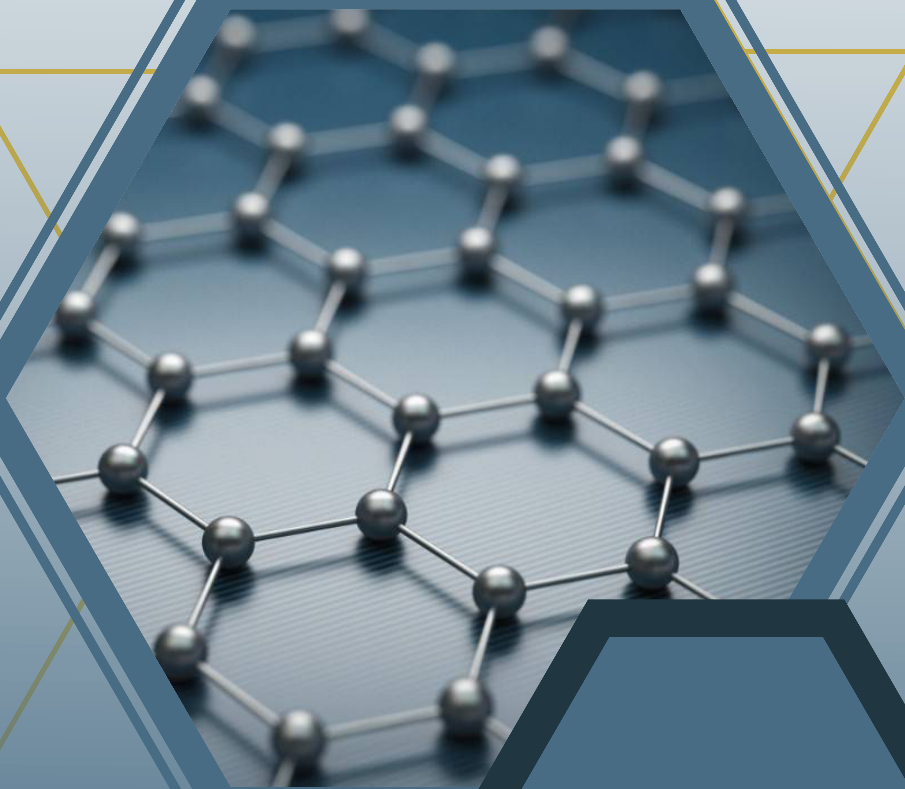
GM2DMAT2023 ABSTRACT BOOK

Global Meet on

2D Materials and Graphene

May 22, 2023 | Webinar



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FOREWORD

The Prime Meetings takes the pleasure to formally invite you to the Global Meet on 2D Materials and Graphene (GM2DMAT2023) which will be held on, May 22, 2023.

GM2DMAT2023, is an annual meeting organized with the intend of being a platform for researchers, engineers, academicians as well as industrial experts from all over the world to present their research results and development activities in 2D Materials and Graphene.

The meeting brings together World Class participants and young researchers looking for opportunities for exchanges that cross the traditional discipline boundaries and allows them to resolve multidisciplinary challenging problems that only a venue of this nature can offer. Through this event you will be able to share the state-of-the-art developments and cutting-edge technologies in the broad areas of 2D Materials and Graphene.

We would like to strongly encourage you to submit your abstracts and register to attend in order to share your achievements in the fields of 2D Materials and Graphene.

We cordially invite the scientific community to participate in what promises to be a memorable webinar in May 2023.

Two-dimensional Nanomaterials Based High Performance-Field Effect Transistors

Arun Kumar Singh

Department of Pure & Applied Physics, Guru Ghasidas Vishwavidyalaya, Bilaspur, Chhattisgarh 495009, India.

Abstract

Two-dimensional (2d) nanomaterials have stimulated a vast amount of research in the fields of condensed matter physics and materials science in the past several years due to their rich and tunable electronic, optical, chemical, mechanical, magnetic and thermal properties. Graphene has received widespread attention since it was first isolated from graphite, has very high charge carrier mobility at room temperature, optically transparency and flexibility making graphene an ideal candidate for a transparent conducting electrode. However, the absence of an energy gap in the electronic band structure limits its practical applications in logic electronic devices. Recently the field has rapidly expanded beyond graphene following the upsurge of semiconducting 2D materials with finite bandgaps such as the transition metal dichalcogenides (TMDCs). Molybdenum disulfide (MoS2), is n-type TMDC semiconductor with tunable bandgap, is attracting increasing interest for its novel electronic and optoelectronic properties. Tailoring of electronic properties of MoS2 is essential in order to best performance of its electronic and optoelectronic devices. Here we have present high-performance field-effect transistors of different layer of MoS2 nanosheets. We also demonstrate simple technique to tune the electrical properties of MoS2 by doping as well as low-voltage and high-performance dual gated transistors of MoS2 with monolayer CVD graphene as source−drain electrodes.

Keywords

2D Nanomaterials; MoS2; Electrical properties; Doping; FETs

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Biography

Dr. Arun Kumar Singh is working as Associate Professor at Department of Pure and Applied Physics, Guru Ghasidas Vishwavidyalaya, Bilaspur, India. He received his M.Sc. degree in Physics from Banaras Hindu University, Varanasi, India and received his Ph.D. degree from

School of Materials Science and Technology, IIT (BHU), India in year 2010. After Ph.D., he joined postdoctoral research work at Graphene Research Institute, Sejong University, South Korea. He got India most prestigious research award, "INSPIRE Faculty awards" from DST, India. He has published many papers as a main author and co-author in international journals/ conferences in the area of materials science/physics. His research work basically includes the charge transport in organic semiconductors/two dimensional nanomaterials and their electronics device applications. He is life member of many scientific societies and reviewer of International scientific journals.

Novel Electrochemical Synthesis and Characterization of Zn(II) and Cu(II) Metal Organic Frameworks for Photocatalytic and Sensing Applications

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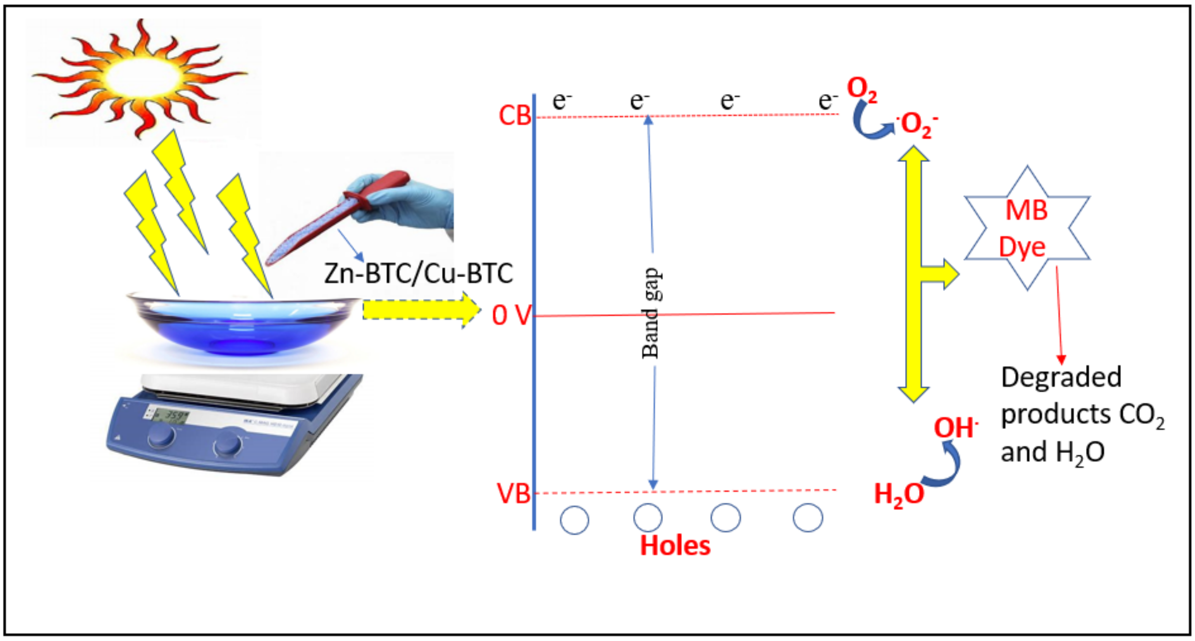
Abstract

Multifunctional 1, 3, 5-benzenetricarboxylic acid (organic linker), Zn (II) and Cu (II) based Zn-BTC and Cu-BTC have been synthesized via electrochemical method. Crystallographic and morphological characterizations of synthesized MOFs have been done using Powder X-ray Diffractometer and Scanning Electron Microscope (SEM), respectively, whereas Fourier Transform Infrared Spectroscopy (FT-IR), Energy Dispersive X-ray Spectroscopy (EDS), UV-Vis Absorption Spectroscopy and Energy Resolved Luminescence Spectroscopic studies have been used for the detailed qualitative, quantitative as well as optical analyses. Sharp PXRD peaks indicate the formation of highly crystalline MOFs with face centered cubic (fcc) structure and good crystallinity. The presence of C, O and Zn in Zn-BTC & C, O and Cu in Cu-BTC have been confirmed by EDS analysis. Photocatalytic activity potential of the synthesized MOFs have been tested using methylene blue dye (MB) as a test contaminant in aqueous media under sunlight irradiation. Recorded results reveal that the synthesized Zn-BTC and Cu-BTC MOFs efficiently degrade MB dye upto 96% and 88.96 %, respectively under sunlight exposure. Selective and sensitive fluorescent sensing of different Nitroaromatic compounds (NACs) like 4-Nitroaniline (4-NA), 3-Nitroaniline (3-NA), 2-Nitroaniline (2-NA), 3-Nitroaniline (3-NA), 4-Nitrotoulene (4-NT), 2,4-Dinitrotoulene (2,4-DNT), 1,3-Dinitrobenzene (1,3-DNB), 2,6- Dinitrotoulene (2,6-DNT) has been done by exploring the photoluminescent behaviour of chemically stable Zn-BTC and Cu-BTC. Synthesized Zn-BTC MOF is extremely sensitive towards 3-NA with PL quenching efficiency of 72.80% and limit of detection 0.889 ppb (6.43μM), whereas Cu-BTC shows selective nature towards 4-NA with PL quenching efficiency of 82.61%, and limit of detection (LOD) = 0.7544 ppb (5.4 nM). These are highest quenching rates till reported. The possible ways of luminescence quenching are successfully explained by the combination of Photoinduced Electron Transfer (PET) and Resonance Energy Transfer (RET) mechanisms. Zn-BTC and Cu-BTC fully demonstrate the power of a multi component MOFs, which provides a feasible pathway for the design of novel material towards fast responding luminescence sensing and photocatalytic degradation of pollutants.



Schematic of photocatalytic degradation mechanism of MB dye solution using Zn-BTC/Cu-BTCas a photocatalyst under sunlight irradiation.

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Classical Computing with Quantum States

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Abstract

Our ability to innovate computing hardware depends on confronting fundamental challenges – such as the energetics of computing, limited by Boltzmann physics, and the speed of data processing, limited by the Von Neumann processing architecture that separates memory and logic cores. While there is a parallel effort at quantum computing using quantum states to solve quantum algorithms, these approaches do not address these inevitable hardware challenges, while inviting considerably greater challenges with precision state control and adiabatic state evolution. I will argue that perhaps a lower hanging fruit is using quantum states for classical computing. There are multiple examples I will focus on – one is doing conventional Boolean logic at low power below the thermal Boltzmann limit, using the topological properties of Dirac fermions to control transmission (so-called Klein tunnelling) across a gated graphene interface. A second example is doing collective computing using temporal state machines to solve certain graph theory problems efficiently. For instance with skyrmions driven along racetracks, their quasi-linear operation and topologically stabilized lifetimes at ultra-small sizes can potentially function as temporal memory in race logic for rapid pattern matching and intermittent-sensor processing applications. Finally, magnetostrictive materials can be used to gate topological surface states as compact row-column selectors for *in-memory* computing, removing data transfer delays between memory and processing cores. These three concepts – topology driven tunnelling, topology stabilized lifetime, and voltage gating of topological surface states, can be used to accomplish complementary goals in low-power computing.

Keywords

Topology; 2D; Skyrmion; Magnetism

Biography

Avik Ghosh is Professor at the Charles Brown Dept of Electrical and Computing Engineering and the Dept of Physics at the University of Virginia. He did his PhD in condensed matter theory at the Ohio State University, and a postdoctoral fellowship in Electrical Engineering at Purdue University. He is the UVA site-director of the NSF-Industry University Cooperative Centre on Multifunctional Integrated Systems Technology (MIST). Ghosh has authored 125+ refereed papers and a book ("Nanoelectronics – a Molecular View", World Scientific) in the area of computational nano-materials and devices. He has given over 125 invited lectures worldwide. He is Fellow of the Institute of Physics (IOP), senior member of the IEEE, and has received the IBM Faculty Award, the NSF CAREER Award, a 2006 best paper award from the Army Research Office, and UVA's All University Teaching Award. His group's work with Columbia University on negative index behaviour in graphene was voted by the editors of Physics World as one of the top10 research breakthroughs of 2016.

Metal Nanoparticles and Enzyme-based Cotton Fiber/Textile Next Generation Biofuel Cells

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Abstract

Biofuel cells (BFCs), which convert chemical energy into electrical energy at mild temperatures and above a moderate pH range, have been considered one of the most promising candidates to power biomedical devices. However, most BFCs have poor electron transfer between enzymes and electrodes, providing low power output and short-term operational stability. One of the most important factors in determining the performance of BFCs is effective electrical communication between the enzyme and host electrode (by favorable interfacial interaction and conformal coating) and between neighboring enzymes (by an electron relay effect). Here, we introduce a metallic cotton fiber/textile-based next generation BFC electrode based on the efficient electrical communication between enzyme and conductive support through the enhanced electrical conductivity and electro catalytic performance. The metal nanoparticles are first assembled on cotton fibers/textiles electrode with small organic linkers and the electrode used as a conductive support for BFC electrodes. For BFC anode, glucose oxidase is sequentially assembled by layer-by-layer method with the same metal nanoparticles on the cotton fiber/textile electrodes. For BFC cathode, Pt-sputtering process is additionally added on metal nanoparticle-coated fiber/textile host to improve electron transfer performance and maximize the electrochemical power performance. As a result, the biofuel cell exhibits remarkably high power density and excellent operational stability. We believe that our unique assembly method can provide a foundation for designing various high-performance bio-, nano-, and biomedical- electrochemical devices, including BFCs.

Keywords

Biofuel Cells; Electron Transfer; Metal Nanoparticles; Enzyme.

Biography

Cheong Hoon Kwon is a professor at the Division of Energy Engineering in Kangwon National University since 2022. She received her Ph.D. degree at the Department of Chemical and Biological Engineering in Korea University in 2008. She was a postdoctoral researcher at Harvard Medical School in Boston (in 2009–2010). She was a research professor in Hanyang University (in 2010–2015) and Korea University (in 2016–2021). Kwon has expertise in the surface modification of metal or metal oxide nanoparticles for electrochemical sensors (or actuators), biofuel cells, and energy storage devices. She has now focused on developing various energy electrodes using metal nanoparticle-based layer-by-layer assembly.

In - situ and Ex - situ Graphene Based Composites for Super-capacitor Application

D. P. Singh* and L. Vivas

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Abstract

*Graphene*1 reported as one of the wondrous material, astonishing the scientific community with its astounding properties, such as remarkable high surface area, excellent thermal conductivity, superior mechanical properties, and ultra-high electron mobility, has facilitated to explore its widespread applications in electronics, optics, biomedicine, energy harvesting and storage. In the energy sector, renewable energy conversion is being achieved by the solar cell devices but simultaneously their storage in an efficient, durable, and low-cost technique is in utmost demand for uninterrupted continuous 24hrs power supply to fulfill energy requirement.2 Electrochemical double layer capacitor (EDLC) or super capacitors are of great interest in this regard because of fast charging, instant power delivery and ability to sustain millions of charge/discharge cycles at higher current densities. Graphene and its composites with metals and transition metal oxides can be the most suitable candidates for the efficient energy storage and low cost of production is another benefit for large scale commercialization. In situ and ex-situ approaches are developed for the synthesis of graphene-based composites such as rGO-Au 3 and rGO-chromium oxide 4 etc. for application as an electrode material for high performance supercapacitors with high energy and power densities and long cyclic life. Synthesis, characterizations, device fabrication and electrochemical performances will be described in detail during presentation.

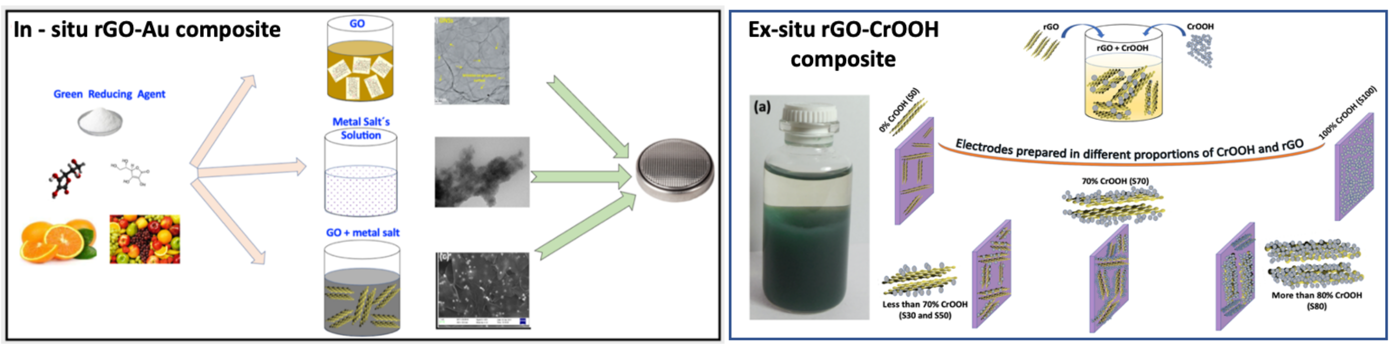

Figure: In situ and ex-situ synthesis of rGO based composites

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Biography

Dr. Dinesh Pratap Singh notched up his M.Sc. (2000) and Ph.D. (2007) degree in Physics from Banaras Hindu University (BHU), Varanasi India. After post-doctoral studies from Southern Illinois University Carbondale (SIUC), Illinois, USA, he joined Department of Physics, University of Santiago, Chile (2010) as an assistant professor. He has published many articles/ reviews (64 articles) and book chapters (9 book chapters) in the refereed journals of high impact and books/encyclopedia published by internationally reputed publishers. He qualified CSIR-NETJRF (UGC India), D S Kothari post-doctoral fellowship and been awarded by various projects funded by CONICYT - ANID Chile. He is one among eight PIs of the leading project called as Millennium institute of Research in Optics (MIRO) for 10 years (2018-2028) awarded by Millennium Science Initiative- Millenio Instituto (ANID) Chile. He is editorial board member of various international journals such as American Journal of Nano Research and Applications (NANO), Online Journal of Material Science, Universal Journal of Physics Research, Journal of Modern Polymer Chemistry and Materials, Journal of Nanotechnology Research, Journal of Nanoscience Research (JNSR), American Journal of Nanosciences and SCIREA Journal of Chemistry etc. He is a reviewer in various internationally renowned journals like Nature Scientific Reports, Nano Energy, International Journal of Nanomedicine etc. just to name few. Besides he is an external referee for the submitted proposals in one of the major funding agencies for research and development in Chile (ANID, CHILE) and National Research Council (CNCS)" Rome of Romanian organization that supports fundamental research in all fields of science. He is a member of American Physical Society, American Chemical Society, and American Nano Society (since 2011) etc. His Current Research Interests include:- 1)Synthesis and characterization of various nanomaterials by employing the methods of chemical, hydrothermal, thermal oxidation, ball milling, spray pyrolysis, CVD etc. 2)Synthesis of Graphene, Graphene derivatives, Carbon nanotubes, Metal oxides and their composites for Dye-sensitized/ Photovoltaic Solar cells and Supercapacitor applications. 3) Synthesis of Metal Organic Frameworks (MOFs) for Non-linear Optics Applications 4) Synthesis and high temperature tribological study of different mixed metal oxide nanostructures (e.g. metal molybdates, metal tungstates and metal vanadates). 5) Synthesis of metallic (silver, gold and copper) nanoparticles and to study their bio-interaction for medicinal applications.

Explore Two-Dimensional Energy-Efficient Nano Electronics

Huamin Li
University at Buffalo, New York

Abstract
With the rise of graphene in 2004, two-dimensional (2D) materials have received great attention in multiple disciplines and been considered one of the most promising materials for future energy-efficient nanoelectronics. In this talk, I will briefly review the novel and fascinating properties of 2D materials, ranging from semimetal graphene to semiconducting MoS2 and insulating h-BN. I will also talk about the state-of-the-art applications of 2D materials in low-power beyond-CMOS nanoelectronics, including some of our recent research results such as steep-slope transistors, Schottky diodes, and metal contact engineering. The discussion will be based on our recent publications, including "Two-dimensional cold electron transport for steep-slope transistors," ACS Nano, vol. 15, pp. 5762-5772, March 2021, and "Diode-like selective enhancement of carrier transport through metal-semiconductor interface decorated by monolayer boron nitride," Advanced Materials, vol. 32, no. 2002716, July 2020.

Biography
Huamin Li has completed his PhD from Sungkyunkwan University, Korea, and postdoctoral research from University of Notre Dame, USA. His expertise is in the exploration of nanoscale two-dimensional materials and their application for next-generation nanoelectronics. He is an Editorial Board Member for IEEE Access, Nano Express, Materials Research Letters, and Frontiers in Physics.

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Using Magnetic Materials Recovered from Wasted Electronics as Redox Materials for Efficient Supercapacitors

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4Cátedras CONACYT, Coordinación para la Innovación y la Aplicación de la Ciencia y la Tecnología, Universidad Autónoma de San Luis Potosí, San Luis Potosí, 78000, Mexico.

Abstract

Currently, the contamination by plastics and wasted electronic components is considered an emergency worldwide. To reduce this problem, we propose the fabrication of graphene based supercapacitors (SC) with recycled magnetic materials and plastics. Barium hexaferrite (BHF) and magnetite (MG-CC) powders were recovered from wasted electronics, respectively. Also, single use plastic packets were recovered from daily-life products. The magnetic materials were analysed by SEM and had an irregular morphology. The magnetic particles had sizes in the range of 0.7-11 µm. The SCs made with BHF and MG-CC powders were named BHF/SC and MG-CC/SC (PVA/H3PO4 was used as electrolyte), respectively. The reference graphene-based SC made without magnetic materials was named as G/SC. The capacitance/energy-density of the devices mentioned above were obtained and decreased in the order of: BHF/SC (634.5 F g-1, 88.1 Wh kg-1) > GM-CC/SC (391 F g-1, 54.3 Wh kg-1) > G/SC (295.3 F g-1, 34.8 Wh kg-1). Thus, using recycled Barium hexaferrite and magnetite (redox materials) into the SCs enhanced their capacitance by 32-114% compared with the reference G/SC device. Additionally, green SCs were made using natural seawater electrolyte (instead of acidic electrolyte). As a result, maximum capacitance and energy density values of 436.6 F g-1 and 60.7 Wh kg-1 were obtained, respectively. A stable output voltage of 0.37-0.60 V was also produced by the devices made with acidic electrolyte. The SC electrodes were analysed by XPS-Raman and found the presence of Fe3+/Fe2+ species and oxygen vacancies defects. Those ones were responsible for the charge storage by redox reactions. In general, this work demonstrates that efficient energy storage devices can be fabricated from e-waste and recycled plastics, which reduces the contamination in the environment.

Keywords
Graphene Supercapacitor; Barium Hexaferrite; Magnetite

Biography
Dr. Oliva obtained is currently working at the Potosi Institute of Science and Technology (located in Mexico). He is 39 years old and has more than 150 publications, 5 patents and +1800 citations. His research is focused on flexible electronics, which includes the optimization of supercapacitors and sensors for industrial applications. He also works on flexible materials for elimination of contaminants from the water (herbicides, pharmaceuticals and dyes). He received in 2022 the Marcos Moshinsky award from the national university of Mexico, which is given to outstanding Mexican young researchers.

Topological Inversion in 2D Materials

Mina Yoon
Oak Ridge National Laboratory, USA

Abstract
In this talk, I will discuss the challenges of characterizing the surface structures of single-atom thick materials such as graphene and boron nitride on metallic substrates using scanning tunneling microscopy (STM). In particular, I will address the difficulty of distinguishing between atomic geometry and electronic effects in STM measurements. Through a combination of first-principles density functional theory calculations and analytical modeling, we will demonstrate the critical role that pervasive substrate states play in topography inversion in STM images. These pervasive states overshadow 2D material states, complicating the measurement of intrinsic properties of 2D materials and leading to counterintuitive phenomena such as a larger tunneling current for insulators than for metals and topography that is opposite to atomic geometry. Our results provide crucial insights for the accurate interpretation of STM topographies of atomically thin materials and contribute to the further development of 2D materials in (opto) electronic and quantum applications.

Biography
Dr. Mina Yoon is the Group Leader of Microstructural Evolution Modeling Group in the Materials Science and Technology Division (MSTD) at Oak Ridge National Laboratory (ORNL) and a Joint Faculty at the Department of Physics and Astronomy, University of Tennessee (UTK), Knoxville. Her research focuses on the application of materials theory, advanced computational approaches, and data analytics/ML to understand fundamental physical phenomena and translate the knowledge into the development of novel energy materials, including nanoscale materials and topological quantum materials. Prior to joining the laboratory Dr. Yoon spent three years on a Max Planck Fellowship at the Fritz Haber Institute of the Max Planck Society. She is a recipient of the Lee Hsun Young Scientist Award from the Institute of Metal Research, Chinese Academy of Science, and Outstanding Scholarly Output team award in 2020 UT-Battelle Awards Night program.

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Study on the Properties and Devices of α-In2Se3 Nanosheets with Ferroelectric Character

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Abstract

Among various two-dimensional (2D) semiconducting materials, α-In_2Se_3 nanosheet is special having ferroelectric property at room temperature with correlated out-of-plane and in-plane polarizations, and has great potential in many fields. In the recent years, besides studying its properties, my group has developed novel devices based on α-In_2Se_3. First, we developed a non-destructive and efficient transfer method for preparing transmission electron microscopy samples of exfoliated 2D materials. Then, using electron energy loss spectroscopy on a scanning transmission electron microscope equipped with monochromator and aberration corrector, we measured the thickness-dependent band gap of few-layer α-In_2Se_3 and found that the band gap increases with decreasing film thickness from 1.44 eV in a 48 nm thick area to 1.64 eV in an 8 nm thick area. We were able to obtain the structural dependence of the band gap within density functional theory up to hundreds of atoms. We found that 2H α-In_2Se_3 transforms to □-In_2Se_3 when it is heated to a high temperature, and the transformation temperature increases from 550 to 650 K with the thickness decreasing from 67 to 17 nm. Annealing the sample below the phase transformation temperature can effectively improve the electronic property of a 2H α-In_2Se_3 field-effect transistor, including increasing the on-state current, decreasing the off-state current, and improving the subthreshold swing. We observed a significant Fermi-level pinning near the bottom of the conductive band of α-In_2Se_3. We fabricated a novel type of synaptic transistor using α-In_2Se_3 as the channel material. The essential synaptic behaviors, such as single-spike response, paired-spike response, and multispike response have been experimentally demonstrated. The conventional gate dielectric material of our transistors may facilitate the miniaturization and batch manufacture of synaptic transistors. A top-gated synaptic transistor based on α-In_2Se_3 with a thickness of less than 10 nm demonstrated excellent performances include an ultralow power consumption of 3.36 fJ per spike response, a large dynamic range of 158, and near-zero nonlinearity. A simulated neural network based on our synaptic transistor showed excellent pattern recognition accuracy. The photodetectors based on α-In_2Se_3 have response in an unexpected broad range from ultraviolet (325 nm) to short-wavelength infrared (1800 nm) at room temperature. The optical response in the long wavelengths beyond the bandgap is attributed to oxygen absorption and oxygen-associated selenium defects in In_2Se_3. Photodetectors were fabricated based on heterojunctions composed of n-type multilayer α-In_2Se_3 and p-type WSe_2. The dark current was effectively suppressed and a high rectification ratio was observed. A photonic neuromorphic device based on WSe_2/In_2Se_3 heterostructure was developed to meet the requirements of high-performance photonic synapse devices. Owing to the optically controlled ferroelectric polarization switching, the device showed light-tunable synaptic functions. For the first time, the light-stimulated synaptic behavior was extended from visible light to short-wavelength infrared region (up to 1800 nm). Finally, a mixed-function platform was fabricated entirely from In_2Se_3 ferroelectric semiconductor, providing a standalone and holistic solution for in-memory computing and sensing.

Keywords

2D Ferroelectric Semiconductor; α-In_2Se_3; Property; Neuromorphic device.

Biography

Prof. Chen is a full professor in School of Electronics, Peking University. She received her PhD degree in Department of Materials Physics, University of Science and Technology Beijing in 1994. She was a visiting student in Department of Materials Science, Cambridge University from 1991-1993. She was a COE research fellow in Institute of Metal Materials, Japan in 1997-1998 and a postdoc in Department of Physics, Arizona State University in 1998-2000. She has published 222 journal papers with more than 13,000 other citations, h-index 54. Her current research interests include developing novel nanodevices based on 2D materials and III-V nanowires, and characterizing nanostructures by in situ TEM and in situ SEM.

Borophene-Like Two-Dimensional Material with Liquid Crystalline Nature

Tetsuya Kambe[1,2], Kimihisa Yamamoto[1,2]
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[2]JST-ERATOs

Abstract

Graphene has been the focus of countless research efforts across multiple fields. It is an attracting material composed of a two-dimensional (2D) carbon network; in other words, it comprises a thin sheet of carbon with a thickness of one atom. These days, various 2D materials including metal complex nanosheets have been reported.[1)]
In our previous work, we have investigated fine controlled clusters of main group elements including superatoms.[2)] In this study, we have achieved the atomically-thin 2D nanosheet liquid material, "liquid borophene," and its use in an inorganic optical device.

An atomically flat boron network skeleton was synthesized through a simple solution-based method from KBH_4. X-ray analysis revealed the 2D material, in which layers of boron atoms bridged with oxygen atoms to form a hexagonal 2D network were intercalated with layers of potassium atoms. Various types of measurements including electron microscopy, spectroscopy, and atomic force microscopy confirmed that the proposed method was effective in producing the desired atomically flat borophene oxide sheets. The characteristic conducting properties of stacked borophene sheets were also revealed from the temperature dependence experiments.[3)]
In addition, the liquid crystalline feature was achieved by chemical modification. The obtained liquid crystal exhibited high thermal stability and optical switching behavior even at low voltages.[4)] These findings highlight the strong potential of borophene oxide-derived liquid crystals for use in widespread applications.

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Keywords

Borophene; Liquid Crystal; Atomic Layer; Boron.

Biography

Tetsuya Kambe received his Ph.D. from the University of Tokyo. He received the JSPS Research Fellowship for Young Scientists from 2012 and then he became an assistant professor at Tokyo institute of Technology in 2014. He served in the ERATO Atom-hybrid Project at the Japan Science and Technology (JST) from 2015 to 2020. He was awarded the Nanoscale Horizons Award in 2019 and the 71th CSJ Award for Young Chemists in 2021. His research interests are in the development of precision synthesis of inorganic or organic/inorganic hybrid materials and low-dimensional materials.

Sensorless Field-Oriented Control for Induction Motor with Parameters Estimation

Youssef Agrebi Zorgani
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Abstract
The induction machine is widely used in industrial fields due to its robustness, low cost, and good standardization. Indeed, its use in high-performance variable-speed drive systems requires the imposition of specific and complex control structures based on the mathematical model of the machine and its power supply. However, this presentation deals with indirect stator field- oriented control (ISFOC) of an induction motor drive (IM), without a speed sensor. In previous works, the MRAS scheme has been used to estimate the speed and the rotor resistance. The reference model and the adjustable one, which are developed in the stationary stator reference frame, are used to estimate simultaneously the rotor speed and the rotor resistance (IM) from the knowledge of the stator currents and voltages. Simulation and experimental results are presented to validate the mathematical study as well as to prove the effectiveness and the robustness of the proposed scheme of control and sensorless ISFOC induction motor drive.

Biography
Dr. Youssef AGREBI ZORGANI is a full-time Professor in the electronics and power drive at the Department of Mechanical Engineering and at the Higher Institute of Technological Studies of Sfax, TUNISIA. Dr. Youssef AGREBI ZORGANI received his Ph.D. degree in Electrical Engineering from the National School of Engineering of Sfax (ENIS)- Tunisia and Ph.D. degree in Automatic from the Faculty of Science, University of d'Aix-Marseille – France. Dr. Youssef AGREBI ZORGANI has published 30+ papers and 1 book in the field of power Electronics and Motor Drive. He is a Member of Laboratory of Sciences and Techniques of Automatic control & computer engineering Lab-STA (ENIS, Sfax, Tunisia). Dr. Youssef AGREBI ZORGANI actively serves as a reviewer in several journals and conference publications, including IEEE conferences and journals. He is the ECONOV'2022 International Conference on Ecological Innovation Chairman for 2022. His research interests focus on Electrical Power Engineering, Electrical& Electronics Engineering, Power Electronics, Renewable Energy, Control systems.