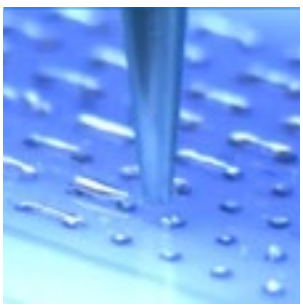
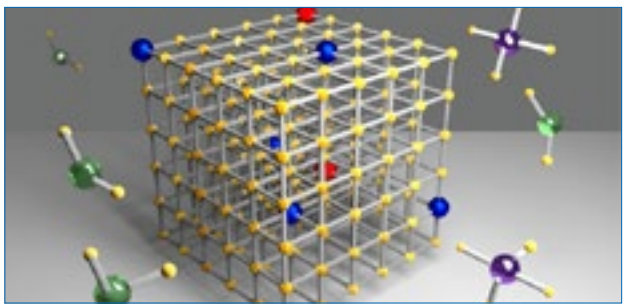
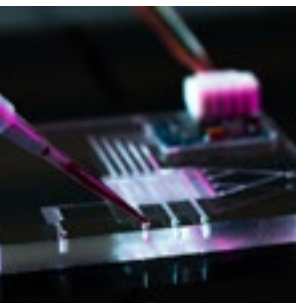
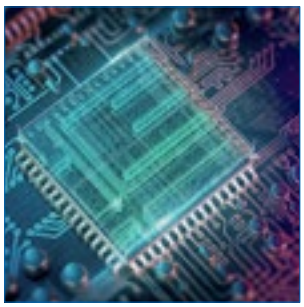
Scientific Tracks & Sessions
May 13, 2022

Nanotechnology 2022



26th International Conference on

Nanotechnology and Nanomedicine

May 13, 2022 | Webinar

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Nanochemistry | Advanced Materials | Polymer Science and Technology | Nanorobotics | Molecular Nanotechnology

Chair
Alireza Heidari
President (AISI) | USA

Session Introduction

Title: Semiconductor nanowires: Innovative control growth and applications of silicon crystals in 1D
Maha M Khayyat | KACST | Saudi Arabia

Title: Functional polyaspartamide polymer-based nanoformulations: From synthesis to recent biomedical applications
Pradip Das | University of Montpellier | France

Title: Brief study of local beeswax as an energy storage material
Eman Dayl | KACST | Saudi Arabia

Title: Structure and properties of electrochemically synthesized silver nanoparticles in aqueous solution by high-resolution techniques
Scotti L | University of Chieti-Pescara | Italy

Title: Synthesis and characterization of symmetric triple decker complexes based on porphyrins (Po) and phthalocyanine (Pc) of earth rare (Ln) [(Po)Ln(Pc)Ln(Po)] for application in medical imaging
Mohamed Tahiri | Hassan II University | Morocco

Title: Light-emitting diodes: As external stimulus for plant-mediated biosynthesis and biological activities of silver nanoparticles
Sumaira Anjum | Kinnaird College for Women | Pakistan

Title: Development and characterization of conductive textile (cotton) for wearable electronics application by printing of conductive inks
Abdelkrim Boumegnane | Hassan II University | Morocco

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Semiconductor nanowires: Innovative control growth and applications of silicon crystals in 1D

Maha M Khayyat
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This article reviews the growth concept of silicon nanowires with an attention to semiconductor nanowires filling the gap in the knowledge from the very original work to the very recent innovative experimental work. The objectives of this article are as follows; 1- to describe the original work of epitaxial growth of semiconductor nanowires, 2-to discuss the recently emerged technique of nanoscale templating controlling the growth position of nanowires and 3- to explore the possible technological applications of position-controlled silicon nanowires. Detailed description of the first reported successful vapor-liquidsolid (VLS) 1-D growth of silicon crystals is presented. Bottom-up approach and the supersaturation in a three-phase system then the nucleation at the chemical vapor deposition (CVD) processes are discussed with more focus on silicon. Positional assembly of nanowires using current available techniques including nanoscale chemical templating (NCT), can be considered as the key part of this document for advanced applications. Several applied and conceptional methods of developing available technologies using nanowires are included, such as, atomic force microscopy (AFM), photovoltaic (PV) cells and metal oxide semiconductor field effect transistors (MOSFET) are explained. The finial section of this review is devoted to the future trend in silicon nanowires research, where it is anticipated that the effort will proceed further to be implemented in daily electronic tools satisfying the demand of low wights and sizes electronics.

Recent Publications

1. Brent A Wacaser, Mark C Reuter, Maha M Khayyat, Cheng-Yen Wen, Richard Haight, Supratik Guha, Frances M Ross, et al. Growth Systems, Structure and Doping of Aluminum Seeded Epitaxial Silicon Nanowires. Nano Lett. 2009; 9(9): 269-301

2. Maha M Khayyat, Brent A Wacaser, Mark C Reuter, Frances M Ross, Devendra K Sadana, Tze-Chiang Chen. Nanoscale chemical templating of Si-NWs seeded with Al. Nanotechnology. 2013; 24(23): 235301

3. Maha M Khayyat. Silica Microspheres for Economical Advanced Solar Applications. Crystals. 2021; 11(11): 1409.

Speaker Biography

Maha Mohammad Khayyat is a research professor of physics of semiconductors at King Abdulaziz City for science and Technology, Materials Science Research Institute, Nanotechnology and Semicondctors Center (2015-present). She first started her professional carrier as a staff member of, physics department, Umm Al Qura University (1996-2015), KSA, delivering lectures, supervising MPhil candidates, she also contributed to the development of the university, she also improved her administrative skills via various management positions such as: vice dean of academia, vice dean of scientific research, advisor of the vice rector of Innovation, in addition to her membership at several committees.

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Functional polyaspartamide polymer-based nanoformulations: From synthesis to recent biomedical applications

Pradip Das
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Several polymers and their derivatives have been extensively utilized for diverse biomedical applications over the past decades. In general, these polymers fruitfully participate in the surface modification of hydrophobic inorganic nanoparticles such as iron oxide and quantum dots to make highly colloidal stable and water-soluble nanoparticles which mainly perform as imaging contrast agents. Additionally, the polymeric nanoformulations demonstrate the excellent capability to deliver the different therapeutic agents (e.g. drug molecules, nucleic acids and proteins) into the diseased cells/tissues. Among various polymers, the exceptional biocompatibility and biodegradability characteristics of functional polyaspartamide polymers construct them as more appropriate candidates for biomedical applications. Therefore, in recent years, various functional polyaspartamide polymers have been well designed and prepared and subsequently, their different nanoformulations (e.g. micelles, nanoparticles and polyplexes) have been productively applied for many preclinical studies in biomedical research. In this regard, the design and synthesis of functional polyaspartamide polymers are more important to improve diagnostic and/or therapeutic efficiency. The large-scale synthesis of the intermediate polymer polysuccinimide is well established. The most commonly employed methods are based on thermal polycondensation and ring-opening polymerization techniques. Its further functionalization onto the polymer backbone with essential pendant molecules is highly facile to achieve the desired functional polyaspartamide polymers. As a result, various types of functional polymers can be easily prepared that offer many beneficial properties like stimuli-responsive degradability and enhanced binding ability. Consequently, the application of these functional polymers in various biomedical fields is more successful. In particular, functional polymers are widely used as surface modifiers to develop water-dispersible inorganic nanoparticle-based bioimaging contrast agents for diagnosis and image-guided therapy. In contrast, various polymeric nanocarriers based on functional polymers are more useful for the safe transportation of therapeutic agents for the effective treatment of many diseases. Besides, these polymers have high potential in other biological fields including agriculture.

Recent Publications

1. Sourov Chandra, Pradip Das, Sourav Bag, Dipranjan Laha, Panchanan Pramanik. Synthesis, functionalization and bioimaging applications of highly fluorescent carbon nanoparticles. Nanoscale. 2011; 3(4): 1533-1540

2. Aniruddha Kundu, Sudipta Nandi, Pradip Das, Arun K Nandi. Fluorescent graphene oxide via polymer grafting: an efficient nanocarrier for both hydrophilic and hydrophobic drugs. ACS applied materials & interfaces. 2015; 7(6): 3512-3523

3. Pradip Das, Nikhil R Jana. Highly colloidally stable hyperbranched polyglycerol grafted red fluorescent silicon nanoparticle as bioimaging probe. ACS Applied Materials & Interfaces. 2014; 6(6): 4301-4309.

Speaker Biography

Pradip Das obtained his B.Sc. (Hons) in 2009 and M.Sc. in 2011 in Chemistry from Vidyasagar University, India and the Indian Institute of Technology Kharagpur, India, respectively. He received his Ph.D. in Chemistry from Indian Association for the Cultivation of Science, India in 2016 under the supervision of Prof. Nikhil R. Jana. He completed his first postdoctoral research with Prof. Ulrich J. Krull from the University of Toronto Mississauga, Canada. Then he joined as a postdoctoral fellow at the University of Milano-Bicocca, Italy, for his second postdoctoral research with Prof. Davide Prosperi. He recently finished his postdoctoral research with Dr. Teresa Pellegrino at the Italian Institute of Technology Genova, Italy. Nowadays, he is working as a Marie-Curie postdoctoral fellow with Dr. Jean-Olivier Durand at the Institute Charles Gerhardt Montpellier, CNRS, France. He has published 26 papers that have been cited more than 1440 times.

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Brief study of local beeswax as an energy storage material

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[2]Abha University, Saudi Arabia

Beeswax is primarily produced by specialized beeswax factories across the world. Beeswax is a phase change material with high heat capacity. The production procedures have a high impact on the quality of beeswax. Melting and chemical extraction are the two procedures for extracting wax. Melting is the most used method. Wax can be melted using hot water, steam, electricity, or solar energy. Chemical solvent extraction is only possible in a laboratory. The use of phase change materials (PCMs) as thermal energy storage devices is gaining popularity in heating and cooling applications. When these substances change phase, such as from solid to liquid or liquid to gas, they absorb a huge quantity of heat while maintaining a steady temperature. To study the thermal properties of beeswax as a phase-changing material, X-ray diffraction (XRD) and fourier transform infrared (FT-IR) spectroscopy were performed.

Recent Publications

1. Brent A Wacaser, Mark C Reuter, Maha M Khayyat, Cheng-Yen Wen, Richard Haight, Supratik Guha, Frances M Ross, et al. Growth Systems, Structure and Doping of Aluminum Seeded Epitaxial Silicon Nanowires. Nano Lett. 2009; 9(9): 269-301
2. Maha M Khayyat, Brent A Wacaser, Mark C Reuter, Frances M Ross, Devendra K Sadana, Tze-Chiang Chen. Nanoscale chemical templating of Si-NWs seeded with Al. Nanotechnology. 2013; 24(23): 235301
3. Maha M Khayyat. Silica Microspheres for Economical Advanced Solar Applications. Crystals. 2021; 11(11): 1409.

Speaker Biography

Eman Dayl is a researcher in Physics, she has exprience in the field of academic teaching and in the research field. She has achieved a paper which includes some topics of water bio-filtration research. Also, she has achieved patents about the topic as well and she have done it at King Abdulaziz City for Science and Technology.

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Structure and properties of electrochemically synthesized silver nanoparticles in aqueous solution by high-resolution techniques

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The aim of this oral presentation is to deeply investigate the structure and properties of electrochemically synthesised silver nanoparticles (AgNPs) through high-resolution techniques such as transmission electron microscopy (TEM), scanning electron microscopy (SEM), zeta potential measurements and matrix-assisted laser desorption/ ionization-time of flight mass spectrometry (MALDI-TOF-MS). Strong brightness, tendency to generate nanoclusters containing an odd number of atoms and absence of the free silver ions in solution was observed. Our laboratory also highlighted that the chemical and physical properties of the AgNPs seemed to be related to their peculiar oxidative state as suggested by X-ray photoelectron spectroscopy (XPS) and X-ray powder diffraction (XRPD) analyses. Finally, the MTT assay tested the low cytotoxicity of the investigated AgNPs. For the first time, nanolcusters solutions with reproducible characteristics are used for investigating the primary effect responsible for cell death.

Recent Publications

1. Luca Scotti, Junior Bernardo Molina-Hernandez, Antonio Aceto, Tonino Bucciarelli, Domenico Paludi, Luca Valbonetti, Katiuscia Zilli, Clemencia Chaves-López, et al. The membrane depolarizationand increase intracellularcalcium level produced by silvernanoclusters are responsiblefor bacterial death. Nature. 2021; 11: 21557

2. Cristina Campestre, György Keglevich, János Kóti, Luca Scotti, Carla Gasbarri, Guido Angelini. Microwave-assisted simple synthesis of 2-anilinopyrimidines by the reaction of 2-chloro-4,6-dimethylpyrimidine with aniline derivatives. RSC Advances. 2020; 10(21): 12249

3. Luca Scotti, Guido Angelini, Antonio Aceto, Carla Gasbarri. Silver nanoparticles as interactive media for the azobenzenes isomerization in aqueous solution: From linear to stretched kinetics. Journal of Molecular Liquids. 2019; 284: 592-598.

Speaker Biography

Luca Scotti has completed his PhD from University of Chieti-Pescara, Italy and BSc. Chemistry at University of Milano, Italy. He is the Professor of Biochemistry at department of Medical, Oral and biotechnology, Italy. He has over 30 publications that have been cited over 300 times and his publication h-index is 11. He has been serving as an editorial board member and topics member of several reputed journals.

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Synthesis and characterization of symmetric triple decker complexes based on porphyrins (Po) and phthalocyanine (Pc) of earth rare (Ln) [(Po)Ln(Pc)Ln(Po)] for application in medical imaging

Mohamed Tahiri and **Abdelkrim Boumeganane**
Hassan II University, Morocco

Synthetic mixed triple decker complexes containing functionalized outer porphyrins and an inner phthalocyanine [(Po)Ln(Pc)Ln(Po)] where Ln=La, Eu, Gd were prepared and their spectroscopic properties were determined. These complexes were characterized by UV/Vis. spectroscopy, 1H NMR and mass spectrometry. In the second part we have reported the different strategies of interporphyrin coupling and the appropriate method for obtaining the "cage" complex in which a phthalocyaninate ligand is encapsulated by two external porphyrinate ligands. These new nanomaterials could have important applications in medical imaging and phototherapy when the Gadolinium III is the central ion of the complex because of the high magnetic moment of the complex (Gd+3 is seven f single electrons). The different parameters that govern this kind of systems will be exposed and described.

Recent Publications

1. M Tahiri, M Laaouan, S Souabi, M A Aboulhassan. Impact of stabilized leachate residues from the uncontrolled landfill of Mohammedia city on the "Oued El Maleh" river and on the soil. J. Mater. Environ. Sci. 2017; 8(12): 4487-4495

2. Tahiri, S Souabi, K Touzar, H Chtioui, F Khalil, Kh Digua. Environment, engineering & development. 2010

3. Mohamed Tahiri, Souad Fettouche, Rachid Madhouni, Omar Cherkaoui. Removal of reactive dyes from aqueous solution by adsorption onto Alfa fibers powder. Journal of Materials and Environmental Science. 2015; 6(1): 129-137.

Speaker Biography

Mohamed Tahiri has received extensive training in Europe on innovation, technology transfer, intellectual property rights and innovation management. He holds in his faculty a bachelor on sanitation management in urban areas. He's conducting R&D in partnerships with various industries. He is awarded Hassan II Prize on environment in the year 2009 for his contribution to disseminate citizen eco initiatives in Moroccan university. He published over 40 general and research articles, organized international meetings and conferences in Morocco.

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Development and characterization of conductive textile (cotton) for wearable electronics application by printing of conductive inks

Abdelkrim Boumegnane
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In order to bring significant improvements to human comfort and well-being, intelligent textiles have become more and more in demand. These are characterized by their ability to detect or react to external stimuli of electrical, thermal, chemical, magnetic or other origin by the integration of certain materials or by the application of certain technical coatings on the surface of the textile substrate. Among the intelligent textiles, we find the electronic textiles which are endowed with an electrical property. This property is generally brought to textile substrates through the use of conductive inks. On the one hand, this type of inks can be formulated based on advanced materials such as metallic fillers like silver, conductive polymers such as PEDOT: PSS, carbon-based fillers like graphene, as well as conductive pigments such as copper phthalocyanine. On the other hand, these conductive inks can be applied on the textile surface using several printing methods among which we find the screen printing which constitutes a method of choice because of its speed, its simplicity and its low cost what allows to elaborate intelligent textiles having a wide range of applications namely ECG electrodes, temperature sensors, energy collectors and antennas. The aim of this work is to formulate conductive inks. These inks were then printed on cotton-based textile substrates by screen printing in order to elaborate smart textiles.

Recent Publications

1. A Boumeganane, A Nadib, O Cherkaoui, M Tahiri. Inkjet printing of silver conductive ink on textiles for wearable electronic applications. Materials today proceedings: 2022

2. Boumegnane Abdelkrim. Developing conductive ink formulations for the progressive application of application of printing on textiles. Journal of Computer engineering and Information Technology. 2022; 11

3. Omar Cherkaoui, Hayat Bouchoum, Mehdi El Bouchti, Amane Jada, et al. Preparation and characterization of a new low-cost polyacrylonitrile adsorbent. IOP Conference Series Materials Science and Engineering. 2020; 827(1):012013.

Speaker Biography

Boumegnane Abdelkrim is a Ph. D student at Hassan II University, synthesis, extraction and physicochemical study of organic molecules, chemical engineering and environment, REMTEX laboratory-Esith, Casablanca, Morocco.

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