interest today due to their wide use in nanoelectronics with applications in non-volatile memory and storage, and neuromorphic computing. The resistive switching (RS) properties of these devices have shown a range of different behaviours regarding the nature and direction of hysteresis loops. In particular, the presence and origin of the negative differential resistance (NDR) regions found in these hysteresis loops has attracted a lot of interest. In this study, we report the resistive switching properties of a single nanowire of Au-Ti/TiO_2/Ti-Au RRAM devices at room temperature in air and under vacuum. The Clockwise Switching (CWS) and clear NDR regions of the I-V characteristics of the device in vacuum are transformed into bipolar Counter-Clockwise Switching (CCWS) without NDR regions when measurements were made in air. The current level also increased significantly in air comparing with vacuum. We explain this behaviour based on the creation of oxygen vacancies under voltage bias at one interface, and the drift of these charge carriers toward the cathode. These vacancies in the vacuum act as shallow donors and dopants diffuse under bias to create multiple depletion regions along the wire resulting in the NDR behaviour. The presence of oxygen in air results in recombination of the oxygen vacancies, quenching the NDR effect and switching the direction of the hysteresis loop. The dynamics of the depletion layer is described using a phenomenological memristor model based on the Hewlett-Packard (HP) Labs picture in which complex charge conduction phenomena can be captured by fitting ion-drift equations with the experimental data. This study demonstrates that the RS and memristive properties of devices are dependent on the ambient conditions and these results will help facilitate future applications of these devices in highly dense random-access memories and brain-like (neuromorphic) devices.

e: alialy.sahar@gmail.com

Notes:

allied academies

Joint Event
2nd International Conference on
Nanomaterials and Nanotechnology
&
22nd International Conference on
Advanced Nanoscience and Nanotechnology
May 16-17, 2019 | Prague, Czech Republic

Mater Sci Nanotechnol, Volume 3

Toxicity of metal oxides NP on rat macrophages: A combined transcriptomic and proteomic study

Doumandji Zahra, Doumandji Z, Cassidy H, Gómez D, Safar R, Nahle S, Lovera-Leroux M, Schneider R, Alem-Marchand H, Ferrari L, Rihn B H and **Joubert O**
Université de Lorraine, France

The paucity of biomarkers to predict the toxicity of nanoparticles (NP) makes important to identify key pathways linked to a toxic exposure of lung to NP. In this study, we focused on the impacts of three metallic NP on NR8383 alveolar macrophages to evaluate modifications in transcriptome and proteome profiles after exposure to sub-toxic doses of zinc oxide (ZnO), zinc ferrite oxide ($ZnFe_2O_4$), and iron oxide (Fe_2O_3) NP. The cytotoxic potency of NP was evaluated by extracellular LDH measurement and by WST1 assay. A significant induction of membrane damage and reduction of NR8383 viability were noticed after 24 hours exposure to the ZnO and $ZnFe_2O_4$ NP. To understand the interactions that occur and the biological consequences of exposure of lung to NP, optimal conditions where NR8383 cells remained viable during the sub-toxic doses exposure. Then, gene expression and protein production were investigated by microarray profiles and mass spectrometry methods, respectively. Genomic study showed 1036, 1274 and 3763 differentially expressed genes following 4 hours exposure to sub-toxic doses of ZnO, $ZnFe_2O_4$ and Fe_2O_3 NP, respectively. Proteomic study revealed 348, 784 and 872 differentially produced proteins after 24 hours, respectively. The main involved pathways in genomic study were eIF2, eIF4/p70S6K and protein ubiquitination signalings. Mitochondrial dysfunction, oxidative phosphorylation, sirtuin signaling, protein ubiquitination, unfolded protein response and cholesterol biosynthesis were the main pathways affected revealed by the proteomic study after exposure to the 3 NP. The use of transcriptomic and proteomic platforms, with appropriately designed experimental conditions, enabled the observation of the early biological impairment induced by ZnO, $ZnFe_2O_4$ and Fe_2O_3 NP. The data allowed us to suggest that the protein synthesis default was the effect biomarker for the three NP studied and the metallothioneins gene overexpression was the exposure biomarker for zinc element.

e: zahra-manel.doumandji@univ-lorraine.fr

Development of ozone gas senors based on delafossite thin films

João Afonso

Luxembourg Institute of Science and Technology, Luxembourg

Ozone gas sensors development is a growing need in modern days, due to it's increase use in several industry areas. A major problem is it's production in office enviroment by lab equipments and laser printers. Ozone exposure can cause several long run cardiopulmunary problems. With this in mind there is the urge to develop efficient, cheap and office compatible sensors. Delafossite is an interesting p-type material that has shown it's responsivity to ozone. With this in mind we will deeply explore delafossite properties and it's responsivity to ozone as well as it's integration into devices and understand the udnerlaying relation. Our delafossite films are deposited by Metal Organic Chemical Vapor Deposition (MOCVD) and undergo annealing steps in order to control its electrical properties. We have been developing a state of the art etching process for delafossite with interesting results, leading into the patterning and We have been developing a state of the art etching process for delafossite with interesting results, leading into the patterning and the integration of the first devices.

e: joao.afonso@list.lu

Notes:

allied academies

Joint Event
2nd International Conference on
Nanomaterials and Nanotechnology
&
22nd International Conference on
Advanced Nanoscience and Nanotechnology
May 16-17, 2019 | Prague, Czech Republic

Mater Sci Nanotechnol, Volume 3

Design and synthesis of nanoparticles based chitosan for improving drug delivery across blood-brain barrier

Martin P[1], Savin C[2], Peptu C A[2], Popa M[2,3], Sevin E[1], Gosselet F[1], Chaveriat L[1]
[1]Université d'Artois, France
[2]University of Iasi, Romania
[3]Academy of Romanian Scientists, Romania

We prepared nanoparticles based on chitosan grafted with poly (ethylene glycol) (PEG) methacrylate. These nanoparticles were then loaded with doxorubicin. The nanoparticles have been fully characterized: laser diffraction, electron microscopy, kinetic of swelling of nanoparticles. The size distribution curve of the nanoparticles attests that the average diameter is 450 nm. The analysis of the morphology of the nanoparticles proved the obtaining of spherical particles, well individualized. The process of loading and releasing the drug into the particle is based on diffusion through the hydrogel matrix. As a result, it depends on the swelling rate of the particles in aqueous solutions. The pH of the solution is also an important factor influencing the swelling degree. The kinetics of the particle swelling process was studied in an aqueous medium at acid pH (3.3) and weakly basic (7.4). The swelling degree in both media is high enough, so the particles may fall into the category of superabsorbent gels. The effect is due to the high hydrodynamic volume of macromolecules that are branched by PEG on chitosan chains. To determine if these nanoparticles could be used as vehicle molecules to treat neurodegenerative diseases, we then investigated their toxicity using an *in vitro* model of the human blood-brain barrier (BBB). Free doxorubicin nanoparticles did not modify BLECs (Brain Like Endothelial Cells) permeability meaning that these molecules do not show any toxic effects at the BBB level. These nanoparticles could therefore be used after functionalization with anti-transferrin antibodies to cross the BBB and thus deliver doxorubicin in brain tumors.

e: patrick.martin@univ-artois.fr

Functional nanocoatings as compatible interphases in hybrid materials

Vladimir Cech

Brno University of Technology, Czech Republic

Plasma-enhanced chemical vapor deposition (PECVD) allows the preparation of very specific materials in the form of a thin film. These materials are increasingly used as abrasion resistant, barrier, biocompatible, dielectric, optical or adhesive coatings and also as functional films in chemical sensors, separation membranes, and hybrid materials such as polymer composites. In addition to organic precursors used for the preparation of diamond-like carbons (DLC), organosilicones are often used as precursors. Recent studies have shown that the physical and chemical properties of thin films prepared from organosilicon precursors can be governed by deposition conditions within relatively wide ranges. Polymer-like coatings of the so-called plasma polymers can be prepared at relatively low powers (< 10 W) delivered to the low-temperature plasma. On the example of selected plasma polymers, we will demonstrate the correlations between the physical (optical, mechanical, electronic) and chemical properties of these materials and their use for the deposition of multilayers and gradient nanostructures with application in polymer composites.

e: cech@fch.vut.cz

Notes:

Prometryn and atrazine herbicide detection via SERS using silver nanoparticles functionalized with humic substance

Rafael J G Rubira, Carlos J L Constantino and **Santiago Sanchez-Cortes**

University Estadual Paulista, Brazil

The growing demand for food and the increase world population have led to the need of large cultivable areas and increased the productivity in agriculture, which resulted in the increased use of pesticides, especially in Brazil where the tropical weather (hot and humid) contributes to the proliferation of pests and weeds. The uncontrolled use of these chemical compounds causes damage to the environment, contaminating vegetables, soil, groundwater and other fountains. This contamination may cause health problems for those who come in contact with the contaminant agents and may harm the areas where the pesticides were used even in the case of more distant areas, due to their permanence in the environment. The functionalization of metal NPs leads to the modification of the chemical properties of the surface that further potentiate the performance of plasmonic devices. Functionalization of surfaces is an important process in the analytical applications of SERS due to the large increase of the affinity of many pollutants toward the metal surface is highly affected by the nature of the metal interface. Humic substances are interesting natural macromolecules which can be employed in the functionalization of NPs due to two main factors: a) they can be easily adsorbed onto the metal surface, and b) they can link a large list of pollutants existing in the environment. Among these pollutants we find polycyclic aromatic hydrocarbons (PAHs), and pesticides. In this work we report the functionalization of AgNPs with the shape of nanospheres with standard humic substances (HS) extracted from soils. These substrates were employed to detect atrazine and prometryn, two of the most used triazine pesticides used in agricultural practices in order to increase the sensitivity and selectivity of the SERS analysis.

e: rafael.gon.fis@gmail.com

Genotoxicity of nanoparticles

Oleksandr H Minchenko, Dariia O Tsymbal and **Dmytro O Minchenko**

National Academy of Sciences of Ukraine, Ukraine

Various nanoparticles have distinctive and remarkable material properties, different from bulk materials with the same chemical composition and potential technological applications, including those in biology and medicine. Many of them have recently emerged as a new option for cancer treatment, bioengineering and gene therapy, but inconsistent data on cytotoxicity and limited control over nanoparticles behavior currently restrict predictability of such applications. Most nanotubes, including single-walled carbon nanotubes (SWCNT), have a highly hydrophobic surface and a non-biodegradable nature that contributes to their reduced biocompatibility, limiting their biomedical applications, with growing concerns about their chronic toxicity. It is important to note that different variants of carbon nanotubes exhibit different toxicity both *in vitro* and *in vivo*. The toxicity of carbon nanotubes is attributed to their physicochemical properties, including structure and dose offered to cells or organisms and can elicit toxicity through numerous mechanisms. The SWCNT affects the expression of a number of genes associated with immune response, apoptosis, cell cycle control and cell proliferation in normal human astrocytes and glioma cells as well as genome stability. Similar results were obtained with many other nanoparticles (C_{60} fullerene, cerium dioxide, chromium disilicide, and titanium nitrite) both *in vitro* and *in vivo*. These nanoparticles activate the endoplasmic reticulum stress responsible genes with prooncogenic and cell surviving properties, strongly suppress immune response-related gene expressions as well as deregulate very important tumor suppressor genes. Furthermore, inhibition of IRE1-mediated endoplasmic reticulum stress signaling strongly reduces cell viability due to treatment with cerium dioxide nanotubes. Nanoparticles-mediated down-regulation of the expression of genes encoded the major histocompatibility complex proteins, which play a central role in the immune system, indicate the possibility of an immune response deregulation due to treatment with various nanoparticles. Therefore, most nanoparticles have a strong genotoxicity and more caution is needed in biomedical application of different nanoparticles

e: ominchenko@yahoo.com

Notes:

In-Situ TEM liquid flow cell synthesis of nanoparticles

Janez Zavašnik and **Uroš Cvelbar**
Jožef Stefan Institute, Slovenia

In the last decades, characterisation of natural and man-made materials by means of electron microscopy became one of the basic investigation techniques. The fast development of the investigation methods and accessibility of the scientific equipment, combined by the introduction of novel research techniques, further unlocks our insight down to the atomic level. However, besides beautiful pictures, the data obtained from such investigations can be crucial in the experiment planning and design, for fine-tuning or adjusting the synthesis itself, for modification or tailoring of nano-particles and nano-structures for various applications in sensors, catalysis, magnetism, etc. Conventionally, we are able to observe our samples only *post-mortem*; after the synthesis or after the treatment, but the tendency to observe the reactions, nanoparticle nucleation or performance of catalyst *in-operando* is probably as old as the invention of the electron microscope itself. The implementation of thin membranes to confine hydrated or gaseous samples exposed to the high vacuum of the electron microscope chamber is not new but has recently experienced a new Renaissance. In the talk, some of the fundamentals and limitations of the liquid-flow *in-situ* synthesis and characterisation using transmission electron microscope will be presented, together with recent advances on the synthesis of anisotropic gold nanoparticles.

e: janez.zavasnik@ijs.si

High thermal conductivity materials containing graphene and carbon nanotubes

Phan Ngoc Minh[1], Bui Hung Thang[1], Nguyen Trong Tam[1], To Anh Duc[2], Mai Thi Phuong[2], Pham Van Trinh[1], Phan Ngoc Hong[1], Nguyen Huu Hong[1] and **Phan Hong Khoi[1]**

[1]Vietnam Academy of Science and Technology, Vietnam
[2]VNU University of Engineering and Technology, Vietnam

Recently, there are a lot of interest in utilizing high thermal conductivity materials for heat dissipation in high power electronic components, devices and apparatus. Graphene (Gr) and Carbon nanotubes (CNTs) are known as excellent additives for thermal materials because their very high thermal conductivity. In this report, we present our obtained results on synthesis and application of high thermal conductivity materials including nano thermal greases, nanofluids and nano-lubrication oils containing Graphene and CNTs. The experimental results on adding CNTs and Gr into thermal greases showed that the thermal conductivity of CNTs and Graphene thermal greases increased 80% and 230% compare to normal greases, respectively. When using CNTs thermal greases and Graphene thermal greases in heat dissipation for Intel Pentium Core i5, the saturation temperature of the CPU decreased 3°C and 6°C, respectively. Nanoliquids containing Graphene and CNTs based distilled water/ethylene glycol (DW/EG) were successfully applied in heat dissipation for Intel Core-i5 processor and 450 W Floodlight LED. The experimental results showed that the saturation temperature of the Intel Core-i5 processor and 450 W Floodlight LED decreased about 6°C and 3.5°C when using nanoliquids, respectively. The CNTs was also effectively utilized as additive material for synthesis of lubricating oils to improve the thermal conductivity, heat dissipation efficiency and performance efficiency of the engine. The experimental results show that the thermal conductivity of lubricating oils increased 12.5%, the engine saved 15% fuel consumption, and the longevity of the lubricating oil increased upto 20,000 km by using 0.1% vol. CNTs in the lubricating oils. The all obtained results confirmed the advantages of heat conductive materials containing Graphene and CNTs in thermal management for high power electronic devices, internal combustion engines and other high-power apparatus.

e: pnminh@vast.vn

Notes: