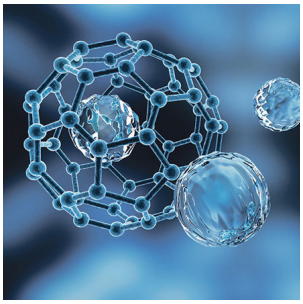
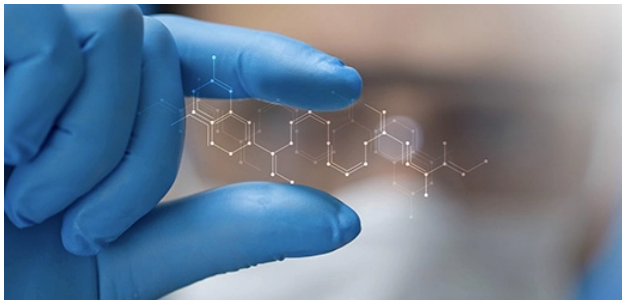
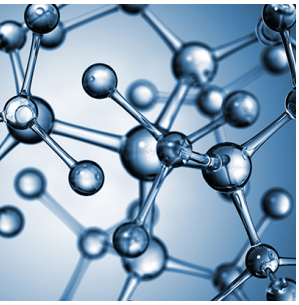
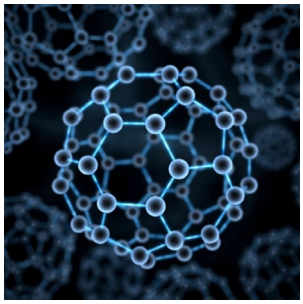
Scientific Tracks & Sessions
November 14, 2022

Materials Science 2022


7th INTERNATIONAL CONFERENCE ON

MATERIALS SCIENCE AND ENGINEERING

NOVEMBER 14, 2022 | WEBINAR

Sessions on

November 14, 2022

Materials | Polymers | Material Physics |Applications in Materials Science

Session Chair

Nghia Dinh Huynh | Sungkyunkwan University | Republic of Korea

Session Introduction

Title: Identification of solids for true design and precise characterization of functional materials

Bunsho Ohtani | Hokkaido University | Japan

Title: Progress on the development of metal salt-assisted ionization source for mass spectrometric analysis of polymers

Theoneste Muyizere | National Center for Nanoscience and Technology | China

Title: Multiferroic heterostructures and non-volatile magnetoelectric effects

Ming Zheng | China University of Mining and Technology | China

Title: Automated mineral identification and its applications in rock mechanics

Saeed Aligholi | Institute of Innovation, Science and Sustainability | Australia

Title: Development of new biodegradable polymers for selected biomedical applications

Hend Behour | Alexandria University | Egypt

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Identification of solids for true design and precise characterization of functional materials

Bunsho Ohtani
Hokkaido University, Japan

How can we design functional solid materials, such as catalysts and photocatalysts? What are the decisive structural parameters controlling their activities, performance or properties? What is obtained as structural properties by popular conventional analytical methods, such as X-ray Diffraction (XRD) or nitrogen-adsorption measurement, is limited to bulk crystalline structure and specific surface area, i.e., no structural characterization on amorphous phases, if present, and surface structure has been made so far. This is because there have been no macroscopic analytical methods to give surface structural information including possibly present amorphous phases. Recently, we have developed Reversed Double-Beam Photoacoustic Spectroscopy (RDB-PAS) which enables measure Energy-Resolved Distribution of Electron Traps (ERDT) for semiconducting materials such as metal oxides [1, 2]. Those detected Electron Traps (ETs) seem to be predominantly located on the surface for almost all the metal oxide particles, and therefore they reflect macroscopic surface structure, including amorphous phases, in ERDT patterns. Using an ERDT pattern with the data of CB bottom position (CBB), i.e., an ERDT/CBB pattern, it has been shown that metal oxide powders, and the other semiconducting materials such as carbon nitride, can be identified without using the other analytical data such as XRD patterns or specific surface area, and similarity/differentness of a pair of metal-oxide samples can be quantitatively evaluated as degree of coincidence of ERDT/CBB patterns. In this talk, an approach of material design based on the ERDT/CBB-pattern analyses is introduced [3].

[1] Chem. Commun., 2016, 52, 12096–12099.

[2] Electrochim. Acta, 2018, 264, 83–90.

[3] Catal. Today, 2019, 321–322, 2–8.

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2. Amalia, Fitri & Takashima, Mai & Ohtani, Bunsho. (2022). Are You Still Using Organic Dyes? Colorimetric Formaldehyde Analysis for True Photocatalytic-activity Evaluation. Chemical Communications. 58. 10.1039/D2CC04291F.

3. Csóka, Levente & Hosakun, Worakan & Kolonics, Ottó & Ohtani, Bunsho. (2022). Reversed double-beam photoacoustic spectroscopic analysis of photoinduced change in absorption of cellulose fibres. Scientific Reports. 12. 10.1038/s41598-022-18749-w.

Biography

Bunsho Ohtani was a Ph. D. course student in Kyoto University when the research work on material chemistry was started in 1981. Since then, he has been studying photocatalysis and related topics for 40 years and published more than 300 original papers (h-index: 72). After gaining his Ph. D. degree from Kyoto University in 1985, he became an assistant professor in the university. In 1996, he was promoted to an associate professor in Graduate School of Science, Hokkaido University and was then awarded a full professor position in Institute for Catalysis, Hokkaido University in 1998 and retired at the end of March 2022.

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Progress on the development of metal salt-assisted ionization source for mass spectrometric analysis of polymers

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The mass spectrometric analysis of Polymers has been addressed as a challenging research due to poor ionization and complicated analysis using conventional mass spectrometry. The ionization source has demonstrated a promising future in rapid mass spectrometric analysis. Soft ionization techniques such as Electrospray Ionization (ESI) and Matrix-Assisted Laser Desorption/Ionization (MALDI) are the most ionization sources appeared to be a powerful tool for polymer characterization when combined with MS. However, they always need the metal salts to be introduced during the ionization protocol for polymers due to the crucial role played by their ions (cations and anions). The current review focuses on the progress in the development of metal-ion assisted-ionization sources for mass spectrometric analysis of polymers. Different ionization systems are comprehensively reviewed. The application of metal ion-assisted ESI, NanoESI, PSI and MALDI-MS for polymer sample analyses is systematically discussed. The future research trends and challenges in this cutting-edge research field are summarized. It also aims to provide the current state-of-the-art of metal salts as a platform for ionization systems for mass spectrometric characterization of polymers and offers the current challenges and perspectives on the promising future to improve analytical performance in this field. Finally, this mini-review would provide a comprehensive handbook to researchers from different research backgrounds wishing to work in this area.

Recent publications

1. Muyizere, Theoneste & Mukiza, Janvier. (2022). Progress on the Development of Metal Salt-Assisted Ionization Source for Mass Spectrometric Analysis of Polymers. Analytical Methods. 14. 10.1039/D2AY00724J.

2. Muyizere, Theoneste & Zheng, Yajun & Liu, Hongni & Zhao, Jia & Li, Jin & Lu, Xianming & Austin, Daniel & Zhang, Zhiping. (2020). Correction: Metal salt assisted electrospray ionization mass spectrometry for the soft ionization of GAP polymers in negative ion mode. The Analyst. 145. 10.1039/D0AN90027C.

3. Han, Weiwei & Zheng, Yajun & Muyizere, Theoneste & Zhang, Zhiping. (2018). Development of paper substrate for paper spray MS in high-sensitivity analysis of biological samples. Bioanalysis. 10. 10.4155/bio-2018-0199.

Biography

Theoneste Muyizere completed his master's degree (MSc) in Applied Chemistry with the specialty of analytical chemistry in 2019, with research distinction from Xi'an Shiyou University, China. Currently, he is perusing Ph.D. degree at the University Of Chinese Academy of Sciences, National Center for Nanoscience and Technology. His current research interest lies development of nano-bioanalytical platforms for biomedical applications through synthesis, design and engineering of nanomaterials.

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Multiferroic heterostructures and non-volatile magnetoelectric effects

Ming Zheng
China University of Mining and Technology, China

Correlated electronic oxides have received continuing attention because of various striking discoveries, typified by the occurrence of colossal magneto resistance effect, high-temperature superconductivity, multiferroicity, exchange bias, vertical hysteretic shift, topologically anomalous Hall effect, etc. Tuning the physical properties of these correlated oxides by an external perturbation, such as a magnetic field, electric field, light illumination, or stress field, enables the investigation of exotic quantum and topological states, and the development of low-energy dissipation electronic and spintronic devices. In this work, we demonstrate the multi-field control of physical properties for perovskite complex oxide (e.g., Nd0.5Sr0.5MnO3, LaVO3, SrVO3) thin films deposited onto ferroelectric 0.7Pb (Mg1/3Nb2/3)O3-0.3PbTiO3 single-crystal substrates. Using the piezoelectric response of the substrate, the quantitative determination of the resistance change and the lateral strain of the film can be obtained. Multiple nonvolatile and reversible resistance evolution can be realized by adjusting the magnitude of ferroelastic strain. These findings demonstrate that lattice strain and physical properties of functional thin films epitaxially grown on PMN-PT substrates can be in situ, in real time, dynamically and continuously modulated via ferroelectric poling, converse piezoelectric effect, polarization rotation, and ferroelastic effect. This method can be further extended to study the intrinsic strain effects of other functional thin films. Moreover, we also found that the strain-excited effect and photo-generated (or magnetic field-generated) effect strongly correlated with each other, which is mediated by the lattice-charge-orbital coupling. Our work points to an effective strategy for realizing the coupled straintronic-optoelectronic effect in hybrid correlated oxide/ferroelectric systems and delivering multi-field tunable low-dissipation versatile electronic and photonic devices.

Recent publications

1. Ming Zheng & Pengfei Guan (2022) Electric field control of photoluminescence response in lanthanide doped ferroelectric materials: A brief review, Ferroelectrics, 598:1, 152-158

2. M. Zheng, and P. Guan, Coupled straintronic-optoelectronic effect in Mott oxide films, Nanoscale 14, 5545 (2022).

3. M. Zheng, P. Guan, Y. Qi, and L. Guo, Straintronic effect on electronic transport and metal-insulator transition in correlated metal films by electric field, Appl. Phys. Lett. 120, 161603 (2022)

Biography

Ming Zheng obtained his PhD degree from Shanghai Institute of Ceramics, Chinese Academy of Sciences. He was awarded JSPS Fellowship in 2018. In 2021, he was honored with IAAM Young Scientist Medal in recognition for his contribution to "Hybrid Electronic, Magnetic & Optical Materials". In 2022, he was honored with VEBLEO Fellow. His current research interests include functional (multiferroic, ferroelectric, magnetic and luminescent) thin-film materials and device physics. He has authored or co-authored more than 40 papers published in international reputed journals including NPG Asia Mater. (2), Adv. Mater., Nano Energy, Appl. Phys. Lett. (9), Phys. Rev. Applied (3).

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Automated mineral identification and its applications in rock mechanics

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Microstructural features of a material are determining its mechanical properties. Mechanical properties of rock materials are very important in a wide range of engineering disciplines including mining, civil and petroleum. In order to reliably model mechanical properties of rock materials quantifying their microstructural features is the first step. Rocks are formed from different minerals with different textural features. Optical microscopy is the main method in order to quantify both mineralogical and textural (size, shape, interlocking, …) features of rock materials. However, manual microscopy is a time-consuming process, and a successful rock quantification requires an experienced operator. Therefore, an Automated Mineral Identification (AMI) scheme is highly demanded. For the sake of a successful AMI both colour and textural patterns of the rock forming minerals must be taken into account. Minerals regarding their crystallographic systems are showing different colors under planned and crossed polarized lights as a function of the orientation of their optical axes with the polarizers. These colour variations are the most important colour features for the task of mineral identification. The major rock forming minerals including quartz and feldspars, however, cannot be recognized just by their colour features. These minerals are showing distinct textural features including twinning and undulatory extinction. It will be explained how developed AMI schemes can recognize and classify minerals based on colour and textural features. Moreover, it will be shown that the mechanical properties of rack materials are closely related to their petrographic features, and it is possible to successfully estimate engineering properties of rock materials by means of quantitative analysis of their photomicrographs.

Recent publications

1. Safari Farrokhad, Sajad & Lashkaripour, Gholam Reza & Moghaddas, Naser & Aligholi, Saeed & Sabri, Mohanad. (2022). The Effect of the Petrography, Mineralogy, and Physical Properties of Limestone on Mode I Fracture Toughness under Dry and Saturated Conditions. Applied Sciences. 12. 10.3390/app12189237.

2. Aligholi, Saeed & Khajavi, Reza & Khandelwal, Manoj & Armaghani, Danial. (2022). Mineral Texture Identification Using Local Binary Patterns Equipped with a Classification and Recognition Updating System (CARUS). Sustainability. 14. 11291. 10.3390/su141811291.

3. Aligholi, Saeed. (2022). Evaluating rock physics–fracture mechanics relationship by quantifying fracture process zone. 10.26180/19661283.v1.

Biography

Saeed Aligholi obtained a B.Sc. in Applied Geology from Shahrood University of Technology, and an M.Sc. in Engineering Geology from Ferdowsi University of Mashhad. His PhD awarded recently by the department of Civil Engineering, Monash University. Dr. Aligholi is currently a sessional lecturer at institute of Innovation, Science and Technology, Federation University Australia. He has worked in the field of automatic microstructural quantification of rock materials by means of image processing and machine learning techniques, and understanding the relationship between physical, mechanical and dynamical properties of rock materials, and has published his findings and contributions in high ranked journals.

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Development of new biodegradable polymers for selected biomedical applications

Hend Behour
Alexandria University, Egypt

High molecular weight biodegradable amphiphilic multiblock copolymers, formally poly(ether-ester-urethane)s were synthesized by condensation polymerization of PCL diol and PEG segments with 1,6-hexa methylen diisocyanate as coupling agent in the presence of dibutyltin dilaurate as catalyst. Different stoichiometric ratios of the hydroxyl end groups and isocyanate functionalities were utilized to produce copolymers with various characteristics. FT-IR, 1H-NMR, and GPC confirmed the chemical composition and the molecular weight of the formed multiblock copolymers. The crystal structure of the copolymers was studied using DSC, TGA, and WAXD. The contact angle measurements allowed correlating the hydrophilicity of the polymer surface to the polymer composition produced. The prepared multiblock copolymers were explored for the fabrication of biodegradable nano/microfibrous scaffolds using the electrospinning technique. The ultrafine fibers developed were characterized for size and morphology using scanning electron microscopy. They were investigated as a dual function cell regeneration and drug delivery scaffold for selected biomedical applications. The scaffold was loaded with chlorhexidine to confer antimicrobial activity, of importance in applications such as wound healing. Chlorhexidine-eluting ultrafine fibers were characterized using IR and DSC. Ultrafine fibers with modulated properties controlled the release of chlorhexidine for more than 6 weeks.

Biography

Hend Behour got her Bachelor degree of Science from Alexandria University at Special Chemistry with a final grade of very good. She has a master degree at Materials Science with grade point average of B+. She has enrolled in PhD program at Materials Science as well. She had given an oral presentation entitled "Chlorohexidine Nanofibers for Antimicrobial Biomedical Applications" in international conference organized by Arab Society of Materials Science (ASMS). She has also attended Drug Delivery summer school offered by Summer University DTU in 2018.

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November 14, 2022

Bio Polymers | Materials in Mechanical Engineering | Materials in Physics | Materials Science | Nanotechnology

Session Chair

Sergey Suchkov | Institute for Global Health of MGUPP | Russia

Session Introduction

Title: Implementing a recent Nano-medical strategy in respiratory infections

Montaser LM | Menoufia University | Egypt

Title: The effect of sub-grid scale straining in the laminar flamelet regime

Kanishk Ganga | University of Cambridge | UK

Title: Obtaining active carbon from waste biomass

Aleksandra Bazan-Wozniak | Adam Mickiewicz University | Poland

Title: p-type black phosphorus based photodetector

Arun Kumar | University of Salerno | Italy

Title: Identification of factors on the possibility of bamboo as scaffolding and a formwork material in Ethiopia

A Amede | Addis Ababa University | Ethiopia

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Implementing a recent nano-medical strategy in respiratory infections

Montaser LM, Fawzy SM
Menoufia University, Egypt

Respiratory infections are among the most common causes of death worldwide, especially due to coronavirus. There are major challenges in combating infectious diseases such as COVID-19, including the fact that there are no effective drugs available. Hence, it is necessary to accelerate the development of antiviral drugs to help mitigate this pandemic. So, nanoparticles can be used as antiviral agents for the treatment of various viral infections. Nanoparticles show great potential for biomedical applications, especially in patients who relapse after completing conventional antiviral therapy. Recently, Nano and Nano mediated combination therapy (nanoparticles plus antiviral drugs) have shown immense promise in Nanomedicine. Metal nanoparticles are known to be extremely effective against microbes and viruses due to their unique property, the controlled release of ions. Nano materials have been used to adjust the immune response, bringing it to an optimal level, and could be used to limit the cytokine storm. The investigation of stem cells based on nanotechnology could provide new methods for stem cell therapy and tissue engineering. Mesenchymal Stem Cells (MSCs) have been reported to be promising treatments for lung diseases. Application of nanotechnology in the Nanomedicine field has shown exciting prospects for development of novel drug delivery systems. Furthermore, Nano-based approaches are feasible, cost effective, non-toxic, biocompatible and a convenient strategy to deal with various types of viral infections, particularly SARS-CoV-2/COVID-19. Nanomaterials are able to deliver the drug at suitable concentrations in a precise manner, to the proper place and at the proper time. Nanotechnology could provide advanced biomaterials which can create a nanoscale extracellular environment capable of promoting the adhesion and proliferation of stem cells and accelerating stem cell differentiation in a controlled manner. Nanotechnology has great potential to be of enormous help in the treatment of COVID-19.

Recent Publication

1. Montaser LM. (30 Aug 2022-b). 3D Bioprinting for Tissue Engineering Amidst the Century Cataclysm. J Reg Med Bio Res. 2022; 3(2): 1-12.

2. Montaser LM (25 July 2022-a). Could stem cell study in space avail patients and researchers on Earth? Adv Tissue Eng Regen Med 2022; 8(1): 1-5

3. Montaser LM (28 Oct 2021-d). Editorial: Could Stem Cells Drive Research and Entrepreneurship in Egypt? J Embryology & Stem Cell Res, 5(2): 1-7. DOI: 10.23880/jes-16000155

Biography

Montaser LM is a Prof. of Clinical Pathology. She served as the Chair Emeritus, Founder leader of Clinical Pathology Department, Faculty of Medicine, Menoufia University, Egypt. Montaser is an internationally recognized stem cell technology professional. She has key competence in stem cell technology and regenerative medicine policy reinforced by global level and international experience in research, formulation and capacity building. In the era of COVID-19, she was awarded thirty four certificates of appreciation for successfully presenting 48 Global Webinars 34/48 (70.8 %) from her home office amid the lockdown of COVID-19 pandemic crisis.

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The effect of sub-grid scale straining in the laminar flamelet regime

Kanishk Ganga, A B Murugavel, J C Massey, Y Tanaka, N Swaminathan
University of Cambridge, United Kingdom

This paper presents and discusses a novel method for including Sub-Grid Straining (SGS) effects on the filtered reaction rate in LES. A reaction progress variable dissipation rate is used to parameterise the SGS strain effects. This method is tested on a fuel-lean turbulent premixed flame stabilised behind a bluff-body, and a turbulent premixed Bunsen flame, with two different grid sizes to show the significance of the inclusion of SGS effects. The results showed that coarsening the grid generally lowered accuracy of results compared to experimental data but including SGS straining had a larger improvement to the accuracy of the coarser grid than the finer grid. An optimisation between grid refinement and SGS straining inclusion should therefore be considered to maximise computational efficiency for reacting flow simulations. These results are consistent with past studies and are discussed with some physical insights. Including SGS effects would enable the use of coarser grids for elevated pressure combustion simulations whilst maintaining good accuracy with respect to experimental results. Follow up work is currently underway studying the effect of SGS for elevated pressure cases to study the relevance of SGS straining in these conditions.

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Biography

Kanishk Ganga is a PhD student studying combustion engineering in the University of Cambridge, UK. Though he originally started in the field of theoretical physics, his interests in space exploration directed his academic focus towards combustion and thermofluid dynamics with the long-term goal of developing novel propulsion systems for sustainable spaceflight.

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Obtaining active carbon from waste biomass

Aleksandra Bazan-Wozniak
Adam Mickiewicz University, Poland

The aim of the presented research was to obtain activated carbons from the residues of supercritical extraction of three plant materials: hop cones, chamomile flowers and green tea leaves. The physicochemical properties of the obtained carbon materials were determined. In the next stage of the research, the obtained sorbents were tested for suitability for the removal of organic pollutants from water on the example of rhodamine B. Activated carbons were also tested for the ability to remove toxic gases represented by nitric oxide (IV). The study also analyzed the influence of the type of precursor on the physicochemical and sorption properties of the obtained carbon materials.

Recent publications

1. Wdowiak K, Walkowiak J, Pietrzak R, Bazan-Woźniak A, Cielecka-Piontek J. Bioavailability of Hesperidin and Its Aglycone Hesperetin—Compounds Found in Citrus Fruits as a Parameter Conditioning the Pro-Health Potential (Neuroprotective and Antidiabetic Activity)—Mini-Review. Nutrients. 2022; 14(13):2647.

2. Marciniak M, Goscianska J, Norman M, Jesionowski T, Bazan-Wozniak A, Pietrzak R. Equilibrium, Kinetic, and Thermodynamic Studies on Adsorption of Rhodamine B from Aqueous Solutions Using Oxidized Mesoporous Carbons. Materials. 2022; 15(16):5573.

3. Ptaszkowska-Koniarz M, Goscianska J, Bazan-Wozniak A, Pietrzak R. Amine-Modified Carbon Xerogels as Effective Carbon-Based Adsorbents of Anionic Dye from Aqueous Solutions. Materials. 2022; 15(16):5736.

Biography

Aleksandra Bazan-Woźniak in 2018 obtained a doctoral degree in chemical sciences. Since 2021, she has been employed as a research assistant professor at the Department of Applied Chemistry, Faculty of Chemistry, and University of Adam Mickiewicz in Poznań. Her research topics focus on the preparation and characterization of the physico-chemical and sorption properties of biocarbon adsorbents obtained from waste materials.

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p-type black phosphorus based photodetector

Arun Kumar[1], Loredana Viscardi[1], Enver Faella[1,2], Filippo Giubileo[2], Kimberly Intonti[1], Aniello Pelella[1,2], Stephan Sleziona[3], Osamah Kharsah[3], Marika Schleberger[3], and Antonio Di Bartolomeo[1,2]

[1]University of Salerno, Italy
[2]CNR-SPIN, Italy
[3]Universität Duisburg-Essen, Germany

Two-dimensional (2D) materials have become the promising channel materials for optoelectronic applications. In this regards, few layered Black Phosphorus (BP) has shown a significant potential, due to its ultrathin layered structure, high carrier mobility, mechanical flexibility and thickness dependent direct band gap ranging from 0.3 eV (bulk) −2.0 eV (monolayer). Herein, we will be presenting the latest results obtained on the fabricated device based on thin layer BP channel. The fabricated device exhibits p-type transport with high hole mobility at low Vds. The device shows a linear increase in photocurrent as a function of laser power and exposure duration. The results confirm high photoresponsivity from the device under white light illumination. Further, a long photocurrent decay time characteristic confirms the single type of traps dominating the process. The obtained results are significant and can be of interest to the researchers involved in the 2D materials for potential photodetector applications.

Recent publications

1. Kumar, Arun & Mirshokraee, Seyed Ariana & Lamperti, Alessio & Cantoni, Matteo & Longo, Massimo & Wiemer, Claudia. (2022). Structural and Interface analysis of Ge-(Sb)-Te/Sb2Te3 core-shell nanowires grown by MOCVD.

2. Longo, Emanuele & Locatelli, Lorenzo & belli, matteo & Kumar, Arun & Longo, Massimo & Fanciulli, Marco & Mantovan, R. (2021). Spin-Charge Conversion in Fe/Au/Sb2Te3 Heterostructures as Probed By Spin Pumping Ferromagnetic Resonance. Advanced Materials Interfaces. 2101244.

3. Giubileo, Filippo & Faella, Enver & Pelella, Aniello & Kumar, Arun & Capista, Daniele & Passacantando, Maurizio & Kim, Sang & Di Bartolomeo, Antonio. (2022). SnO2 Nanofibers Network for Cold Cathode Applications in Vacuum Nanoelectronics. Advanced Electronic Materials.

Biography

Arun Kumar is a University Researcher (Asst. Prof.) at the Department of Physics 'E.R. Caianiello', University of Salerno, Italy, working on the development of low dimensional heterostructures for optoelectronics applications. His research interests are towards the development and fundamental understanding of semiconductor nanomaterials for the photodetectors, non-volatile memories, solar cells, sensors applications. He has published more than 27 publications in peer reviewed scientific journals and presented his scientific activities at various international conferences.

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Identification of factors on the possibility of bamboo as scaffolding and a formwork material in Ethiopia

Ermias A Amede
Addis Ababa University, Ethiopia

In several countries trend bamboo has been used as a scaffolding material in building projects. Nonetheless, Ethiopia is known for the high population of bamboo vegetation such utilization of the material remained untapped. The purpose of this paper is to identify factors that influence bamboo's structural suitability as a temporary material and to create a conceptual map for using it as an alternative structural material. Following the identification of important applications influencing parameters via literature analysis, both qualitative and quantitative approaches were used to identify significant factors. The paper also used a series of protocols; at first, several documents were selected based on criteria to provide an overview of bamboo-based construction systems. Following that, four major categories for SWOT analysis were chosen to examine the Ethiopian construction industry's stance on the use of bamboo as a scaffolding material. Finally, a scoring model was employed as a quantitative analysis protocol to calculate the weight of factors (safety, procedure and implementation, time, and cost) through expert opinions. The investigation revealed that the use of bamboo has a cost and time savings advantage, while an increase in trash in acute and intermittent areas was one of the challenges. Furthermore, one of the challenges in creating bamboo formwork is a lack of complementary joinery techniques. Besides that, it is expected that the bamboo content will fall short of technical requirements. On the Brightside, every single respondent stated unequivocally that bamboo-made formwork meets a low-cost requirement.

Recent publications

1. Leule M. Hailemariam, Ermias A. Amede, Ezra K. Hailemariam & Denamo A. Nuramo (2022) Philosophies of bamboo structural design and key parameters for developing the philosophies, Cogent Engineering, 9:1, 2122155,

2. Ermias Amede (2022) A relationship between productivity and significant controlling factors of highway construction earthwork, Cogent Engineering, 9:1, 2114203,

3. Hailemariam, E.K., Hailemariam, L.M., Amede, E.A. and Nuramo, D.A. (2022), "Identification of barriers, benefits and opportunities of using bamboo materials for structural purposes", Engineering, Construction and Architectural Management, Vol. ahead-of-print No. ahead-of-print.

Biography

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