PROGRAM AND ABSTRACTS

iSAMN 2023

7th International Symposium on Advanced Materials and Nanotechnology

12 – 13 September 2023

UPM

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UNIVERSITI PUTRA MALAYSIA
BERILMU BERBAKTI

MESSAGE FROM DEPUTY VICE CHANCELLOR OF UNIVERSITI PUTRA MALAYSIA

Assalamualaikum Warahmatullahi Wabarakatuh.

I would like to welcome all the keynote speakers, invited speakers, all the sponsors and participants from various faculties, institutes, and universities, both local and international to the 7th International Symposium on Advanced Materials and Nanotechnology 2023 (iSAMN 2023), hosted by ION2. I would also like to acknowledge ION2 for their untiring efforts in organizing this kind of international event every year, since 2017; bringing together local and international researchers in the field of advanced materials and nanotechnology.

Universiti Putra Malaysia (UPM) has set itself the vision of becoming an internationally reputable university and thus building a brilliant brand globally. UPM has been ranked 123rd in the world and 2nd in Malaysia by Quacquarelli Symonds (QS) World University Rankings for 2023. Guided by the motto "With Knowledge, We Serve," UPM is fervently advancing translational research in diverse domains, including Advanced Materials and Nanotechnology, to ensure that research discoveries can effectively address both national and global challenges. UPM's drive to foster translational research stands as a pivotal pledge to ensure that research undertakings not only thrive within laboratories, but also tangibly resolve issues while engaging with local and worldwide communities.

The chosen theme for iSAMN 2023, "Nanotechnology Towards Green and Sustainable Future" holds great relevance for discussion. Bringing together distinguished guest speakers from countries including Turkiye and Japan, international participants from China, Nigeria, UAE, and India, alongside respected local speakers from institutions such as Universiti Teknologi Malaysia, Universiti Malaya, Universiti Kebangsaan Malaysia, Universiti Pertahanan Nasional Malaysia, Universiti Malaysia Sabah, and Universiti Teknologi Mara, is a remarkable achievement for iSAMN2023. I extend my gratitude to all the speakers for their presence at this symposium and for their willingness to share their expertise. I am confident that this collaborative effort will pave the way for future partnership opportunities among all stakeholders. Thank you.

To all the speakers and participants, I wish you a productive, enriching, and advantageous conference.

Prof. Dr. Ismi Arif Ismail
Deputy Vice Chancellor (Academic and International)
Universiti Putra Malaysia

MESSAGE FROM ION2 DIRECTOR

Assalamualaikum warahmatullahi wabarakatuh,

On behalf of ION2, I would like to extend my warmest welcome to the participants of the International Symposium on Advanced Materials and Nanotechnology 2023, or iSAMN2023. This symposium provides an excellent platform for fellow colleagues and students to share and discuss knowledge and findings while expanding networks in the field of advanced materials and nanotechnology. This year marks the first time that the symposium is being held in a hybrid mode, with both physical and online platforms, allowing those who cannot travel from abroad to join us virtually.

It is an honor and a pleasure to welcome our keynote speakers from renowned universities in Turkiye and Japan, as well as representatives from agencies and industries in Malaysia closely related to nanotechnology. I believe that each of our keynote speakers will share their research findings, providing valuable insights that will benefit all participants in the fields of Advanced Materials and Nanotechnology. I encourage every participant to seize this rare opportunity to interact and establish connections with our esteemed speakers. We are also delighted to welcome presenters from Malaysian universities and international presenters from Iraq, the United Arab Emirates, China, and Nigeria.

I would like to express my heartfelt gratitude to the editorial staff, members of the organising committee, secretarial staff, and everyone who has dedicated their efforts to make this symposium a reality and ensure its success. Additionally, I would also like to convey my appreciation to the staff and students of ION2 at Universiti Putra Malaysia for their unwavering cooperation.

In conclusion, I extend my best wishes for a delightful two-day conference, and we are optimistic that iSAMN2023 will attain significant success and prove to be a fulfilling experience for all participants.

Terima kasih.

PROF. DR. MOHD NIZAR HAMIDON
Director
Institute Of Nanoscience and Nanotechnology (ION2)
Universiti Putra Malaysia

MESSAGE FROM ISAMN2023 CHAIRMAN

Assalamualaikum Warahmatullahi Wabarakatuh and warm greetings to all

On behalf of the Organising Committee, it gives me great pleasure and enthusiasm to bid a very warm welcome to all of you to the International Symposium on Advanced Materials and Nanotechnology 2023 (iSAMN2023). This symposium represents a significant milestone in our collective pursuit to advancing knowledge, fostering innovation, and contributing to the green and sustainable future in the field of nanoscience and nanotechnology.

The theme chosen for iSAMN2023, "Nanotechnology Towards Green and Sustainable Future," encapsulates the pivotal moment we stand upon. The emergence of the nanotechnology era has ignited a fervor of scientific curiosity, opening doors to unprecedented insights and remarkable breakthroughs.

This symposium serves as a vibrant platform where brilliant minds gather to exchange insights, share groundbreaking research, and incubate creative ideas that hold the potential to shape our tomorrows. As we delve into captivating discussions and enlightening presentations, I encourage you to actively engage, collaborate, and network with your peers. The connections forged during this event could lay the foundation for lasting partnerships that transcend borders and disciplines.

I would like to express my thanks and commend all the members of the Organising Committee for their commitment, tremendous support and effort in ensuring the smooth and success of this symposium. A special note of appreciation goes to our esteemed Keynote Speakers and Invited Speakers. Your expertise and insights enlightening us with perspectives beyond boundaries. To all our sponsors, we sincerely thank you for your kind contributions, without which the success of the symposium would not have been as great.

Finally, I wish all of you to have a pleasant two-day symposium, and that iSAMN2023 will be a successful event to provide fruitful discussions to all participants.

Thank you.

ASSOC. PROF. ChM. DR. JAAFAR ABDULLAH
Chairman of iSAMN2023

SYMPOSIUM OVERVIEW

Day 1: September 12, 2023 (Tuesday)

TIME (MYT)	EVENT	
0900 - 0930	Registration Day 1	
0930 - 1030	**Session 1A – Devices I** *Session Chair:* *Dr. Mohd Amrallah Mustafa*	**Session 1B – Environment I** *Session Chair:* *Dr. Josephine Ying Chyi Liew*
1030 - 1100	Morning Break	
1100 - 1200	**Session 2A – Devices II** *Session Chair:* *Dr. Haslina Jaafar*	**Session 2B – Environment II** *Session Chair:* *Assoc. Prof. Dr. Yap Wing Fen*
1200 - 1230	**Keynote Paper 1 - Nanotechnology: Engineering Materials and Processes for the Green Economy** Assoc. Prof. Dr. Ruslinda A. Rahim Director, National Nanotechnology Centre (NNC), MOSTI *Session Chair: Prof. ChM. Dr. Janet Lim Hong Ngee*	
1230 - 1245	Industrial Talk 1 – Aseptec Sdn. Bhd.	
1245 - 1430	Lunch Break	
1430 - 1500	**Opening Ceremony** - Negaraku Anthem and Putra Gemilang - Doa Recitation - Welcoming Speech by iSAMN2023 Chair - Officiating Speech by Deputy Director of Centre for Corporate Strategy and Relations, UPM - Photography Session	
1500 - 1530	**Keynote Paper 2 – Manganese Oxide Nanorod-Supported Ni@Ir Core-Shell Nanoparticles Catalyzed Complete Dehydrogenation of Hydrazine-Borane** Prof. Dr. Mehmet Zahmakiran (Online) Vice Rector, Bartin University, Turkiye *Session Chair: Assoc. Prof. Ir. Dr. Siti Hajar Othman*	
1530 - 1630	**Session 3A – Energy** *Session Chair:* *Prof. Ir. Ts. Dr. Suhaidi Shafie*	**Session 3B – Healthcare** *Session Chair:* *Ts. Dr. Mohd Nazim Mohtar*
1630 - 1700	Tea Break	
1700	End of Day 1	

Keynote session venue: Auditorium Rashdan Baba

Day 2: September 13, 2023 (Wednesday)

TIME (MYT)	EVENT	
0900 - 0930	Registration Day 2	
0930 - 1030	**Session 4A – Devices III** *Session Chair:* *Dr. Tan Sin Tee*	**Session 4B – Environment III** *Session Chair:* *Assoc. Prof. Dr. Shahrul Ainliah Alang Ahmad*
1030 - 1100	Morning Break	
1100 - 1200	**Session 5A – Devices IV** *Session Chair:* *Assoc. Prof. Ts. Dr. Suriati Paiman*	
1200 - 1230	**Keynote Paper 3 – Facile, Cost-effective and Environment-friendly Approaches Towards Oriented Thin Film Fabrication for Flexible Organic Electronic Devices** Prof. Dr. Shyam Pandey (Online) Graduate School of LSSE, Kyushu Institute of Technology, Japan *Session Chair:* *Assoc. Prof. ChM. Dr. Jaafar Abdullah*	
1230 - 1245	Industrial Talk 2 – RGS Sdn. Bhd.	
1245 - 1430	Lunch Break	
1430 - 1530	**Session 6A – Agriculture & Food** *Session Chair:* *Assoc. Prof. ChM. Dr. Norizah Abdul Rahman*	**Session 6B – Online presentation** *Session Chair:* *Dr. Ismayadi Ismail*
1530 - 1600	**Keynote Paper 4 – Aptamer-based Biosensor: From R&D to Commercialisation** Dr. Eda Yuhana Ariffin Product Specialist (Biosensor), Biogenes Technologies Sdn. Bhd. *Session Chair:* *Assoc. Prof. Ir. Dr. Norhafiz Azis*	
1600 - 1630	**Closing Ceremony** - Best Paper and Best Presenter Award - Closing Speech by iSAMN2023 Chair - iSAMN2024 Handover	
1630 - 1700	Tea Break	
1700	End of Day 2	

Day 1, September 12, 2023 (Tuesday)

SESSION 1

TIME (MYT)	SESSION 1A (DEVICES I) Venue: Auditorium Rashdan Baba	SESSION 1B (ENVIRONMENT I) Venue: Mini Auditorium 1
09.30	Resistivity Analysis of Nickel Nanoparticles Additive-based Magnetorheological Grease ***Norzilawati Mohamad*** *Universiti Malaysia Sabah, Malaysia*	Fabrication and Characterization Methods of PVA/TiO_2 Fibers for Potential Application of Water Treatment ***Cik Rohaida Che Hak*** *Malaysian Nuclear Agency, Malaysia*
09.45	Synthesis and Characterization of Carbon Nanotubes with Metal-Organic Framework Composites ***Nafisah Aqhirah Zolkepli*** *Universiti Putra Malaysia, Malaysia*	CaO-La_2O_3 Supported Co, Ni, and Pd Catalysts for Methane Dry-reforming Toward Syngas Production ***Faris Abdulridha Jassim Aldoghachi*** *University of Basra, Iraq &* *University Putra Malaysia, Malaysia*
10.00	A Structural and Morphological Study of Titanium Dioxide Nanoparticle-based Device ***Mohamad Nizar Hadi Mohamad Nassir*** Universiti Kebangsaan Malaysia, Malaysia	Elucidating Interactions of Immobilized Lysozyme on Cellulose Spheres ***Sharifah Nabihah Syed Jaafar*** *Universiti Kebangsaan Malaysia, Malaysia*
10.15	An Ohmic Contact on TiO_2-based Thick Film using Interdigitated Electrode Graphite on Different Substrate ***Azlinda Abu Bakar*** *Universiti Putra Malaysia, Malaysia*	Structural and Functional Group Characterization of Graphene Oxide Functionalized Melamine Sponge ***Balarabe El-yaqub*** *Universiti Putra Malaysia, Malaysia*

Day 1, September 12, 2023 (Tuesday)

SESSION 2

TIME (MYT)	SESSION 2A (DEVICES II) Venue: Auditorium Rashdan Baba	SESSION 2B (ENVIRONMENT II) Venue: Mini Auditorium 1
11.00	Surface Functionalization at Microelectrode Array and Screen-printed Electrodes for Biosensor Application: Strategies and Challenges ***Nur Azura Mohd Said*** *Malaysian Agricultural Research & Development Institute (MARDI), Malaysia*	Immobilization of ZnO Microrods on Rigid Meshes Using Hydrothermal Method ***Pung Swee Yong*** *Universiti Sains Malaysia, Malaysia*
11.15	Effect of Annealing Environment on Structural and Optical Properties of Solution-grown NiO Nanoflowers ***Norfarariyanti Parimon*** *Universiti Malaysia Sabah, Malaysia*	The Effect Of Nano Silica as Nano-filler on Tensile, Flexural and Compression Properties of Basalt and Glass Fiber Reinforced Composites using Industrial Polyester Resin ***Mohamad Asrofi Muslim*** *University Technology MARA, Malaysia*
11.30	Effects of Dispersed Solvents on Carbon Black Distributions ***Nur Alia Irdina Amini*** *Universiti Kebangsaan Malaysia, Malaysia*	Optimisation in Compressive Strength of Seawater and Zeolite based Geopolymer Foam Reinforced with Nanocellulose ***Tay Chai Hua*** *Universiti Putra Malaysia, Malaysia*
11.45	Exchange-coupling Behaviour in $BaFe_{12}O_{19}$- $Y_3Fe_5O_{12}$ Nanocomposites Film Prepared by a Sol-gel Method ***Noor Baa'yah Ibrahim*** *Universiti Kebangsaan Malaysia, Malaysia*	Neolamarckia Cadamba Nanofibrillated Filter Paper For Textile Wastewater Treatment via Cross-flow Filtration System: Performance and Fouling Mechanism ***Siti Solehah Ahmad Norrahma*** *Universiti Tun Hussein Onn Malaysia, Malaysia*

Day 1, September 12, 2023 (Tuesday)

SESSION 3

TIME (MYT)	SESSION 3A (ENERGY) Venue: Auditorium Rashdan Baba	SESSION 3B (HEALTHCARE) Venue: Mini Auditorium 1
15.30	Enhancing Nucleation of Graphitic Carbon on Carbon Nanotube Basal Planes via Temperature and Gas Flow Rate Control ***Ismayadi Ismail*** *Universiti Putra Malaysia, Malaysia*	Antimicrobial Activity of Biomediated-Synthesized Silver Nanoparticles using Persicaria Odorata Aqueous Extract ***Nik Ahmad Nizam Nik Malek*** *Universiti Teknologi Malaysia, Malaysia*
15.45	Green Chemistry Biosynthesis of Stable Silver Nanoparticles by Saccharomyces Cerevisiae Grown in Static Magnetic Fields ***Atika Ahmad*** *Khalifa University Abu Dhabi, United Arab Emirates*	RGD¬-Modified ZIF-90 As Vehicle for Targeted Delivery of Cisplatin ***Emilia Abd Malek*** *Universiti Putra Malaysia, Malaysia*
16.00	Valley and Spin Transport Characteristics Based on a Quantum Dot Contact Structure Regulated by Piezoelectric Field ***Ruhao Liu*** *University of Electronic Science and Technology of China, China*	Progress Testing of Antimicrobial Mycobacterium Tuberculosis with Nanotitania ***Ahmad Mukifza Harun*** *Universiti Malaysia Sabah, Malaysia*

Day 2, September 13, 2023 (Wednesday)

SESSION 4

TIME (MYT)	SESSION 4A (DEVICES III) Venue: Auditorium Rashdan Baba	SESSION 4B (ENVIRONMENT III) Venue: Mini Auditorium 1
09.30	Characterizations of MWCNTs Nanofluids on the Effect of Surface Oxidative Treatments ***Norli Abdullah*** *Universiti Pertahanan Nasional Malaysia, Malaysia*	Nanohybrid Polysulfone Membranes Functionalized with Antimicrobial Silver for Water Purification from Heavy Metals ***Norherdawati Kasim*** *Universiti Pertahanan Nasional Malaysia, Malaysia*
09.45	Effect of $NaClO_4$ Dopant on Chemical Bond and Ionic Conductivity of Benzoyl Kappa-carrageenan Gel Biopolymer Electrolyte ***Intan Juliana Shamsudin*** *Universiti Pertahanan Nasional Malaysia, Malaysia*	Preparation and Characterization of Electrospun PAN/Sago Lignin Nanofibers ***Norizah Abdul Rahman*** *Universiti Putra Malaysia, Malaysia*
10.00	Role of Graphene Oxide Addition on Microstructural Properties of $YBa_2Cu_3O_7$- δ Superconductor ***Nurulnabihah Aqilah Zulkarnain*** *Universiti Malaysia Terengganu, Malaysia*	Investigation of Inhibition Activity of Acetylcholinesterase (AChE) Encapsulated Inmetal Organic Framework (MOF) for Monitoring Carbamate Pesticide ***Bariah Kamaruddin*** *Universiti Putra Malaysia, Malaysia*
10.15	Impact of Micrometer and Nanometer-sized Particles on the Electrical Properties of Prosopis Africana Biochar Thick Films ***Suleiman Babani*** *Universiti Putra Malaysia, Malaysia*	Yeast-assisted Dissolved Air Flotation-enhanced UV/H_2O_2/TiO_2 Photocatalytic Advanced Oxidation Process for the Treatment of Synthetic Slaughterhouse Wastewater ***Yeoh Jen Xen*** *Universiti Putra Malaysia, Malaysia*

Day 2, September 13, 2023 (Wednesday)

SESSION 5

TIME (MYT)	SESSION 5A (DEVICES IV) Venue: Auditorium Rashdan Baba
11.00	Aluminium-doped Zinc Oxide (AZO) Prepared by Hydrothermal Method as a Potential of Potentiometric pH Sensors ***Muhammed Azmi Abdul Hamid*** *Universiti Kebangsaan Malaysia, Malaysia*
11.15	Synthesis and Characterization of Silicon Quantum Dots Using Hydrothermal Method ***Hassan Grema*** *Universiti Putra Malaysia, Malaysia*
11.30	Electrospinning Cellulose Acetate Nanofibers with Graphite Additives for Potential Applications in Electronics ***Mohd Ali Mat Nong*** *Universiti Putra Malaysia, Malaysia*
11.45	Plasmonic Enhancement in Gold-Silver Nanoparticles-Infused Styrene Methyl Methacrylate Copolymer for Surface Enhanced Raman Spectroscopy ***Nur Aida Mohamed Shaul Hamid*** *University Malaysia Terengganu, Malaysia*

Day 2, September 13, 2023 (Wednesday)

SESSION 6

TIME (MYT)	SESSION 6A (AGRICULTURE & FOOD) Venue: Auditorium Rashdan Baba	SESSION 6B (ONLINE PRESENTATION) Venue: Mini Auditorium 1
14.30	Enhancing The Luminescence of Carbon Quantum Dots from Biochar by Tuning the Functional Group via Hydrothermal Synthesis ***Nur Afif Nadhrah Kamaruzaman*** *Universiti Putra Malaysia, Malaysia*	The Optical Constant of Copper Sulfide Nanoparticles for Spectral Splitting PV/T System ***Jie Zhang*** *Universiti Selangor, Malaysia*
14.45	Mechanical Properties of Starch-Based Film Incorporated with Chitosan Nanoparticles and Thymol-Encapsulated Chitosan Nanoparticles: A Comparative Study ***Ruzanna Ahmad Shapi'i*** *Universiti Putra Malaysia, Malaysia*	Rice Husk Ash (RHA) Nanoparticles as a New Material for Hydrogen Gas Sensor ***Jamila Lamido Sumaila*** *Bayero University Kano, Nigeriaa*
15.00	Study of Optical Properties of The Agriculture Waste Based Carbon Quantum Dot (CQDs) ***Mhammed Ali Khalifa Mhammed Ali Alnigomi*** *Universiti Putra Malaysia, Malaysia*	Synthesized CNT-ferrite Nanocomposite via CVD as Magnetic-conductive Material for Microwave Application ***Intan Helina Hasan*** *Universiti Putra Malaysia, Malaysia*

Ruslinda A. Rahim
National Nanotechnology Centre
Ministry of Science, Technology and Innovation (MOSTI),
Malaysia

NANOTECHNOLOGY: ENGINEERING MATERIALS AND PROCESSES FOR THE GREEN ECONOMY

Abstract

There is growing recognition that the transition to a more sustainable economic growth is vital. The existing approach on continuously increasing natural resource consumption with concomitant pollutants emission cannot guarantee an environmentally sustainable socioeconomic growth, especially when resources are becoming increasingly scarce. Pollution due to increased industrial output which is not environmentally friendly will have adverse impacts on human lives and livelihoods as well as the natural ecosystem. As societies around the world face serious challenges, we are actively searching for new technologies and innovation to offer direct or indirect solutions in almost every aspect of modern life, ranging from health to environment and energy. Nanotechnology is one of the most promising enabling technologies of the 21st century. This keynote will discuss the roles of nanotechnology and advanced materials in introducing solutions and opportunities to address various challenges, hence allowing transition to the green economy.

Shyam S. Pandey
Graduate School of LSSE,
Kyushu Institute of Technology
Japan

FACILE, COST-EFFECTIVE AND ENVIRONMENT-FRIENDLY APPROACHES TOWARDS ORIENTED THIN FILM FABRICATION FOR FLEXIBLE ORGANIC ELECTRONIC DEVICES

Abstract

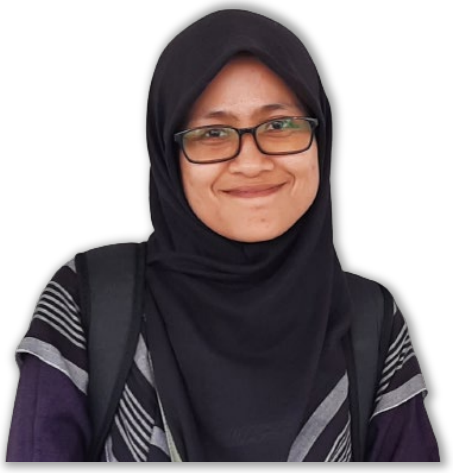
To harness the full potential of solution processable conjugated polymers (CPs) as active device elements for flexible organic electronic devices, fabrication of their large-area thin films by low-cost and environmentally benign techniques is inevitable. Therefore, facile fabrication of large-area uniform films with controllable film morphology, thickness and minimal interference to underlying layers is inevitable. We have developed and improvised the floating film transfer method (FTM), which not only provides large area uniform thin films but also they are highly oriented. FTM-processed thin films are not only oriented but also provide edge-ON orientation, which is highly desired for planer devices like organic field effect transistors. It has been demonstrated that oriented thin films of the NR-P3HT prepared by FTM led to a remarkable enhancement in the field effect mobility (>102 times) as compared to their spin-coated film counterparts. Utilizing highly edge-on oriented thin film thin films of PBTTT-C14 processed by FTM, we have not only demonstrated a very high optical dichroism of >10 but also an OFET mobility of 1.24 cm2/Vs, which is one of the highest reported mobility values for this class of CPs. Recently, we have demonstrated the control of the extent and direction of molecular orientation using DPP-TTT, which is rather difficult to orient owing to its molecular rigidity. Harnessing the synergy of orientation and molecular orientation under FTM using DPP-TTT, the very high field-effect mobility of 12.4 cm2V-1s-1 was recently demonstrated, which is also of the highest values reported for solution-processable semiconducting polymers We have also recently improvised the solvent-less friction transfer (FT) method as solvent assisted friction transfer (SAFT) and demonstrated that CPs generally imparting face-ON orientation can be oriented in to Edge-ON manner. At the same time SAFT can be used to fabricate oriented thin films of flexible as well as rigid substrates.

Prof. Dr. Mehmet Zahmakiran
Department of Biotechnology,
Faculty of Science, Bartin University,
Turkiye

MANGANESE OXIDE NANOROD-SUPPORTED Ni@Ir CORE-SHELL NANOPARTICLES CATALYZED COMPLETE DEHYDROGENATION OF HYDRAZINE-BORANE

Abstract

Hydrazine borane (HB; $N_2H_4BH_3$) has been considered to be one of the most promising solid chemical hydrogen storage materials owing to its high hydrogen capacity and stability under ambient conditions. Despite that, the high purity of hydrogen production from the complete dehydrogenation of HB stands as a major problem that needs to be solved for the convenient use of HB in on-demand hydrogen production systems. In this study, we describe the development of a new catalytic material comprised of bimetallic Ni@Ir core-shell nanoparticles (NPs) supported on OMS-2-type manganese oxide octahedral molecular sieve nanorods (Ni@Ir/OMS-2), which can reproducibly be prepared by following a synthesis protocol including (i) the oleylamine-mediated preparation of colloidal Ni@Ir NPs and (ii) wet impregnation of these ex situ synthesized Ni@Ir NPs onto the OMS-2 surface. The characterization of Ni@Ir/OMS-2 has been done by using various spectroscopic and visualization techniques, and their results have revealed the formation of well-dispersed Ni@Ir core-shell NPs on the surface of OMS-2. The catalytic employment of Ni@Ir/OMS-2 in the dehydrogenation of HB showed that Ni-0.22@Ir-0.78/OMS-2 exhibited high dehydrogenation selectivity (>99%) at complete conversion with a turnover frequency (TOF) value of 2590 h(-1) at 323 K, which is the highest activity value among all reported catalysts for the complete dehydrogenation of HB.



Dr. Eda Yuhana Ariffin
Product Specialist (Biosensor),
Biogenes Technologies Sdn Bhd,
Malaysia

APTAMER-BASED BIOSENSOR: FROM R&D TO COMMERCIALISATION

Abstract

Aptamer-based biosensors have emerged as a promising technology at the intersection of molecular recognition and sensing application. In BIOGENES, aptamers are designed and validated using bio-computational technique, which is faster and cheaper than conventional lab-based method. Our platform technologies include APTCAD-aptamer design platform, APTFAB-aptamer and sensor fabrication platform and APTSENS-digital diagnostics platform. All three platforms connected via cloud to support journey from R&D to commercialisation. These platforms are practical for application ranging from human healthcare to animal health, agriculture, food safety and environmental monitoring.

Keywords: Aptamer; aptamer-based biosensor; sensing technology; Research & Development; commercialisation

SESSION 1A – DEVICES I

RESISTIVITY ANALYSIS OF NICKEL NANOPARTICLES ADDITIVE-BASED MAGNETORHEOLOGICAL GREASE

Presenter: **Norzilawati Mohamad,** Universiti Malaysia Sabah, Malaysia

Magnetorheological grease (MRG) is classified as smart material due to the tunable rheological properties with the presence of external magnetic force. The improvement in the yield performance of MRG under an applied magnetic field is actively studied. However, there is a very limited study related to the conductivity properties that have been reported. Therefore, this paper is to investigate the effect of nickel nanoparticles base MRG (NMRG) on conductivity properties through resistivity analysis. In this study, the NMRG sample was fabricated between different sizes of magnetic particles and grease. Then, the resistivity analysis was conducted through a simple self-develop test rig setup. Further analysis of the chemical compound and hydrophobicity effect were examined. The results show that the resistivity values decrease with the additional percentage of nickel nanoparticles. The hydrophobicity effect also increases by 8.4% due to the disrupted highly dynamic hydrogen bonds formed between polar and non-polar molecules which is proven by FTIR. By having dual properties, the applications of MR materials can be broadened in many applications and industries.

SYNTHESIS AND CHARACTERIZATION OF CARBON NANOTUBES WITH METAL-ORGANIC FRAMEWORK COMPOSITES

Presenter: **Nafisah Aqhirah Zolkepli,** Universiti Putra Malaysia

Recently, the development of nanomaterials is gaining attention in many fields due to their unique physical, chemical, magnetic, and optical properties. Metal-organic frameworks (MOFs) are known as crystalline porous materials with unique properties such as tunable pore size, large surface area, various chemical functions, and stability. The introduction of another guest material into the porous compound of MOFs can lead to the improvement of electrical conductivity and catalytic activity. Therefore, composites of MOFs and carbon nanomaterials were prepared by introducing carbon nanotubes (CNTs) into the MOFs structure. The physical mixing method was used to synthesize CNT-MOFs composites because it is more convenient and environmentally friendly. The structure of CNT-MOFs was characterized by Fourier transform infrared (FT-IR), X-ray diffraction (XRD), field emission scanning electron microscopy (FE-SEM) with energy dispersive X-ray (EDX), Brunauer-Emmett-Teller (BET) surface analysis, RAMAN spectroscopy and thermogravimetric analysis (TGA). Optimal physical and chemical conditions such as pH, CNT content, and scan rates for current enhancement were determined. Cyclic voltammetry analysis shows that the current response is better for carbon-MOF nanocomposites than for MOFs alone. This work shows that modifying MOFs with conductive material such as carbon leads to better performance by improving the conductivity of the compound.

SESSION 1A – DEVICES 1

A STRUCTURAL AND MORPHOLOGICAL STUDY OF TITANIUM DIOXIDE NANOPARTICLE-BASED DEVICE

Presenter: **Mohamad Nizar Hadi Mohamad Nassir,** Universiti Kebangsaan Malaysia, Malaysia

This paper focuses on developing and characterizing a TiO_2 nanoparticle-based device in terms of structural, morphological study and electrical study. The structural and morphological study were carried out by varying two major parameters: the annealing temperature and thickness of TiO_2 film. In this work, TiO_2 solutions have been prepared using the sol-gel method and coated on a SiO_2 wafer using a spin coater. After coating, the TiO_2 nanoparticle-based devices were characterized using Field-emission Scanning Electron Microscope (FESEM) and X-ray Diffractometer (XRD). The results obtained show that the surface morphology of TiO_2 changes when annealed at different temperatures. As the annealing temperature increases, there is more agglomeration of TiO_2 nanoparticles seen as well as the size of TiO_2 nanoparticle. For electrical analysis, after undergoing four repetitions of periodic tap water injection and drying processes, it was demonstrated that this TiO_2 device exhibits excellent repeatability and response time. This concludes that the TiO_2 particle diameter shows high reliance on the annealing temperature and the number of layers of spin coat. The TiO_2 device also shows excellent repeatability and response time, making it suitable for practical applications.

AN OHMIC CONTACT FORMATIONS ON TiO_2-BASED THICK FILM USING INTERDIGITATED ELECTRODE GRAPHITE ON DIFFERENT SUBSTRATE

Presenter: **Azlinda Abu Bakar,** Universiti Putra Malaysia

This work investigated the Ohmic contact between thick film graphite as an electrode and a TiO_2-based sample. MWCNT and B_2O_3 materials were added using mixing and doping processes respectively. The mixing and doping used a fixed volume of 5 wt.% MWCNT and 5 wt.% B_2O_3, for paste preparations. The main content of the binder to develop TiO_2-based is linseed oil. The thick film was deposited on polyimide film and alumina substrate using a screen-printing technique, then annealed at 350ºC for one hour in ambient air. Graphite IDE was deposited at the bottom sample before a layer of TiO_2-MWCNT or TiO_2- B_2O_3 thick film on top of a substrate. I-V characteristics and resistance values were measured at room temperature. The resistance results showed that the addition of MWCNT and B_2O_3 in TiO_2 reduced the resistance value of the interdigitated electrode. It also showed that graphite IDE and TiO_2-MWCNT, TiO_2- B_2O_3 produced an Ohmic contact behaviour, convincing the suitability to use as sensor applications. The resistance values of both thick films showed an increasing trend with the additional TiO_2-based associated with a slower electron mobility effect of resistance increase in materials.

SESSION 1B – ENVIRONMENT I

FABRICATION AND CHARACTERIZATION METHODS OF PVA/TiO_2 FIBERS FOR POTENTIAL APPLICATION OF WATER TREATMENT

Presenter: **Cik Rohaida Che Hak,** Malaysian Nuclear Agency, Malaysia

Titanium dioxide (TiO_2) is an ideal photocatalyst because of its stability in terms of chemical and optical properties. The performance of TiO_2 as fiber incorporated in a membrane may find better than in bulk form especially in applications of water treatment. There are many methods for fabrication of TiO_2 in a composite membrane such as freeze-drying, thermal evaporation, physical and chemical vapour deposition. Unfortunately, these methods are not favor because they require multiple steps which may produce impurities. Electrospinning is a simple and versatile technique to produce composite membrane comprise of TiO_2. In this study, we propose fabrication of PVA/ TiO_2 composite membrane using electrospinning method for the potential in water treatment. We studied two parameters which is polymer loading and sonication time to investigate the quality of the electrospun fibers. Then we investigated the ability of this composite to show UV photodegradation. Morphology studies confirmed that the TiO_2 particles are incorporated well into the fibers. XRD phase analysis showed the incorporation of anatase into the composite and finally this composite showed the ability to degrade the methylene blue under UV.

CaO-La_2O_3 SUPPORTED Co, Ni, AND Pd CATALYSTS FOR METHANE DRY-REFORMING TOWARD SYNGAS PRODUCTION

Presenter: **Faris Abdulridha Jassim Aldoghachi,** University of Basra, Iraq

The dry reforming of methane poses a critical challenge due to its endothermic nature and the propensity for coke formation. Developing catalysts and reaction conditions that promote efficient CH_4 and CO_2 conversion while mitigating carbon deposition is a central issue in achieving sustainable and economically viable carbon dioxide utilization. In this study, dry reforming of methane was conducted over $Ca_{1-x}La^{3+}{}_xO$ supported Co, Ni, and Pd catalysts, where x ranged from 0 to 0.15. The resulting catalysts underwent thorough characterization using XRD, XRF, FT-IR, TEM, and BET techniques. Prior to the reaction, the catalysts were reduced by H_2 at 700 °C. The dry reforming of methane reaction was carried out, the order of conversions of CO_2 and CH_4 at 900°C of the reduced catalysts after being on the stream for 200 h was as follows: Co, Ni, Pd/$Ca_{0.85}La^{3+}{}_{0.15}O$> Co, Ni, Pd/$Ca_{0.93}La^{3+}{}_{0.07}O$> Co, Ni, Pd/$Ca_{0.97}La^{3+}{}_{0.03}O$> Co, Ni, Pd/CaO with a 1:1 mole ratio of CH_4 : CO_2 that displayed the best resistance to deactivation by carbon formation and formed high selectivity of H_2 and CO.

SESSION 1B – ENVIRONMENT I

ELUCIDATING INTERACTIONS OF IMMOBILIZED LYSOZYME ON CELLULOSE SPHERES

Presenter: **Sharifah Nabihah Syed Jaafar,** Universiti Kebangsaan Malaysia, Malaysia

Folding of lysozyme has been a major drawback and limits its application. Cellulose, which is a green molecule has the potential to be a carrier of lysozyme, because of its high functionality and chemical stability. The aim of this study is to elucidate the interaction of immobilized lysozyme on cellulose spheres (CS) by evaluating their physical and chemical interactions. Prior to dissolution, cellulose pulp undergoes acid treatment. Later, the cellulose solution was continued with the sol-gel emulsion technique and later impregnated with lysozyme for 12 hours. The ratio of cellulose solution and lysozyme used was 1:3, 1:5, and 1:7. After that, the formed and immobilized cellulose spherical (Lys-CS) was collected, washed, and dried. The zeta potential of lysozyme was found to be positively charged and the cellulose spheres were negatively charged. However, the Lys-CS samples were positively charged but the value was lower than Lysozyme. The Fourier transform infrared (FTIR) spectrum depicted, the interaction of CS and lysozyme occurred at 1650 and 1550 cm^{-1}. The findings proved the interaction of cellulose spheres and lysozyme had occurred.

STRUCTURAL AND FUNCTIONAL GROUP CHARACTERIZATION OF GRAPHENE OXIDE FUNCTIONALIZED MELAMINE SPONGE

Presenter: **Balarabe El-yaqub,** Universiti Putra Malaysia, Malaysia

Graphene oxide was successfully grafted onto melamine sponge using a simple dip coating technique. The material was characterized using XRD, FTIR and FESEM to confirm its structural, functional group and morphological characteristics. The presence of broad peaks in the XRD diffractogram confirms the amorphous nature of the composite. Meanwhile, FTIR spectra exhibited absorption peak attributed to C-N stretch of aliphatic amine which ascertain the interaction of melamine with graphene oxide. FESEM images also confirmed the presence of GO on the melamine sponge.

SESSION 2A – DEVICES II

SURFACE FUNCTIONALIZATION AT MICROELECTRODE ARRAY AND SCREEN-PRINTED ELECTRODES FOR BIOSENSOR APPLICATION: STRATEGIES AND CHALLENGES (INVITED PAPER)

Presenter: **Nur Azura Mohd Said,** Malaysian Agricultural Research & Development Institute (MARDI), Malaysia

In electrochemistry, silicon-based microelectrode arrays (MEAs) fabricated by means of UV photolithography may increase the electrochemical current while maintaining the special features of a single microelectrode (steady-state current, low ohmic potential drop and a low time constant). Among surface functionalization strategies that can be performed on MEAs include electrochemically assisted self-assembly mesoporous silica films, nanoporous gold deposition and surface silanization. However, application of silicon-based sensors is often hampered as they fail too fast when used in liquid media besides being susceptible to delamination and surface cracks. In order to produce better standard curve in biosensor development and to accommodate more immobilized bioreceptors, larger surface areas are needed. For a more practical and economical approach in biosensing, disposable screen-printed electrodes (SPEs) are still favored. With the use of handhand portable device, electrochemical analysis based on SPEs represents an excellent miniaturized point-of-care detection. However, careful attention must be given when addressing surface functionalization on SPEs as well as the use of novel nanoparticles to facilitate the route from 'lab-to-market' sensing application at later stage.

EFFECT OF ANNEALING ENVIRONMENT ON STRUCTURAL AND OPTICAL PROPERTIES OF SOLUTION-GROWN NiO NANOFLOWERS

Presenter: **Norfarariyanti Parimon,** Universiti Malaysia Sabah, Malaysia

Nickel oxide (NiO) nanoflowers with improved crystallinity were grown on the NiO seed-coated glass substrates by the immersion growth process. Argon (Ar) gas and ambient atmosphere were used during the heat treatment process of the samples. The properties of NiO nanoflowers annealed at 500°C in an Ar and ambient atmosphere surrounding were analyzed using X-ray diffraction (XRD), field emission scanning electron microscopy, and ultraviolet-visible spectroscopy. The XRD patterns of the highly porous NiO nanoflowers showed they were in a cubic NiO-type polycrystalline structure. The crystallinity improved with Ar-annealed compared to the ambient atmosphere-annealed. The crystallite sizes estimated from the most prominent peak of XRD were 21.4 nm and 17.5 nm for the samples annealed in the ambient and Ar environments, respectively. The dislocation density is also higher for the sample annealed in Ar. The optical properties demonstrated that the average transmittance in the visible region (400 - 800 nm) was approximately 32 % and 37 % for the NiO samples annealed in the ambient and Ar environments, respectively. Further, the absorbance spectra showed a higher absorption edge when the sample was annealed in the Ar atmosphere, which is 410 nm compared to 360 nm when annealed in the ambient environment.

SESSION 2A - DEVICES II

EFFECTS OF DISPERSED SOLVENTS ON CARBON BLACK DISTRIBUTIONS

Presenter: **Nur Alia Irdina Amini,** Universiti Kebangsaan Malaysia, Malaysia

Carbon black (CB) particle is an emerging material produced by incomplete combustion and possesses unique characteristics such as high surface area. As a result, it has high surface activation energy and tends to agglomerate. This study aims to reduce the agglomeration of CB by undergoing solvent dispersion. The treatment of CB was prepared in ethyl acetate (EA) and dichloromethane (DCM) at 30°C. The CB dispersion stability was confirmed via phase separation, Fourier transform infrared (FT-IR) spectroscopy, Raman spectroscopy, and transmission electron microscopy (TEM). The colloidal suspension of CB in DCM (CB-DCM) shows better phase stability than the colloidal suspension of CB in EA (CB-EA). This is because the chemical changes have happened in the CB-EA, as confirmed by the FTIR and Raman spectroscopies. The TEM results confirmed show that the CB-DCM and CB-EA were aggregated. This study proves that the agglomeration of CB particles could be reduced through solvent dispersion.

EXCHANGE-COUPLING BEHAVIOUR IN $BaFe_{12}O_{19}$-$Y_3Fe_5O_{12}$ NANOCOMPOSITES FILM PREPARED BY A SOL-GEL METHOD

Presenter: **Noor Baa'yah Ibrahim,** Universiti Malaysia Sabah, Malaysia

In this study, the $BaFe_{12}O_{19}/Y_3Fe_5O_{12}$ nanocomposite film with various soft phase (YIG) compositions (11%, 17%, 20%, 33% and 43%) were synthesized through a sol-gel method followed by a spin coating technique and annealed at 900°C for 2 hours. The microstructural analysis shows that film that contain low YIG content has good crystallinity without impurity phase. It was found that the magnetic properties of the nanocomposite film were influenced by soft phase composition. The exchange-coupling interaction that was achieved at an 11% of soft phase composition managed to improve the magnetic properties of the nanocomposite film higher than the single BaM phase. Further increment in the soft phase causes the dipolar interaction (soft-soft) to suppress the soft-hard interaction which causes the magnetic properties to be reduced. In this study, the best nanocomposite (BaM/YIG) film with good magnetic properties exhibited by the film with 11% of soft phase, with $(BH)_{max}$ value of 7.52 kJ/m^3 which is 9% higher than the single BaM phase (6.9 kJ/m^3). Magnetic properties analysis at high temperatures found that the Curie temperature of the best nanocomposite film is 720 K, slightly lower than the single BaM phase film (740 K).

SESSION 2B – ENVIRONMENT II

IMMOBILIZATION OF ZnO MICRORODS ON RIGID MESHES USING HYDROTHERMAL METHOD

Presenter: **Swee-Yong Pung,** Universiti Sains Malaysia, Malaysia

Although ZnO photocatalyst demonstrates promising results in organic pollutants removal, its application in industry for wastewater treatment is still limited. One of the major issues are the deterioration of photocatalytic performance over time as the ZnO particles tend to drain away by the flowing wastewater during the treatment. To address this issue, ZnO microrods were immobilized on the kanthal meshes using hydrothermal technique. The effect of synthesis temperature on the growth of ZnO microrods was studied. The ZnO microrods rods that synthesized at 100ºC was selected for photocatalytic test. It demonstrated reasonable photodegradation on methylene blue (MB) under UV irradiation. However, the ZnO microrods demonstrated poor repeatability in removal of MB dye after 5 cycles.

THE EFFECT OF NANO SILICA AS NANO-FILLER ON TENSILE, FLEXURAL AND COMPRESSION PROPERTIES OF BASALT AND GLASS FIBER REINFORCED COMPOSITES USING INDUSTRIAL POLYESTER RESIN

Presenter: **Mohamad Asrofi Muslim,** Universiti Teknologi MARA, Malaysia

Granite waste is becoming increasingly relevant as the global demand for granite increases. This study aimed to develop a new composite using nano-silica as a nanofiller in basalt and glass fiber-reinforced composites using industrial polyester resin. Composite fabrication processes using hand lay-up and vacuum silicon mould. Analysis testing results show that nano silica increases tensile, flexural and compression strength values. The maximum weight percentage value is 1wt%. More than 3wt% nano silica will decrease the strength value. Samples with more than 3wt% nano silica tend to agglomerate. Replacement of using glass to basalt will increase by 28% in tensile strength. Using nano silica in this application will help decrease the waste in granite industries and contribute sustainable resources. This new composite is suitable for truck body carriers and is more environmentally friendly.

SESSION 2B – ENVIRONMENT II

OPTIMISATION IN COMPRESSIVE STRENGTH OF SEAWATER AND ZEOLITE BASED GEOPOLYMER FOAM REINFORCED WITH NANOCELLULOSE

Presenter: **Chai Hua Tay,** Universiti Putra Malaysia, Malaysia

Geopolymer Foam (GF) is an innovative and extension product of geopolymer with additional porosity. This provides the material with the advantages that comes with being porous while benefiting from the basic properties of a common geopolymer. Although numerous studies are reported on geopolymer foam, none has reported on the optimization in its compressive strength which is essentially critical in determining its suitability for various applications. The scope of this research is to optimize and validate the best combination of factors that produces the highest compressive strength of GF. A Central Composite Design (CCD) comprising four factors and five levels, which are Seawater/Potassium Silicate (SW/KSil: 1, 1.05, 1.1, 1.15, 1.2), Potassium Hydroxide/Potassium Chloride (KOH/KCl: 20/80, 40/60, 60/40, 80/20, 100/0), Sodium Laureth Ether Sulfate/Benzalkonium Chloride (SLES/BAC: 0/100, 25/75, 50/50, 75/25, 100/0), and Hydrogen Peroxide/Nanocellulose (H2O2/NC: 0/100, 25/75, 50/50, 75/25, 100/0), and five levels respectively, with two replications chosen, totalling up to 62 experimental runs. ANOVA data revealed that all factors are significant with p-value < 0.05. The optimized design is found to be at SW/KSil=1.03, KOH/KCl=90.30/9.70, SLES/BAC=0/100 and H2O2/NC of 0/100. The experimental validation showed an average error of 3.369%.

NEOLAMARCKIA CADAMBA NANOFIBRILLATED FILTER PAPER FOR TEXTILE WASTEWATER TREATMENT VIA CROSS-FLOW FILTRATION SYSTEM: PERFORMANCE AND FOULING MECHANISM

Presenter: **Siti Solehah Ahmad Norrahma,** Universiti Tun Hussein Onn Malaysia, Malaysia

An approach presented on the textile wastewater treatment by using nanofibrillated (NFC) filter paper prepared from renewable resources (Neolamarckia cadamba) via cross-flow filtration system with different operating parameters (cellulose dosage, pH and initial feed concentration). The best operating conditions of the cross-flow filtration system were obtained at an initial pH 6.5 and 100% of initial feed concentration of textile wastewater with a 60:40 cellulose dosage of NFC filter paper. The mechanisms of membrane fouling were investigated using model fitting according to the Wiesner and Aptel equations revealed that cake formation occurred rapidly at both stages of the fouling mechanism. Thus, overall results revealed that this study has a great deal of promise to serve as a benchmark for an efficient and viable way to treat textile wastewater.

SESSION 3A - ENERGY

ENHANCING NUCLEATION OF GRAPHITIC CARBON ON CARBON NANOTUBE BASAL PLANES VIA TEMPERATURE AND GAS FLOW RATE CONTROL

Presenter: **Ismayadi Ismail,** Universiti Putra Malaysia, Malaysia

Graphenated carbon nanotubes (g-CNTs) amalgamate the unique attributes of 2D graphitic carbon from graphene and 1D carbon nanotubes (CNTs). Single-wall CNTs (SWCNTs) exhibit electronic conductivity, while multi-wall CNTs (MWCNTs) offer structural reinforcement and energy storage. Large-scale graphene synthesis limitations propel the creation of 3D g-CNTs by merging graphene with MWCNTs, resulting in materials with amplified surface area and charge capacity. G-CNTs show potential for supercapacitors and fuel cells, boasting accelerated electron transfer kinetics due to heightened edge density. Our study introduces an innovative single-step floating catalyst chemical vapor deposition (FCCVD) method for synthesizing g-CNT sheets, providing a high-volume-density framework of carbon nanotubes possessing graphene properties. The synthesized sheet-bulk structure holds industrial potential and signifies progress in g-CNT synthesis techniques. The investigation explores temperature and hydrogen gas flow effects on the CNT-to-g-CNT transition, paving the way for scalable g-CNT sheet production.

GREEN CHEMISTRY BIOSYNTHESIS OF STABLE SILVER NANOPARTICLES BY *SACCHAROMYCES CEREVISIAE* GROWN IN STATIC MAGNETIC FIELDS

Presenter: **Atika Ahmad,** Khalifa University Abu Dhabi, United Arab Emirates

Biosynthesis of metal nanoparticles has received significant attention for its ability to offer cost-effective, sustainable, eco-friendly, and industrially scalable technology. In the present work, we report a novel green chemistry approach to synthesize nanoparticles using *Saccharomyces cerevisiae* cultured in the presence of static magnetic fields (SMF). Cell-free media from the SMF-treated cultures supported biosynthesis of extremely stable and monodispersed silver nanoparticles (AgNPs) compared to the control cell-free media obtained from SMF untreated cultures. Magnetic field strength for the formation of smallest AgNPs was 7 mT. AgNPs from SMF-treated cultures were crystalline and smaller compared to the ones synthesized by control media without SMF treatment.Dynamic light scattering (DLS) sizes of 36 nm (SMF) and 57 nm (without SMF) transmission electron microscopy (TEM) gave ranges of 5-15 nm (SMF) versus 10-25 nm (control). A remarkable difference in stability of AgNP was observed over a period of 75 days between SMF-treated and untreated control media through DLS and estimation of polydispersity index.

SESSION 3A - ENERGY

VALLEY AND SPIN TRANSPORT CHARACTERISTICS BASED ON A QUANTUM DOT CONTACT STRUCTURE REGULATED BY PIEZOELECTRIC FIELD

Presenter: **Ruhao Liu,** University of Electronic Science and Technology of China, China

Piezotronics and piezo-phototronics have attracted great interest and are widely used in self-powered technology, low power consumption, and artificial intelligence. piezoelectric field is an important role to modulate charge-carrier transport properties in two-dimensional(2D) materials. In this study, piezotronics effect on the transport of valley and spin properties in monolayer transition metal dichalcogenides which include MoS2, MoSe2, MoTe2, WS2, WSe2 and WTe2, based on a quantum dot contact structure is studied. The interface piezoelectric fields of different transition metal dichalcogenides in the structure, as well as the valley and spin conductance and the valley and spin polarizability under the corresponding piezoelectric field regulation are calculated theoretically. Our work not only demonstrate the significant advantage of the strong piezoelectric field on the modulation of valley and spin quantum states, but also provide a guidance for device design and material selection of high performance quantum piezotronic devices.

SESSION 3B - HEALTHCARE

ANTIMICROBIAL ACTIVITY OF BIOMEDIATED-SYNTHESIZED SILVER NANOPARTICLES USING *PERSICARIA ODORATA* AQUEOUS EXTRACT (INVITED PAPER)

Presenter: **Nik Ahmad Nizam Nik Malek,** Universiti Teknologi Malaysia, Malaysia

Silver nanoparticles (AgNP) is an inorganic antimicrobial agent that can be synthesized through a biological approach that is more environmentally friendly, as compared to a chemical approach. This paper reports the biosynthesis of AgNP using Kesum (*Persicaria odorata* plant) aqueous extract. The colour of the $AgNO_3$-Kesum extract mixture changed from yellowish to reddish-brown, indicating the formation of AgNP and proven by surface plasmon resonance (SPR) peak in the range of 420 to 470 nm. The optimized synthesis conditions of 0.9 mL P. odorata 4% resulted in the highest SPR intensity. Attenuated Total Reflectance-Fourier Transform Infrared Spectroscopy (ATR-FTIR) showing the bioactive from the plant extract in the AgNP sample. Transmission Electron Microscopy (TEM) image showed that the AgNP had an average size of 20 ± 5 nm and a predominantly spherical shape and appeared both in dispersed and aggregated forms. The antifungal activity of the AgNP sample was evaluated against Candida albicans (ATCC 90028) using Disc Diffusion Technique (DDT). Higher sample concentrations resulted in larger inhibition zones, indicating stronger antifungal activity against C. albicans. Thus, P. odorata aqueous extract could be used as a bio-reducing agent for AgNP formation and it is shown to have promising antifungal properties.

RGD¬-MODIFIED ZIF-90 AS VEHICLE FOR TARGETED DELIVERY OF CISPLATIN

Presenter: **Emilia Abd Malek,** Universiti Putra Malaysia, Malaysia

Cis-platin is a conventional and very effective chemotherapy drug and is still used today as first line therapy for lung cancer and other cancers. Targeted delivery of cis-platin to cancer cell was designed via covalent-modification of zeolitic imidazolate framework-90 (ZIF-90) with RGD peptide. RGD peptide's ability to recognize integrins results in active targeting of cancer cell due to overexpression of integrins by cancer cell. Nano-sized ZIF-90 encapsulated cis-platin (RGD@Cis⊂nZIF-90) was prepared by in-situ encapsulation followed by covalent modification with RGD peptide. NMR and IR confirmed the formation of imine bond between imidazolcarbaldehyde linker of ZIF-90 and RGD peptide. The cis-platin loading was measured to be 24.8% and sustained released behaviour at pH 5 was observed with maximum released (92%) observed after 24 hours. The MTT assay showed that RGD@Cis⊂nZIF-90 nanoparticle was more toxic towards A549 (IC50 8.79 μgmL^{-1}) than MRC-5 (IC50 31.07 μgmL^{-1}). The selectivity index (3.5) suggested that there is selectivity towards cancer cell (A549). RGD-modified nano-sized ZIF-90 encapsulated cis-platin has been successfully synthesized and determined to have good selectivity and toxicity towards lung cancer cell over normal cell. This may lead to more selective and improve performance of cancer therapy with little side effect.

SESSION 3B - HEALTHCARE

PROGRESS TESTING OF ANTIMICROBIAL *MYCOBACTERIUM TUBERCULOSIS* WITH NANOTITANIA

Presenter: **Ahmad Mukifza Harun,** Universiti Malaysia Sabah, Malaysia

A worldwide known disease, Tuberculosis (TB) which is originated from bacteria called *Mycobacterium tuberculosis*, is one of the leading global health concerns, together with its spectrum landscape co-infection with HIV plus complicated by its resistant to drug. The advancement of nanotechnology promised a potential alternative strategy fighting this known noxious bacteria. Here, this study researching the potential antimicrobial properties of nanoscale titanium dioxide (nano-TiO_2) in inhibiting the growth of Mycobacterium tuberculosis. The synthesized nano-TiO_2 was then used to study its microbial growth prevention of Mycobacterium tuberculosis using the broth microdilution method. The antimicrobial assay demonstrated that nano-TiO_2 exhibited strong bactericidal and growth prevention activity against Mycobacterium tuberculosis. The anti-growth activity of nano-TiO_2 could be attributed to the production of its reactive oxygen species (ROS), leading to oxidative stress that can prevent the bacterial growth. This ROS-mediated bactericidal activity could potentially bypass the mechanisms of antibiotic resistance in Mycobacterium tuberculosis, providing a new therapeutic avenue against drug-resistant Mycobacterium tuberculosis. In brief, this study provides evidence enhancing the potential of nano-TiO_2 as an effective antimicrobial agent against Mycobacterium tuberculosis. This work opens up a promising new direction in TB treatment, potentially overcoming the challenges of drug resistance and contributing to the global effort to eliminate TB.

SESSION 4A - DEVICES III

CHARACTERIZATIONS OF MWCNTs NANOFLUIDS ON THE EFFECT OF SURFACE OXIDATIVE TREATMENTS

Presenter: **Norli Abdullah,** Universiti Pertahanan Nasional Malaysia, Malaysia

MWCNTs have been successfully chemically modified using the acid treatment method to introduce the SOFG on the MWCNTs wall structure. FESEM revealed that the mean diameter of commercial MWCNTs increased from 26 nm to 43 nm. The Raman spectroscopy proved the presence of SOFG on MWCNTs by showing a greater I_D/I_G ratio due to the presence of functional groups attached to the MWCNTs was confirmed by TGA and FTIR spectroscopy. TGA showed additional weight losses due to the elimination of oxygenated functional groups. FTIR spectrum confirmed the attachment of oxygenated functional groups by appearing essential bands. The surface oxidized MWCNT with PVP in water-based nanofluids is more stable than non-oxidized MWCNTs with PVP and commercial MWCNTs with and without PVP by the observation on the particle sedimentation and coagulation. The thermal conductivity performance of nanofluids revealed that the surface oxidized MWCNTs with PVP shows enhancement in thermal conductivity contributed by improved stability and homogenization of nanoparticles. Hence improved the distribution of MWCNTs in water base media leads to improvement in thermal conductivity. These promising properties of MWCNTs in water-based fluids would enable the nanofluids to be used in heat transfer fluid and cooling applications.

EFFECT OF $NaClO_4$ DOPANT ON CHEMICAL BOND AND IONIC CONDUCTIVITY OF BENZOYL KAPPA-CARRAGEENAN GEL BIOPOLYMER ELECTROLYTE

Presenter: **Intan Juliana Shamsudin,** Universiti Pertahanan Nasional Malaysia, Malaysia

Gel biopolymer electrolytes based on benzoyl kappa-carrageenan (Bz-κcar) as polymer host and sodium perchlorate ($NaClO_4$) as dopant was successfully produced. The concentration of $NaClO_4$ was varied from 0.5 to 3.0 wt.% in order to investigate its effects on the chemical bonds and the ionic conductivities (σ) of the electrolytes. Characterizations were performed by Fourier-transform infrared spectroscopy (FTIR) and electrochemical impedance analysis (EIS). Significant changes in the FTIR spectra were detected indicated chemical interactions between Bz-ƙcar and $NaClO_4$. The ionic conductivity of the gel electrolytes increased with higher concentration of $NaClO_4$, suggesting that $NaClO_4$ was an effective charge carrier in the system. The highest σ of the gel electrolyte attained at ambient temperature (298 K) was 1.29 x 10-3 S cm^{-1}. The temperature dependence of conductivity is Arrhenian in the studied temperature range and achieved elevated σ of 7.90 x 10^{-3} S cm^{-1} at 100°C with small values in the activation energy (Ea) were observed in all the electrolytes prepared.

SESSION 4A - DEVICES III

ROLE OF GRAPHENE OXIDE ADDITION ON MICROSTRUCTURAL PROPERTIES OF $YBa_2Cu_3O_{7-\delta}$ SUPERCONDUCTOR

Presenter: **Nurulnabihah Aqilah Zulkarnain,** Universiti Malaysia Terengganu, Malaysia

Yttrium Barium Copper Oxide ($YBa_2Cu_3O_{7-\delta}$) is a group of crystalline chemical compounds of high-temperature superconductors (HTSc). However, $YBa_2Cu_3O_{7-\delta}$ superconductor suffers from low grain conductivity and weak links of the grains, thus resulting in disruption of superconducting performance. Thus, in this research, the high-temperature superconductor $YBa_2Cu_3O_{7-\delta}$ was added with graphene oxide (x = 0.0, 0.2, 0.4, 0.6, 0.8, and 1.0 wt.%) and synthesized via solid state method. All samples then being characterized using thermogravimetric analysis (TGA), X-ray diffraction (XRD), and scanning electron microscope (SEM). The thermogravimetric analysis indicated that the samples have identical thermal decomposition observing the weight lost with optimum sintering temperature at 900ºC. It was found that orthorhombic structure is preserved in all samples with predominant Y-123 phase and secondary phase of graphene oxide in added samples with the main peak of 2θ = 32.45º plane of (013). Samples became porous and their grain sizes increased as the addition of graphene oxide increased. As a conclusion, it was shown that the addition of the graphene oxide nanoparticle in $YBa_2Cu_3O_{7-\delta}$ increases the grain growth of $YBa_2Cu_3O_{7-\delta}$. This may be attributed to enhancement in superconducting volume fraction in the sample, as graphene oxide nanoparticles reside near the grain boundary region to increase the weak link between superconducting grains.

IMPACT OF MICROMETER AND NANOMETER-SIZED PARTICLES ON THE ELECTRICAL PROPERTIES OF *PROSOPIS AFRICANA* BIOCHAR THICK FILMS

Presenter: **Suleiman Babani,** Universiti Putra Malaysia, Malaysia

The goal of this work was to develop a thick film using *Prosopis africana* biochar (PAC) and to investigate the influence of particle size on the electrical properties of the thick layer of P. africana. In this study, biochar particles of micrometer and nanometer sizes were prepared, from which a conductive paste was prepared and deposited on an alumina substrate using a screen-printing technique. The PAC material was sieved to < 20 µm for the micrometer size and then milled for 3 hrs at the nanometer scale. The electrical properties of thick biochar films were characterized and compared. The results show that the micrometer-sized particles are dense and uniform films with better interparticle contact and higher electrical conductivity than thick films with nanosized particles. In future work, it will be necessary to examine the effects of different firing temperatures and the adhesion of the thick film to its substrate. A longer firing time enhanced the conductivity of thick PAC layers.

SESSION 4B – ENVIRONMENT III

NANOHYBRID POLYSULFONE MEMBRANES FUNCTIONALIZED WITH ANTIMICROBIAL SILVER FOR WATER PURIFICATION FROM HEAVY METALS

Presenter: **Norherdawati Kasim,** Universiti Pertahanan Nasional Malaysia, Malaysia

Iron (Fe) naturally occurs in groundwater and contributes to metallic taste and could stain clothes. Membrane filtration is considered as an alternative method in removing heavy metals from water resources. It is commonly reported that pH effect has substantial impact on membrane performance. In this study, nanohybrid polysulfone/silver-graphene oxide (PSf/Ag-GO) membranes were fabricated by wet phase inversion method. The polymeric PSf solution is incorporated with silver graphene oxide. The fabricated PSf/Ag-GO membranes were investigated for Fe removal from synthetic groundwater at pH range 3 to 12. The rejection of Fe is 68% (acidic pH) and increased to 96% for filtration at pH 9. In acidic conditions, the water flux has decreased from 47.21 L/m^2.h to 9.58 L/m^2.h. It was found that the change of feed pH for Fe removal has significantly influenced the performance of the fabricated nanohybrid membranes. Results showed that the adjustment of pH has impacted the ionic solute (Fe^{2+}) removal and water flux of filtration. It is expected that the solute-membrane interaction has impacted the size of solute and surface charge of the membrane. This nanohybrid membrane with superior properties has the potential to remove iron to the desired extent for groundwater treatment.

PREPARATION AND CHARACTERIZATION OF ELECTROSPUN PAN/SAGO LIGNIN NANOFIBERS

Presenter: **Norizah Abdul Rahman,** Universiti Putra Malaysia, Malaysia

Polyacrylonitrile (PAN)/Sago Lignin (SL) nanofibers were prepared via consecutive electrospinning method. The PAN to SL ratios were varied during electrospinning to obtain an optimum morphology of the fibers. The fiber diameter of PAN/SL was found greatly dependent on the ratio of SL incorporated in the fibers. The diameter of the fiber varied from 500 nm to 700 nm. A uniform bead-free nanofibers morphology was achieved at 20 wt% of lignin content. FTIR analysis results suggest the two polymers only have physical blending without any chemical interactions. The degradation steps of the fibers were faster (steeper) than sago lignin only, but overall, the PAN/SL still maintains its thermal stability. DSC results show that PAN and SL were homogenously blended. The electrospun PAN/SL nanofibers show great potential to be used as the carbon nanofibers precursor.

SESSION 4B – ENVIRONMENT III

INVESTIGATION OF INHIBITION ACTIVITY OF ACETYLCHOLINESTERASE (AChE) ENCAPSULATED INMETAL ORGANIC FRAMEWORK (MOF) FOR MONITORING CARBAMATE PESTICIDE

Presenter: **Bariah Kamaruddin,** Universiti Putra Malaysia, Malaysia

Pesticide residue determination has sparked considerable attention because of pesticides high acute toxicity and ability to cause long-term harm to the environment and human life even at trace levels. Traditional analytical methods, such as HPLC, GC-MS, and SERS, have been widely used to analyze pesticides in contaminated materials, but they have limitations such as time-consuming sample preparation, complexity, expensive instrumentation, and the requirement for highly experienced personnel. As a result, there is a growing demand for analytical methods that allow for the simple, rapid, sensitive, selective, low-cost, and reliable detection of pesticides at trace levels. Over the last few decades, enzyme-based biosensors have evolved as simple, quick, and ultrasensitive ways for monitoring the toxicity of environmental and food pesticides. These biosensors have the potential to enhance or replace existing analytical techniques by simplifying or eliminating sample preparation and allowing for faster and easier field testing while dramatically lowering the cost per analysis. Recent improvements in enzyme-based biosensors, colorimetric approaches, and pesticide screening technologies have enabled naked-eye on-site monitoring methods. Soon, this technology may be used to create portable equipment for quick toxicity testing of samples, providing a competitive alternative to present systems.

YEAST-ASSISTED DISSOLVED AIR FLOTATION-ENHANCED UV/H_2O_2/TiO_2 PHOTOCATALYTIC ADVANCED OXIDATION PROCESS FOR THE TREATMENT OF SYNTHETIC SLAUGHTERHOUSE WASTEWATER

Presenter: **Jen Xen Yeoh,** Universiti Putra Malaysia, Malaysia

The rapid growth of the global human population and the shift towards a more Western-style diet, which includes high-protein foods, has led to an increase in the generation of slaughterhouse wastewater (SWW) due to the growing numbers of meat processing plants (MPP). Conventional treatment processes (CTPs) used to treat SWW such as anaerobic processes, membrane processes, and electrocoagulation have various drawbacks including limited effectiveness, fouling issues, and high energy consumption. While advanced oxidation processes (AOPs) show potential as alternative solutions to address these limitations, the treatment efficiency declines significantly when there is a large presence of insoluble lipid particles and suspended solids (SS) in the SWW. In this research, synthetic slaughterhouse wastewater (SSWW) was first pre-treated by using H_2O_2 and yeast to achieve yeast-assisted dissolved air flotation (YADAF) to uplift lighter lipid particles. Subsequent treatment by using a UV/H_2O_2/TiO_2 photocatalytic tank has, overall, removed 93.84% of COD and 79.76% of CBOD5 after 24 hours of 8W UVC irradiation compared to 68.32% COD and 56.27% of CBOD5 when using UV/H_2O_2/TiO_2 PAOP alone. This shows that the YADAF is extremely effective at improving the treatment efficiency of conventional UV/H_2O_2/TiO_2 PAOP and can be used as in treating SWW.

SESSION 5A - DEVICES IV

ALUMINIUM-DOPED ZINC OXIDE (AZO) PREPARED BY HYDROTHERMAL METHOD AS A POTENTIAL OF POTENTIOMETRIC PH SENSORS

Presenter: **Muhammed Azmi Abdul Hamid,** Universiti Kebangsaan Malaysia, Malaysia

Numerous investigations have been conducted to increase the sensitivity and stability of metal oxide semiconductors as pH-sensing membranes. This article will describe the pH sensing and characterisation of undoped zinc oxide (ZnO) and aluminium-doped zinc oxide (AZO) as potentiometric pH sensors. The hydrothermal technique was used to grow undoped ZnO and AZO thin film nanostructures with doping concentrations of 1 and 3 at% Al on the cleaned FTO substrates. The pH potentiometric sensing was performed in a wide pH range of 4-12 and produced sensitivity, including stability of the nanostructures. The prepared samples were also characterized by X-ray diffraction analysis (XRD), field effect scanning electron microscope (FESEM), energy dispersive X-ray (EDX) to explore the influence of aluminium concentration on structural and morphology characteristics and then prepared as electrodes for pH sensing. From the XRD result, the sharp peaks and high peak intensities demonstrated well crystalline of the synthesized ZnO nanorods. Furthermore, the FESEM reveals the growth of array nanorods perpendicular over the surface of FTO. The sensitivity of the pH sensor with 3 at% AZO exhibits higher sensitivity (43.80 mV/pH), and larger linearity (0.9507).

SYNTHESIS AND CHARACTERIZATION OF SILICON QUANTUM DOTS USING HYDROTHERMAL METHOD

Presenter: **Hassan Grema,** Universiti Putra Malaysia, Malaysia

Recently, research in developing novel nanomaterials which provided a wide range of choices of nanomaterials based on their desired properties is interesting. Silicon quantum dots (SiQD) have become one of the most popular nanomaterials in biological applications for their excellent biocompatibility and optical properties. In this study, water-soluble silicon quantum dots with fluorescence properties were synthesized using a one-pot hydrothermal process. The synthesis involved reacting 3-aminopropyltriethoxysilane (APTES) as precursor and sodium citrate as reducing agent. The structural characteristics of the synthesized SiQD was investigated using FTIR indicates surface functionalization and the bonding composition have strong absorbance at 1101 cm^{-1} and 1001 cm^{-1} ascribed to the Si-O bending vibrations that proved successfully prepared of SiQD. The surface morphology by TEM showed a uniformity, near spherical shape and the size range with an average diameter of 24 nm. The optical features of the SiQD, including their absorption and emission characteristics were investigated using UV-Vis and fluorescence spectroscopy. It displayed absorption pattern from 200 to 400 nm with a prominent shoulder around 329 nm and maximum emission peak at 430 nm with excitation of 360 nm.

SESSION 5A - DEVICES IV

ELECTROSPINNING CELLULOSE ACETATE NANOFIBERS WITH GRAPHITE ADDITIVES FOR POTENTIAL APPLICATIONS IN ELECTRONICS

Presenter: **Mohd Ali Mat Nong,** Universiti Putra Malaysia, Malaysia

In this study, cellulose acetate was dissolved in a solution of N, N-dimethylacetamide (DMAc) and acetone (2:1) to form a 17% cellulose acetate solution. Graphite was added at a concentration of 1% to create electrospinning solutions. The solutions were mixed, sonicated, and magnetically stirred before the electrospinning process. For electrospinning, the solutions were pumped through a needle at 5.00 mL/hour, using a 10ml syringe and a syringe pump. The electrospinning process lasted 2 hours with a voltage of 18kV, and a nanofiber mesh collector was placed on a rotary collector with different speeds: 300 rpm, 600 rpm, 900 rpm, 1000 rpm, and 1500 rpm. The size of the nanofibers decreased as the speed increased. The study aimed to produce nanofibers with cellulose acetate and conductive additives for potential applications in electronics, sensors, and energy storage.

PLASMONIC ENHANCEMENT IN GOLD-SILVER NANOPARTICLES-INFUSED STYRENE METHYL METHACRYLATE COPOLYMER FOR SURFACE ENHANCED RAMAN SPECTROSCOPY

Presenter: **Nur Aida Mohamed Shaul Hamid,** Universiti Malaysia Terengganu, Malaysia

Surface-Enhanced Raman Spectroscopy (SERS) is a sensitive analytical technique for molecular detection. In this research, we investigate the plasmonic enhancement of styrene methyl methacrylate copolymer (SMMA) embedded with gold-silver bimetallic nanoparticles (Au-Ag) as a high-performance SERS substrate. The SMMA copolymer was synthesized through free-emulsifier emulsion polymerization while Au-Ag bimetallic alloy nanoparticles prepared via reduction method. Prior to Au-Ag incorporation, surface modification of SMMA with polyethyleneimine (PEI) improved the compatibility and stability of the composite (SMMA@Au-Ag). Characterization of SMMA@Au-Ag substrates were done using various instruments such as Malvern Zeta Sizer, scanning electron microscopy (SEM), and High-Resolution transmission electron microscopy (HRTEM). The fabricated SERS substrates exhibited distinct plasmonic properties, evident from ultraviolet-visible (UV-Vis) analysis showing surface plasmon resonance effects for the Au-Ag nanoparticles. Different ratios and concentrations of Au-Ag nanoparticles allowed substrate customization for performance optimization. SMMA@Au-Ag SERS substrates were evaluated using Raman probe molecules, 4-aminothiophenol, and malathion pesticide. The substrates successfully detected the unique fingerprints of both Raman probes, demonstrating exceptional sensing capabilities. This systematic study showcases the plasmonic enhancement of a styrene-based copolymer embedded with Au-Ag bimetallic nanoparticles for SERS applications, holding great promise for molecular sensing in environmental monitoring, bioanalytical assays, and chemical detection.

SESSION 6A – AGRICULTURE & FOOD

ENHANCING THE LUMINESCENCE OF CARBON QUANTUM DOTS FROM BIOCHAR BY TUNING THE FUNCTIONAL GROUP VIA HYDROTHERMAL SYNTHESIS

Presenter: **Nur Afif Nadhrah Kamaruzaman,** Universiti Putra Malaysia, Malaysia

Empty fruit bunch (EFB) is a promising carbon source for preparing carbon quantum dots (CQD). CQD is widely used in the application of solar cells and agriculture as CQD exhibits fascinating properties such as biocompatibility, photostability, and easily tunable optical properties. In this study, a facile hydrothermal method was utilized to synthesize red-shifted CQD (R-CQD) and red-shifted nitrogen-doped CQD (R-NCQD) from biochar and sulfuric acid (H_2SO_4) as a solvent. Heteroatom-doped modification using urea as the nitrogen source is an efficient approach to enhance the electron transfer and thus notable redshift of the optimal excitation wavelength and the strongest emission peak. R-CQD and R-NCQD were characterized by Perkin Elmer LS55 PL spectroscopy and FTIR spectrum 100. The reactions were carried out at 200 °C for 10 hours in Teflon-lined stainless steel autoclave reactor. Under 450 nm excitation, R-CQD and R-NCQD showed maximum fluorescence emission at 518 nm and 575 nm. This research demonstrates the sustainable agrowaste utilization through a better understanding of hydrothermal synthesis processes.

MECHANICAL PROPERTIES OF STARCH-BASED FILM INCORPORATED WITH CHITOSAN NANOPARTICLES AND THYMOL-ENCAPSULATED CHITOSAN NANOPARTICLES: A COMPARATIVE STUDY

Presenter: **Ruzanna Ahmad Shapi'i,** Universiti Putra Malaysia, Malaysia

Active packaging is an effective solution that can be used to inhibit the growth of microbes and oxidation processes, thus lengthening the shelf life of food. In this study, chitosan nanoparticles (CNP) and thymol-encapsulated chitosan nanoparticles (CNP-T) were incorporated into starch-based films to produce active packaging films using the solvent casting technique. This study aimed to compare the mechanical properties of starch-based films incorporated with CNP (starch/CNP) and starch-based films incorporated with CNP-T (starch/CNP-T). The mechanical properties of the active packaging films, including tensile strength (TS), elongation at break (EAB), and Young's modulus (YM), were characterized using a texture analyzer. A comparison between CNP and CNP-T demonstrated that CNP was more effective in increasing the TS of the starch-based films. CNP-T was more effective than CNP-T in increasing the EAB of the starch films. Overall, this study reveals the different reinforcement roles of CNP and CNP-T in starch-based films.

SESSION 6A – AGRICULTURE & FOOD

STUDY OF OPTICAL PROPERTIES OF THE AGRICULTURE WASTE BASED CARBON QUANTUM DOT (CQDS)

Presenter: **Mhammed Ali Khalifa Mhammed Ali Alnigomi,** Universiti Putra Malaysia, Malaysia

In this study, Carbon Quantum Dots (CQDs) were successfully synthesized using watermelon peels as a carbon source. We investigated the optical properties of these CQDs through Photoluminescence (PL) and Zeta potentials, employing a carbonization technique with watermelon peels. The study used three distinct solvents: water (DI), Methanol (MtOH), and Ethanol (EtOH) for the carbonization process. The results of the study revealed that the density of CQDs increased with higher concentrations, leading to enhanced light dispersion. Specifically, concentrations of 6.9 mg/ml in both Ethanol and Methanol exhibited lower PL emission rates compared to Di water, but the concentration of 3 mg/ml showed emissions in a range between Ethanol and Methanol. The study also found that a concentration of 6 mg/ml resulted in the highest stability for CQDs in both Di water and Methanol. Additionally, a concentration of 3.9 mg/ml displayed the highest stability for CQDs in Ethanol. In summary, this research demonstrated that using watermelon peels as a carbon powder source for CQD synthesis in various solvents can yield interesting optical properties, with CQD density increasing with higher concentrations and leading to improved light dispersion. Different solvents showed variations in PL emission rates and stability of the CQDs, depending on the concentration used.

SESSION 6B – ONLINE PRESENTATION

THE OPTICAL CONSTANT OF COPPER SULFIDE NANOPARTICLES FOR SPECTRAL SPLITTING PV/T SYSTEM

Presenter: **Jie Zhang,** Universiti Selangor, Malaysia

Spectral splitting medium is very important in the solar energy spectral splitting photovoltaic/thermal hybrid system. Due to good thermal conductivity and modulable spectral radiation characteristics, CuS is proposed as an alternative nanofluid in a PV/T hybrid system. The selective absorption characteristic of CuS nanofluid is closely related to the optical constant of nanoparticles. In this paper, the optical constant of CuS nanoparticles were studied. The results show that the refractive index n of CuS nanoparticles decreases with the increase of wavelength. The refractive index n characterizes the propagation speed of electromagnetic waves in the medium. The higher the refractive index n, the lower the propagation speed. The propagation speed of light in CuS nanoparticles increases with the increase of wavelength. For the extinction coefficient k of CuS nanoparticles, it is very small in the uv and visible light bands, and the order of magnitude is just 10-8. In the near-infrared shortwave band, the extinction coefficient k gradually increases to the order of 10-5. It shows a trend of first increasing and then decreasing in the wavelength range of 1300nm~1600nm, and reaches maximum at a wavelength of approximately 1500nm, with an order of magnitude of 10-4. In the 1800nm-2000nm band, the extinction coefficient k shows a trend of first increasing, then decreasing, and then increasing. The maximum value appears at a wavelength of approximately 2000nm, with an order of magnitude of 10-3. A minimum value appears at 2200nm, with an order of magnitude of 10-4. In general, the extinction coefficient k of CuS nanoparticles is much higher in the near-infrared band than in the ultraviolet and visible light bands. It represents that CuS nanoparticles have better absorption characteristics in the near infrared band than in the ultraviolet and visible bands. These optical properties provide strong support for the wide application of CuS nanofluid in the spectral splitting photovoltaic/thermal hybrid technology.

SESSION 6B – ONLINE PRESENTATION

RICE HUSK ASH (RHA) NANO PARTICLES A NEW MATERIAL FOR HYDROGEN GAS SENSOR

Presenter: **Jamila Lamido Sumaila,** Bayero University Kano, Nigeria

In this work, a hydrogen gas sensor was developed with carbon-based material from rice husk ash (RHA) mixed with an equal proportion of biochar obtained from the Prosopis Africana char (PAC) plant as a sensing material. The sensing material was mixed with a linseed organic binder to form a sensing film. Thermogravimetric analysis (TGA) was carried out on the thick film paste and the morphological and structural properties of the sensing film were characterized by field emission scanning electron microscopy (FESEM), energy-dispersive X-ray spectroscopy (EDX), and Raman Spectroscopy. The gas sensor was exposed to hydrogen with a concentration of 100–1000 ppm and was tested at room temperature. The gas sensor showed capability in sensing low concentrations of hydrogen to as low as 100 ppm at room temperature with appreciale sensitivity and the sensitivity increases when the temperature was increased up to 250°C.

SYNTHESIZED CNT-FERRITE NANOCOMPOSITE VIA CVD AS MAGNETIC-CONDUCTIVE MATERIAL FOR MICROWAVE APPLICATION

Presenter: **Intan Helina Hasan,** Universiti Putra Malaysia, Malaysia

CNT-ferrite nanocomposite has been successfully synthesized using chemical vapor deposition (CVD) with copper iron oxide nanopowders as catalyst, ethanol as carbon stock and Argon as carrier gas. Carbon nanotubes (CNT) was observed to have grown from the ferrite nanopowders with bamboo-like structures. CVD synthesis temperatures of 700°C and 900°C were set as varying parameter to study the effect of temperature to the CNT growth. FESEM and RAMAN characterization indicated that CNT-ferrite nanocomposite with synthesis temperature of 900°C exhibited growth of bamboo-like CNT with high graphitization compared to CNT-ferrite at 700°C.

ONLINE POSTER SESSION

P01 **FLEXIBLE SENSOR FOR AGRICULTURE APPLICATIONS**
by Muhammad Shahrul bin Othman

P02 **ENHANCING THE POWER CONVERSION EFFICIENCY OF BIFACIAL DYE-SENSITIZED SOLAR CELLS BY USING A TRANSPARENT SANDWICH LAYER STRUCTURE**
by Hussein A. AlSultan

P03 **ENHANCING OF TRANSPARENT SANDWICH LAYER STRUCTURE IN BIFACIAL DYE-SENSITIZED SOLAR CELLS WITH GRAPHENE NANOPARTICLES**
by Hussein A. AlSultan

P04 **ENHANCING URIC ACID ELECTROCHEMICAL DETECTION WITH COPPER ION-ACTIVATED MINI PROTEIN MIMICKING URICASE WITHIN ZIF-8**
by Shahrul Ainliah Alang Ahmad

P05 **BIOMASS WASTE-BASED QUANTUM DOTS FROM PALM KERNEL SHELL AND OYSTER SHELL FOR BIOIMAGING APPLICATION**
by Norhidayah binti Abu

P06 **NOVEL TERNARY NANOHETEROSTRUCTURES FOR PHOTOELECTROCHEMICAL CELLS**
by Zulkarnain Zainal

P07 **STRUCTURAL AND MORPHOLOGICAL EVOLUTION OF ZNO NANOSTRUCTURES HYBRIDIZED SEEDED ON CARBON NANOTUBES COTTON**
by Juraina Md Yusof

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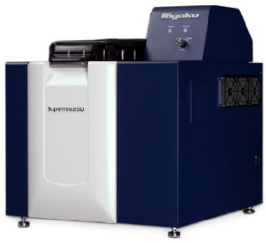

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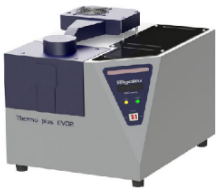

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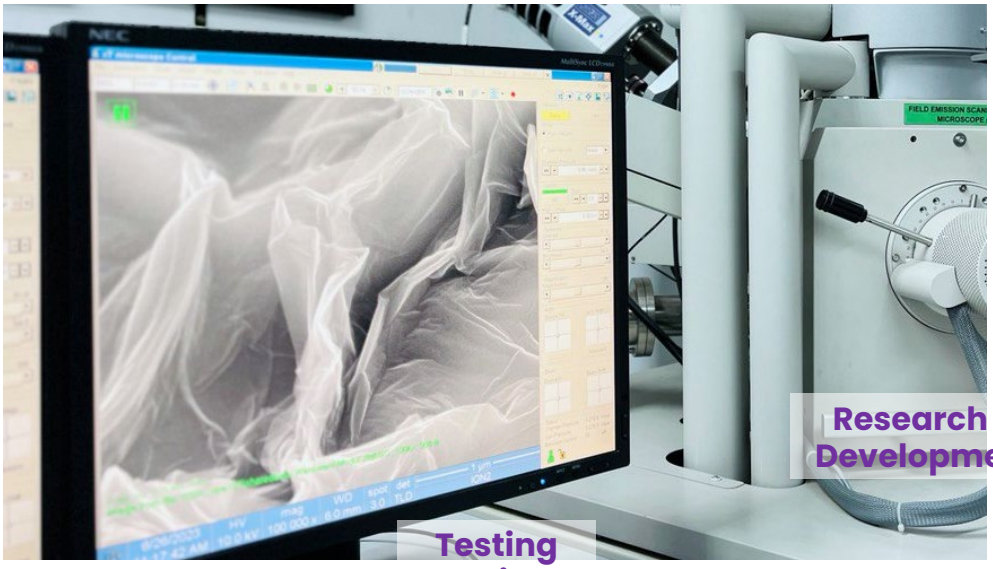

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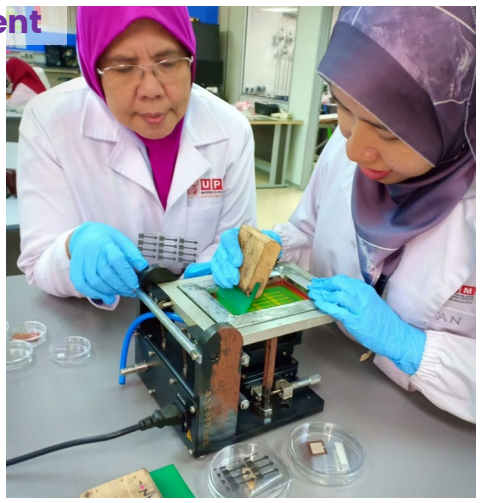

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