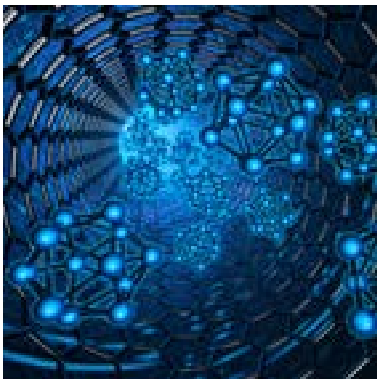
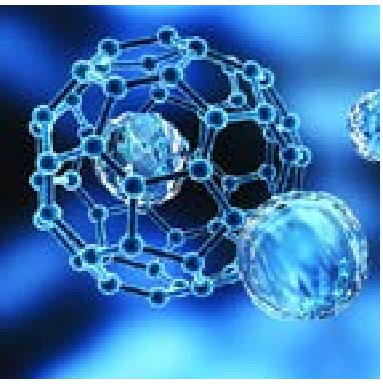
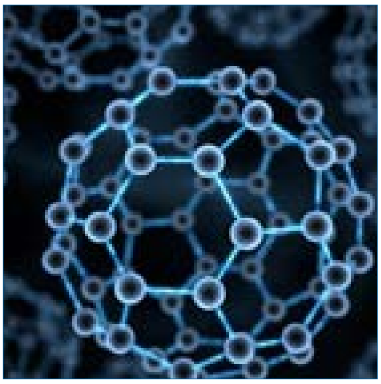
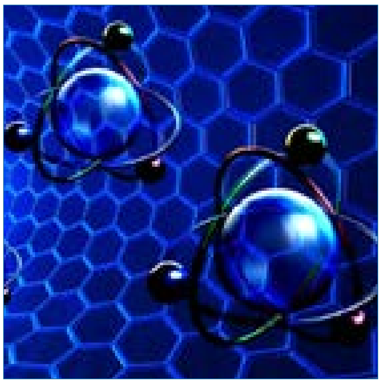
Scientific Tracks & Abstracts
November 29, 2017

Nanochemistry 2017



International Conference on

Nanomaterials and Nanochemistry

November 29-30, 2017 | Atlanta, USA

Synthesis of ternary oxides by microwave technique

Qilin Dai
Jackson State University, USA

Synthesis of nanomaterials is highly demanded due to the development of nanodevices. Nanostructures or microstructures of binary oxides such as TiO_2, ZnO and Al_2O_3 have been extensively prepared and studied. The synthesis of ternary oxide nanomaterials with controlled structures, morphologies and sizes are of interest due to the potential application in nanodevices caused by tunable energy level, bandgap and structure. In this work, we use solution based method to prepare $CaWO_4$ and $LaPO_4$ ternary oxide nanomaterials by microwave technique. Controlled sizes and morphologies including nanorods and microspheres are synthesized by microwave method, which is believed to be a simple and low cost technique for scaling up synthesis of ternary oxide nanomaterials. In addition, the short-time consuming process enables the high efficiency of the production. Structural and optical properties of the prepared nanomaterials are investigated in this work. We believe that this work points out a new research direction ternary oxide synthesis.

Speaker Biography

Dr. Dai is an assistant professor of physics in Jackson State University USA. He earned his Ph.D degree in Condensed Matter Physics at Chinese Academy of Sciences in 2009, then served as postdoctoral research associate in USA at Florida State University and University of Wyoming. He serves as a reviewer for about 20 journals. He has published 70 papers in peer-review journals. He received 2017 Mississippi Space Grant Consortium Research Initiation Seed Grants, 2017 Mississippi IDeA Network of Biomedical Research Excellence Curriculum Development Grants, 2013-2016 National Science Foundation China, 2009 "Da-Heng" Optics Scholarship, Chinese Academy of Sciences. He is an editorial board member of 1) Nature - Scientific Reports, 2) SCIREA Journal of Energy, 3) Nanomedicine and Nanotechnology Journal.

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Swertia chirayta mediated facile green synthesis of ultra-small copper oxide nanoparticles (UCuONPs) and their antibacterial activity

Faiz Mohammad
Aligarh Muslim University, India

We report the antibacterial activity of ultra-small copper oxide nanoparticles (UCuONPs). Ultra-small copper oxide nanoparticles have been synthesized by using aqueous and alcoholic extracts of Swertia chiryta as a reductant and stabilizer. Thus prepared UCuONPs were in the diameter range of 2-10 nm. The UCuONPs were characterized using Fourier transform infrared spectroscopy, X-ray diffraction, UV-visible spectroscopy, high resolution transmission electron microscopy, scanning electron microscopy and energy-dispersive X-ray spectroscopy. On the basis of these results ultra-small copper oxide nanoparticles were successfully prepared by interaction of copper ions and plant extracts. The as-prepared ultra-small copper oxide nanoparticles were studied for their antibacterial activity against *Staphylococcus aureus, Escherichia coli and Salmonella enterica* with the possible use as antibiotic against Gram-positive and Gram-negative strains. Results indicated that UCuONPs were most effective against Gram-positive bacterial strains as compared to Gram-negative ones.

Speaker Biography

Dr. Faiz Mohammad is a full Professor in the Department of Applied Chemistry (Faculty of Engineering and Technology) of Aligarh Muslim University. He obtained his D.Phil. in the field of Electrically Conducting Polymers from the School of Chemistry and Molecular Sciences, University of Sussex (UK) in 1988.

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Nanochemistry applications in advanced drug delivery: Nano-targeted delivery for therapeutic and imaging

Shaker A Mousa
ACPHS, USA

Targeted delivery of drug incorporated nanoparticles, through conjugation of tumor-specific cell surface markers, such as tumor-specific antibodies or ligands can not only enhance the efficacy of the anticancer drug but also reduce the unwanted toxicity of the drug. Additionally, multifunctional characteristics of the nano-carrier system would allow for simultaneous imaging of tumor mass, targeted drug delivery and monitoring. A summary of recent progress in nanotechnology as it relates specifically to nanoparticles and anticancer drug delivery will be reviewed. Nano Nutraceuticals using combination of various natural products provide a great potential in cancer management. Additionally, various Nanomedicine approaches for the detection and treatment of various types of clots organ specific delivery, vascular targeting, improved PK / PD, and vaccine will be briefly discussed.

Learning Objectives:
Highlight the Role of Nanobiotechnology and other enabling technologies in the followings:
1. Targeted Drug Delivery
2. Improved PK and PD
3. Early detection (Imaging)
4. Targeted Delivery of Chemotherapy for optimal efficacy and safety
5. Nano synthesis and assembly of various platforms for Targeted Delivery
6. Nanobiotechnology in shortening the time and risk of Drug Discovery and Development.

Speaker Biography

Dr. Mousa finished Ph.D from Ohio State University, College of Medicine, Columbus, OH and Post-doctoral Fellowship, University of Kentucky, Lexington KY. He also received his MBA from Widener University, Chester, PA. Dr. Mousa is currently an endowed tenure Professor and Executive Vice President and Chairman of the Pharmaceutical Research Institute and Vice Provost for Research at ACPHS. Prior to his academic career, Dr. Mousa was a senior Scientist and fellow at The DuPont Pharmaceutical Company for 17 years where he contributed to the discovery and development of several FDA approved and globally marketed diagnostics and Therapeutics. He holds over 350 US and International Patents discovering novel anti-angiogenesis strategies, antithrombotics, anti-integrins, anti-cancer, and non-invasive diagnostic imaging approaches employing various Nanotechnology platforms. He has published more than 1,000 journal articles, book chapters, published patents, and books as editor and author. He is a member of several NIH study sections, and the editorial board of several high impact Journals. His research has focused on diagnostics and therapeutics of angiogenesis-related disorders, thrombosis, vascular and cardiovascular diseases.

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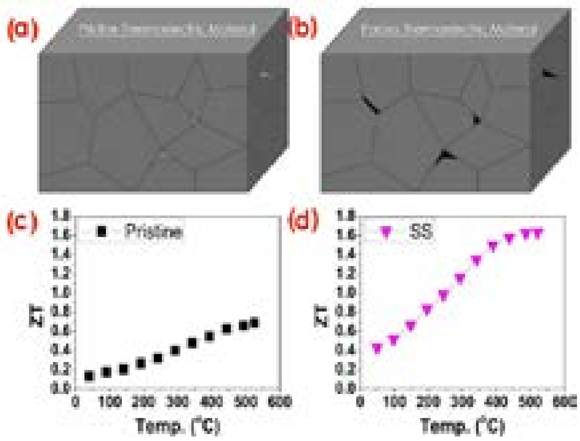
Nano-micro-porous skutterudites with 100% enhancement in ZT for high performance thermoelectricity

Atta Ullah Khan
Rutgers University, USA

Increasing energy demands require new materials, e.g., thermoelectrics, for efficient energy conversion of fossil fuels. However, their low figure of merit (ZT) limits widespread applications. Nanostructuring has been an effective way of lowering the thermal conductivity. However, grain growth at elevated temperature is still a big concern, for otherwise expected to be long-lasting thermoelectric generators. Here, we report a porous architecture containing nano- to micrometer size irregularly shaped and randomly oriented pores, scattering a wide spectrum of phonons without employing the conventional rattling phenomenon. Lattice thermal conductivity reaches the phonon glass limit. Basically, a low melting phase was sintering with skutterudite powder. Later on, annealing under vacuum helped this low melting phase evaporate from the structure, leaving behind a mix of nano and micrometer sized pores. These pores interact with phonons and causing them to either slows down or dissipates, resulting in a very low thermal conductivity. On the other hand, electrons can pass through the dense part due to their ability to change path resulting in only a small drop in electrical conductivity. This design yields greater than 100% enhancement in ZT, as compared to the pristine sample. An unprecedented and very promising ZT of 1.6 is obtained for $Co_{23.4}Sb_{69.1}Si_{1.5}Te_{6.0}$ alloy, by far the highest ZT ever reported for un-filled skutterudites, with further benefits, i.e. rare-earth-free and improved oxidation resistance enabling simple processing.



Speaker Biography

Atta Ullah Khan has his expertise in phase equilibria, crystallography, thermoelectric materials and ceramics. He received his Ph.D in Physical Chemistry in 2011 from the University of Vienna, Austria. He has worked for three years as a postdoctoral fellow in National Institute for Materials Science (NIMS), Japan. Currently, he is working as a Postdoctoral Fellow in Department of Materials Science and Engineering, Rutgers, The State University of New Jersey, USA.

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allied academies

Scientific Tracks & Abstracts
November 30, 2017

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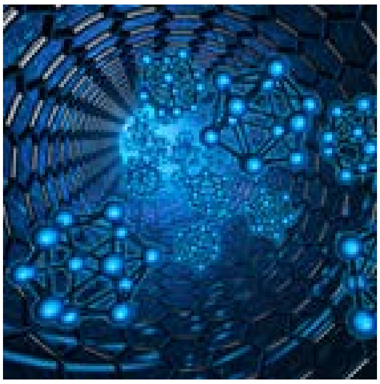

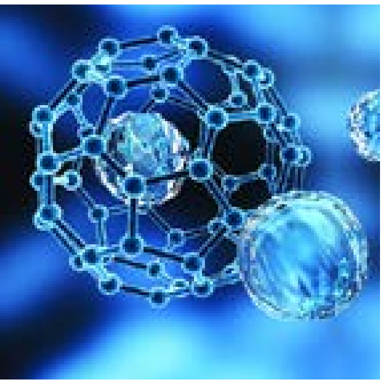
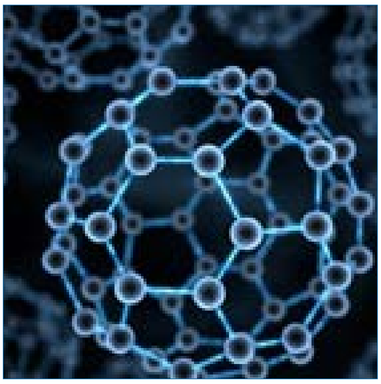
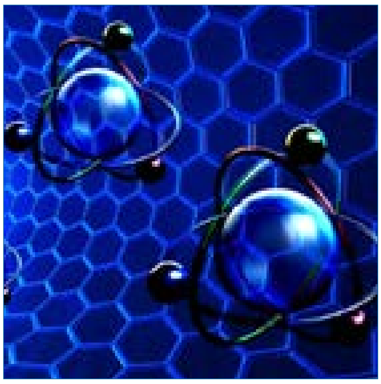

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Nanoscale templating with persistent micelles

Morgan Stefik
University of South Carolina, USA

The ability to tune nanoscale features in traditional materials can enable new properties or enhanced performance in technologies ranging from pseudocapacitors to solar devices. Our lab takes inspiration from the promise of nanomaterials chemistry to advance the capabilities of devices for both energy conversion and storage. One of our core strategies is the design of novel block copolymer self-assembly systems that enable new levels of precision fabrication. In my talk, I will focus on recent developments where thermodynamic concepts are used to direct micelle entrapment for precision control during nanostructure self-assembly. The resulting tunable isomorphic architectures have widespread applications to advance (photo) electrochemical devices.

Speaker Biography

Morgan Stefik obtained a degree in Materials Engineering from Cal Poly SLO in 2005 before completing Doctoral studies in Materials Science at Cornell University under Prof. U Wiesner and Prof. F J DiSalvo in 2010. After two years of Post-doctoral research at École Polytechnique Fédérale de Lausanne with Prof. M Grätzel, he joined the University of South Carolina in 2013 as an Assistant Professor in the Department of Chemistry and Biochemistry. He is the founding Director of the South Carolina SAXS Collaborative, a NSF supported facility. His research focus is nanomaterials chemistry with emphasis on self-assembly techniques and atomic layer deposition.

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Nanotechnology molecular tagging

Boris Gorbunov
University of Kent, UK

A novel technology of measuring concentrations of ionized molecules in gases that enables detection of individual ionized molecules by means of tagging them with readily detectable nano-objects has been discovered, developed and partially commercialised. It was found that Nanotechnology Molecular Tagging (NMT) method where ions were tagged with electrically neutral objects, e.g. nanoparticles with radius 100 nm, can provide a breakthrough in sensitivity by enabling a single molecular ion, electron or muon to be detected. This provides an increase in sensitivity over three orders of magnitude in comparison to existing detection methods based on the Faraday cup/plate or Mass Spectrometry. For example, the concentration of ionized molecules of cocaine was measured and a detection limit of 5 cm^{-3} was observed. This concept opens doors for advances in detection sensitivity in chemistry, biology, medicine and physics. In medical applications and life science the measurement of VOC biomarkers as a diagnostic of cancer and infectious diseases is a rapidly growing area of metabolomics that promises to bring a non-invasive fast diagnostic to points of care. An increase in sensitivity with NMT detector will enable diagnosis of earlier stages of diseases and increase patient survival rate, e.g. for the lung cancer from 20 to 80%. Detection of an ultra-low concentration of VOCs is crucial for security applications to identify explosives and illicit drugs in airports. Replacement of Faraday cup sensors with NMT detectors enables the false negative rate of detection to be considerably reduced and also it improves customer experience.

Speaker Biography

Boris Gorbunov has been working in nanotechnology over 40 years. He has worked in the UK, Finland, Russia and France. Currently he is a director of Ancon Technologies Ltd. (Canterbury UK), Ancon Medical Inc. (Minneapolis MN), Naneum Ltd., (Canterbury UK) and a Board Member of some other nanotechnology companies. He has over 150 publications and circa 600 citations. His RG score is 33.75. He is an inventor of the NMT detection technology and the main driving force to commercialize and apply it for the life science and medical diagnostic. He also has developed a new method and instrumentation to evaluate adverse health effects of airborne nanoparticles. He is a co-author of discovery of the surface controlled nucleation that was successfully applied to characterise carcinogenic potential of nanoparticles.

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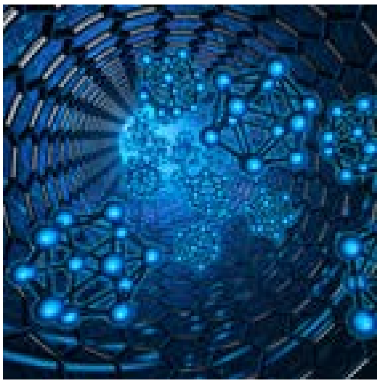
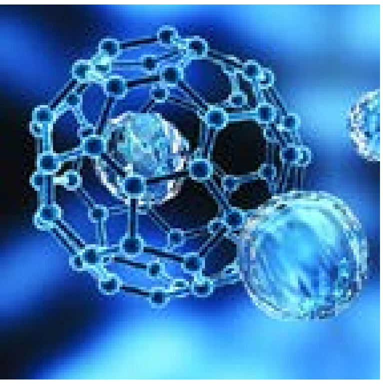
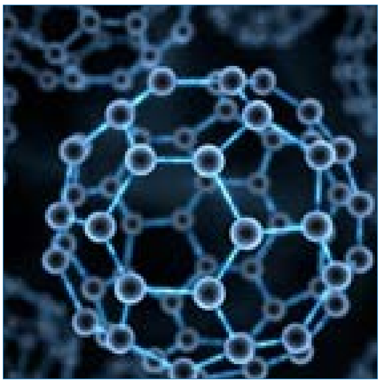
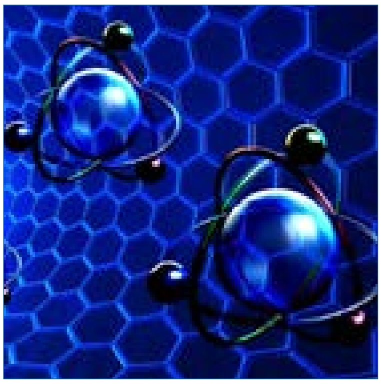
Workshop

Nanochemistry 2017



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James Gole

Georgia Institute of Technology, Georgia

Nanostructure directing sensor interfaces created from nanoparticle island sites deposited to micro- porous arrays

Novel nanostructured metal oxide island sites are made to decorate a microporous/nanoporous array forming efficient sensor platforms. These nanoparticle metal oxide island sites, formed from easily obtained solutions allow the formation of sensor platforms distinct from film-based coating. The nanostructure directing acidic metal oxide sites which vary in their Lewis acidity control the electron transduction process. The interaction of analytes with these island sites varies in a predictable manner and can be modified through in-situ functionalization of their Lewis acidity. The microporous structure allows rapid Fickian diffusion of analytes to the active nanostructure island sites whose reversible interaction dominates the sensor response as it requires low energy consumption. Highly accurate repeat depositions are not required. The island sites are deposited at sufficiently low concentration so as not to interact electronically with each other. The response time of these interfaces is more rapid than film-based depositions, which require a more lengthy diffusion time. The sensors are reversible. The nanoporous structure prevents sintering of the island centers at elevated temperatures. The concentration of detection centers can be made to produce an optimum matrix of enhanced sensor responses and force a dominant, distinct, analyte-interface physisorption (rather than chemisorption). The produced semiconductor interface is easily functionalized to create an enhanced range of nanoparticle semiconductor sites. The matrix provides a sensitive means of transferring electrons that are easily detected. The sensors operate at room temperature as well as elevated temperatures. Low energy magnetic field signal enhancement can be achieved with transition metals. Contaminated sensors can be readily rejuvenated. Pulsed mode operation ensures low analyte consumption and high analyte selectivity and further provides the ability to rapidly assess false positive signals using Fast Fourier Transfer techniques, Solar pumped sensors requiring low light levels (≤ 1 Watt) have been demonstrated. Water vapor contamination can be greatly if not entirely reduced. The modeling of sensor response with a new Fermi energy distribution based response isotherm is found to be superior to other isotherms. Sensors can be made to operate efficiently for two gases simultaneously. Modes of extending these studies to multiple gas arrays have been considered.

Speaker Biography

James L. Gole received the B.S. degree in chemistry from the University of California, Santa Barbara where he was an NSF Research Fellow (1967). He received the Ph.D from Rice University (1971) where he was a Phillips Research Fellow. He was an NSF Post-Doctoral Fellow at Columbia University from 1971 to 1973. He joined the Department of Chemistry at M. I.T. in 1973 and in 1977 he joined the School of Chemistry at the Georgia Institute of Technology where he became Professor of Chemistry in 1981. In 1983 he joined the School of Physics, GIT, where he is currently Professor of Physics. In 2002, he became a joint Professor in Mechanical Engineering. He is a Fellow of the American Physical Society (APS) and the American Association for the Advancement of Science (AAAS). Dr. Gole is interested in high temperature materials nanosynthesis, the chemical physics of surfaces, porous silicon structures for hybrid nano/microsensors and nanostructure enabled photocatalytic reactors, nanostructured directed sensing, and the IHSAB principle. He holds 27 patents and has published over 300 papers. Dr. Gole has been a recipient of the Sustained Research Award of the Sigma Xi Research Society. He has been named GIT Outstanding Research Author. In 2005, he was named Outstanding Undergraduate Research Mentor. He was also recipient of the Professional of the Year Award from Worldwide Who's Who.

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