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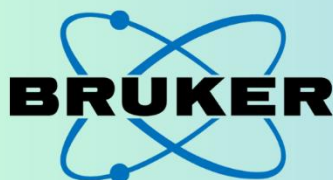
# INTERNATIONAL CONFERENCE ON BIOENGINEERING AND TECHNOLOGY (IConBET 2023)

**Conference Program Book**



**29th - 30th August 2023**  
**Grand Riverview Hotel,**  
**Kota Bharu, Kelantan**

**Sponsored by:**



# **CONFERENCE PROGRAM BOOK**

## **International Conference on Bioengineering and Technology (IConBET 2023)**

**29<sup>th</sup> - 30<sup>th</sup> August 2023  
Grand Riverview Hotel,  
Kota Bharu, Kelantan, Malaysia**

### **Editors:**

Ts. Dr. Teo Pao Ter  
Dr. Hidayani Jaafar  
Assoc. Prof. Dr. Mahani Yusoff

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## **MESSAGE FROM THE PATRON OF IConBET 2023**

Assalamualaikum, Salam Sejahtera and Greetings to all attendees,



I am delighted to welcome all of you to the International Conference Bioengineering and Technology 2023 (IConBET 2023) organized by Faculty of Bioengineering and Technology, Universiti Malaysia Kelantan. On behalf of Universiti Malaysia Kelantan (UMK), I would like to express my deepest appreciation for your presence in this impactful conference. I extend my sincere gratitude to the organizers, sponsors, and all those who have contributed to bringing this conference to fruition. Your dedication and passion exemplify the spirit that drives progress and fosters growth.

IConBET 2023 stands at the forefront of scientific and technological advancements, bridging the gap between pure sciences and engineering disciplines. This conference serves as a testament to our commitment to fostering interdisciplinary dialogue and pushing the boundaries of knowledge. With each passing year, our community grows stronger, and our collective potential for impact deepens. Throughout this conference, you will have the opportunity to engage in insightful discussions, attend captivating keynote presentations, and explore a diverse array of research presentations. Our esteemed speakers will share their latest findings, sparking new ideas and laying the foundation for future breakthroughs. Moreover, the networking opportunities here are invaluable – forging connections that have the potential to shape the trajectory of your career and the future of bioengineering.

Once again, I extend my deepest gratitude to the distinguished speakers, sponsors, scholars, researchers, and participants who have dedicated their time and effort to contribute to the IConBET 2023. Your diverse perspectives and insights enrich the impacts of this conference and will undoubtedly contribute to its success. Last but not least, I wish all have a pleasant experience in Kota Bharu, Kelantan, and a wonderful IConBET 2023.

Thank you.

Warmest regards,

**YBHG. PROF. DATO' DR. RAZLI BIN CHE RAZAK**  
**VICE CHANCELLOR**  
**UNIVERSITI MALAYSIA KELANTAN**

## **MESSAGE FROM THE ADVISOR OF IConBET 2023**

Assalamualaikum, Salam Sejahtera and Greetings to all attendees,



It is with great pleasure and enthusiasm that I welcome you to the International Conference Bioengineering and Technology 2023 (IConBET 2023), organized by Faculty of Bioengineering and Technology, Universiti Malaysia Kelantan. This conference serves as a dynamic platform for the exchange of innovative ideas, groundbreaking research, and collaborative partnerships in bioengineering and technology related fields.

As the Deputy Vice Chancellor of Research and Innovation, I am immensely proud to witness the unfolding of this event, which embodies the spirit of exploration and progress that defines our institution. Bioengineering stands at the nexus of scientific ingenuity and societal impact, and your contributions to this field are vital in addressing the challenges of our times. I urge you all to seize this occasion to engage in dialogues that transcend academic boundaries, spark innovation, and nurture relationships that will undoubtedly fuel future collaborations. The broadness of perspectives and experiences you bring enriches the discourse and fosters a holistic understanding of the intricate web that binds biology, chemistry, physics, environment, entrepreneurship and engineering.

I extend my deepest gratitude to our distinguished speakers, organizing committee members, reviewers, sponsors, and partners for their relentless efforts in making this conference a reality. Your dedication to advancing the frontiers of bioengineering and technology fields is truly commendable. May this conference be a source of inspiration, fostering innovation that resonates far beyond its conclusion. I look forward to witnessing the synergies that emerge and the impact that your work will have on the world.

Thank you.

Best regards,

**YBHG. PROF. TS. DR. ARHAM BIN ABDULLAH  
DEPUTY VICE CHANCELLOR (RESEARCH & INNOVATION)  
UNIVERSITI MALAYSIA KELANTAN**

## **MESSAGE FROM THE ADVISOR OF IConBET 2023**

Assalamualaikum, Salam Sejahtera and Greetings to all attendees,



It is an honor to warmly welcome all delegates and participants to the International Conference Bioengineering and Technology 2023 (IConBET 2023) organized by Faculty of Bioengineering and Technology, Universiti Malaysia Kelantan. IConBET is a platform where groundbreaking ideas, cutting-edge research, and innovative solutions converge. As the Faculty Dean, I am truly delighted to see the remarkable gathering of experts, researchers, students, and professionals from around the world who are committed to advancing the frontiers of bioengineering and technology.

IConBET is established in line with the vision and mission of the faculty that prioritizes technology innovation with an entrepreneurial implementation. It is also to provide space and exposure for young and senior researchers in the universities to establish a network of collaborators with industrialists and researchers from both local and abroad institutions and industries. The program we have meticulously curated for this conference reflects the dynamic and multidimensional nature of bioengineering. With a diverse session of keynote speeches, panel discussions and paper presentations, we aim to facilitate vibrant discussions, knowledge sharing, and networking opportunities.

I would like to extend my heartfelt gratitude to the organizing committee, the speakers, the sponsors, the reviewers, and all those who have contributed their time and expertise to make this conference a reality. Your dedication is what fuels the engine of progress in our field. As we embark on this exciting journey of exploration and discovery, I encourage you all to engage, collaborate, and take full advantage of the knowledge and experiences that this conference has to offer. Let us harness the power of bioengineering to address the challenges of our time and pave the way for a brighter future.

Thank you.

Sincerely,

**ASSOC. PROF. DR. MUHAMMAD AZWADI BIN SULAIMAN**  
**DEAN**  
**FACULTY OF BIOENGINEERING AND TECHNOLOGY**

## **MESSAGE FROM THE CHAIRMAN OF IConBET 2023**

Assalamualaikum, Salam Sejahtera and Greetings to all attendees,



It is with great pleasure that I welcome all of you to the the International Conference Bioengineering and Technology 2023 (IConBET 2023) organized by Faculty of Bioengineering and Technology, Universiti Malaysia Kelantan. As the Chairman of this remarkable event, I am both honored and excited to witness the exchange of knowledge and insights that will undoubtedly shape the future of bioengineering and technology related research fields.

IConBET 2023 is a conference based on innovation and invention using advanced technology for the development of a sustainable community. This conference is committed to providing a great opportunity for all the academician, scientists, researchers, technologists, students, and industry representatives in the field of bioengineering, biology, chemistry, physics, environment, and entrepreneurship with other related areas to share and exchange their knowledge, research findings and latest technological innovation with the application of entrepreneurial elements in every research studies. This perfectly aligned with the conference's topic - "Sustainable Advancement Through Multidisciplinary Innovation and Invention".

I extend my heartfelt gratitude to the organizing committee, the speakers, the sponsors (Bruker Malaysia Sdn Bhd, Novatiq Scientific Sdn Bhd, One Resources Progressive Sdn Bhd, O&E Technologies Sdn Bhd and Dira Resources), and each and every participant for their dedication in making this conference a reality. Your contributions are invaluable in fostering an environment of intellectual growth and pushing the boundaries of what we can achieve together.

May this conference be a platform for not only sharing knowledge but also igniting a passion for exploration and discovery. Together, we can make a lasting impact on the world of bioengineering and pave the way for a brighter and healthier future for generations to come. Last but not least, I wish all have a pleasant experience in Kota Bharu, Kelantan, and a wonderful IConBET 2023.

Thank you.

Sincerely,

**ASSOC. PROF. DR. NOOR AZLINA BINTI IBRAHIM**  
**CHAIRMAN**  
**IConBET 2023**



## **ORGANIZING COMMITTEE OF IConBET 2023**

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Dr. Ezwan Bin Selamat  
Dr. Nurul Akmar Binti Che Zaudin  
Assoc. Prof. ChM. Ts. Dr. Nor Hakim Bin Abdullah  
Dr. Zubaidah Aimi Binti Abdul Hamid  
Dr. Noor Fazliani Binti Shoparwe  
YM Raja Nur Syafiqah Binti Raja Ashaari

## CONFERENCE SCHEDULE

<b>29 August 2023: Conference Day</b>			
<b>Time</b>			
8.45 am – 9.00 am	<p align="center"><b>Welcoming Speech</b> <i>Dewan Putri Sa'adong</i></p> <p align="center"><b>Assoc. Prof. Dr. Noor Azlina Binti Ibrahim</b> Chairman IConBET 2023</p>		
9.00 am – 10.00 am	<p align="center"><b>Keynote Speaker 1</b> <i>Dewan Putri Sa'adong</i></p> <p align="center"><b>Prof. Ts. ChM. Dr. Wan Mohd Khairul Bin Wan Mohamed Zin</b> Universiti Malaysia Terengganu, Malaysia</p> <p align="center"><i>Exploring Biomaterial-Based Solid-Electrolyte Doped Extended Conjugated Bonds Towards Organic Electronics Interests</i></p> <p align="center">Moderator: <b>Assoc. Prof. ChM. Ts. Dr. Wong Yee Ching</b></p>		
10.00 am – 11.00 am	<p align="center"><b>Keynote Speaker 2</b> <i>Dewan Putri Sa'adong</i></p> <p align="center"><b>Prof. Dr. Katsuyoshi Kondoh</b> Joining and Welding Research Institute (JWRI), Osaka University, Japan</p> <p align="center"><i>Powder Based Titanium Alloys Strengthened by Ubiquitous Elements</i></p> <p align="center">Moderator: <b>Assoc. Prof. ChM. Ts. Dr. Wong Yee Ching</b></p>		
11.00 am – 11.30 am	<b>Coffee Break</b>		
	<p align="center"><b>Parallel 1A</b> <i>Dewan Putri Sa'adong</i></p> <p align="center"><b>Materials Science &amp; Technology</b></p> <p align="center">Chairperson: <b>Dr. Wan Suriyani Faliq Adeeba Binti Wan Ibrahim</b></p>	<p align="center"><b>Parallel 2A</b> <i>Dewan Congkak</i></p> <p align="center"><b>Bioindustrial Technology, Wood Technology &amp; Agricultural Technology</b></p> <p align="center">Chairperson: <b>Dr. Mohd Ezwan Bin Selamat</b></p>	<p align="center"><b>Parallel 3A</b> <i>Dewan Wau</i></p> <p align="center"><b>Energy, Mineral &amp; Environmental Technology</b></p> <p align="center">Chairperson: <b>Ts. Dr. Mardawani Binti Mohamad</b></p>

<p>11.30 am – 12.00 pm</p>	<p>Invited Speaker: <b>Assoc. Prof. Dr. Mohammad Hafizuddin Bin Jumali</b> Universiti Kebangsaan Malaysia, Malaysia (representing Bruker AXS)</p> <p><i>Wake-up Ferroelectric Behavior in Ca and Zr Modified BaTiO<sub>3</sub> as Lead Free Ferro-ceramics</i></p>	<p>Invited Speaker: <b>Prof. Dr. R. Jaya Madhuri</b> Sri Padmavati Mahila Visvavidyalayam, India</p> <p><i>Economic Importance of Microalgae as Biocatalyst for Industrial Production of Bioplastic, Biofuel and Bioflavouring Agents</i></p>	<p>Invited Speaker: <b>Mr. Charles Hooi</b> Novatiq Scientific Sdn Bhd</p> <p><i>Advancements in Scanning Electron Microscopy: Unveiling the Nanoscale World</i></p>
<p>12.00 pm – 12.15 pm</p>	<p>INT08: <b>Mr. Galih Rineksa</b> Universitas Indonesia</p> <p><i>Mechanical Characteristics of Thermoplastic Sago Starch-Based Biopolymer Composite Reinforced with Microcrystalline Cellulose (MCC) as A Potential Surgical Suture Material</i></p>	<p>UMK55: <b>Assoc. Prof. Dr. Mohd Hazim Bin Mohamad Amini</b> Universiti Malaysia Kelantan</p> <p><i>Rubberized Glutaraldehyde-Modified Starch Plasticized with Triethanolamine</i></p>	<p>UTHM03: <b>Dr. Mohd Baharudin Bin Ridzuan</b> Universiti Tun Hussein Onn Malaysia</p> <p><i>A Development of Spatial Data in Flood Management to Forecast Future Land Development in Peninsular Malaysia</i></p>
<p>12.15 pm – 12.30 pm</p>	<p>UMK39: <b>Dr. Noor Fazliani Binti Shoparwe</b> Universiti Malaysia Kelantan</p> <p><i>Fabrication and Characterization of Mixed Matrix Ultrafiltration Polyether-Sulfone Membrane Blended with Biopolymer Cellulose/Titanium Dioxide Nanoparticles for Humic Acid Removal</i></p>	<p>SPMVV06: <b>Prof. Dr. N Vijaya Kumari</b> Sri Padmavati Mahila Visvavidyalayam, India</p> <p><i>Assessment of Soil Fertility Status and Mapping in Mulberry Growing Areas of Chittoor District in Andhra Pradesh State</i></p>	<p>UIAM01: <b>Ms. Wan Nur Asiah Binti Wan Mohd Sukri</b> Universiti Islam Antarabangsa Malaysia</p> <p><i>Energy Yields Analysis on Enhancing the Power Output of An Air Cathode Biofuel Cell</i></p>

<p>12.30 pm – 12.45 pm</p>	<p>SPMVV04: <b>Prof. Dr. Suvarnalatha Devi Potireddy</b> Sri Padmavati Mahila Visvavidyalayam, India</p> <p><i>Phytochemical Analysis, Invitro Antimicrobial and Antioxidant Potential of Zinc Oxide Nano Particles Containing Commelina Benghalensis Extract</i></p>	<p>UKM01: <b>Mr. Mohd Norfikri Bin Omar</b> Universiti Kebangsaan Malaysia</p> <p><i>Metabolic and Genome Engineering for Enabling Xylose Utilization in Corynebacterium Glutamicum</i></p>	<p>UNISEL01: <b>Ms. Primeela Gunalan</b> Universiti Selangor</p> <p>Decolourization of Methylene Blue Using Indigenous Microbes</p>
<p>12.45 pm – 1.00 pm</p>	<p>UIAM02: <b>Assoc. Prof. Dr. Noorasikin Binti Samat</b> Universiti Islam Antarabangsa Malaysia</p> <p><i>Effect of Electron Beam Irradiation on The Properties of Poly(Vinyl Alcohol (PVA)-Cellulose Nanocrystal Hybrid Aerogel</i></p>	<p>UCTS01: <b>Mr. Abdul Fattah Bin Ab Razak</b> University of Technology Sarawak</p> <p><i>Optimising the Processing Conditions of Kenaf Seed MH8234 Milk Powder in terms of its Physicochemical Properties: An Investigation Using the Central-Composite Design Approach</i></p>	<p>UPM01: <b>Ms. Nur Jazilah Binti Jaafar</b> Universiti Putra Malaysia</p> <p><i>Factors Influencing The Visitation and Revisitation of Recreational Area at Alor Lempah, Kuala Kubu Bharu</i></p>
<p>1.00 pm – 2.30 pm</p>	<p><b>Lunch</b></p>		
	<p><b>Parallel 1B</b> <i>Dewan Putri Sa'adong</i></p> <p><b>Materials Science &amp; Technology</b></p> <p>Chairperson: <b>Prof. Dr. Suvarnalatha Devi Potireddy</b></p>	<p><b>Parallel 2B</b> <i>Dewan Congkak</i></p> <p><b>Bioindustrial Technology, Wood Technology &amp; Agricultural Technology</b></p> <p>Chairperson: <b>Prof. Dr. N Vijaya Kumari</b></p>	<p><b>Parallel 3B</b> <i>Dewan Wau</i></p> <p><b>Energy, Mineral &amp; Environmental Technology</b></p> <p>Chairperson: <b>Dr. Noor Fazliani Binti Shoparwe</b></p>

<p>2.30 pm – 3.00 pm</p>	<p>Invited Speaker: <b>Dr. Yang Jinhua</b> Bruker Nano Analytics</p> <p><i>Electron Backscatter Diffraction Technology: Theory and Applications</i></p>	<p>Invited Speaker: <b>Assoc. Prof. Dr. Wan Faizal Bin Wan Ishak</b> Universiti Malaysia Kelantan/ One Resources Progressive Sdn Bhd</p> <p><i>Optimizing Briquette Charcoal Production: A Comparative Analysis of Sawdust, Bamboo, and Coconut Shell Combinations</i></p>	<p>Invited Speaker: <b>Ts. Dr. Teo Pao Ter</b> Universiti Malaysia Kelantan</p> <p><i>From WASTE to WEALTH: Recycling of Food, Agricultural, and Industrial Wastes as Pore Forming Agents for Sustainable Porous Ceramic Production</i></p>
<p>3.00 pm – 3.15 pm</p>	<p>UMS01: <b>Dr. Norsahida Binti Azri</b> Universiti Malaysia Sabah</p> <p><i>Effect of Bimetallic Co-Cu/Dolomite Catalyst on Glycerol Conversion to 1,2-Propanediol</i></p>	<p>UCTS02: <b>Ts. Mohamad Saiful Bin Sulaiman</b> University of Technology Sarawak</p> <p><i>Physicomechanical and Microstructure Analysis of Polypropylene Hybrid Composite Reinforced Kenaf and Bamboo Fiber</i></p>	<p>UMK41: <b>Dr. Zubaidah Aimi Binti Abdul Hamid</b> Universiti Malaysia Kelantan</p> <p><i>Study on Knowledge, Attitude, and Practices (KAP) of Recycling and Disposing of Used Cooking Oil (UCO): A Case Study in Kelantan, Malaysia</i></p>
<p>3.15 pm – 3.30 pm</p>	<p>USM08 <b>Dr. Mohammad Khairul Azhar Bin Abdul Razab</b> Universiti Sains Malaysia</p> <p><i>Detection of UV-C (200 nm to 280 nm) Using GaN Photodiode Detector for UV Disinfection Robot Performance</i></p>	<p>UMK07 <b>Assoc. Prof. Dr. Noor Azlina Binti Ibrahim</b> Universiti Malaysia Kelantan</p> <p><i>Optimization of culture conditions for the expression of recombinant thermostable alkaline protease 50a</i></p>	<p>UMK06: <b>Assoc. Prof. Dr. Mahani Binti Yusoff</b> Universiti Malaysia Kelantan</p> <p><i>Ferrous Precipitation from Recycled Steel Slag for Treating Water of Sungai Chalil, Gua Musang, Kelantan</i></p>
<p>3.30 pm – 3.45 pm</p>	<p>UMK48: <b>Assoc. Prof. Ts. Dr. Sarizam Bin Mamat</b> Universiti Malaysia Kelantan</p> <p><i>Development of TIG/MIG Hybrid Welding Process</i></p>	<p>UMK16: <b>Dr. Nur Sakinah Binti Mohamed Tamat</b> Universiti Malaysia Kelantan</p> <p><i>Effect of Varying Board Densities and Resin Contents on the Properties</i></p>	<p>UMK51: <b>Dr. Asanah Binti Radhi</b> Universiti Malaysia Kelantan</p> <p><i>Physicochemical Properties of Starch Aerogel Incorporated with Titanium Dioxide</i></p>

		<i>of Particleboard Made with Admixtures of Hevea brasiliensis (Rubberwood) and Neolamarckia cadamba (Kelempayan)</i>	
3.45 pm – 4.00 pm	<p>UMK42:  <b>Ms. Nur Hidayah Binti Yaakob</b>                      Universiti Malaysia Kelantan</p> <p><i>Effect of Annealing Temperature to Mechanical Properties of Soda Lime Silica Glass</i></p>	<p>UMK23:  <b>Mr. Bambang Kartono Kurniawan</b>                      Universiti Malaysia Kelantan</p> <p><i>Green Building Material on Bamboo SLR</i></p>	<p>UMK33:  <b>Mrs. Hasanah Binti Safein @ Shafie</b>                      Universiti Malaysia Kelantan</p> <p><i>A Study on CCTO for Improvement of Dielectric Resonator Antennas</i></p>
4.00 pm – 5.00 pm	<b>Coffee Break</b>		
8.00 pm – 10.30 pm	<b>Conference Dinner, MoU Signing and Closing Ceremony</b>		



**KEYNOTE SPEAKER 1**

**PROFESSOR TS. CHM. DR. WAN MOHD KHAIRUL BIN WAN  
MOHAMED ZIN**

**Universiti Malaysia Terengganu, Malaysia**



Prof. Wan Mohd Khairul Wan Mohamed Zin is an esteemed chemistry expert who has acquired a Bachelor of Science (Honours) degree from the prestigious Universiti Putra Malaysia and a Master of Science and Ph.D from Durham University. He is renowned for his proficiency in synthetic inorganic and organometallic chemistry and is dedicated to creating innovative functional molecules suitable for molecular electronics. Currently serving as a professor at Universiti Malaysia Terengganu, he supervises both postgraduate and undergraduate students in synthesizing and applying functionalized molecules that cater to optoelectronics. His outstanding work has earned him over 30 research grants and 8 intellectual property rights, and he is frequently invited to speak at various esteemed conferences and institutions across the globe.

## **KEYNOTE SPEAKER 2**

### **PROFESSOR KATSUYOSHI KONDOH**

**Joining and Welding Research Institute (JWRI), Osaka University, Japan**



Professor Katsuyoshi Kondoh received his Ph.D. degree in Welding Engineering from Osaka University (OU), Japan in 1998. His undergraduate education was received at OU from April in 1982 to March in 1986, and he got a MS degree in Welding Eng. from OU in 1988. He worked in Sumitomo Electric Industries from 1988 to 2000. Since Feb. 2000, he was an Associate Professor, The University of Tokyo until March 2006. He is a full-Professor of Joining and Welding Research Institute (JWRI) of OU, and a Vice Executive Director in charge of Global Engagement at OU. Now he is an Executive Assistant to the President of OU in charge of Gender Equality. He is an Invited Professor at Xi'an University of Technology, China from April 2019. His current research interests in Materials Science related to high-performance powder metallurgy (PM) materials and high-strengthened dissimilar bonded light materials. He has published more than 430 journal papers, patent applications over 200, Plenary, Keynote & invited inter. conf. presentations more than 70. He is also the Editorial Board Member of many journals.

**INVITED SPEAKER**

**PROFESSOR. DR. R. JAYA MADHURI**

**Sri Padmavati Mahila Visvavidyalayam (SPMVV), India**



Dr. R. Jaya Madhuri is Professor in Microbiology, from Sri Padmavati Mahila Visvavidyalayam, Tirupati, India. She has 17 yrs of teaching experience and 15 yrs of research experience. Her research expertise is in the field of Environmental Microbiology on microbial mediated removal of xenobiotics and production of eco-friendly bio products using fermentation technology/bioengineering both from soil and marine habitats. As an outcome of her research work, one trade Mark patent has been filed and four national patents were published. She has completed three projects on bioplastics, AI mediated agriculture and adolescent health. Presently she is team member of DBT Builder Project. Under her guidance two PDFs and 8 Ph.Ds were awarded. She is a recipient of AP Science Academy Associative Fellow Award, National Environmental Science Academy Women Excellence Award, Researcher Award. 30 national and 32 international papers majority indexed in Scopus and Web of Science were published. She has presented her research findings nationally and internationally in Malaysia, Thailand, Dubai, and Turkey.

**INVITED SPEAKER**

**ASSOC. PROF. DR. MOHAMMAD HAFIZUDDIN BIN JUMALI**

**Universiti Kebangsaan Malaysia, Malaysia (representing Bruker AXS)**



Assoc. Prof. Dr. Mohammad Hafizuddin obtained his Ph.D. in Physics from Warwick University. Upon completing his studies in 1999, he joined Universiti Kebangsaan Malaysia as a lecturer. His current research interest includes lead-free ferroelectrics and thin film nanostructures. He has extensive experience in material characterization techniques, including X-ray diffraction and X-ray fluorescence.

**INVITED SPEAKER**

**MR. CHARLES HOOI**

**Novatiq Scientific Sdn Bhd**



Mr. Charles Hooi graduated from Universiti Putra Malaysia in 2012 with a Bachelor in Biotechnology and a 3.82 GPA. Strong passion for analytical lines, especially in imaging and spectroscopy products with over 10 years of experience since 2012. He started as a sales engineer handling X-ray spectroscopy product and slowly ventured into Microscopy and X-ray imaging products in 2016. He started his own imaging business in 2018 by establishing Novatiq Scientific Sdn Bhd which specialized in technology such as spectrometry, material characterization, X-ray imaging, microscopy technique, failure analysis, non-destructive testing, surface profiling, etc. and representing well-known high-end instrument manufacturers like Tescan, Technoorg Linda, San Ying, Euromex, Oxford, Bruker, etc.

**INVITED SPEAKER**

**DR. YANG JINHUA**

**Bruker Nano Analytics**



Jinhua Yang received his Ph.D. in Chemical and Biomolecular Engineering from National University of Singapore in 2010. He was a Research Scientist at the Institute of Bioengineering and Nanotechnology in A-Star from 2009 to 2021. He has more than 10 years of R&D experiences on the synthesis and characterization of inorganic materials for electrochemical applications in batteries, fuel cell and supercapacitors. He has published 23 papers and held 3 patents. He is familiar with advanced analytical instrumentations, such as TEM and SEM and professional in material theory and characterization.

**INVITED SPEAKER**

**ASSOC. PROF. DR. WAN FAIZAL BIN WAN ISHAK**

**Universiti Malaysia Kelantan, Malaysia/ One Resources Progressive Sdn Bhd**



Assoc. Prof. Dr. Wan Mohd Faizal Wan Ishak is a distinguished academic and researcher in environmental engineering, currently serving as a Senior Lecturer at the Faculty of Bioengineering and Technology at Universiti Malaysia Kelantan. With a strong background in environmental engineering, he spent 16 years at Universiti Malaysia Pahang, where he contributed significantly to teaching, research, and consultancy projects. He also has six years of industrial experience, enhancing his knowledge of practical applications in environmental engineering. Assoc. Prof. Dr. Wan Mohd Faizal Wan Ishak has secured research grants totaling over RM6 million from prestigious institutions, including Korea and Japan, focusing on water and environmental engineering. He has also been involved in consulting projects related to water and environmental management, locally and internationally, with a total value exceeding RM3 million. His passion for addressing water-related challenges has extended to community projects, such as underground water filtration projects benefiting schools, estates, mosques, and housing areas. His publications have influenced practical approaches to environmental engineering and contributed to the academic community. As a respected scholar and leader in his field, he continues to be a driving force in environmental engineering, promoting sustainable solutions and community welfare.

**INVITED SPEAKER**

**TS. DR. TEO PAO TER**

**Universiti Malaysia Kelantan, Malaysia**



Dr. Teo Pao Ter received his Bachelor of Engineering (Materials Engineering) with 1st Class Honours and Doctor of Philosophy (Materials Engineering – Metals) from Universiti Sains Malaysia (USM) back in 2012 and 2017, respectively. Prior to pursuing PhD degree, he worked as a Research Engineer at Southern Steel Berhad, Penang Malaysia from year 2012 to 2013. After completed the PhD study, he joined Materials Technology Program, Faculty of Bioengineering and Technology, Universiti Malaysia Kelantan (UMK) on December 2017 as Lecturer and subsequently was promoted to Senior Lecturer on May 2019. Since 2013, he has been actively involved in materials recycling technology related research field, encompassing re-processing, utilization and recycling of food, agricultural, municipal and industrial wastes as secondary greener and sustainable raw materials for development of new material products. Along with the academic and industry career path, he has secured several research grants as both Project Leader and Project Member such as Southern Steel Berhad’s Industrial Research Grant, Fundamental Research Grant Scheme (FRGS), Ministry of Higher Education Malaysia, UMK Prototype Grant, UMK Matching Grant and UMK Impact Grant, with the total amount of grants up to RM 500,000. The extensive research outputs have been successfully published in prestigious Web of Science (WoS) and high impact factor journals such as Waste Management (Elsevier; Q1; IF: 8.816) and Journal of Cleaner Production (Elsevier; Q1; IF: 11.072). As a young and enthusiastic researcher, he has managed to achieve the Scopus and Google Scholar H-Index of 6 and 9, respectively. Apart from research grants and publications, Dr. Teo also actively participates in product innovation competitions, and has been recognized with many awards in local and international research innovations. These include Malaysia Technology Expo 2021 (Silver medal), EREKA UniMAP 2021 and 2022 (Gold medal), CITREX UMP 2021 (Gold medal) and IIDEX 2022 (Gold medal). Additionally, he has successfully filled three (3) patents namely, A Method of Producing Electric Arc Furnace Slag Based Geopolymer Ceramic (2020), A Method of Producing A Clay-Based Porous Ceramic for Thermal Insulating Application (2021), and, A Light-weight and Thermal Insulated Porous Ceramic Brick Formulation and Method of Producing Thereof (2023).



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**ABSTRACT:  
KEYNOTE SPEAKER**



**PROF. TS. CHM. DR. WAN MOHD KHAIRUL BIN WAN MOHAMED ZIN**

**Universiti Malaysia Terengganu, Malaysia**

**Exploring Biomaterial-Based Solid-Electrolyte Doped Extended Conjugated Bonds Towards Organic Electronics Interests**

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**Abstract.** The demands for an efficient, less hazardous by-products, eco-friendly material for organic electronics has attracted much interest. These materials are not only expected to have high degree of sustainability but also should bring greater benefit towards nation’s wealth and community or social well-being. Remarkable progress on the utilization of natural biomaterials (e.g. cellulose, chitosan, agars) has been extensively studied to boost carrier mobility, electrical performance with small molecule (organic, inorganic, conjugated moiety) in advanced electrochemical components specifically in electrolyte, electrode and separator. In this contribution, hybrid molecules bearing functional substructures of vinylene (-CH=CH-) and azomethine (-CH=N-) bonds featuring “Donor-spacer-Acceptor” concept and push-pull effect have been integrated as additives in solid biopolymer electrolytes (SBEs). In line with green chemistry approach, the preparation of these designated additive carried out under an ambient condition to minimise waste, possess low cost of raw materials and production, boost maximum yield of the desired products and align with a concept environmentally friendly technology. The investigation on their spectroscopic and theoretical assessments were conducted to alter the energy level in improving the structural and ionic conductivity performance in carboxymethyl cellulose (CMC)-based biopolymer electrolytes. The highest ionic conductivity of SBEs achieved at ambient temperature was  $\sim 8 \times 10^{-3}$  Scm<sup>-1</sup> upon the addition of additive, obeying an Arrhenius model with reciprocal of temperature (303 K–373 K). The increment is due to coordination interaction of C-O bond of ether from alkoxy and CH=N band from azomethine facilitate in dissociating more cation (H<sup>+</sup>) of ammonium salt and created alternative pathways for H<sup>+</sup> to hop into coordinating site in CMC. These SBEs were sandwiched between commercial photoanode and counter electrode to fabricate dye-sensitized solar cells. This proposed system had shown potential to be explored as additive in SBEs system and this biomaterial can contribute in enhancing organic electronic applications.

**Keywords:** Hybrid molecules, biomaterial, electrolyte, conductivity.

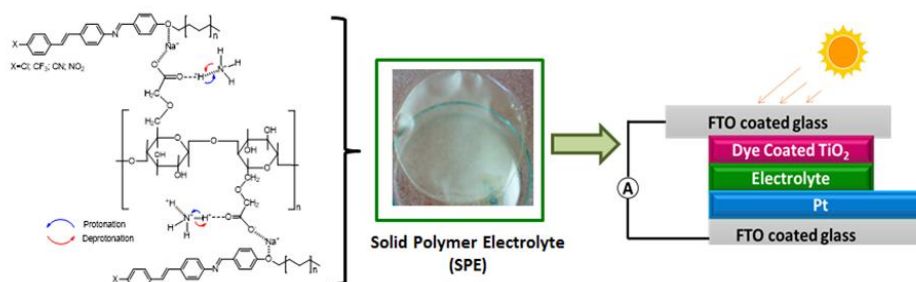


Figure 1: Biomaterial-based Solid-Electrolyte as DSSCs

**PROF. DR. KATSUYOSHI KONDOH**

**Osaka University, Japan**

**Powder Based Titanium Alloys Strengthened by Ubiquitous Elements**

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**Abstract.** Instead of expensive rare metals such as vanadium (V), zirconium (Zr) and molybdenum (Mo), the cheap ubiquitous elements (X=O, N, C, Fe, Si etc.) are employed to improve the mechanical properties of advanced Ti materials fabricated by powder metallurgy (PM) or additive manufacturing (AM) process in this study. PM and AM Ti-X alloys show a good balance between yield stress (YS) and elongation compared to the commercial Ti-6%Al-4%V alloy widely used in the industries. The main strengthening factor of Ti-X alloys is solid-solution strengthening behavior in  $\alpha$ -Ti and  $\beta$ -Ti grains. Their YS increment is quantitatively analyzed by Labusch model and Hall-Petch equation, and consequently agrees with the tensile test results. In particular, Ti-N materials prepared by Laser powder bed fusion (LPBF) shows not only high YS and enough elongation, but also improved isotropy of their tensile properties due to the randomized textures.

**Keywords:** Powder based titanium alloy, ubiquitous elements.

**ABSTRACT:  
INVITED SPEAKER**

**PROF. DR. R. JAYA MADHURI**

**Sri Padmavati Mahila Visvavidyalayam (SPMVV), India**

**Economic Importance of Microalgae as Biocatalyst for Industrial Production of Bioplastic, Biofuel and Bioflavouring Agents**

R. Jaya Madhuri<sup>1,a</sup>, M Bhargavi<sup>1</sup>, M. Sujatha<sup>1</sup>, K.P. Leela<sup>1</sup>, Sai K. Saleema Uzma<sup>1</sup> and K. Mrunalika<sup>1</sup>

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**Abstract.** Algae, like other plants, produce a variety of remarkable compounds collectively referred to as secondary metabolites. They are synthesized by these organisms at the end of the growth phase and/or due to metabolic alterations induced by environmental stress conditions. Algae is used to develop many products such as, bioflavours, biofuels and biopolymers etc, The verity of flavour production from various types of algae and its application in the food industry, and a about its health benefits among the consumers. Flavour and aromatic compounds are the most essential components in food, feed, cosmetics, pharmaceuticals, and toiletries products. Biofuels production from algae can provide some distinctive advantages such as their rapid growth rate, greenhouse gas fixation ability and high production capacity of lipids. This current status of biofuel from algae as a renewable energy resource. Bioplastic production from algae is a new opportunity to be explored and further improved. Therefore, the algae used as resources for bioflavours, biofuels, and bioplastic production. On the other hand, the use of algae as a potential source of high value economical . Recently, algae have been used as a novel food with potential nutritional benefits in industry and medicine for various purposes.

**Keywords:** Microalgae, bioflavours, biofuels, bioplastic, secondary metabolites, environmental stress.

**ASSOC. PROF. DR. MOHAMMAD HAFIZUDDIN JUMALI**

**Universiti Kebangsaan Malaysia (Representing Bruker AXS)**

**Wake-up Ferroelectric Behavior in Ca and Zr Modified BaTiO<sub>3</sub> as Lead Free Ferro-Ceramics**

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**Abstract.** BaTiO<sub>3</sub> based ceramics is one of the perovskite-typed materials that has been identified as the most possible alternative for Pb based piezoelectrics. Besides enhancing its piezoelectric properties, numerous efforts have been put to improve the ferroelectric characteristics of BaTiO<sub>3</sub> based ceramics. This is because, in advanced application such as FeRAM, it requires extended life time reliability. Unfortunately under intense repeated polarization reversals, most BaTiO<sub>3</sub> based ceramics exhibited fatigue. However in this work, unique polarization characteristics in (Ba<sub>1-x</sub>Ca<sub>x</sub>)(Zr<sub>y</sub>Ti<sub>1-y</sub>)O<sub>3</sub> ceramics have been observed. Three different series of (Ba<sub>1-x</sub>Ca<sub>x</sub>)(Zr<sub>y</sub>Ti<sub>1-y</sub>)O<sub>3</sub> ceramics have been prepared using solid-state method and sintered at 1350 °C for 2 h. Crystalline phase, microstructure and dielectric properties of the ceramics were extensively examined. The ferroelectric measurement was performed at 50 Hz using Sawyer-Tower principal up to 106 cycles. XRD analysis confirmed the crystalline phases for the ceramics are tetragonal (A-site substitutions series), orthorhombic (B-site substitutions series) and tetragonal for (Ba<sub>1-x</sub>,Ca<sub>x</sub>)(Ti<sub>1-y</sub>,Zr<sub>y</sub>)O<sub>3</sub> ceramics. The dielectric constant for all series exhibited upward trends except for A-site substitutions series while Curie temperature, T<sub>c</sub> consistently decreasing for all series. At x = 0.1 and y = 0.025, clear evidence of ferroelectric wake-up was observed with increasing P<sub>m</sub> as the number of cycles increased. SEM images proved that surface of the ceramics remained intact after 106 switching polarization cycles. This work proves that the properties of the BaTiO<sub>3</sub> based ceramics significantly affected by its compositions with (Ba<sub>0.9</sub>,Ca<sub>0.1</sub>)(Ti<sub>0.975</sub>, Zr<sub>0.025</sub>)O<sub>3</sub> ceramic exhibited the unique wake-up ferroelectric characteristic.

**Keywords:** BaTiO<sub>3</sub> based ceramics, dielectric constant, wake-up ferroelectric characteristic.

**MR. CHARLES HOOI**

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**Advancements in Scanning Electron Microscopy: Unveiling the Nanoscale World**

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**Abstract.** The Scanning Electron Microscope (SEM) has undergone significant advancements since its inception, enabling researchers to explore the nanoscale world with unprecedented clarity and detail. The Scanning Electron Microscope (SEM) has evolved into a powerful tool for investigating the intricate structures and phenomena occurring at the nanoscale level. Over the years, SEM technology has experienced remarkable advancements, revolutionizing various scientific and industrial fields. Advancements in SEM hardware have contributed to higher resolution imaging, improved energydispersive X-ray spectroscopy (EDS), and enhanced sample handling. The introduction of field emission electron sources, aberration correction technologies, and versatile detectors has led to sub-nanometer imaging resolutions, enabling the visualization of nanoscale features with remarkable clarity. Moreover, the integration of cryogenic capabilities has facilitated the examination of biological samples in their near-native state, offering insights into cellular and subcellular structures with unprecedented detail. In the realm of nano/materials science, SEM has played a pivotal role in characterizing nanomaterials, nanocomposites, and thin films. Advanced imaging modes, such as electron backscatter diffraction (EBSD), have enabled the analysis of crystallographic orientations and defects in materials. The combination of SEM with correlative microscopy techniques, such as Raman and AFM microscopy, has allowed researchers to bridge the gap between molecular and structural information. Furthermore, advancements in SEM have led to innovations in in situ experiments, enabling dynamic observations of processes at the nanoscale. Real-time imaging of mechanical deformation, has expanded our understanding of various phenomena, with implications for fields ranging from electrochemistry to materials engineering. In conclusion, the evolution of the Scanning Electron Microscope has propelled scientific discovery across numerous disciplines. From its roots as a tool for surface imaging, SEM has metamorphosed into a versatile instrument that enables comprehensive exploration of the nanoworld. As SEM technology continues to advance, researchers can anticipate even greater insights into nanoscale structures and behaviors, fostering breakthroughs with transformative societal impacts.

**Keywords:** Scanning Electron Microscope (SEM), raman imaging, nanoscale imaging, advancements, materials science, in situ experiments, correlative microscopy, high-resolution imaging, nanomaterials.

**DR. YANG JINHUA**

**Bruker Nano Analytics**

**Electron Backscatter Diffraction Technology: Theory and Applications**

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**Abstract.** Electron backscatter diffraction (EBSD), a scanning electron microscopy (SEM) technique used to study the crystallographic structure of materials, is widely used in materials science and engineering, geology, and biological research. Herein, the theory of EBSD and transmission Kikuchi diffraction (TKD) with nanosized spatial resolution of EBSD are introduced. Furthermore, the samples with EBSD/ EDS integration, in-situ tensile and heating EBSD, EBSD application in battery are demonstrated.

**Keywords:** Electron backscatter diffraction (EBSD)

**ASSOC. PROF. DR. WAN MOHD FAIZAL WAN ISHAK**

**Universiti Malaysia Kelantan/One Resources Progressive Sdn Bhd, Malaysia**

**Optimizing Briquette Charcoal Production: A Comparative Analysis of Sawdust, Bamboo, and Coconut Shell Combinations**

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**Abstract.** The manufacturing of briquette charcoal utilising three different material combinations—sawdust, bamboo, and coconut shell—was compared in this study. The study assessed each combination's calorific value and ash content to see whether it was suitable for producing charcoal in an effective and sustainable manner. SBC (sawdust + bamboo + coconut shell), CS (coconut shell), and BS (bamboo + sawdust) were the three material combinations that were examined. Each sample's calorific value, an important measure of the energy content of briquette charcoal, was determined. With 7004 Kcal/kg, the SBC combination had the highest calorific value, followed by CS with 6697 Kcal/kg and BS with 6354 Kcal/kg, according to the results. For each combination, the ash concentration, a crucial element influencing the effectiveness of combustion and the environmental impact of briquette charcoal, was also determined. According to the analysis, the SBC combination had an ash content of 88.67%, CS had a content of 91.54%, and BS had a content of 92.91%. For briquette charcoal manufacturers and academics looking to optimise raw material selection and production methods, these findings offer invaluable insights. The SBC combination's high calorific value means that it has the capacity to generate energy effectively, and its lower ash content suggests that it has a smaller environmental impact. Producers can improve the quality, effectiveness, and sustainability of briquette charcoal manufacturing by considering the characteristics and performance of various material combinations. Additionally, our findings support the overarching objective of developing greener energy choices and lowering reliance on conventional charcoal.

**Keywords:** Briquette charcoal, sawdust, bamboo, coconut shell.



**TS. DR. TEO PAO TER**

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**From WASTE to WEALTH: Recycling of Food, Agricultural, and Industrial Wastes as Pore Forming Agents for Sustainable Porous Ceramic Production**

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**Abstract.** Utilizing various wastes in ceramic production has been growing worldwide. This work provides an extensive literature review on the utilization of food, agricultural, and industrial wastes as pore-forming agents (PFAs) in sustainable porous ceramic production. The literature conducted since 2010 indicates that waste-based porous ceramics has versatile properties with excellent performances. Determination of waste material and clay properties as well as processing conditions such as material composition, sintering temperature, and compaction pressure, which influence pore formation in ceramics, has been comprehensively provided. These factors significantly influence the properties of the resulting porous ceramics, including physical, mechanical, and toxicity properties. Recycling food, agricultural, and industrial wastes for increased energy saving and green ceramic production can be realized as an economical and practical approach to sustainable waste management, which align well with achieving sustainability in a circular economy and the UNESCO's Sustainability Development Goals (SDG). Achieving zero food, agricultural, and industrial wastes can eliminate environmental burdens and pave the way for closed-loop production. In overall, the waste-based porous ceramics can pave the way for sustainable environments, expanding the economic sector, particularly alternative building materials.

**Keywords:** Food waste, agricultural waste, industrial waste, pore forming agent, sustainable porous ceramic.

**ABSTRACT:  
MATERIALS SCIENCE  
AND  
TECHNOLOGY**

## INT03

### **Substrate Temperature Effects on the Structural and Surface Properties of AlN Thin Film Synthesized via RF Magnetron Sputtering**

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**Abstract:** Aluminum nitride (AlN) is a piezoelectric material that has potential in sensing and energy harvesting applications. In this study, we present the deposition of AlN thin film onto a silicon substrate via RF magnetron sputtering. The synthesis was done at various temperatures of 22°C (room temperature), 300°C and 450°C at a deposition time of 30 min. X-ray diffraction of the samples revealed the growth of the desired compound as the peaks corresponding to the (100) and (004) phases of AlN were observed. In addition, results showed that as the substrate temperature was increased, the full-width at half maximum (FWHM) of the sample decreased, indicating an improved crystallinity. Meanwhile, contact angle measurements showed that the sample became less hydrophilic as the substrate temperature was increased. Subsequently, the surface energies of the samples deposited at high substrate temperature were greater compared to the sample synthesized at room temperature.

**Keywords:** Aluminum nitride, RF sputtering, surface energy, wettability, X-ray diffraction.

## INT04

### **Structural and Surface Free Energy Analysis of Vanadium Nitride (VN) Thin Film Synthesized via Reactive High-Frequency Magnetron Sputtering**

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**Abstract:** This research reports the synthesis of a vanadium nitride (VN) thin film via reactive high-frequency magnetron sputtering on an n-type silicon wafer ( $\Phi 2$  inches) substrate. The synthesis was performed by varying the substrate temperature at 300°C and 400°C (VN1 and VN2), respectively. X-ray Diffraction result shows that VN1 and VN2 reveal a Bragg peak at  $2\theta = 76.9^\circ$ , which matches the reflection of the (311) plane of VN. Thus, the lone orientation exhibited in VN1 and VN2 coincides with a face-centered cubic structure unit cell connected to VN cubic system. Further, contact angle measurement was used to calculate the free surface energy of the samples. Analysis of the results reveals that the increase in substrate temperature led to the descent of surface energy.

**Keywords:** Vanadium nitride, sputtering, substrate temperature, surface free energy, X-ray diffraction.

**INT07**

**Optical and Structural Analysis of Synthesized Silver Nanofilm using RF Magnetron Sputtering**

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**Abstract:** This study presents the properties of silver (Ag) nanofilms synthesized on an N-type silicon wafer substrate oriented in (100) with thickness of 1 mm and 2 inches diameter. The films are deposited at 300 °C and 500 °C substrate temperature (Ag1 and Ag2), accordingly. The light absorption is determined using UV-Vis and result shows that Ag1 has better absorption in all wavelengths compared to Ag2. The results in X-ray Diffraction exhibits that both films have strongest peak in  $2\Theta = 38.05^\circ$  with preferred orientation in (111) plane parallel to the surface of the substrate that coincides with silver materials. Results reveal that increasing the substrate temperature enhances the crystallinity and increased the grain size of the nanofilm which confirmed in the resulting values of full width at half maximum (FWHM).

**Keywords:** Silver, silver nanofilm, X-ray diffraction, sputtering, substrate temperature, UV-vis.

## INT08

### **Mechanical Characteristics of Thermoplastic Sago Starch-Based Biopolymer Composite Reinforced with Microcrystalline Cellulose (MCC) as a Potential Surgical Suture Material**

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**Abstract:** Common biopolymer-based surgical sutures are made from biopolyesters such as poly(glycolic acid) (PGA) and Polyglactin 910 (copolymer of lactic and glycolic acid). However, such materials have acidic degradation products. Another bio-based polymer, thermoplastic starch (TPS), is developed to tackle this problem. TPS has glucose as its main degradation product, however, it has poor mechanical properties. To tackle this problem, a reinforcement material is added. In this research, TPS is synthesized from sago (Metroxylon sago) starch plasticized with two types of plasticizer (glycerol and sorbitol, 30% wt.) and a reinforcement of microcrystalline cellulose (MCC) with various concentrations (0%, 2%, 5%, and 10% wt.). Specimens were subjected to a tensile test (ASTM D 638) to obtain the values of strain at break, tensile strength, and Young's modulus. Results show that tensile strength peaks at 2% MCC concentration, while elongation at break generally decreases with the addition of MCC. The value of Young's Modulus increases with the addition of MCC for the glycerol-plasticized specimens, while no significant trends observed among the sorbitol-plasticized specimens. The addition of 2% MCC into sorbitol-plasticized sago starch results in an improvement in tensile strength to 4.68 MPa and Young's Modulus to 45.01 MPa. Such sample has the highest tensile strength and Young's Modulus out of all specimens, thus being the most feasible for surgical suture material.

**Keywords:** Biopolymer composite, mechanical characteristics, microcrystalline cellulose; surgical suture, thermoplastic starch.

## **INT09**

### **Thermal Stability of Nanocellulose Reinforced in Polyurethane Composites**

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**Abstract:** The addition of cellulose nanocrystalline (CNC) is considered highly crystalline structure material that can be used as reinforcement or filler in different polymer matrices. One of the CNC reinforcement consider is used in polyurethane as composite to improve the thermal stability. In this study, the CNC was extracted using conventional method of acid hydrolysis and mixed with polyurethane with different percentage of loading (1-5wt%). The addition of CNCs into polyurethane matrix was mixed manually and stirring for 30 min before casting and drying. To investigated the the thermal stability of polyurethane composites were using TGA and DSC. Based on the results, the addition of CNCs in polyurethane improve the thermal stability with higher onset degradation for CNCs/polyurethane composite as compared with pure polyurethane. The results also showed the increment in char residues were obtained. The DSC results showed improvement on glass transition and crystallinity. These results also supported with micrograph analysis by FESEM on char residues that obtained a filled porosities on polyurethane composites with remaining of polyurethane still intact together with higher loadings (5wt%) the most visible. This polyurethane composite is a good potential to be applied in the different applications that need for the heat and good thermal resistance.

**Keywords:** Nanocellulose, thermal stability, polyurethane, composite, polymer

## **JMG01**

### **Enhancing High-Grade PCC Production from Carbide Lime Waste using Physical Retardant Agent**

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**Abstract:** Acetylene market is anticipated to be driven by the growing applications across numerous industries particularly chemical synthesis, oxy-acetylene welding and metal cutting. Attributable to wide-range uses, acetylene witnesses stable growth in global market. However, the production of acetylene results in increasing generation of carbide lime waste that is classified as a scheduled waste under Malaysian Environmental Quality Act: EQA 1974 (SW427) due to its high alkalinity. The rising amount of the waste has warranted the need for repurposing its usage to avert handling and disposal difficulties. In overcoming this crucial environmental issue, the carbide lime waste was transformed into more marketable product so-called precipitated calcium carbonate (PCC) via feasible carbonation, promoted using natural sucrose solution. During the carbonation process, physical retardant agent was introduced at various mass (i.e 25, 50, 75 and 100 g) in investigating its effects on the PCC formation. The production of PCC with purity above 98% suggested that the carbide lime waste was successfully transformed into high-grade PCC, which not only may help in preserving environmental sustainability yet can also offer profitable return to industry.

**Keywords:** Precipitated calcium carbonate, carbide lime waste, carbon dioxide, carbonation.



## SPMVV04

### **Phytochemical Analysis, Invitro Antimicrobial and Antioxidant Aotential of Zinc Oxide Nano particles Containing *Commelina Benghalensis* Extract**

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**Abstract:** The *Commelina benghalensis* leaf extract has revealed potential antioxidant and antimicrobial effect. Zinc oxide based nanocarriers are promising drug delivery vehicles for antioxidant and antimicrobial compounds. In this study, aqueous and methanolic extracts of *C.benghalensis* leaves were prepared, loaded on zinc oxide nanoparticles (ZnONPs), and their antioxidant and antimicrobial effects were investigated. The Zinc oxide Nanoparticles (ZnONPs) were synthesised by Zinc Acetate is done by mixing 25mL of Zinc acetate [ $Zn(OAc)_2 \cdot 2H_2O$ ] (0.02M) solution and 1mL of the *C.benghalensis* aqueous leaf extract. The Zinc Oxide Nanoparticles structures are confirmed by using X-Ray Diffraction studies, UV-Visible Spectroscopy, FT-IR Spectroscopy, and Zeta analyser techniques. Further, qualitative phytochemical analysis and in vitro biological activities were evaluated. The size of ZnONPs containing methanolic extract showed 0.5nm, UV and FTIR distinct peaks at 310 nm,  $463.26cm^{-1}$ . The crystalline size of XRD is 1.64nm with zeta potential of -36.6 mV. Based on the results of antioxidant and antimicrobial revealed more potent effects, which seems to be associated with presence of higher content of phenolic compounds. The obtained results revealed the ZnONPs have substantial antioxidant and antimicrobial effects of *C.benghalensis* extracts and can be used further pharmaceutical formulations.

**Keywords:** *Commelina benghalensis*, antioxidant, nanoparticles, antimicrobial.

## **TATI01**

### **Thermal Stability and Hydrolysis Study of Degradable Biopolymer Material from Shrimp Shell**

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**Abstract:** Chitosan is an organic amino-polysaccharide that is produced from chitin. Chitosan has been widely used in a variety of applications due to its natural origin and exceptional qualities, including biocompatibility, biodegradability, non-toxicity, and metal ion chelation. This study's goal was to compare how well chitosan was produced at two distinct temperatures—high temperature for method A and ambient temperature for method B. Both methods, method A (90°C on deproteination, 25°C demineralization, and 90°C deacetylation) and method B (25°C on deproteination, 25°C demineralization, and 25°C deacetylation), required three steps to produce chitosan. Chitosan film was created by heating the synthesized chitosan in 1% acetic acid. Using Fourier Transform Infrared Spectrum (FT- IR), the functional group of chitosan and chitosan film was determined for this work. Thermal stability was studied using Thermal Gravimetric Analysis (TGA) and weight loss on hydrolysis study. Char residue of chitosan at 650°C for method A is 18.8% and method B 32.2% while char residue for chitosan film method A is 23% and Method B is 0%. In hydrolysis study, the condition at 40°C of 5 days' dried in the oven gave 45% of maximum weight loss for chitosan film A and 33% maximum weight loss for chitosan film B. In addition, pH tests, solubility, yield percentage, and degree of deacetylation, were performed to assess the quality of chitosan and chitosan film produced by each method. The results show that method A has a higher yield (11.9%) and a higher solubility (100%). It also performed 89% degree of deacetylation, which was measured based on FT-IR wavelength compared to method B.

**Keywords:** Chitosan, biopolymer material, thermal stability, hydrolysis study.

## **TATI02**

### **Determination of Water Absorption Rate for Natural Superabsorbent Polymer**

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**Abstract:** Superabsorbent Polymer (SAP) are widely used in various applications including medical and health, hygiene product and agriculture. SAP is a synthetic material derived from petroleum, that able to absorb and retain large amounts of water and aqueous solution. Due to current needs, the replacement of petroleum to renewable energy due to it's limited lifetime, the research on SAP was extensively carried out with the Natural Polymers. In this research, the investigation of potential Methylcellulose (MC) and Oil palm trunk powder (OPT) as natural polymer were examined as substitution of petroleum product. The various composition of MC and OPT that crosslinked with citric acid were investigated to the water absorption capacity rate. The findings show the OPT water absorption rate is three (3) times higher than pure MC materials at room temperature. This research shows the potential of biobased materials as SAP for various applications.

**Keywords:** Superabsorbent polymer, methylcellulose, oil palm trunk.

## **TATI05**

### **Contribution of Mn<sup>2+</sup> and Fe<sup>3+</sup> Addition to Natural Hydroxyapatite (HAp) in UV Absorption for Sunscreen Application**

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**Abstract:** Hydroxyapatite (HAp) is a biomaterial that can be derived from fish bones or crustaceans. This natural HAp contains a lot of calcium phosphate which acts as an active ingredient that can absorb UV rays and prevent them from penetrating the skin. HAp then is doped with iron (Fe<sup>3+</sup>) and manganese (Mn<sup>2+</sup>) to form a hybrid complex that will reflect UV rays when they reach the skin. This hybrid complex formulated cream has undergone spectroscopic analysis (FTIR, TGA, UV, XRD) and skin analysis (melanin, TEWL, hydration), and the result are great and give better efficiency as a sunscreen. This research also highlighted the integration of quantum chemical approach and experimental results in attempts to elucidate the structural-property characteristics and its relation to the UV absorption that effects the SPF value.

**Keywords:** HAp, clamshell, sunscreen

## UCTS02

### **Physicomechanical and Microstructure Analysis of Polypropylene Hybrid Composite Reinforced Kenaf and Bamboo Fiber**

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**Abstract:** Composite materials in general are used in the industry because of their benefits. Among the benefits are cost-effective, high mechanical performance, low specific weight and biodegradability. The physical and mechanical properties of a hybrid plastic bamboo and kenaf composite were investigated. The bio-renewable composites were fabricated into different fibre weightage (40 wt%, 50 wt%, 60 wt% and 70 wt%). The fabrication of bio-renewable composite was done using a hot press process at 180°C for 20 minutes at 5 MPa with different fibre weightage. The thickness swelling and water absorption were determined and the mechanical properties were directly measured via a tensile test and flexural test. While morphological property tests were performed using a scanning electron microscope (SEM). Physicomechanical properties were conducted as followed by the ASTM standard. Found that the water absorption and thickness swelling of the composite increased as the fibers weight ratio increased. Also, the specimens with a higher modulus produce a higher tensile strength and flexural strength. Furthermore, represented that the 50 wt% of fibre content produces a higher tensile and flexural value compared to other specimens with 7.757 MPa and 8.200 MPa respectively. SEM results revealed the presence of voids and fibre breakage in 70 wt% and 60 wt% of fibre content because of poor interfacial adhesion while fewer voids appeared in 50 wt% and 40 wt% of fibre content since there is good interfacial adhesion between the fibre and the matrix. Concluded that the 50 wt% ratios highlighted better performance and it was recommended for interior composite applications as well.

**Keywords:** Bio-renewable plastic composite, scanning electron microscopy, tensile, flexural, thickness swelling, water absorption.

## **UIAM02**

### **Effect Of Electron Beam Irradiation On The Properties of Poly(Vinyl) Alcohol (PVA)-Cellulose Nanocrystal Hybrid Aerogel**

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**Abstract:** In this study, a polyvinyl alcohol (PVA) hybrid with oil palm empty fruit bunch (EFB) cellulose nanocrystal aerogel was prepared with the freeze-drying method. The fabricated PVA hybrid aerogels have been irradiated with an electron beam (EB) at low doses ranging from 5, 10, and 20 kGy. The properties of non-irradiated and irradiated PVA hybrid aerogels were compared and characterized by gel content, Fourier transform infrared (FTIR), uniaxial compression, and adsorption (methylene blue (MB) dyes) tests. Results showed that the compressive strength and Young's modulus of aerogel samples improved with the addition of cellulose nanocrystals and increased irradiation doses. The irradiation-induced crosslinking reaction was evident from the FTIR analysis. The EB irradiation also affects the adsorption capacity of the PVA hybrid aerogel.

**Keywords:** Polyvinyl alcohol, hybrid, crosslinking.

## UiTM01

### **Effect of Electrode on Tribological Behaviour of Ni-GO Nanocomposite Coating**

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**Abstract.** Research on electrode materials has concentrated on understanding their active surface area and catalytic capabilities for improving reaction kinetics. Practical electrodes in industrial processing and technology must meet criteria such as cost-effectiveness, mechanical and thermal stability, efficient electrocatalysis, high electrical conductivity, and scalability. This has led to the emergence of electrodeposition as a financially viable and technically feasible method for producing metallic coatings, generating considerable interest among engineers in diverse sectors. Coating, which involves the deposition of thin layers onto a solid surface, serves as a crucial protective measure, effectively reducing the risks and consequences of damage and corrosion on the substrate. This research aimed to explore the influence of different electrodes on the tribological properties of Nickel-Graphene Oxide (Ni-GO) nanocomposite coatings. The electrodeposition process involved depositing Ni-GO nanocomposite coatings on carbon steel substrates with a graphene oxide concentration of 0.05 g/L. The coatings were deposited using different electrodes, namely graphite, platinum mesh, titanium, and stainless-steel rod, at a temperature of 45°C for 45 minutes. Various characterization techniques, such as scanning electron microscopy (SEM), Alicona Infinite Focus, micro-Vickers hardness testing, and X-ray diffractometry (XRD), were employed to analyze the surface morphology, surface roughness, coating thickness, microhardness, and phase structures of the coatings, respectively. The tribological performance was evaluated using a pin-on-disc tribometer, while the nature of the corrosion products was determined through characterization. Among the different electrodes used, the coating deposited with a stainless-steel rod exhibited the highest coating hardness of 303.4 HV. The platinum electrode yielded the thickest coating with a thickness of 27.92  $\mu\text{m}$ , while the coating deposited with the graphite electrode had a 6.16  $\mu\text{m}$  significantly lower thickness. Moreover, the coating using stainless-steel electrodes displayed the highest surface roughness of 2.13  $\mu\text{m}$ , while the coating using graphite electrodes exhibited the lowest coefficient of friction at 0.65. In conclusion, the utilization of different electrodes in the electrodeposition process significantly affects the chemical and mechanical properties of Ni-GO nanocomposite coatings.

**Keywords:** Graphene oxide, electrodeposition, coating, electrode, nickel sulphate

## **UiTM03**

### **Examining the Hyperelastic Characteristics of Silicone and Skin Via Computational Analysis**

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**Abstract:** Biomaterials play a critical role in medical technology and require properties that can interact safely with the human body. While silicone and skin have the potential as biomaterials, there is a need to understand their hyperelastic properties better and compare their performance. This research investigates the performance of hyperelastic models for skin and silicone material to develop a novel synthetic skin for wound healing. We use Ansys software and finite element analysis to compare the Neo-Hookean and Ogden models, which describe the behavior of nonlinear materials. We consider four categories of parameters for the models, representing Ogden and Neo-Hookean models for skin and biomaterial patches. Our analysis shows that the Ogden model matches the experimental curve and demonstrates the potential for wound-healing applications. This research contributes to biomaterials and has implications for designing medical technologies that interact with the human body.

**Keywords:** Biomaterial, computational analysis, hyperelastic, neo-hookean, ogden.



## UMK03

### Effect of Cellulose Nanocrystals (CNC)/ZnO as Hybrid Filler in Polyvinyl Alcohol (PVA) Matrix for Food Packaging Application

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**Abstract.** There has been growing interest in developing sustainable and biodegradable materials for food packaging applications in recent years. This study investigates the effect of incorporating Cellulose Nanocrystals (CNC)/ZnO hybrid fillers into a Polyvinyl Alcohol (PVA) matrix for food packaging purposes. The PVA/CNC/ZnO nanocomposite films were prepared by solvent casting with different hybrid filler, CNC/ZnO ratios (3:1 wt%) and (3:2 wt%). PVA, PVA/CNC and PVA/ZnO were also prepared for control. The prepared thin film samples were then characterised using visual inspection, optical microscopy, and FTIR-ATR. The samples were also tested as packaging for fresh cherries, where the weight loss percentage was determined over 30 days. Visual inspection of the nanocomposite films against the logo showed that the increasing weight ratio of CNC/ZnO resulted in films that were opaquer and appeared whiter, while those under the polarized optical microscopy exhibited the birefringent patterns observed in the samples with CNC. FTIR-ATR revealed the related functional groups to the PVA, CNC, ZnO and the mixture in the nanocomposite films. The effectiveness of the nanocomposite films in reducing weight loss of fresh cherries showed a significant impact where PVA/CNC/ZnO (3:1 wt%) had the lowest weight loss namely 1.37% while the control sample, PVA thin films, had the highest weight loss with 15% after 30 days. In conclusion, the PVA/CNC/ZnO nanocomposites exhibit promising potential as biodegradable materials for food packaging applications.

**Keywords:** Cellulose nanocrystals, ZnO, hybrid filler, PVA, food packaging.

## UMK10

### Anti-fungal Properties of Iron Compound–Rich Electric Arc Furnace (EAF) Slag

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**Abstract:** Electric Arc Furnace (EAF) slag is a by-product generated during low-carbon steel refining, has increased throughout the year. Only a few EAF slag is being utilized for construction applications, and the remaining were stockpiled without full utilization. Iron compound is a significant component in EAF slag that has great potential to carry anti-fungal properties. EAF slag rich with iron compound can be utilized and be an alternative to the anti-fungal agent for wood products. Therefore, this project aims to determine the suitability of iron compound-rich EAF (obtained from Malaysia's steel manufacturer) slag as an anti-fungal agent, that the inhibition zone of brown rot and white rot fungi were investigated. For the anti-fungal assay, potato dextrose agar (PDA) was used as media to culture the brown rot (*Coniophora puteana*) and white rot (*Lentinus Sajor-caju*) fungi. Then, the EAF slag powder was placed surrounding rot fungi to observe the inhibition zone for 30 days. The anti-fungal assay, EAF slag was also compared to synthetic iron compounds such as pure Fe, Fe<sub>2</sub>O<sub>3</sub>, and Fe<sub>3</sub>O<sub>4</sub> were observed. The EAF slag was also characterized using X-Ray Diffraction (XRD) to identify the phases present. The fundamental of this experiment is to find what phases exist in EAF slag that works excellent on inhibiting the growth of rot fungi. From this experiment, EAF slag shows no inhibition zone towards brown rot and white rot fungi. However, pure Fe<sub>2</sub>O<sub>3</sub> and Fe shows the most significant influenced on the inhibition zone towards brown and white rot fungi growth, respectively, on day-30 of the fungal assay. It shows that the EAF slag has no significant influenced on rot fungi as the inorganic agent to protect the wood from brown rot and white rot fungi attack.

**Keywords:** EAF slag, iron compound, anti-fungal, brown rot fungi, white rot fungi.

## UMK24

# **Tunable ETFE Cushions: A Concept Study on Shading Systems for Climate-Sensitive Building Skins**

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**Abstract:** Climate-sensitive building skins adapt to weather changes, control incoming sunlight and moderate heat transfer between in- and outdoor spaces. ETFE foil is a material that allows engineering building envelopes with these functionalities. While lightweight, flexible, and highly transparent, it can also be equipped with air-controlled switchable features for solar control. Dual mode switching mechanisms have been shown to reduce buildings' energy consumption for heating, cooling and improving daylight performance. However, they do not perform equally well in different climates and weather conditions. A gradual shading system would adapt more efficiently to environmental changes on a wider range, increasing daylighting hours and reducing building energy consumption even further. Therefore, this paper reports on a concept study developing a tunable shading mechanism for inflated ETFE cushions, aiming to perform more climate-sensitive than previous systems. The study proposes reversible transformations of inflated ETFE foil layer systems as a conceptual basis for novel shading mechanisms, relying on previous discoveries in the field. The anticipated challenge resides in detailing a flexible edge profile that allows the dynamic transformation of the air-operated shading element. The methods employed include FEM form-finding techniques, parametric 3D modelling, 3D printing, experimental testing, and simulating the mechanical and environmental performance of a scaled mock-up. The preliminary results provided enough data for a proof of concept and showed that 3D printed flexure springs could enable reversible shape transformations of flat patterned ETFE cushions that would allow for tunable shading mechanisms. The results support the project's overall goal to advance current adaptive technologies for ETFE constructions and thereby contribute to the development of sensitive building skins that will enhance the comfort conditions and energy performance of buildings.

**Keywords:** ETFE, pneumatic construction, flexure spring, kinetic, solar control, building performance.

### UMK33

## **Study on Effect of Glass Additives In An Electroceramic Material For Improvement Of Dielectric Resonator Antennas**

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**Abstract:** The release of the unlicensed 60GHz band and the development of 5G technologies aimed at increasing data rate on wireless communication network by a factor of 100 will impose stinging specifications (large bandwidth, high gain, small size, and temperature independent performance) on the design of the radio frequency (RF) electronics. Various front-end antenna solutions relying on monopoles, dipoles, and patch antennas have been proposed for millimetre- wave applications. These antennas are characterized by small size, low weight, and low cost and can be easily integrated on chip. However, unless advanced design solutions based on the integration of suitable dielectric superstrates or lensing structures are adopted, these antennas typically suffer from reduced radiation efficiency and narrow impedance bandwidth due to the effect of lossy silicon substrate materials. On the other hand, dielectric resonator antennas (DRAs) are promising candidates to replace traditional radiating elements at high frequencies, especially for applications at millimetre waves and beyond. In this work amine functionalized material of glass have been designed with dielectric gradients. The glass were characterized with suitable characterization tools and the dielectric behaviours were measured through impedance measurement. The dielectric study has shown significantly high dielectric properties at sintered temperature 1000°C (6 h). So it can conclude that this series of glass with a different dielectric constant can be used for designing various electronic devices.

**Keyword:** Dielectric resonator antennas, glass additives (CCTO)

## UMK39

### **Fabrication and Characterization of Mixed Matrix Ultrafiltration Polyether-sulfone Membrane Blended with Biopolymer Cellulose/Titanium Dioxide Nanoparticles for Humic Acid Removal**

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**Abstract:** In this study, polyethersulfone mixed matrix membrane were fabricated using different composition of cellulose and Titanium dioxide (TiO<sub>2</sub>) nanoparticle in order to improve the properties and performance of ultrafiltration membrane. The properties of the fabricated membrane were evaluated in term of chemical structure, surface hydrophilicity, porosity, water content, and surface morphology surface roughness. The performance of the fabricated membrane was also determined by conducting the pure water flux, humic acid flux and acid rejection. The antifouling properties of the fabricated membrane was analyzed by measuring the fouling resistance parameters. Overall, the addition of 3 wt.% cellulose and TiO<sub>2</sub> into the casting solution gives the highest humic acid rejection and improved antifouling properties with the flux recovery ratio (FRR) increased up to 75.34% compared with the pure PES of 61.50%, respectively.

**Keywords:** Membrane technology, ultrafiltration membrane, humic acid removal

## UMK42

# Effect of Annealing Temperature to Mechanical Properties of Soda Lime Silica Glass

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**Abstract:** Soda lime silica glass usually made up from sand (silicon dioxide, SiO<sub>2</sub>), soda ash (sodium carbonate, Na<sub>2</sub>CO<sub>3</sub>) and limestone (calcium carbonate, CaCO<sub>3</sub>). It is a widely used type of glass due to its reasonable price, recyclable, chemically stable, reasonably hard and transparent. Silicate glass have broad range of conventional and advance applications such as tableware, laboratory equipment, automotive parts, optical and mobile devices. However, the silicate glass brittleness become one of its weaknesses. The glass strength was easily affected if there any surface flaws present. A rapid or uneven changes of temperature faced by the glass can create surface micro crack due to low thermal shock resistance. To overcome this situation, there several strengthening methods can be done to improve the glass properties. In this study, it focuses on heat treatment method. Annealing at different temperature, 500 °C, 550 °C and 600 °C for 16 hours, can reduce residual stresses and relieve internal stresses of the glass. As a result, the glass strength is increased with increasing of annealing temperature.

**Keywords:** Soda lime silica, annealing, strengthening, strength, internal stresses

## UMK46

### **Application of TIG-MIG Hybrid Welding on A516 Carbon Steel**

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**Abstract:** TIG-MIG hybrid welding combination was proposed to improve MIG welding and to add the advantages of TIG welding in terms of visual appearance. In this study, four different travel angles (90, 75, 60 and 45) and two types of welding speed which is 5 mm/s and 7 mm/for both MIG and TIG-MIG hybrid welding. The aim of this study is to find the application of TIG-MIG hybrid on carbon steel by evaluating the visual appearance (reinforcement height, penetration depth, bead size and weld toe angle) of the weldment, analysed the grain size of the weldment microstructure and relates it with the mechanical properties and identification the optimum welding parameter of by using Taguchi method in comparison with conventional MIG and TIG-MIG hybrid welding. The results were achieved in this research and conclusion is made based on three objectives of this study as follow. Based on visual appearance result, the TIG-MIG hybrid welding produce smooth weld bead profile, higher bead height and weld toe angle compared to MIG welding even though MIG welding has deeper penetration but both types of welding have their own advantages for certain application. Heat input is reduced when TIG-MIG hybrid are applied which is good application to use the thinner workpiece. Meanwhile, the grain size of MIG welding is larger due to higher input compared to TIG-MIG hybrid welding. In terms of microhardness, TIG-MIG hybrid produce higher microhardness which might be due to grain refinement which enhance its strength which might be due to its lower heat input compared to MIG welding. Optimum parameters are achieved in Taguchi method analysis which shows that for this method and parameters that is used is better to applied TIG-MIG hybrid welding rather than MIG welding.

**Keywords:** TIG (Tungsten Inert Gas) welding, MIG (Metal Inert Gas) welding

## UMK48

### Development of TIG/MIG Hybrid Welding Process

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**Abstract :** The influence of TIG current variation on arc stability of TIG/MIG hybrid welding was studied by comparing it with the conventional MIG welding process. The welding current-voltage waveform was analyzed to characterize the arc stability of the MIG arc. From the observation, introducing a TIG arc at as low as 60 A of current significantly changed the MIG arc stability in TIG/MIG hybrid welding. The length of the MIG arc in TIG/MIG welding increased with the introduction of the TIG arc compared with the one in conventional MIG welding. The increase in arc length is believed to be related to the arc interaction between the TIG arc and MIG arc, which then affected the wire melting rate. At the optimum TIG current, the diameter of the molten droplet decreased with the increment of droplet transfer frequency.

**Keyword :** TIG/MIG hybrid welding, arc stability, arc interaction



## UMK50

### **Influence of Zinc Oxide Morphologies on The Antibacterial Activity**

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**Abstract:** In this research, a hydrothermal method was effectively used to synthesize ZnO of various morphologies. The raw materials used are sodium hydroxide (NaOH) and zinc chloride (ZnCl<sub>2</sub>) to prepare ZnO. The mixture was heated at 180 °C for 24 hours for all samples. By adjusting the amount of sodium hydroxide (NaOH), the precursor's pH was changed from 8, 9, 10, 11, and 12. The pH of the precursor affected the morphology and optical band gap of ZnO (ZnO) nanostructures. X-ray diffraction (XRD), and ultraviolet-visible (UV-Vis) spectroscopy were used to characterize the materials. The antibacterial activity of *Staphylococcus aureus* and *Escherichia coli* is influenced by ZnO was observed. XRD to calculate the various crystal structure properties, such as lattice strain and crystallite size. Indicating the presence of blueshift, UV-Vis spectroscopy reveals ZnO's absorption or reflectance peaks were between 300 and 400 nm. From the zone of inhibition testing, we can see that the morphologies may affect the antibacterial activity.

**Keywords:** ZnO, antibacterial, morphologies, aggregate.

## UMK51

### **Physicochemical Properties of Starch Aerogel Incorporated with Titanium Dioxide**

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**Abstract:** Starch aerogels have drawn a lot of interest as lightweight, environmentally friendly materials with a wide range of applications. In this study, we explore the synthesis and characterization of starch aerogels incorporated with titanium dioxide (TiO<sub>2</sub>) nanoparticles to enhance their properties and extend their potential application. The incorporation of TiO<sub>2</sub> nanoparticles aimed to enhance adsorption capacity of the starch aerogels. The preparation of starch aerogels was achieved through a sol-gel process, utilizing starch as the biopolymer precursor. TiO<sub>2</sub> nanoparticles were homogeneously dispersed within the starch matrix via a facile and cost-effective method. The effect of varying TiO<sub>2</sub> nanoparticle loadings (0.006, 0.012, 0.018 wt%) on the aerogel's structural and morphological properties was investigated. The structural analysis, including Fourier transform infrared spectroscopy (FTIR) and X-ray diffraction (XRD), revealed the successful integration of TiO<sub>2</sub> nanoparticles into the starch aerogels. Furthermore, the adsorption capacity of the aerogels was evaluated using methylene blue as a model pollutant. The TiO<sub>2</sub> incorporation led to improved adsorption efficiency, attributing to the combined effects of pore structure and photocatalytic degradation of the adsorbate.

**Keywords:** Starch aerogel, Titanium dioxide, physicochemical properties, adsorbent

## UMK56

### Effect of Epoxidised Natural Rubber on Mechanical Properties of Kenaf Core Fibre-reinforced Polypropylene Biocomposites

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**Abstract.** In this research, the kenaf core fibre (KCF) reinforced polypropylene (KCFRPP) biocomposites were fabricated by melt blending using Brabender internal mixer and compression molding with the presence of a different amount of epoxidised natural rubber (ENR). Brittleness had been a problem in engineering materials, which caused to be a failure premature in applications. In order to achieve good toughness in composites, the incorporation of rubber phases (ENR) into KCFRPP had been done. The pure polypropylene (PP) matrix was used as a sample control of the composites. Seven samples with different formulations were prepared and underwent characterization to determine the mechanical properties using universal testing machine (UTM). Overall, the result demonstrated that the increment of ENR content had significantly improved impact-related properties (elongation at break) but at the expense of strength and modulus properties. The field emission scanning electron microscopy (FESEM) morphological studies proved that the matrix fibrillation's presence contributed to the increasing of the toughness properties of KCFRPP biocomposites. Still, the existence of fibre pull-out and void contributed to the low strength and modulus properties of KCFRPP biocomposites.

**Keywords:** Polypropylene, epoxidised natural rubber, kenaf core fibre, mechanical properties

## UMP03

### Electrolyte Engineering for Improved Energy Density of Symmetry Carbon Electrode Supercapacitor

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**Abstract:** Supercapacitor had gained tremendous attention owing to its long cycling lifetime (capable of retaining 99% its initial capacitance after 10,000 charge-discharge cycle) as well as superior power density (fully charged in seconds). However, supercapacitor technologies were haunted with low energy density, significantly impacting its competitiveness when compared to lithium-ion batteries. Surface modification of the electrode was frequently used to improve the charge storability of supercapacitors – saturated activities with limited achievement. Electrolyte engineering is viewed as the next revenue in enhancing the energy density of supercapacitors. Herein, modified EmimBF<sub>4</sub> ionic liquid was adopted as the electrolyte for symmetry activated carbon supercapacitor. Three different lithium salts (namely LiBF<sub>4</sub>, LiClO<sub>2</sub>, and LiTFSI) were separately added to the EminBF<sub>4</sub> and the electrochemical performance of the fabricated devices were studied. Surprisingly, adding 0.5M of LiClO<sub>2</sub> doubled the energy density of the symmetry supercapacitor from 51.34 to 102.49 Wh/kg. The effect of LiClO<sub>2</sub> concentration on the electrochemical performance of the symmetry supercapacitor was also studied, where higher concentration demonstrated negative contribution to the energy density of the device, attributable to the increased viscosity of the electrolyte. This work demonstrated that the energy density of the ionic liquid-based electrolyte can be doubled simply through lithium salt addition.

**Keywords:** Non-aqueous electrolyte, ionic liquid, activated carbon, EDLC, energy storage

## UMS01

### Effect of Bimetallic Co-Cu/Dolomite Catalyst on Glycerol Conversion to 1,2-Propanediol

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**Abstract:** The performance of Cu and Co monometallic and bimetallic catalysts supported on dolomite were evaluated for glycerol hydrogenolysis to 1,2-propanediol (1,2-PDO). The catalysts were synthesized via method of impregnation, calcined at 500 °C and later reduced at 600 °C. Advanced analytical techniques such as BET, BJH, XRD, H<sub>2</sub>-TPR, NH<sub>3</sub>-TPD, and SEM, were used to characterize the synthesized catalysts and subsequently evaluated in glycerol hydrogenolysis. Of all catalysts synthesized and tested in hydrogenolysis, the cobalt-copper bimetallic catalyst exhibited the highest performance with 80.3% glycerol conversion and 85.9% selectivity towards 1,2-PDO at 200 °C temperature, 4 MPa pressure and 10 h reaction time. The good interaction of cobalt-copper-dolomite species leading to adequate acidity, good metal reducibility (reduction of oxide species at lower temperature), larger particle size, high surface area (15.3 m<sup>2</sup>g<sup>-1</sup>), small pore volume (0.032 cm<sup>3</sup>g<sup>-1</sup>), small pore diameter (0.615 nm) leading to high catalytic performance.

**Keywords:** Cobalt, copper, dolomite support, acidity, glycerol hydrogenolysis, 1,2-propanediol.

## USIM01

### **Physicochemical Properties and Decomposition of Mechanically Recycled and Thermal Treated Polylactic Acid Filament used in Additive Manufacturing**

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**Abstract:** 3D printing is a pivotal technology that is driving the Industry 4.0 revolution. This technology involves the creation of three-dimensional objects using a computer-aided design model, which is achieved through a layer-by-layer technique. Among the various materials used for 3D printing filaments, polylactic acid (PLA) is one of the most preferred due to its unique properties. However, the slow degradation of PLA, which takes about 12 weeks, has led to an increase in plastic pollution in the environment. To address this issue, this study aimed to explore an alternative approach to managing bioplastic waste through mechanical recycling and pre-decomposition using thermal treatment. Briefly, the process involved mechanical treatment of PLA to reduce its size, followed by dissolution in chloroform to create PLA films. These films were then subjected to pre-decomposition by thermal treatment at temperatures of 100, 120, and 150°C for 8 hours. After thermal treatment, the films were biodegraded in compost at a temperature of 58°C for 15 days. The study found that longer incubation times led to greater degradation of the PLA film, as evidenced by weight loss. With extended incubation time, the films were observed to break down into powder due to compost's attack on the film structure. Additionally, functional group analysis revealed that the biodegradation process and thermal treatment altered the functional groups of the PLA films. Therefore, this method can be used by communities to facilitate the self-degradation of their PLA waste, even within their own facilities and promote end-of-life if bioplastic for sustainability.

**Keywords:** Additive manufacturing, compost medium, PLA film, plastic end-of-life, pre-decomposition

## USM08

### **Detection of UV-C (200 nm to 280 nm) using GaN Photodiode Detector for Boocax UV Disinfection Robot Performance Analysis**

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**Abstract:** The rapid spread of SARS-CoV-2 from its origin in Wuhan City of China to the rest of the world urges the world to take many initiatives to fight against it. Recently, the use of Ultraviolet (UV) radiation as a disinfection method has increased in popularity due to its effectiveness. Many companies start to manufacture UV-C disinfection machines. However, the accuracy intensity of the germicidal UV-C that was emitted by the machine is still unclear. Thus, we studied a fabricated UV sensor by using GaN photodiode to analyze the performance of UV disinfection robot (Boocax UVRobot) by detecting the percentage of UV-C intensity has been produced. Metallic thin film was used to discriminate between UV-C (200 nm-280 nm) UV-B (280-315 nm) and UV-A (315-400 nm) during detection process. UV index decreases with distance and increased with time. Initial analysis using UV-Vis spectroscopy unit found the metallic thin film used absorbed all UV-A (315-320 nm), 70% UV-B (290-315 nm) and allow 100% UV-C (200-280 nm) to pass through. FESEM and EDX showed the selected metallic thin film is degraded by UV light. The metallic thin film used is not suitable to be used as a permanent UV filter due to its low thermal conductivity. Boocax UVRobot performance produced optimum UV-C at 5 cm and 5 min time of exposure. The percentage output of UV-C (200-280 nm) emitted at those parameters is 3.72%.

**Keywords:** COVID-19, ultraviolet-C, Disinfection, UV Robot

## USM09

### **Banana-leaves Cellulose-Starch Bioplastic Beads Composites: Preparation and Characterization**

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**Abstract:** Renewable, cost-effective, and widely available biomass is an appealing source of feedstock for numerous competent industrial materials. The biopolymer class is primarily composed of polysaccharides, which are nearly limitless polymeric raw materials possessing remarkable structure and properties. In this study, a biodegradable three-dimensional porous structure of banana leaves extracted cellulose-starch composites microbeads have successfully fabricated with improving properties using facile dropping technique. Cellulose was extracted from local banana leaves under mechanical treatment, followed by alkaline treatment and bleaching process. The produced cellulose was dissolved in green solvent containing NaOH and urea solvent. Subsequently, cellulose solution was mixed with starch at various percentages (1%, 5% and 10%). The mixture then dripped using syringe at certain height into a hot HCl as a coagulation solution. The beads were allowed to age in the solution for 12 hours before washing. After solvent exchange and subsequent freeze-drying, porous spherical cellulose beads with diameters ranging from 3.0 to 4.5 mm were produced. The physical and chemical properties of the prepared cellulose-starch composites beads were analyzed using various techniques, including analytical determination, UV, FTIR, Zeta, SEM, and EDX analysis. The SEM analysis revealed that the concentration of cellulose influenced the shape, size, and surface morphology of the beads, while FTIR proved the presence of extracted cellulose and its composites. These microbeads show potential for use in wastewater treatment.

**Keywords:** Adsorption, banana, biopolymer, dripping method, microsphere



## USM10

### **Mechanical Properties of Dental Composite Resin with Modified Aerogel Silica as a Filler**

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**Abstract:** Dental composite resin was produced by using a formulation of 50 wt% of triethylene glycol dimethacrylate (TEGDMA) and 50 wt% bisphenol A-glycidyl methacrylate (Bis-GMA), which acted as a monomer in this composition. In this dental composite formulation, aerogel silica was used as filler. The aerogel silica was produced from the sol-gel method via sonication of tetraethyl orthosilicate (TEOS). The aerogel then proceeds with the surface treatment with vinyltriethoxysilane (VTEOS). A series loading of modified aerogel silica (10 %, 20 %, 30 %, 40 % and 50%) was mixed in monomer composition to form a dental composite resin. The study observed that the presence of the silica and vinyl groups in aerogel was detected through Fourier transform infrared analysis (FTIR). Based on the mechanical testing, the flexural and compressive strength of dental composite resin prepared with the modified aerogel fillers showed higher with increasing filler ratio.

**Keywords:** Dental material, surface modification, dental composite.

## USM11

### **Comparison of Cervical Vestibular Evoked Myogenic Potential (cVEMP) Elicited by Custom-built Downward Narrow Band Chirp and 500 Hz Tone Burst Stimuli in Healthy Adults**

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**Abstract:** The vestibular evoked myogenic potential (VEMP) is commonly used to assess the functionality of otolith organs in clinical settings. Cervical VEMP (cVEMP) is a subtype of VEMP that evaluates the integrity of the saccule and inferior vestibular nerve. Although cVEMP is typically recorded with a 500 Hz tone burst, there is growing interest in exploring cVEMP's diagnostic utility when evaluated using chirp stimuli, originally designed for recording auditory brainstem responses (ABRs). This study aimed to compare the cVEMP responses evoked by custom-built downward narrow band chirp and 500 Hz tone burst stimuli in healthy adults. In this comparative study, 20 healthy adults (40 ears) aged 18 to 59 underwent the cVEMP test based on the recommended test protocol. The results demonstrated that the custom-built chirp stimulus generated significantly shorter P1 and N1 latencies compared to the tone burst stimulus ( $p < 0.05$ ). Additionally, the custom-built stimulus elicited larger P1 amplitudes, N1 amplitudes, and interamplitudes relative the tone burst stimulus ( $p < 0.05$ ). These findings imply that the custom-built chirp is more optimal than the conventional 500 Hz stimulus and may serve as an alternative stimulus to elicit cVEMP responses. In addition, there is limited information regarding the diagnostic utility of chirp-evoked VEMP in evaluating individuals with vestibular disorders. Further research in this aspect should be the next step.

**Keywords:** Otolith organs, vestibular evoked myogenic potential, saccule, inferior vestibular nerve, chirp, tone burst, amplitude, latency.

## **UTHM01**

### **Properties of Concrete as a Radiation Shielding- A Preliminary Review**

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**Abstract:** Among all of the shielding materials, concrete is considered to be the most suitable material that can be advantageously employed in fabricating shields since it not only possesses an adequate attenuation property but also the required mechanical strength. Furthermore, concrete can be cast into moulds of any required shape and by varying the compositions, high density concrete could be achieved. Another additional advantage of concrete shielding is that it could also be economical since it required almost no maintenance. There are many kinds of material that can be used as aggregates but the most common aggregate used was a nature-common rock. Aggregates need to be inert and act as filler materials. In short, aggregate can be classified as fine and coarse aggregates. This paper reviews the properties of concrete as a good radiation shielding.

**Keywords:** Concrete, radiation, radiation shielding, ionizing radiation, aggregate

**ABSTRACT:  
ENVIRONMENTAL  
TECHNOLOGY**

## **TATI04**

### **Treated Banana Peel Bioadsorbent for Heavy Metals Removal from Aqueous Solution**

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**Abstract:** Conventional methods in removal of heavy metals require high operational cost, need highly skilled labour, and generate sludge at the end of the operation. Compared to other techniques, banana peel bioadsorbent is a cost-effective adsorbent, easy to operate, environmentally safe and no health risk for the operator. The major problem associated with banana peel adsorbent is that the activated carbon produces from various low-cost raw materials have little or poor adsorption capacity against various pollutants as compared to commercial coal-based activated carbon. Besides that, large quantity of banana peel waste contributes to its significant disposal problem. Thus, this study is expected to solve the waste of banana peel and transform it as effective banana peel bioadsorbent through facile approach of its production process. The objectives of this research is to synthesize HNO<sub>3</sub> treated banana peel bioadsorbent and to characterize the functional groups as well as the absorption performance of the banana peel bioadsorbent. The bioadsorbent was characterized using FTIR and the removal of Fe and Cu ions were determined by using AAS. The results showed improvement in heavy metals removal using the treated adsorbent, at 16.45% and 19.29% for Cu and Fe ions respectively, compared to untreated banana peel. It is hope that the study will solve the banana peel waste and produce effective banana peel bioadsorbent.

**Keywords:** Banana peel, bioadsorbent, heavy metals.

## UMK13

### **Integrated Scheduled Waste Management System for Educational Sector**

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**Abstract:** Hazardous waste is waste in different physical forms, including solids, liquids, and gases with properties that make it dangerous or capable of having a harmful effect on human health or the environment. In Malaysia, hazardous waste is classified as scheduled waste as stated in Environmental Quality (Scheduled Wastes) Regulations 2005: Environmental Quality Act 1974. Hazardous materials are not only produced in industrial sectors such as manufacturing, agriculture, and mining, but also in the education sector as many hazardous chemicals are used in laboratories. The increasing usage of chemicals in the laboratories either for teaching and learning or for research purposes had increased the generation of scheduled wastes as well. The miss-management of scheduled wastes due to lack of awareness and competent staff and involving many laboratories as waste generator will contribute to an unsafe working environment for students and staff in the higher education sector. Therefore, this research is aimed to develop a systematic, integrated system for scheduled waste in higher education institutions. A pilot study for this system had been done in one of the education higher institutions in Kelantan. From the study, it was found that the developed scheduled waste integrated system was able to gather information from all laboratories (schedule waste generator) on scheduled wastes generation in one system. Besides that, reports generated from this system were developed as per requirement in the act enforced by the Department of Environment.

**Keywords:** Scheduled waste, integrated system, environment.

## UMK20

### **Application of Electrical Resistivity Method in Determining Fracture Zone in Granitic Rock Mass in JKR Quarry Bukit Buloh, Pulai Chondong, Machang**

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**Abstract:** Determining the fault zone in the rock mass is challenging because its unseen beneath. A geophysical method is an effective tool to obtain structural differentiation in the rock mass by interpreting a 2D electrical resistivity models. It is a well-known method that is user-friendly, rapid data acquisition, and non-invasive. An Electrical Resistivity Imaging (ERI) method was applied in this research study. Four electrical resistivity survey line are carried out to determine the fracture zone at JKR Quarry Bukit Buloh, Pulai Chondong, Kelantan. A Wenner configuration is chosen for this research study with 80m to 100m survey length with a depth of penetration is 12m to 15m respectively. The resistivity data recorded were inverted into subsurface electrical structures using the least-square inversion techniques. The data processing was carried out by using Res2dINV software. The resistivity results are divided into three zones which are low resistivity, medium resistivity, and high resistivity. Low resistivity is present with a range of less than 100  $\Omega\text{m}$ , medium resistivity with a range of 100  $\Omega\text{m}$  until 1000  $\Omega\text{m}$ , and high resistivity with a range more than 1000  $\Omega\text{m}$ . The result from pseudo sections shows that a fault zone is possibly present in the survey area with the resistivity value is between 500 $\Omega\text{m}$  to 2000 $\Omega\text{m}$ .

**Keywords:** ERI, subsurface, fracture zone, Res2dINV

## UMK21

### **Analysis of Multiple Surficial Sediments Contamination Indexes from the Selected River in Kelantan, Malaysia**

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**Abstract:** Sediment pollution is one type of pollution that has a negative impact on the environment. As a result, the research of sediment contamination indices provided additional data on the current state of the sediment and is frequently used. This study aims to determine the concentrations of metals in sediment, with an emphasis on lead, copper, zinc, manganese, chromium, and nickel. Meanwhile, the Enrichment Factor (EF), Geoaccumulation Index (I-geo), and Pollution Load Index (PLI) were used as indicators for sediment contamination indices in this study. The sediment samples were gathered in four rivers (Galas River, Dabong; Kelantan River, Kota Bharu; Kelantan River, Pasir Mas and Kelantan River, Bachok), each with five sampling points, and analysed with an Atomic Absorption Spectrometer (AAS). The results highlight that the total concentration in order as follows  $Mn > Zn > Pb > Cr > Ni > Cu$  with the average of sediment concentration were 264.42 for manganese; 52.23mg/kg for zinc; 27.23mg/kg for lead; 19.01mg/kg for chromium; 13.71mg/kg for nickel and 10.85mg/kg for copper. The Enrichment Factor (EF) revealed that the sources of pollutants in those rivers from the anthropogenic activities. In the meantime, the Geoaccumulation Index (I-geo) showed that all elements in four rivers were classified as zero to one, indicating that the sediment quality was from unpolluted to moderately polluted. This finding was also supported by the Pollutant Load Index (PLI), which showed that all elements in the river are under one revealing the sediment was unpolluted. The data obtained from this study proved valuable as one of the soil monitoring strategies to reduce soil pollution. However, in the future, more intensive research is required.

**Keywords:** Heavy metals, Enrichment Factor (EF), Geoaccumulation Index (I-geo), Pollution Load Index (PLI)



## UMK22

### Photocatalytic Degradation of Glyphosate using Immobilized TiO<sub>2</sub>/CNT

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**Abstract:** The most used herbicide in crop production for controlling weeds and grass is glyphosate, commonly known as N-(phosphonomethyl) glycerine. Glyphosate isopropyl ammonia, an effective commercial herbicide, was employed in this experiment. Overuse of this glyphosate in agriculture harms the environment because it results in runoff, which contaminates water supplies. Advanced Oxidation Process (AOP) is the method for resolving water contamination concerns, and photocatalytic degradation using immobilized TiO<sub>2</sub>/CNT nanocomposites has been observed to be a reliable solution for degrading glyphosate. The photocatalyst of TiO<sub>2</sub>/CNT nanocomposite was prepared using various ratios which were 50:50, 70:30 and 90:10. These photocatalysts were prepared using hydrothermal process. The prepared TiO<sub>2</sub>/CNT photocatalyst nanocomposite has been applied to degrade glyphosate in assessing its performance. Hence, the effect of various ratio of TiO<sub>2</sub> and CNT used, the initial glyphosate concentration and amount of photocatalyst used during photocatalytic degradation of glyphosate were investigated. According to this study, using 20 mg of a 50:50 TiO<sub>2</sub>/CNT nanocomposite photocatalyst to degrade glyphosate at 5 and 10 ppm resulted in degradation rates of 85.2% and 81.9%, respectively. This showed that it was possible to employ the developed photocatalyst to degrade glyphosate solution.

**Keywords:** glyphosate, TiO<sub>2</sub>, CNT, hydrothermal.

## UMK27

### **Cyberpreneurship among MSEs in Promoting Environmental Technology**

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**Abstract:** The Industrial Revolution 4.0 (IR 4.0) has brought significant changes worldwide, which requires entrepreneurs to reassess their businesses and embrace digitalization. There is a need for Micro and Small Enterprises (MSEs) to embrace online entrepreneurship, known as cyberpreneurship, to enhance the economic strengths and competitiveness in the global market. However, the readiness of MSEs in Malaysia to accept digital entrepreneurship remains uncertain and need further research. This study aims to identify a sustainable framework for cyberpreneurship among MSEs to enhance digital entrepreneurship in promoting environmental technology via quantitative methods to consolidate the proposed conceptual framework. This study will benefit MSEs, government agencies, policymakers, and scholars in enhancing cyberpreneurship to reduce the environmental impact of business operations. Businesses can reduce their carbon footprint by minimizing travel and energy consumption by embracing digital technologies such as cloud computing, remote work, and virtual meetings. Overall, cyberpreneurship is crucial not only to increase Malaysian economic growth but also has the potential to enhance environmental technology adoption, innovation, and sustainability.

**Keywords:** IR 4.0, cyberpreneurship, digital entrepreneurship, environmental technology, sustainability.

## UMK28

### **Sustainable Education through Blended Learning: The Case of Universiti Malaysia Kelantan**

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**Abstract:** Blended learning is an effective technological tool that enhances teaching and learning. It is a useful technological resource for sustainable education thus contributing to a sustainable environment. Previous studies established that policy implementation in the Malaysian educational context has produced various degrees of success. The difference in usage level for blended learning implementation across the faculties at University Malaysia Kelantan, however, is still debatable as the initiative related to the technology implementation for blended learning were equally distributed. Thus, this study aims to determine the success factors of blended learning toward sustainable education. Using the MPCU theory, questionnaires were administered to 50 UMK lecturers from five faculties who have implemented 100% blended learning. Based on a partial least square regression, results show that both intrinsic and extrinsic factors contributed significantly to the success of blended learning. In particular, academic workload has been found to be a new construct that influences blended learning implementation. The findings contribute to the current literature on MPCU theory application in blended learning and provide practical solutions for sustainable education. Respective communities including policymakers, institutions, lecturers, and students can benefit from this study, which is aligned with Malaysia Education Blueprint 2013-2025 and Sustainable Development Goal 4.

**Keywords:** Blended learning, sustainable education, successful factor, lecturers, sustainable environment.

## UMK34

### **Consumer Purchase Intention of Organic Food: A Cross-Sectional Study among Young Adult**

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**Abstract.** Malaysia was exposed to organic food as the country's growth changed. Even though it is still relatively new, it has garnered a positive reception. Therefore, this study aims to determine young adults' intentions toward consuming organic food in Malaysia. The study used the Theory of Planned Behaviour (TPB) as a theoretical framework and expanded on it by including the two components, health consciousness, and environmental concern. Using an online survey, google forms, and the judgmental sampling approach, 324 valid responses were obtained. Structural equation modeling (PLS-SEM) was used to examine the data. The results reveal that attitude, subjective norms, perceived behavioral control, health consciousness, and environmental concern positively influence the purchase intention of organic food in Malaysia. TPB was beneficial in predicting young individuals' intention to consume organic food. The findings are essential for organic food manufacturers to craft a marketing strategy aimed at organic food consumers in Malaysia.

**Keywords:** Organic, food, Theory of Planned Behaviour, PLS-SEM

## UMK35

### **Heavy Metal Concentration in Groundwater of Kampung Ipoh, Tanah Merah, Kelantan**

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**Abstract:** The main objective of present research is to produce the geological map with scale 1:25,000 and identify heavy metal concentration in groundwater. An application of this assessment indirectly can evaluate human health risk effect as well as the level of pollution and the sources of heavy metal levels in groundwater. Kampung Ipoh, which located in district Tanah Merah, Kelantan, Malaysia has been choose as a study area. It is situated at the west part of Tanah Merah district which cover an area of 25 kilometers square and it lies between latitude 05°51'13.28"N to 05°48'30.98"N and longitude 102° 3'45.50"E to 102° 0'54.75"E. The methodology used were mainly based on fieldwork inputs where the fresh rock sample have been collected. All of the data obtained were transferred into (GIS) software before the geological and other thematic maps were produced. Meanwhile, twelve water sample were collected from different well in Kampung Ipoh during sampling. The in-situ parameters which have been analysed in this research include pH, temperature, turbidity, total dissolved solids and dissolved oxygen. It has been observed by using a multiparameter instrument. Also, six heavy metal were identified (Mn, Fe, Cu, Zn, Ch and Pb) in groundwater by using Atomic Absorption Spectrometry (AAS) method. Schist was found dominant lithology that can be found mostly at the eastern part of study area. The granitic body in the study area could be known as Kemahang Granite. Taku schist is a unit that is in contact with Kemahang Granite along Kampung Ipoh-Ayer Lanas road. For the heavy metal concentration in Kampung Ipoh, Tanah Merah, Kelantan, its value was compared with the guideline that has been given by WHO and MOH for drinking quality of groundwater.

**Keywords:** Geological mapping, Kemahang Granite, Heavy metal concentration, AAS.

## UMK36

### **Characterization of Porosity and Permeability Properties of Limestone, Sandstone, and Shale Rock Formations in the Paloh Area, Gua Musang, Kelantan, Malaysia**

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**Abstract:** The Paloh area in Gua Musang, Kelantan, Malaysia, is of significant geological and hydrogeological importance. The porosity and permeability properties of rock formations in the Paloh area play a crucial role in the storage and movement of groundwater, making their understanding essential for effective water resources management and sustainable development in the region. The study area, covering 25 square kilometres, is defined by latitudes between 05°01'09" E to 05°03'50" E and longitudes between 102°12' 43N to 102° 15' 0 E. The main goal of this study is to produce an updated geological map on a scale of 1:25,000 for the area and to identify hydrogeological characterisation. The methodology applied for this research includes fieldwork, collecting samples from fresh outcrops, recording structural trends in rocks, and observing geomorphological features and drainage patterns. All of the field-related data are processed in GIS, to generate geological and thematic maps. Based on field observations, the study area is categorized into three distinct lithologies: limestone, shale, and sandstone, with the majority of the area being covered by karst limestone formations. The predominant landforms are karst limestone. Small streams (rivers) and caves are notable karst elements in this environment. The dynamics of groundwater circulation, storage, drainage patterns, and interactions with surface water are better understood because of these properties. By including the spatial characteristics of these karst formations, we may better understand hydrogeological processes and make defensible decisions about how to manage water resources and use land.

**Keywords:** Porosity, permeability, limestone, sandstone, shale, rock formations, Gua Musang, Malaysia, water resources.

## UMK37

### **River Channel Change Analysis using Remote Sensing Images for Sungai Galas, Kelantan**

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**Abstract:** River channel changes are frequently contributed by the changes to the physical controls on river channels, sediment and streamflow. It is anticipated that river channels physically change over time, caused by natural processes such as erosion and sedimentation. This study aims to quantify the spatio-temporal changes of Sungai Galas in Kelantan with the use of ArcGIS software. The river change analysis was done by plotting ten sets of cross sections along the three different zones which were upstream, midstream and downstream zones during dry and monsoon seasons. The overall result showed that significant changes were detected at all cross sections for both dry and monsoon seasons. The knowledge about river form changes can contribute and aid in the efficiency of river management.

**Keywords:** River channel changes, river management, spatio-temporal study, satellite imagery analysis

## UMK38

### **The Inclusion of Environmental, Social and Governance (ESG) Reporting in the Sustainable Environment: The Understanding and Awareness among Future Accounting Graduates**

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**Abstract:** The increasing important on the environmental, social and governance (ESG) in the sustainability agenda has called the role of the accounting professionals in preparing the sustainability reports and disclosures to the top management and providing assurance on sustainability data. The accounting professionals including accountants and auditors are expected to be well versed with the ESG matters and develop their technical and critical thinking skills in addressing the ESG matters. Therefore, it is essential for the higher education process to equip the future accounting graduates to be able to handle ESG matters which goes beyond the basic financial reporting. This study aims to analyze the level of awareness and knowledge of sustainability reporting and disclosure among accounting students by comparing the understanding of students of first and final year students. Using survey research design through the administration on a sample of accounting students, the data was analyzed using descriptive analysis by using Cronbach's alpha, mean, standard deviation and inferential statistics. The finding showed that accounting students have an adequate awareness on the ESG issue, knowledge on the need of the sustainability reporting and disclosure and agreed on the significant role of the future ready accountants to prepare sustainability reporting and provide assurance on sustainability reporting and disclosure.

**Keywords:** ESG, sustainable environment, sustainable reporting, accounting graduates.



## UMK40

### **Distribution of Microplastic in Soil at Lata Renyok, Jeli**

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**Abstract:** Plastic pollution in the marine and river environment has increased in the past few decades due to the increased use of plastic. In general, micro plastic fragments (<5 mm) are the most abundant environmental pollutants found in marine, freshwater and terrestrial ecosystems. There are many studies that have been reported and the effects of microplastics have already been found in the marine environment and rivers in Malaysia. But there is still less research done on the soil in Malaysia. Therefore, the purpose of this study is to study the distribution of microplastics in the soil in Lata Renyok, Jeli. 50 g of soil samples were taken to assess the availability of microplastics at each of the 5 sampling points (closed area, before hydropower, after hydropower, garbage disposal area and barbecue area). The microplastics present were analyzed for their size, shape and color using a biological microscope. Next, microplastics were characterized by Fourier Transform Infrared Spectroscopy (FTIR) according to the type of plastic to determine its chemical properties. In addition, Thermogravimetric Analysis (TGA) was used to determine the thermal and oxidative stability of materials, as well as the compositional quality of microplastics. This study shows that microplastics have been identified and there are more of microplastics during dry periods than after heavy rainfall. This could be caused by a variety of variables, including mechanical forces such as thermodegradation, photolysis, thermo-oxidation, and biodegradation processes. These processes break larger plastic waste into smaller pieces and they are likely to be absorbed into soil pores through rainwater. This can affect the quantity of microplastics found at each sampling point and subsequently contaminate the quality of the soil. This is due to the location that is known for fishing activities, picnic areas, and tourist areas. This study provides data on the presence of microplastics in soil that can benefit the local responsible parties for achieving the goals of the Sustainable Geotourism Development Project.

**Keywords:** Soil microplastics, microplastics, dry periods, heavy rainfall

## UMK41

### Study on Knowledge, Attitude, and Practices (KAP) of Recycling and Disposing of Used Cooking Oil (UCO): A Case Study in Kelantan, Malaysia

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**Abstract.** Used cooking oil (UCO) is a domestic waste generated from food preparation in households, restaurants, hotels, or school cafeterias. Normally after the preparation process, UCO will end up being dumped into the drain and sewer. This practice has resulted in environmental and odor pollution due to the solidification of UCO at low temperatures, which causes the substance to coalesce and adhere to the wall's piping system. Currently, limited studies have been conducted on the disposal and recycling of UCO among residents in Kelantan. The objective of this study is therefore to collect, analyze, and determine the knowledge, attitude, and practices (KAP) on the recycling and disposing of used cooking oil in communities of Kelantan, Malaysia. A total of 171 respondents from three districts (kota Baharu, Tanah Merah and Jeli) were involved in answering the survey questions through Google Form. This questionnaire is structured by using a theory of Knowledge-Attitude-Practices (KAP) and the sampling method used is non-probability sampling which is the purposive sampling method. The results obtained from this study were analyzed by using IBM® Statistical Package for Social Science (SPSS)® 20. The result of this study shows that there is a significant relationship between knowledge with attitude ( $p$ -value = 0.000), however, there is no significant relationship between knowledge with practice ( $p$ -value = 0.079) and attitude with practice ( $p$ -value = 0.618). Lastly, there is a high level of knowledge ( $M=3.8977$ ,  $SD= 0.54368$ ) and attitude ( $M=3.9187$ ,  $SD=0.49421$ ) among respondents, but a low level of practice ( $M=1.7678$ ,  $SD=0.24793$ ) towards recycling and disposing of UCO. It is suggested that various awareness campaigns need to be done to improve their practice.

**Keywords:** Used cooking oil, recycling, disposing, Theory of Knowledge-Attitude-Practices (KAP).

## UMP01

### **Particulate Matter (PM<sub>2.5</sub>) Dispersion Pattern at Selected Construction in Kuantan, Pahang: Environmental Management Modeling**

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**Abstract:** The emission of particulate matter is a synonym outcome of the release at the construction site. The emission of particulate involves defining a different phase of activities that occurred. The significance of the study, the emission of PM<sub>2.5</sub> depends on the type of activities that occurred during the construction and the relationship of the emission with the present meteorological data. This paper presents the dispersion pattern of PM<sub>2.5</sub> (particles less than 2.5 microns in aerodynamic diameter) emit at the construction site at selected construction in Kuantan, Pahang using the Rstudio software; an integrated tools development environment for R to map the PM<sub>2.5</sub> dispersion pattern. The dispersion pattern shows in Bivariate polar; (blue polar) about 0 to 8 µg/m<sup>3</sup> of PM<sub>2.5</sub> distribute to the North, Northwest, Southwest, and Northeast areas in the range of 4 m/s to 18 m/s within 6 months from June to November 2020. light blue polar distribute in 3 directions; East, West, and South in the range of 8 µg/m<sup>3</sup> to 9 µg/m<sup>3</sup> within 6 m/s to 14 m/s. WRPLOT helps in this study to determine the wind speed and wind direction were about 56.17% wind direction with wind speed within 0.5-2.10 m/s (orange), 13.87% wind direction with wind speed within 2.10 -3.60 m/s (yellow), 2.5% wind direction with wind speed within 3.60-5.70 m/s and 0.2% wind direction with wind speed more than 5.70 m/s. The calm wind is 27.25% of the time. Consequently, the combination of Rstudio and WRPLOT can deliver a better relationship outcome for mapping the dispersion pattern of PM<sub>2.5</sub> and provide valuable information for decision-making to the policymaker to improve the regulation and enhance guidelines for future air quality monitoring for the country.

**Keywords:** PM<sub>2.5</sub>, Rstudio, WRPLOT, construction site

## UNISEL01

### Decolourization of Methylene Blue using Indigenous Microbes

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**Abstract:** The process of wet processing in the batik industry results in wastewater that contains high levels of color (dyes), chemical oxygen demand (COD), biological oxygen demand (BOD), total dissolved solids (TDS), total suspended solids (TSS) and stubborn pollutants due to the substantial use of water and chemicals. This can pose a significant threat to human health and the environment if not addressed appropriately. Thus, it is essential to preserve water resources by seeking a cost-effective and eco-friendly approach to enhance the quality of batik wastewater before release into the environment. One way to accomplish this is by utilizing indigenous microbes derived from the batik wastewater to decolorize the dyes. In this study, the effectiveness of indigenous microbes specifically strain SK1 and strain SK2 isolated from the batik wastewater were examined for the decolorization of Methylene Blue. The decolorization process was performed at a temperature of 37 °C, using static and shaking conditions for the removal of 0.1 g/L Methylene Blue and the pH was not adjusted during the experiment. The results indicated that for the decolorization of Methylene Blue, both strains demonstrated a preference for the shaking conditions. Between these strains, strain SK2 demonstrated the most promising results, achieving  $79.89 \pm 1.76$  % decolorization after a 3-day incubation period. Compared to strain SK1, strain SK2 exhibited a higher decolorization capacity by 70 %. Therefore, this local strain, which showcases Malaysia's biodiversity richness, can be regarded as a competent biocatalyst for the effective treatment of batik wastewater.

**Keywords:** Decolourization, indigenous microbes, methylene blue.

## **UPM01**

### **Factors Influencing The Visitation and Revisitation of Recreational Area at Alor Lempah, Kuala Kubu Bharu**

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**Abstract:** Tourism has proven an attractive way to achieve economic growth and regional development in several rural areas. In addition, participation in outdoor recreational activities has increased and involves a large group of elderly, adults, youth, and children who are influenced by the latest technologies such as social media. These recreational activities are associated with positive values and benefits for people to spend their free time. Many people are aware of the benefits of participating in outdoor recreational activities for individuals' physical and mental well-being. A study was conducted to examine visitor participation in outdoor recreation activities. Since different recreation areas may have different qualities, different results could be obtained. The specific objectives of this study are (1) to identify the visitation factor in Alor Lempah, (2) to determine the revisit factor in Alor Lempah, and (3) to examine the relationship between service quality and revisit intention. Alor Lempah is located in Ampang Pecah, a remote district of Kuala Kubu Bharu, and has long been a focus of the national tourism industry. Alor Lempah, the recreational area, became a viral place for visitors during inter-district travel restrictions due to Covid-19 in areas covered by Phase 2 of the National Recovery Plan (NRP). However, visitors will continue to visit Alor Lempah after NRP, especially on weekends and holidays. The data was gathered from a recreation area along the river of Alor Lempah. Only visitors who visited the Alor Lempah were selected for the purpose of this study. This study applies a non-probability sampling method known as convenience sampling to identify qualified respondents. The respondents had to be visitors of Alor Lempah and had spent their time at the site. Data analysis was done using Microsoft Excel and Statistical Package for Social Science (SPSS). Descriptive analysis and binary logistic regression analysis were carried out to investigate the relationship between dependent and independent variables of the study. The results from the descriptive analysis show that free entry fees and spending time with family were the main factors motivating Alor Lempah's visitation.

**Keywords:** Motivation, satisfaction, revisit intention.

## USM01

### **Utilization of Tea Waste for Removal of Nickel (II) And Chromium (VI) In Aqueous Solution**

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**Abstract:** Recently, the search for low-cost eco-friendly adsorbents has become one of the main objectives of researchers. Therefore, for this research tea waste is chosen due to an abundant, low-cost, environmentally friendly and have higher metal binding capacities material that has shown promising potential as an adsorbent for heavy metal removal. The main objective of this study was to investigate the ability of tea waste to adsorb Ni (II) and Cr (VI) in aqueous solution and optimum adsorption capacity under various parameters such as different contact time and pH solutions using raw and acid treated tea waste. The adsorption of Ni (II) and Cr (VI) onto raw and acid treated tea waste were conducted in batch at contact time (30,60,90,120,150,180 minutes) and pH (3,5,7,9,11). The maximum removal of Ni (II) was 70% using acid treated tea waste was obtained at pH 5 and 120 minutes. Whereas, the maximum removal of Cr (VI) was 93% using acid treated tea waste at pH 3 and 150 minutes. The statistical analysis showed that there was significant mean difference between percent removal of Cr (VI) meanwhile for Ni (II) showed no significant mean difference by using raw and acid treated tea waste. Hence, this study showed that acid treated tea waste can be used as suitable and cost-effective adsorbent for removal of Ni (II) and Cr (VI) in aqueous solution.

**Keywords:** Raw tea waste, acid treated tea waste, heavy metal, contact time, pH.

## USM02

### Adsorptive Removal of Lead, Cadmium and Arsenic Ions from Fish Species Using Agricultural Waste Materials

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**Abstract:** Longtail tuna (*Thunnus tonggol*) and Shortfin scad (*Decapterus macrosoma*) are common fish species consumed by Malaysians. Heavy metals can accumulate in fish organs and cause health hazards to consumers. Therefore, this study aims to detect heavy metals in different fish species and remove the heavy metals, mainly lead (Pb), cadmium (Cd), and arsenic (As), using natural adsorbents techniques known as bio adsorbents techniques. It was found that the contents for Pb, Cd and As in these two different fish species were below the permissible limit set by Malaysian Food Regulation (MFR) 1985 and World Health Organization (WHO). The analysis of heavy metals was performed using Flame Atomic Absorption Spectroscopy (FAAS) and Graphite Furnace Atomic Absorption Spectroscopy (GFAAS). The biosorption technique used two adsorbents from natural waste: banana trunk and tea waste. This study was carried out with several parameters: the treatment time, adsorbent dosage, and temperature. This study revealed that the optimum conditions for the treatment to remove the heavy metals from *Thunnus tonggol* and *Decapterus macrosoma* were 0.1 g of adsorbent, 70 minutes treatment at 25±0.05 °C. The highest percentage removal was 100.00% for Pb, Cd and As. As the banana trunk was conducted based on the optimum conditions, the %R was higher when compared to tea waste. Despite that, both adsorbents gave a high efficiency in removing the toxic heavy metals in fish. Therefore, this biosorption technique can be used as an alternative technology to eliminate heavy metals that are more environmentally friendly, efficient and cost-effective and reduce the cost of raw materials in the manufacturing sector.

**Keywords:** Thunnus tonggol, Decapterus macrosoma, biosorption, waste materials.

## **USM03**

### **Knowledge, Attitude and Practice of Food Safety And Hygiene Among Home-Based Food Handlers in Kota Bharu, Kelantan**

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**Abstract:** Home food handlers must acquire the necessary knowledge and skills in food hygiene to maintain food safety requirements. Many people have started their home-based food businesses due to the COVID-19 outbreak. However, the degree of hygiene and safety of the food provided to clients is determined by individual knowledge, attitude, and practices. This study assesses the knowledge, attitude and practice of food safety and hygiene among home-based food handlers in Kota Bharu, Kelantan. Data were collected online among 119 home-based food handlers within the Kota Bharu area using a cross-sectional study. A set of questionnaires served as the primary instrument for the data collection and was analysed using SPSS version 26.0. The result showed that most respondents were female (90.8%). Meanwhile, 67.2% of the respondents had obtained their typhoid injection, and 70.6% attended the food handling course. Subsequently, 56.3% had good knowledge, and 84.9% showed a moderate attitude towards food safety and hygiene. Almost half of the respondents exercised a moderate practice of food safety and hygiene (43.7%). The study found a significant association between knowledge and perception scores ( $r=0.338$ ,  $p<0.01$ ). However, no significant correlations were found between practice with knowledge and attitude ( $p> 0.05$ ). In conclusion, it is important to assess home-based food handlers' knowledge, attitude and practice regarding food safety and hygiene to ensure the safety and cleanliness of the food prepared for the customer.

**Keywords:** Home-based food handler, knowledge, attitude, practice, food hygiene, food safety.



## USM05

### The Indoor Indoor Air Quality of Vehicles: The Influence of Window and Engine Settings

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**Abstract:** One of the most prevalent indoor air pollutants is particulate matter (PM), which has been associated to several negative health consequences, including early deaths and increased mortality in infants and other susceptible populations. Moreover, as there are numerous types of dangerous PM including PM<sub>2.5</sub> and PM<sub>10</sub>, vehicles are one of the causes that contribute to air pollution. Poor indoor air quality inside a vehicle can have an impact on a person's health. As compared to other micro-environments, vehicles have a higher personal exposure to PM and this exposure is influenced by factors like wind speed, driving conditions, vehicle type, emission rate and time spent in the vehicle. The reading was measured in the morning, afternoon and evening for 3 days under different windows and engine settings. The measurement was done by using Lighthouse Worldwide Solutions (Handheld 3016-IAQ). The acceptable limit for respirable particulate is 0.15 mg/m<sup>3</sup> (150 µg/m<sup>3</sup>). It was found the average reading for both PM<sub>2.5</sub> and PM<sub>10</sub> under different settings of windows during engine off and on were still below the acceptable value. For independent t test, the p value > 0.05, the result was found not significant. There is no comparison between mean of concentration of PM<sub>2.5</sub> and PM<sub>10</sub> with different control of window settings during engine off and on. Besides, for Pearson's correlation test, there is a significant correlation between PM<sub>2.5</sub> and PM<sub>10</sub>. There is a strong positive correlation (r=0.840). For this study, the limitation as the equipment has a problem with the battery that need to take some time to recharge and replace. Moreover, the type of car used in this research is only focus on one type which is hatchback.

**Keywords:** Particulate matter, air quality, vehicle type, windows and engine settings, PM<sub>2.5</sub>, PM<sub>10</sub>.

## USM06

### **Undergraduate Student's Awareness, Understanding and Readiness to Adopt Environmental Sustainability Practices In USM Health Campus**

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**Abstract:** The study aimed to assess the awareness, understanding, and readiness to adopt environment sustainability practices on campus by undergraduate students using a structured questionnaire. There were 92 respondents with a mean age of  $22.5 \pm 1.2$  years (74% women, 94% Malay ethnicity). While 57.6% and 60.9% responded as climate change and global warming are important issues, respectively, their self-reported practices on reducing waste, reusing material and recycling ranged from 31.5 - 51.1%, 37.0 - 41.3% and 30.4 - 31.5%, respectively. Nearly two-thirds of respondents reported high interest in sustainability practices with 45% highlighting the lack of recycling bins and 57% noting the lack of sustainability campaigns on campus. The respondents' awareness, understanding, and readiness were generally moderate, with mean scores of 72.8%, 79.9%, and 78.2%, respectively. There was a significant relationship between the score of readiness and understanding ( $p < 0.001$ ,  $r = 0.481$ ), the score of readiness and awareness ( $p = 0.003$ ,  $r = 0.308$ ), and the score of understanding and awareness ( $p < 0.001$ ,  $r = 0.381$ ). However, awareness, understanding and readiness scores were not influenced by age, gender, and program of study ( $p > 0.05$ ). In conclusion, campus sustainability practices can be enhanced through increased understanding and facilities for students.

**Keywords:** Awareness, understanding, readiness, environmental, sustainability.

## USM09

### **Knowledge, Attitude, and Practice of Solid Waste Workers towards Occupational Health Hazard Prevention in Kota Bharu, Kelantan**

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**Abstract:** Solid waste workers are exposed to potential occupational health hazards due to the nature of their work and work environment. This study aims to assess the knowledge, attitude, and practice of solid waste workers towards occupational health hazard prevention in Kota Bharu, Kelantan. A cross-sectional study was conducted among 150 solid waste workers in Kota Bharu. A questionnaire consisting of four sections, including sociodemographic, knowledge, attitude, and practice, was used to collect data. Descriptive statistics, Pearson correlation, and Spearman correlation were used to analyse the data. The study found that only 29.3% of the workers had good knowledge, 19.3% had a good attitude, and 58% demonstrated good practice in preventing occupational health hazards. Pearson correlation showed a significant correlation between attitude and practice ( $p < 0.05$ ), while Spearman correlation showed a significant correlation between duration of employment and practice on occupational health hazard prevention ( $p < 0.05$ ). Despite good practice among solid waste workers towards occupational health hazard prevention, their knowledge and attitude need improvement. Providing proper training and education to enhance their knowledge and attitude towards occupational health hazard prevention is necessary to ensure their safety and health in the workplace.

**Keywords:** Solid waste workers, occupational health hazards, knowledge, attitude, practice, safety and health.

## UTHM02

### Assessment of Heavy Metals and Radionuclide concentration in *Rastrelliger kanagurta* from wet market at Muar, Johor

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**Abstract:** Marine environmental pollution is a long standing global problem as a result of various industrial and anthropogenic sources. Heavy metals and radionuclides accumulate in marine life, particularly fish, as a result of pollution. Consumption of fish containing high concentrations of heavy metals and radionuclides can be harmful to human health. Thus, the investigation of the toxic heavy metals and radionuclides concentration levels in fish is essential. This study aimed to evaluate the heavy metals contents and radionuclide concentrations in *Rastrelliger kanagurta*. *R. kanagurta* is chosen as fish sample in this research because it is widely consumed among Malaysian population. *R. kanagurta* has been dried and grinds to 100 microns of powder form. The elemental composition of the heavy metals was determined using Inductively Coupled Plasma-Mass Spectrometry (ICP-MS). Meanwhile, Hyper Pure Germanium detector (HPGe) was used to determine the radionuclide concentration. The powdered fish samples must be homogenised before being transferred to Marinelli standard beakers. The sample was then airtightly packed with aluminium foil and stored at room temperature for at least one month to ensure that the radioactive secular equilibrium could be attained. In this study, the concentrations of Mg, Al, Fe, Cu, Zn, As and Pb in *R. kanagurta* were 2740, 461, 82.4, 9.33, 48.8, 3.66 and 2.43 ppm respectively. Meanwhile the trends for the concentrations of heavy metals in *R. kanagurta* were in descending order which are Mg > Al > Fe > Zn > Cu > As > Pb. U-238, Th-232, and K-40 concentrations in *R. kanagurta* also varied from 0.0042 to 0.1952 and 0.3221 ppm, respectively. The level of accumulation of these radionuclides for *R. kanagurta* in descending order was K-40 > Th-232 > U-238. This study revealed that the contamination of the sampled fish from heavy metals was below the acceptable limit that suggested by WHO, FAO and UNSCEAR. Additionally, it was discovered that the radionuclide concentrations in *R. kanagurta* was within UNSCEAR permissible limits.

**Keywords:** Heavy metals, radionuclides, ICP-MS, HPGe, *R. Kanagurta*

## UTHM03

### **A Development of Flood Hazard Map in Batu Kikir, Negeri Sembilan for Flood Management**

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**Abstract:** Pekan Batu Kikir is a small town in Jempol region in eastern Negeri Sembilan. Pekan Batu Kikir is located along the Kuala Pilah-Bandar Baru Seriting main trunk road and its location was in between Bahau and Kuala Pilah town. The development that has taken place in the area is not in line with the existing infrastructural facilities, which has led to flash floods and damaged some houses in the area. The main problem in the area is the lack of a major drainage system to the nearby river. In addition, the irregular village and house drainage and the small, outdated drainage system in these areas often cause flash floods during heavy rainfall. Therefore, flood hazard mapping is a useful non-structural strategy for catastrophe risk reduction, property protection, and sustainable urban development. The river basin's flood hazards were assessed in this study. The river basin's flood inundation map was created by integrating a hydrological and hydraulic model with geographic information systems. Different return durations for flood hazards were defined on maps. The flood hazard map can be used to improve the efficiency of the risk management procedures for disasters.

**Keywords:** Flood Hazard Map, Geographic Information Systems (GIS)

**ABSTRACT:  
BIOINDUSTRIAL  
TECHNOLOGY**

## **SPMVV01**

### **A Genome Editing Tool for Identifying Infertility**

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**Abstract:** Infertility is defined as a “disease of the reproductive system” and results in disability. Infertility affects a significant proportion of humanity. Current and future research in the area of infertility will not only serve itself, however may assist in finding innovations for new methods of contraception, to resolve issues of recurrent spontaneous miscarriage, pre-term birth or other neonatal complications. The global burden of infertility is greatest ensuring, emphasis on innovative, safe and cost-effective solutions. Deep learning methods allow to complete classification tasks such as identifying subtle abnormalities in genome data, clustering patients with similar characteristics into risk-based cohorts, or highlight relationships between symptoms and outcomes within vast quantities of unstructured data. Unlike other types of machine learning, deep learning has the added benefit of being able to take decisions with significantly less involvement from human trainers. The main objective of this paper is to identify the genetic interference in infertility cases with gene editing then Deep learning algorithms are used to classify the infertility cases by their functionality and to generate cloud datasets appropriately. Finally, a Gene Editing tool is generated for diagnosis of the Infertility based on infertility cases with major modifications of mutations and deletions using Deep learning algorithms.

**Keywords:** Infertility, Subfertility, Gender identity, Gene Editing, Deep Learning

## **SPMVV02**

### **Economic Importance of Microalgae as Biocatalyst for Industrial Production of Bioplastic, Biofuel and Bioflavouring Agents**

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**Abstract:** Algae, like other plants, produce a variety of remarkable compounds collectively referred to as secondary metabolites. They are synthesized by these organisms at the end of the growth phase and/or due to metabolic alterations induced by environmental stress conditions. Algae are used to develop many products such as bioflavours, biofuels and biopolymers, etc. Bioflavour and aromatic compounds are the most essential components in food, feed, cosmetics, pharmaceuticals, and toiletries products. Biofuel production from algae can provide some distinctive advantages such as their rapid growth rate, greenhouse gas fixation ability and high production capacity of lipids. This current status of biofuel from algae as a renewable energy resource. Bioplastic production from algae is a new opportunity to be explored and further improved. Therefore, the algae are used as resources for bioflavours, biofuels, and bioplastic production. Bioflavour, bioplastic, and biofuel synthesis are based on *de novo* microbial processes (fermentation) or on bioconversions of natural precursors using microbial cells or enzymes (biocatalysis). On the other hand, the use of algae as a potential source of high value economically useful products. Recently, algae have been used as a novel food with potential nutritional benefits in industry and medicine for various purposes. Fermentation and bioprocessing is the process of microbial and biochemical conversion of organic substances. It can be considered as the vehicle to transfer innovations in fundamental biology into bio-based products and thus plays a key role in bioeconomy.

**Key words:** Microalgae, Bioflavours, Biofuels, Bioplastic, Fermentation technology, Bio-processing.



## SPMVV05

### **Dynamics of *Firmicutes* Diversity and Abundance in Rhizosphere and Non-Rhizosphere Regions of *Santalum album* Tree Revealed through Next-generation Sequencing: Implications for Plant-Microbe Interactions and Soil Health**

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**Abstract:** Plant-microbe interactions in soil ecosystems are crucial for maintaining plant health and overall ecosystem functioning. This study focuses on *Santalum album*, commonly known as Indian sandalwood, a highly valued plant renowned for its aromatic properties and medicinal uses. Despite the diverse bacterial communities associated with sandalwood, the impact role of *Firmicutes* diversity in shaping plant health and ecosystem dynamics remains poorly understood. To address this knowledge gap, we conducted next-generation Illumina HiSeq sequencing, targeting the V3 region of the 16S rDNA, followed by bioinformatics analysis. Our research aimed to investigate the *Firmicutes* diversity and abundance variations between the rhizosphere and non-rhizosphere soil of *S. album*, an arboreal species exclusively found in the picturesque Tirumala hills region in Southeast India. We identified dominant *Firmicutes* families in both soil samples, including *Paenibacillaceae*, *Bacillaceae*, *Alicyclobacillaceae*, *Planococcaceae*, and *Thermoactinomycetaceae*. Comparative analysis revealed higher *Firmicutes* diversity in the rhizosphere region compared to the non-rhizosphere region, while the relative abundance (>0.01) differed between the two regions. The non-rhizosphere exhibited a total of 47 abundant and 98 rare species, whereas the rhizosphere region exhibited 38 abundant and 115 rare species, suggesting the presence of novel species. This research significantly contributes to our understanding of the microbial ecology associated with sandalwood, providing insights into *Firmicutes* specific roles and interactions in the growth and health of this economically significant tree species.

**Keywords:** *Santalum album*, 16S rDNA, Illumina HiSeq sequencing, Metagenomics, Microbial ecology, Relative abundance

## UKM01

### Metabolic and Genome Engineering for Enabling Xylose Utilization in *Corynebacterium glutamicum*

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**Abstract:** *Corynebacterium glutamicum*, a Gram-positive and industrially-important bacterium, is increasingly employed for sustainable biomanufacturing using lignocellulosic biomass as biofeedstock. However, biomass conversion using wild type *C. glutamicum* is inefficient due to the lack of crucial genes in xylose utilization pathways, preventing the bacteria from utilising xylose as sole/mixed carbon sources. For this purpose, this study was designed to address this substrate limitation by developing xylose-utilizing *C. glutamicum* using metabolic and genomic engineering strategies. To enable xylose utilization via the oxidative Weimberg pathway, a recombinant xylonate dehydratase (XylD) gene from *Herbasprillum huttiense* was cloned and isothermally assembled using pXMJ19 as the vector backbone to yield pXMJ19-*trc-hsxylD*. Following plasmid construction, electrocompetent *C. glutamicum* was transformed with pXMJ19-*trc-hsxylD* to generate pXylD strains. When cultivated on R2 minimal media with 2% xylose as sole carbon source, the engineered pXylD strain grew up to OD<sub>600</sub>= 1.88 compared to control pXMJ19 strain that could not grow (OD<sub>600</sub>= 0.15) after 48-hour incubation. The growth on xylose was comparable with the cells grown in 2% glucose-only medium where OD<sub>600</sub>= 1.99 and OD<sub>600</sub>= 1.79, respectively were obtained for the engineered pXylD strain and control pXMJ19 strain. To develop plasmid-free xylose utilization, the *trc-xylD* gene cassette was integrated into the myo-inositol transporter (*IolT1*) promoter region in the bacterial genome via homologous recombination. Following random strain screening, five out of 14 colonies (36% genome editing efficiency) were successfully genome-engineered to yield the *C. glutamicum pIolT:trc-xylD* strains. The findings obtained from this study will therefore provide a starting platform for further strain improvement using bioengineered *C. glutamicum* strains for tailored bio-product development.

**Keywords:** *Corynebacterium glutamicum*, xylose utilization, bioengineering, genome engineering, synthetic biology

## UMK05

### **Evaluating the Inoculation of Locally Isolated Methylo-trophic Plant Growth-Promoting Bacteria (PGPB) on Chilli Plant's Growth by Pot Study.**

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**Abstract.** Methylo-trophs are a group of bacteria capable of utilizing one-carbon compounds, such as methane, methanol and formaldehyde as their sole source of carbon and energy for growth and metabolism. Several methylo-trophs isolated from plant phyllosphere were found to have beneficial interactions with plants, where they act as plant growth-promoting bacteria (PGPB). These methylo-trophic PGPB promote plant growth by providing nutrients, stimulating phyto-hormone production and enhancing stress tolerance. In this study, three of our locally isolated methylo-trophic PGPB strains; ENPD1, ENPM1, and ENPM3 were inoculated to chilli plants to evaluate the bacteria-plant interactions by pot study. The chilli plants were inoculated weekly with foliar spray containing the culture of methylo-trophic PGPB and the growth performance of the inoculated chilli plants was assessed by plant height, plant weight and chlorophyll content after four weeks of inoculation. Results showed that all the inoculated chilli plants had significant increases in plant height and plant weight compared to the control, while no significant differences were observed in the chlorophyll content of the control and inoculated chilli plants. The increase in plant height and weight suggests beneficial plant-bacteria interaction and potential applications of our methylo-trophic PGPB as a biofertilizer for sustainable agriculture.

**Keywords:** Methylo-trophs, plant growth-promoting bacteria (PGPB), plant growth-promoting activities, biofertilizer

## UMK07

### **Cloning and Expression of Thermostable Alkaline Protease (TAP50a) gene in *E. coli* BL21 (DE3) and TOP10**

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**Abstract:** Protease is one of the valuable enzymes which has been used in numerous industrial applications. Thus, high production is required to meet the market demand. Thermostable alkaline protease 50a (TAP50a) was previously produced from *Bacillus subtilis* 50a strain. However, the use of wild type strain is not sufficient for commercial success due to inadequate production of desired protease. Therefore, design and optimization approach have been applied in this study. Most common design used for optimization condition for protease production is by using Box-Behnken Design (BBD). *E. coli TOP 10* harbouring TAP50a gene was been used in this study. Three parameters were used to optimize production which are agitation (rpm), inoculum size (%), and incubation time (h). The optimized condition for the optimum expression TAP50a enzyme in *E. coli* TOP10 was 30.0 U/mL under optimized conditions at 199.90 rpm, 3.16% inoculum size, and 23.67 h of incubation time. The expression of TAP50a in the host presented 2.36-fold increment under optimized culture conditions compared to the non-optimized. The fermentation using new host *E. coli TOP 10* for production of TAP50a able to give an advantages to the better production of the enzyme.

**Keywords:** Thermostable alkaline protease, optimization, Box-Behnken Design, agitation, inoculum size incubation time

## UMK08

### **Effect of Parameters on the Extraction Yield of Phenolic Compound in *Albizia Myriophylla*, Tebu Gajah Herbal Plant**

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**Abstract:** For decades, herbal plants had played an essential part in traditional medicine. According to the WHO (World Health Organization), 80% of people still used herbal plants to cure ailments in conventional medicine. Apart from contemporary medicine, traditional medicine can treat various diseases, such as high blood pressure, cholesterol, and immune system deficiencies. Each type of herbal plant had its specialization in conventional medicine, containing various nutrients. *Albizia Myriophylla*, or Tebu Gajah generally a plant or herb as an alternative to antidiabetic medicine widely used in ancient times because of its benefits and functions in treating diseases such as reducing glucose in the blood. However, the scientific substance that responds was unknown. To overcome this problem, research was carried out in extracting the phenolic compound at different process parameters (extraction solvent, extraction time and extraction ratio) using Soxhlet extraction method. GCMS testing is done to identify the respective bioactive compounds that were responsible for anti-diabetic properties. Result shows the best extraction yield of phenolic compound from Tebu Gajah was ethanol as solvent, at 4 hours, with 1:28 (w/v). The best parameter for enhancing the yield of the phenolic compound was the extraction solvent with a 2.93(%) yield.

**Keywords:** Tebu Gajah, *Albizia Myriophylla* Phenolic Compound and Extraction

## UMK11

### **Preparation and Characterization of Home-Made Soap From Sacha Inchi Oil**

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**Abstract:** The present study focuses on the preparation and characterization of homemade soap derived from Sacha Inchi oil, a rich source of essential fatty acids and bioactive compounds. Sacha Inchi (*Plukenetia volubilis*) oil, renowned for its numerous health benefits, has garnered interest in diverse applications, including soap production. This study aimed to explore the feasibility of utilizing Sacha Inchi oil as the primary ingredient for soap formulation and determine the appropriate amount of sacha inchi oil in the oil mixture to ensure the production of high-quality soap. A series of soap batches with varying concentrations of Sacha inchi oil (5, 10, 15, 20 and 25 %) were produced via cold process technique. The soaps were then characterized based on their physicochemical properties such as total fatty matter content (TFM), moisture content and volatile matter, pH level, colour and hardness. Soaps made with 5 to 15% Sacha inchi oil exhibited the best quality characteristics. The results showed promising findings, suggesting that Sacha inchi oil could be potentially incorporated into home made soap formulations.

**Keywords:** Sacha inchi oil, home-made soap, physicochemical properties.

## UMK12

### **Cloning and Expression of Thermostable Alkaline Protease (TAP50a) gene in *E. coli* BL21 (DE3) and TOP10**

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**Abstract:** Amylase is one of the important enzymes which has been used in numerous industrial applications such as food, starch processing, textile, and paper industry. Amylase can be produced through several sources which include plants, animals and microorganisms. With the advancement of technology, microbes are preferred to plants and animals as sources of enzymes because they are generally cheaper to produce, and their enzyme contents are more predictable and controllable. Therefore, it is necessary to search for new, available, and effective sources of amylase-producing bacteria. Hence, this study is to screen and characterize bacteria that produce amylase from the soil. The sample was collected at the kitchen site of the food canteen in University Malaysia Kelantan, Jeli, Malaysia. The collected sample was tested on 1 % starch agar and incubated at 37 °C for 24 hours. Each colony showed a clear zone around the colony was isolated due to a positive reaction which indicated amylase activity. These isolates were then further studied for their morphology and amylase activity. Among 10 amylase-producing isolates, Isolate M showed the largest clear zone ratio of 1.5 on 1 % starch agar in the Gram iodine test and showed the highest amylase activity of 1.5 U/ml in enzyme assay. It also showed the most active at 60°C and pH 7. The fermentation using new amylase producing bacteria gives advantages to the mass production of amylase.

**Keywords:** Amylase, amylase-producing bacteria, amylase assay

## UMK14

### Characterization of Plant Growth-Promoting *Pseudarthrobacter niigatensis*, and *Pseudarthrobacter enclensis* Isolated from Paddy (*Oryza sativa*) Rhizosphere

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**Abstract:** Plant growth-promoting rhizobacteria (PGPR) is the bacteria that inhabit the plant rhizosphere and could promote plant growth by helping the plants to obtain essential nutrients and plant growth regulator substance via several mechanisms including solubilization of insoluble phosphate in the soil, fixation of atmospheric nitrogen into the form that available for plant's uptake, and production of phytohormone such as Indole-3-Acetic Acid (IAA). This project aimed to isolate PGPR specifically nitrogen fixing bacteria (NFB) on selective media namely Burk's medium. Two NFB isolates labelled as UMK-PNF3, and UMK-PNF5 were screened, and selected for further identification by gram staining, and by 16S rRNA sequence analysis. UMK-PNF3, and UMK-PNF5 are gram positive bacteria with rod shape. Based on the BLAST analysis of their 16S rRNA gene sequences, the isolated bacteria were identified to have close relatedness with bacteria species as follows: UMK-PNF3 (*Pseudarthrobacter niigatensis*, 98.97%), and UMK-PNF5 (*Pseudarthrobacter enclensis*, 98.17%). It was discovered that both isolates can solubilize phosphate with *P. niigatensis* UMK-PNF3 having the highest phosphate solubilization activity showing solubilization index (SI), phosphate solubilization activity, and phytase activity varies from SI  $1.40 \pm 0.14$  to SI  $1.14 \pm 0.01$ ,  $0.239 \text{ mg/mL}$ , and  $29.320 \pm 1.016 \text{ U/mL}$  to  $40.869 \pm 6.040 \text{ U/mL}$  respectively. On the other hand, it was investigated that *P. niigatensis*, and *P. enclensis* could produce  $36.569 \pm 1.668 \text{ }\mu\text{g/mL}$ , and  $54.704 \pm 6.615 \text{ }\mu\text{g/mL}$  of IAA with the addition of L-Tryptophan (Trp) precursor respectively. The paddy seeds treated with PGPR isolates were shown to have a faster germination rate compared to control, and develop a better shoot, and root elongation, hence improve the seedling vigor of paddy seeds range between  $514.167 \pm 21.744$  to  $686.067 \pm 8.706$  with the higher SVI was validated by *P. niigatensis* UMK-PNF3. The results suggest that both NFB isolates have a plant growth promoting traits and are good potential candidates to be exploited as plant growth promoter biofertilizer replacing chemical fertilizer.

**Keywords:** Plant growth-promoting rhizobacteria, nitrogen fixing bacteria, indole acetic acid, solubilization, nitrogen fixation



## UMK18

### **Glucose Syrup Production from Enzymatic Hydrolysis Pre-treatment of Expired Bread**

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**Abstract:** Enzymatic hydrolysis pre-treatment is one of the pre-treatments invented to extract monosaccharide from the polymerisation of starch. This research reports utilisation of expired breads as a glucose source or substrate for many industrial applications such as ethanol and organic acid production due to carbohydrate content. First is the process of gelatinization where the expired bread was pre-heated for 15 minutes, followed by the process of liquefaction and saccharification. Liquefaction process was conducted under different conditions of temperature, enzyme concentration, and reaction time while the conditions for saccharification process involved different temperature and reaction time. The analysis of sugar concentrations were evaluated using FTIR and UV Spectrophotometer. The study of glucose syrup concentration yield revealed that 50°C, 6% w/v, and 180 min has the highest concentration of glucose yield under liquefaction process. After liquefaction process, saccharification process was conducted which revealed the highest glucose concentrations at 60°C in 60 min.

**Keywords:** expired bread, carbohydrate, starch, enzymatic hydrolysis, glucose syrup.

## UMK26

### Phytochemical Screening and Antioxidant Activity of Crude Plant Extracts From *Kyllinga Brevifolia* (Green Kyllinga) Plant

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**Abstract:** *Kyllinga Brevifolia* is believed to have great potential as herbal medicine for humans and animals due to the presence of phytochemical compounds such as alkaloids, flavonoids, terpenoids, and others. In this study, maceration was used to extract the phytochemical components from the plant with two different solvents, which are distilled water and ethanol. The determination of the phytochemical constituent in the plant and several screening tests have been conducted, including Salkowski's test, Dragendorff's test, Alkaline reagent test, and some other chemical tests. The effect of solvents was observed towards the presence of bioactive compounds. The analysis of the antioxidant activity in the plant was done using DPPH free radical scavenging activity assay method. Phytochemical screening results showed the presence of the expected bioactive compound in the plant extract. However, tannins and steroidal glycoside are absent in distilled water extract, while saponins and flavonoids presented negative results in ethanol extracts. Next, the antioxidant activity in plant extract is higher than ascorbic acid based on the results of DPPH radical inhibition and  $IC_{50}$ . The value of  $IC_{50}$  for distilled water extract is 6.973 mg/mL that considered as strong antioxidant activity followed by ethanol extract (25.098 mg/mL) and ascorbic acid (37.409 mg/mL). Compared with ethanol extract, distilled water is more suitable for studying the antioxidant activity in *Kyllinga Brevifolia* with the lowest  $IC_{50}$  value.

**Keywords:** *Kyllinga brevifolia*, phytochemical compounds, herbal medicine, antioxidant activity.

## UMK31

### **Microbial Concrete : The Growth Environment**

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**Abstract:** In microbial concrete, microbes mineralizing in the cracks and resulting in the precipitation of calcium carbonate. This method is an innovative way to patch cracks and strengthen concrete. However, does a different environment affect the growth of microbes and subsequently provide a positive effect on the microbial concrete itself. The objective of this study is to determine how microbes affect the compressive strength of concrete with a curing environment in water and soil. This study used an additive rate of 3% weight of microbial material into the concrete mix with a ratio of 1:1.5:3. Preliminary analysis of the characteristics and growth of the study microbes showed that the use of a small amount of additive could produce many microbial colonies. Meanwhile, SEM analysis shows that bacteria are directly involved in the precipitation of calcite. To determine the microbial growth environment in concrete, the compressive strength for these two curing processes also shows that concrete cured in soil has a higher compressive strength than concrete cured in water. This research approach shows that concrete microbial growth environment is suitable for underground structures. This is because concrete is an important component in almost every underground construction project. It also significantly affects the durability and cost of a project.

**Keywords:** Microbial concrete, growth environment, compressive strength, SEM analysis

## UMK49

### **The Optimization of Biodegradable Plastic Formulation of Zea Mays L (corn) and Solanum tuberosum (potato) with Glycerol and Sorbitol as Plasticizer using RSM Method**

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**Abstract:** The global plastic production is at 367 million metric tons has been stated throughout the years. The plastics that contaminated the water bodies have caused hazardous long-term carcinogenic effects to the fishes, animals, and human beings due to the release of diethylhexyl phthalate, lead mercury, and cadmium. This paper aimed to optimize the biodegradable plastic formulation of Zea Mays L (corn) and Solanum Tuberosum (potato) with glycerol and sorbitol as plasticizers using the RSM method. It has also been used to analyze the physical and mechanical properties of biodegradable plastics by using Fourier Transform Infrared Spectroscopy (FTIR) and Thermogravimetric Analysis (TGA). Furthermore, it is also used to analyze the water absorption and time taken for the bioplastic's biodegradability. In this paper, Response Surface Methodology (RSM) has been used to find the optimization of the mixture for biodegradable plastics. The FTIR analysis shows that all 15 samples have 3 main chemical compounds which are Polyethylene, chlorinated 48 wt%, Pullulan P800, and Pullulan P2000. Besides that, the biodegradation test has resulted in 27 days maximum for the biofilm to completely biodegrade. In addition, the water absorption test has shown the highest rate in sample GS2 while the least rate amount of absorption is in sample GS 13 where there is no active absorption activity during the 3 hours of immersion. Lastly, for the TGA result where the minimum temperature for all the samples taken to start losing weight is 39.06°C and the maximum temperature for the bioplastic to lose weight is 598.34°C. The bioplastic film mixture has been optimized at the end of this research.

**Keywords:** Bioplastic, Zea Mays L, Solanum Tuberosum, plasticizer, Response Surface Methodology (RSM)

## UMK52

### Production of $\beta$ -glucan by *Proteus Mirabilis* PI18 Strain in Rich and Minimal Media

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**Abstract.** Microbial  $\beta$ -glucans have showed promising benefits in various applications. However, the complexity of microbial  $\beta$ -glucans production and extraction processes lead to drawback in exploiting novel microbial  $\beta$ -glucans. *Proteus mirabilis* strain PI18 strain has previously shown promising  $\beta$ -production when supplied with sucrose as carbon source. To test if nutrient content in the growth medium can affect the production of  $\beta$ -glucan by *P. mirabilis* strain PI18, the  $\beta$ -glucan production in LB rich medium were compared to the production of  $\beta$ -glucan in minimal medium. Both media were supplemented with 20% w/v sucrose and growth under identical settings in 1.5 L bioreactor. Samples were collected every day for 5 days. Our results indicated that under controlled condition in the bioreactor, PI18 strain produced remarkably higher  $\beta$ -glucans yield in minimal medium compared to LB rich medium with peak  $\beta$ -glucans production were achieved at Day 2 (1.412mg/mL) and Day 3 (1.424 mg/mL) after cultivation of seed culture. Production of  $\beta$ -glucan in rich LB medium was remarkably low (0.2 mg/mL). The extracted  $\beta$ -glucans were then characterized by Fourier Transform-Infrared Spectroscopy (FT-IR). The present of two major peaks within 1,200 – 950 cm<sup>-1</sup> confirmed the presence of polysaccharides. This suggest that *P. mirabilis* PI18 produced higher amount of  $\beta$ -glucan due to nutritional stress.

**Keywords:**  $\beta$ -Glucan, PI18 strain, extraction

## VIG01

### Vaccine Design: *In silico* Construct of Polytope of Envelope Protein of SARS CoV2

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**Abstract:** COVID-19 pandemic in the year 2020-2021 disturbed the economy and social life world over and also resulted in consequential health issues. In an effort to combat the ill effects due to Covid-19, many prominent pharmaceutical and non-pharmaceutical firms with the aid from the respective governments have come out with one of the best solutions namely targeting its spike protein. However, due to the multiple strains resulted in the duration of two years the vaccinated subjects were again re-infected, which must have been due to mutations in the spike protein. Hence, the envelope protein in SARS CoV2, being highly conserved, was considered in the present article to design a polytope vaccine candidate using IEDB online tool. *In silico* construct of DNA sequence of the polytope in pET28(a) expression vector was made in an expression host namely *E.coli* strain K12. The homology model of the polytope of envelope protein was found to be predominantly alpha helix which was further confirmed through Ramachandran plot. The molecular docking scores of polytope with TLR-9, HLA-I and Fab region of IgM using ClusPro 2.0 were found to be -1304.7, -1042 and -271.4 respectively. The observed *in silico* results suggested considering the envelope protein of SARS CoV2 to be a possible vaccine candidate.

**Keywords:** SARS CoV2, envelope protein, polytope, vaccine design

**ABSTRACT:**  
**AGRICULTURAL TECHNOLOGY**

## INT01

### **A Smart Farming Learning Kit using Arduino with IoT**

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**Abstract.** Thailand 4.0 aims to enhance productivity and boost economic growth. One of the challenges of this policy is to promote and strengthen industrial agriculture. Smart agriculture that incorporates The Internet of Things (IoT) and Artificial Intelligent (AI) technologies is gaining a lot of attention. The utilization of IoT and AI is not only essential and beneficial in the industry but also in academics. Learning content also needs to adapt and match society's needs. The study has been inspired by the aging society of agriculture currently facing in Thailand. The pilot development of an agricultural learning kit using IoT, which is learned and tested by students, is the challenge to represent a feasibility study before an actual project of smart agricultural equipment implementation. The development of learning material is characterized by low cost, high quality, and easy portability. The robot cars with line tracking ability using Arduino ESP32, serve as the learning material in which motors and sensors were attached to the left and right of the cars. Learners have chances to learn a program on how to control cars. They can freely operate the cars through computer programming and gain an understanding of learning principles. We have prepared two robot cars. The first robot can move back and forth and is equipped with a robot's arm that operates by a controller. The second car also has a movement function and is fully loaded with vegetable seeds stored in small containers. The first robot picks vegetable seeds from the second robot, lifts them, moves into the farm field, and selects the appropriate location for planting. A field for planting where the robot can run is prototyped with the vinyl sheet with line tracking. The power supply uses dry batteries. Students can have the opportunity to learn programming, operate the robots, and engage in the design and development of the entire project. The performance testing of the learning kit is at a good level.

**Keywords:** IoT equipment, agricultural practice, agriculture, Robot Car, Arduino



## SPMVV06

### Assessment of Soil Fertility Status and Mapping in Mulberry Growing Areas of Chittoor District in Andhra Pradesh State

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**Abstract:** The present research work was conducted during the year 2021-2022. This study involves collection of soil samples from Chittoor District of Andhra Pradesh to assess the nutrient status and soil fertility mapping of mulberry gardens using the most sophisticated software ArcGIS V10. Mulberry plant is the sole food source of Silkworm *Bombyx mori*.L and Sericulture is one of the agro based industry in Chittoor district. A 54 geo referenced soil samples were collected from 6 different mandals of mulberry growing areas (Palamaneru, V. Kota, Chowdepalle, Gangavaram, Baireddipalle, Peddapanjani) of Chittoor district. The study area is situated in Latitudes between 12°40'7" and 13°46'07"N and Longitude between 78°45'28" and 78°75'59"E. Soil fertility mapping plays an important role for nutrient assessment and fertilizer recommendation in a particular area. The collected soil samples were analyzed for pH, EC, OC, and macro nutrients like available N, P and K, micro nutrients like Cu, Mn, Fe and Zn. The soil fertility data revealed that the majority of soil samples were alkaline in condition, whereas the electric conductivity (100%) samples were low in reaction, with respect to organic carbon (48.2%) were high, (50%) samples were medium, and only (1.8%) samples were recorded low. And the available N (100%) samples were recorded low. In case of available phosphorus (20.4%) was high. (75.9%) medium, (3.7%) samples were recorded low. With regard to the available potassium (37.0%) samples were high, (50%) were medium and (20.0%) were recorded low. With respect to micronutrients, the majority of samples were deficient in Cu, Mn, Fe and Zn.

**Keywords:** GPS, micro nutrients, macronutrients, soil fertility

## **TATI03**

### **Agricultural Dust Behavior during Free Fall**

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**Abstract:** In sustainable agriculture, minimizing dust emissions is critical not only for the health and safety of workers and the environment but also to prevent dust explosions. Agricultural dust can ignite and cause explosions when it accumulates in a confined space with oxygen and a source of ignition. To prevent dust explosions, sustainable agriculture practices can be implemented to minimize the amount of dust generated and emitted during powder production, storage, transport, and handling. As the behavior of particles during free-fall is significant in terms of both sustainable agriculture and dust explosion risks, this study presents the experimental research results on the particle count of different agricultural powders (castor sugar, oat, semolina and tea) during free-fall. It appears that there is a variation in particle count for each substance at different points inside the experiment chamber. Castor sugar, oat particles, and semolina particles show a decrease in particle count as the height of the chamber increases, while tea powder shows an increase in particle count. Particle characteristics, such as size, shape, and density, are important factors that can influence particle behavior during free-fall. Overall, knowledge of particle behavior during free fall can be used to develop safer and more effective industrial processes and agricultural practices that minimize risks to human health and the environment.

**Keywords:** Agricultural particles: particle behavior: dust explosion: sustainable agriculture: dust emission.

## UCTS01

### **Optimising the Processing Conditions of Kenaf Seed MH8234 Milk Powder in Terms of its Physicochemical Properties: An Investigation Using the Central-Composite Design Approach**

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**Abstract:** The production of kenaf seed MH8234 milk powder (KSMP) is one of the kenaf seed MH8234 based food development initiatives that are considered to be underutilised. In this study, the objective is to identify the optimum processing conditions to produce a final product from KSMP with minimum moisture content (%) and maximum crude protein content (%). The selection of the processing conditions involves the use of a central composite design consisting of independent variables: vacuum drying time (5, 6 and 7) hours, vacuum drying temperature (53, 63 and 73) °C and maltodextrin concentration (10, 20 and 30) % (w/w); dependent variables: moisture content (%) and crude protein content (%). At the end of this study, it was found that the optimal condition for KSMP is at moisture content 7.27% and crude protein content at 9.44%. Both values are obtained at vacuum drying time 7 hours, vacuum drying temperature 73°C and maltodextrin concentration at 10 % (w/w). From the values obtained, it is clear that the use of a central composite design is practical to obtain optimal processing conditions that give the maximum value for the two dependent variables.

**Keywords:** Kenaf seeds, optimisation, central-composite design, processing conditions, physicochemical properties.

## UiTM04

### **Insecticidal Effect of Selected Weed Extracts for Controlling Rice Weevil, *Sitophilus oryzae***

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**Abstract:** Stored product insects became a major problem for the rice grain industry, leading to losses in quality and quantity. The rice weevil, *Sitophilus oryzae* is the major pest of stored product insects especially in rice grains. Numerous studies have revealed the adverse effects of using chemicals that might cause people to have serious health problems. Currently, compounds found in weed extracts have been proposed as an alternative to traditional synthetic insecticides for the control of insects. The selected weed samples were classified under the broad-leaved weed, and they were widely distributed in the open land area. These weeds were identified as potential weeds because of their high nutritional value and chemical components for a variety of bioactivities, including insecticidal activity. The insecticidal activity of ethanol and acetone weed extracts of *Melastoma malabatricum*, *Clidemia hirta*, *Chromolaena odorata*, and *Ageratum conyzoides* were investigated against *Sitophilus oryzae*. The insecticidal activity was evaluated using repellent, contact, and fumigation test. The weed extracts exhibited insecticidal activity against *Sitophilus oryzae* adults causing up to 100% repellency of *Chromolaena odorata* and *Ageratum conyzoides* from the family Asteraceae for both solvents. 100 % mortality was shown from all the weed samples for both solvents towards contact and fumigation test. The exposure duration and technique used to demonstrate the insecticidal activity of the weed extracts had an impact on this insect. The present study is indicative of the potential of using these weed extracts for *Sitophilus oryzae* management.

**Keywords:** *Sitophilus oryzae*, Insecticidal activity, Repellency, Mortality, Weed

## UiTM05

### Growth, Yield, and Compositions of Selected Vegetables Grown with Agricultural Waste Planting Media

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**Abstract:** Growing media, “substrates” or “plant substrates” provide a root environment that is initially free of plant pathogens and properties that ensure adequate aeration, water, and nutrient supply. Efforts should be escalated for establishing, and expanding growing media, in compliance with the regulations on the production of organic vegetable seedlings, as being an important input in organic agriculture. Application of agricultural waste such as empty fruit bunch and coconut husks along with organic manure significantly improved the quality parameters, nutrient uptake, and fertility status of crops. Therefore, this study will be focusing on the growth and yield responses of the selected vegetables, besides evaluating chemical compositions of the vegetables planted with media from selected agricultural waste. Three selected vegetables, namely cherry tomato (*Solanum esculentum* var *Cerasiforme*), bok choy (*Brassica chinensis* L.), and choy sum green stem (*Brassica rapa*) were grown on various types of planting media, which is agricultural waste, mix soil, and organic. The field test study was done in a community garden Shah Alam. The results revealed significant variations in the growth patterns and yield outcomes among the three crops and planting media. Cherry tomatoes planted with agricultural waste planting media demonstrated the most robust growth, abundant foliage development, early flowering within 21 days after transplanting, and a high fruit yield. Bok choy and choy sum also displayed remarkable growth characteristics when planted with agricultural waste planting media. Compositions value analyzed provide insights into the nutrient content of these vegetables, which contribute to their nutritional profiles and potential health benefits. The findings of this study highlight the potential benefits of utilizing agricultural waste planting media for cherry tomatoes, bok choy, and choy sum growth. Implementation of organic media derived from empty fruit bunches and coconut husks is a beneficial way to enhance the nutrients and overall value of the media while also promoting sustainable agricultural practices. When plants are grown in soilless media, it is considered a sustainable production approach because it offers advantages such as better utilization of space, nutrients, and water compared to crops grown in soil.

**Keywords:** Agricultural Wastes, Bok Choy, Cherry Tomato, Chemical Compositions, Choy Sum, Sustainable Agriculture

## UMK25

### **Total Flavonoids Content, Total Phenolic Content, and Antioxidant Activity in *Eleiodoxa conferta*'s Fruit Skin Collected from Jeli, Kelantan, Malaysia**

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**Abstract:** Recent studies show that *Eleiodoxa conferta* fruit has been used traditionally and in modern societies for juice and other culinary purposes. However, limited studies have been done on the selected samples of *E. conferta* fruit, even though the antioxidant properties of fruits are known. Previously, there was a lack of study on the medicinal properties of the fruit's skin and information on the antioxidant effect of various extracts prepared from the skin. Therefore, the present study evaluates *E. conferta* fruit, which is skin, by assessing its antioxidant potential. The fruit was extracted using four different solvents in a maceration extraction technique. The crude extracts were tested for Total Phenolic Content (TPC), Total Flavonoid Content (TFC) and antioxidant activity. Statistical analysis was performed to identify the trend of the tested extract samples. Ethanol extract showed the highest TPC value, methanol extract presented the highest TFC value, and ethyl acetate exhibited the highest IC<sub>50</sub>. The results showed that the concentration of flavonoid, phenolic, and antioxidants depend on the solvent used during the extraction process of the fruit. However, all four solvents showed the presence of the tested compound, even in a small amount.

**Keywords:** *Eleiodoxa conferta*, total flavonoid content, total phenolic content, antioxidant activity, DPPH scavenging activity.

## USM04

### **Antioxidant and antimicrobial activities of *Etlingera elatior* against *Staphylococcus aureus*, *Pseudomonas aeruginosa*, and *Escherichia coli***

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**Abstract:** *Etlingera elatior* or torch ginger is known to have pharmacological properties due to the presence of wide range of phytochemical content. The aims of this study were to determine the antioxidant and antimicrobial activities of *E. elatior* against *Staphylococcus aureus*, *Pseudomonas aeruginosa* and *Escherichia coli*. The flowers of *E. elatior* was extracted using distilled water as solvent. The antioxidant activity of aqueous flower extract of *E. elatior* was evaluated through DPPH (1,1-diphenyl-2-picrylhydrazyl) assay to calculate IC<sub>50</sub>. Meanwhile, the antimicrobial activity of the flower extract was evaluated based on zone of inhibition by well diffusion method. The IC<sub>50</sub> value of *E. elatior* aqueous flower extract was 4.34 µg/mL which was slightly higher than the IC<sub>50</sub> value of standard ascorbic acid which was 4.25 µg/mL. Flower extract exhibited antibacterial activity against Gram-positive bacteria (*S. aureus*) with zone of inhibition range 11-15mm at concentrations 40-100 mg/mL. However, the Gram-negative bacteria (*P. aeruginosa* and *E. coli*) were resistant to the flower extract as no zone of inhibition observed at all concentration. These findings indicated that *E. elatior* aqueous flower extract possesses antimicrobial activity and is a comparable antioxidant to standard ascorbic acid. *E. elatior* aqueous flower extract offers significant potential as a source of alternative medicine. Detailed evaluations are suggested to identify the phytochemicals present in the flower extract.

**Keywords:** *Etlingera elatior*: antioxidant: antimicrobial activity: inhibition: DPPH: IC<sub>50</sub>.

## UTM01

### **Design and Development of Smart Lobster Breeding System (SLABS V3)**

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**Abstract:** Freshwater lobster, also known as *Cherax quadricarinatus*, which belongs to crustacean species, has become one of income generator for aquaculture breeders. They are seawater lobster look alike making them to be cheaper alternative for having lobster cuisines or for breeders to breed them. Freshwater lobster normally being develop in freshwater lakes without any supervision. One of the common issue is that people breed them manually without any supervision. Due to this issue, we develop a system called smart lobster breeding system (SLABS). This study focuses to study the freshwater lobster breeding process, designing the lobster-breeding platform and to study and optimize the breeding process. The system intends to improve the breeding process, promote sustainability, and provide accessibility for aquaculture breeders. The system have three types of tanks for juvenile, egg carrying lobster and adult lobster. The use of IoT technology with the Raspberry Pi enables for real-time monitoring crucial parameters. Part of the system will operates on solar energy generated by integrated solar panels to achieve sustainability practices. Integrating the IoT enables the lobster to be feed automatically 2 times per day. Any anomaly can be detected immediately by using this system. This system control parameters includes monitoring the pH, temperature, dissolved oxygen (DO) contents and water turbidity. Using this system, we can measure the lobster growth per day and their weight per day. From the study, we manage to breed the lobster in 9 months instead of 10 months based on normal standard normal time, which give improvement of 10%. It also reduce the mortality rate by 10% allowing the survivability of lobsters. The overall system performance is estimated to have higher growth rate per day. The system capable of maintaining or reduces mortality rate compared to previous system. The system can maintain the quality if water such as control the pH range to be between 7.25 to 7.65 and average temperature of 27 °C. In conclusion, the objectives of the studies achievable. The continue study of this project need to overcome the leftover pallets problem and test the system for longer duration period.

**Keywords:** Freshwater lobster breeding; IoT; Raspberry Pi; solar panels; sustainable practices.



**ABSTRACT:  
ENERGY TECHNOLOGY**

## **INT05**

### **The Impact of the Japanese Finance and Insurance Industry in the National Economy: 1985-2005**

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**Abstract:** The Japanese finance and insurance industry is one of the most developed and sophisticated industries in the world. It comprises wide range of financial institutions, including banks, insurance companies, security firms, and asset management firms. This industry has played a crucial role in the country's economic development. It has helped in funding large-scale infrastructure projects and provided financial services to businesses and individuals, contributing to Japan's economic growth and stability. This study aims to analyze the impact of the finance and insurance industry in the Japanese national economy. This study employs Input-Output (IO) analysis as an analysis instrument. More specifically, this study applies the parts of IO analysis, namely simple output multiplier, simple household income multiplier, index of the power of dispersion, and index of the sensitivity of dispersion as analysis tools. The analysis period of this study is from 1985 through 2005. The results show that, by using both multipliers, the analyzed industry did not include in the top five Japanese industries from 1985 through 2005.

**Keywords:** Finance and insurance industry, impact, national economy, IO analysis

## **KMUTT01**

### **Development of 4-blades in Micro Hydraulic Power Generation Utilizing Water Pipeline for Electricity Crisis from Nature Disasters**

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**Abstract:** Several countries are faced with increasing frequency of natural disasters, such as heavy rains, earthquakes, and typhoons lead to continuous energy crisis. In order to manage these emergencies, hydro-energy is one of the most promising renewable energy sources. Therefore, this study has developed the design of low head turbine of 4-blades for micro hydraulic power generation in water pipeline, which is a simple device. There have been found that the obtained result was highly impacted to changes to water pressure, thus influencing the efficiency power generation. The results presented that with increasing in the number of loads, the output voltage (V) was decreased continuously, which displayed the highest beginning point by 4.3 V, while the load current (mA) was rise gradually to maximum of 240 mA in 0.3 Mpa water pressure. Similarly, the rotor speed was found that have significant effect follow the water pressure, which was dropped slightly when the load current improved. Therefore, the studied demonstrated that micro hydraulic is an ideal way for power generation in pipeline and encouraging for further application.

**Keywords:** 4-blades, renewable energy, micro hydraulic, nature disasters

## UIAM01

### Energy Yields Analysis on Enhancing the Power Output of An Air Cathode Biofuel Cell

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**Abstract:** Biofuel cells commonly pair an air electrode against an oxidative reactant. The air electrode serves as a reaction site for oxygen reduction reaction (ORR). Since the ORR is a rate-limiting reaction, much attention has been focused on enhancing the air electrode capacity so as to increase the output of inherently low-energy BFCs. This work reports the energy gain yields of BFC from air purging and increasing the air electrode effective surface area. These arrangements are most common in enhancing the BFC performance. The BFC studied is a microbial zinc/air cell that employs microbes of the naturally occurring white-rot fungi (*Phanerochaete chrysosporium*) suspended in potato dextrose broth (PDB) electrolyte mixed with oil palm empty fruit bunch (OPEFB). This fungal strain secreted ligninolytic enzymes such as laccase as it degrades lignin-rich EFB. Laccase enzyme catalyzes the reduction of dissolved oxygen (DO). Air purging into electrolytes is a straightforward way to improve the dissolved oxygen content. As the air was purged into the electrolyte, the cell power output increased by 24% but at the expense of 3.5 Wh input energy per hour of operation. Further, an increment of the air electrode surface area by 4 times increased the power output by 3 times. Therefore, there is a delicate balance between enhancing the BFC energy output and optimizing the system cost.

**Keywords:** Microbial fuel cell (MFC), energy yield, dissolved oxygen, air purging.

## UMK15

### **Characterization of Alumina Supported Chicken Eggshell and Coconut Chaff as A Potential Heterogenous Catalyst of Biodiesel via XRD and FTIR**

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**Abstract.** Coconut chaff and chicken egg shell are the bio-based waste material that can be used as active phases in producing the heterogenous catalyst for biodiesel. An alumina supported coconut chaff and chicken egg shell was prepared via incipient wetness impregnation in 1:1 proportion on a mass basis and calcined at calcined at 900 °C for 4 h. The crystal structure and phase of the prepared catalyst was determined by the X-ray diffraction (XRD). The results obtained revealed that the prepared catalyst dominantly contains of SiO<sub>2</sub>, CaO, K<sub>2</sub>O and Al<sub>2</sub>O<sub>3</sub>. The surface functional group contained in the sample was examined using Fourier-transform infrared spectroscopy (FTIR). The result shows that the prepared catalyst rich with the functional group of carbonyl, carboxylic, amine and alkane. The results of XRD and FTIR were comparable with other studies using different bio-based waste material.

**Keywords:** Coconut chaff, chicken egg shell, catalyst, characterization

## UMK19

### **Dual Axis Solar Tracking System for Water Quality Monitoring System**

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**Abstract:** Water quality tests are widely used in environmental monitoring. The changes in the quality of water may cause by humans and nature and these changes affect the aquatic life and ecosystem naturally. The quality of water can be investigated in different fields of view. For example, temperature and turbidity are used to measure the water quality physically, whereas pH and dissolved oxygen are applied to measure the chemical attributes of water. On the other hand, algae and phytoplankton are also used as biological water quality indicators. Thus, a continuous system to monitor the water quality is required. However, monitoring the water quality continuously will affect the cost of maintenance due to high energy consumption. To reduce the energy consumption while supplying the power continuously for the system, a solar panel with a dual-axis solar tracker is proposed in the water quality monitoring system (WQMS). The result shows that the WQMS can fully function in different conditions, and the optimized voltage for DAST is around 12v to 13v. In a nutshell, this device is expected to clarify the current situation of water conditions and energy generation from the sun.

**Keywords:** water quality monitoring, aquaculture, solar tracking, water quality

## UMK29

### **Optimizing Energy Storage and Consumption in Solar Energy Systems using IoT-enabled Energy Management Algorithms**

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**Abstract:** Clean energy production heavily relies on renewable energy sources. The management of solar power now heavily depends on energy storage and consumption due to the rising popularity of solar energy systems. Therefore, IoT-enabled energy management algorithms are being utilized to optimize energy storage and utilization in solar energy systems. In order to employ machine learning algorithms to make educated decisions about when and how to store and use energy, these algorithms are created to gather and analyses data from sensors and devices in the solar energy system. The paper describes the advantages of deploying these algorithms and as a result, the efficiency of energy system is increased and saves the cost. It also addresses the problems with complexity, scalability, and data privacy and security that need to be solved in system. The usage of IoT-enabled energy management algorithms will be more and more crucial as more people switch to solar energy systems in order to manage energy storage and consumption efficiently and move away from fossil fuels.

**Keywords:** IoT, clean energy, IoT-enabled energy management algorithms, energy storage and consumption.

## UMP02

### **Mass Loading versus Electrochemical Performance of Battery – Supercapacitor Hybrids**

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**Abstract:** A battery – supercapacitor hybrid device comprises a battery-type positive electrode and supercapacitor-type electrochemical double layer capacitor (EDLC) electrode and will offer higher power capability than batteries and higher energy storability than supercapacitors. However, the mass-loadings in the two-type of electrodes are to be adjusted for optimum performance. In this work, a flower-shaped NiCo<sub>2</sub>O<sub>4</sub>-NiO composite was used as a battery-type electrode while commercial activated carbon was used as an EDLC electrode. Both materials were characterized for their chemical structure, physical surface, morphology and electrochemical properties separately. The NiCo<sub>2</sub>O<sub>4</sub>-NiO//AC hybrid device was fabricated on aluminium foil current collector and studied the effect of varying mass-loading on the electrochemical performance of the device in EmimBF<sub>4</sub> ionic liquid electrolyte. The mass loading of the electrode was controlled through altering the coating thicknesses of the electrodes. The largest cell capacitance was ~140.5 mF, energy density ~7.3 Wh/kg, and power density ~105 W/kg with a mass loading of 3 mg/cm<sup>2</sup>. The decreasing trend of absolute capacitance was observed with higher mass-loading; electrochemical impedance spectroscopy measurements associate it with increased resistance. This study suggests that the mass loading of the electrodes is a critical factor in determining the electrochemical performance of NiCo<sub>2</sub>O<sub>4</sub>-NiO /AC battery supercapacitor hybrid.

**Keywords:** Battery supercapacitor hybrid, coin cell, ionic liquid, mass loading, current collector, doctor blade technique



## UPM02

### **Optimizing Briquette Charcoal Production: A Comparative Analysis on Sawdust, Bamboo, and Coconut Shell Combinations**

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**Abstract.** Various combinations of sawdust, bamboo and coconut shell in producing the briquette charcoal were studied and compared. Assessment on different combination of calorific value and ash content in producing charcoal effectively were also done. The materials that were examined for their effectiveness were a combination of sawdust, bamboo and coconut shell (SBC) and a combination of bamboo and sawdust (BS). Apart from that, the performance of coconut shells (CS) has also been examined. The calorific value which is an important parameter of the energy content of briquette charcoal was determined. Analysis showed that a 7004 Kcal/kg of SBC combination had the highest calorific value, followed by a 6697 Kcal/kg CS and 6354 Kcal/kg BS. As the ash concentration which is a crucial element gives impact to the combustion and the environment, thus the percentage of ash concentration for each combination was also determined. Based on the analysis, the concentration of ash in the combination of SBC, CS and BS are 88.67%, 91.54%, and 92.91% respectively. These findings are significant for manufacturers and researchers in optimising the used of raw materials in producing the briquette charcoal. A high calorific value and lower ash content in the SBC combination shows that SBC has the capacity to generate energy effectively and less environmental impact. By considering the characteristics and performance of different combinations of various materials, suppliers thus can improve the quality, productivity, and sustainability of briquette charcoal manufacturing. Eventually this supports the overarching objective of introducing greener energy choices and lowering the reliance on conventional charcoal.

**Keywords:** Briquette charcoal, saw dust, bamboo, coconut shell, calorific value.

**ABSTRACT:  
WOOD AND FOREST  
TECHNOLOGY**

## INT06

### Reactivity Study on Wood Esterification by Fatty Acids and Trifluoroacetic Anhydride

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**Abstract:** Fatty acids and their derivative which have long alkyl chain structure are good candidate for wood esterification to obtain thermoplastic properties of wood. Most recent research used acyl chloride as a form of fatty acid to be reacted with the hydroxyl group of lignocellulosic materials in various solvents. Fatty acids on other hand, not react easily with hydroxyl group of wood. In this study, we investigated the reactivity of wood with various fatty acids of different chain lengths using trifluoroacetic anhydride as impelling agent in various reaction condition. Generally, esterification of fatty acids without solvent resulted higher Weight Percentage Gain (WPG) and ester content than reaction in present of CH<sub>2</sub>Cl<sub>2</sub>. Reaction of esterification could be performed effectively at room temperature. Increasing temperature reaction provoke degradation on esterified wood. WPG of 67% was obtained for the C3 and 253% for the C16. Nevertheless, the ester content were uniform and comprised between 10.60 and 11.81 mmol ester/gram of wood for all chain lengths. Higher quantity of reactive leads to higher ester content which tends to stabilize after ratio of 1:4 wood and TFAA/FA. Esterification reaction was performed rapidly. Ester content of comprised between 7.65 and 9.94 mmol ester/gram of wood were achieved only after 15 minutes of reaction. Fourier-transform infrared spectroscopy (FTIR) analysis were performed to confirm the chemical changes of wood before and after esterification. O-H stretching vibration at 3300-3500 cm<sup>-1</sup> was disappeared in esterified wood, replaced by C=O carbonyl ester group at 1744 cm<sup>-1</sup> and aliphatic chain at 2821 and 2851 cm<sup>-1</sup>.

**Keywords:** Esterification, fatty acids, FTIR, reactivity, wood, WPG

## UMK16

### Effect of Varying Board Densities and Resin Contents on the Properties of Particleboard Made with Admixtures of *Hevea brasiliensis* (Rubberwood) and *Neolamarckia cadamba* (Kelempayan)

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**Abstract.** Among the major contributors to the commodity sector for the country's economic growth in Malaysia is the wood-based industry. Therefore, the demand for raw wood materials is increasing and the wood-based sector needs to find alternative raw wood materials to produce products so that the supply of wood-based products is always consistent. This research work aims to determine physical and mechanical properties of particleboard made from admixtures of fast growing species namely Kelempayan and rubberwood bonded with urea formaldehyde resin. In this study, the species used to produce particleboard was 50:50 ratio for each species. Evaluation of the effect of board density and resin content on the properties of particleboard using three different resin contents, namely 8, 10 and 12% of urea formaldehyde resin and three different board densities of 600, 700 and 800 kg/m<sup>3</sup>. The particleboard tested for modulus of rupture, modulus of elasticity, tensile strength and thickness swelling according to Japanese Industrial Standard (JIS A 5908:2003) for particleboard. The result showed that the particleboards with higher resin content had better mechanical strength. The samples made from density 800 kg/m<sup>3</sup> with 12% resin content had the highest mechanical test and lowest thickness swelling values compare to others. After evaluation of the test results, it can be concluded that Kelempayan and rubberwood can be mixed and used as an alternative species to manufacture particleboard to ensure sustainability of raw material.

**Keywords:** Fast growing, urea formaldehyde (UF) resin, physical properties, mechanical strength

## UMK17

### **Study on the Cellulose Content from *Bambusa vulgaris* and *Gigantochloa scortechinii* using Different Methods for the Potential of Bio-foam Industry**

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**Abstract.** The chemical composition of *Bambusa vulgaris* and *Gigantochloa scortechinii* were investigated. Each bamboo was divided into three portions which were the top, middle and bottom portion. The aim of this study is to determine the chemical composition which is the percentage of extractive, holocellulose, cellulose, hemicellulose and lignin content of both species and also to compare the amount of cellulose content derived between both species using different methods which were Soxhlet extraction and Kraft pulping. The cellulose samples obtained from these different methods then were tested under Fourier Transform Infrared Spectroscopy – Attenuated Total Reflectance (FTIR-ATR). The methods used to extract all chemical composition were following the TAPPI standard. From this study, it can be highlighted that the higher extractive content is 5.24% from the bottom of *Gigantochloa scortechinii*. Furthermore, the higher content of holocellulose and hemicellulose was shown on the top of *Gigantochloa scortechinii* with 79.15% and 40.72% respectively. Followed by the higher content of cellulose in the middle of *Gigantochloa scortechinii* with 48.63%. However, *Bambusa vulgaris* has a higher percentage of cellulose which makes this species suitable for the potential of bio-foam industry. Lastly, the study has also indicated that the highest lignin content is produced from the middle portion of *Bambusa vulgaris* with 32.83%. In this study also, the main compound of the celluloses was identified using FTIR – ATR. Based on the result, all cellulose samples from *Bambusa vulgaris* were detected as cellulose while the cellulose samples from *Gigantochloa scortechinii* were cellophane. From this study also can be pointed out that the Soxhlet method has proved to produce a higher percentage of cellulose, compared to the Kraft method. This may cause by the degradation of the carbohydrate that affected the yield produced as reported in the previous study.

**Keywords:** *Bambusa vulgaris*, *Gigantochloa scortechinii*, cellulose content, Soxhlet extraction, Kraft pulping

## UMK23

### **Green Building Material on Bamboo SLR**

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**Abstract.** Bamboo is a natural material that is energy efficient and environmentally friendly. Bamboo is a versatile material widely applied in various product categories such as household appliances, furniture, interior decoration, residential buildings, architecture, and building construction. This study discusses the potential of bamboo to review the body of knowledge and scientific research on using bamboo resources to encourage awareness of environmentally friendly materials. This research method uses a systematic literature review conducted with the PRISMA protocol to work and summarizes published studies. Twenty-two peer-reviewed publications were included after a thorough thaw from the Scopus database source. Bamboo material has played a role in having new opportunities as a new energy source, especially renewable energy for the use of green building materials because it is a source of environmentally friendly materials and can provide benefits in creating sustainable environmental ecosystems.

**Keywords:** Bamboo, green building material, systematic literature review

## UMK30

### Effects of Torrefaction Process on Chemical Properties of Small Diameter *Leucaena leucocephala*

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**Abstract:** Malaysia's main source of electricity is fossil fuels such as natural gas and coal. Realizing that resources are insufficient to support continuously so the concerns are raised about finding the new sources of energy. Biomass energy production is the best solution to replace fossil fuels. But this biomass energy source is often associated with resource and environmental problems. The effects of torrefaction on *Leucaena leucocephala* carried out in a conventional furnace at holding temperatures of 200 and 300°C for periods of 30 and 90 minutes. The effects of torrefaction's holding temperature and residence time have been studied quantitatively by determined the content of the chemical properties between raw of *Leucaena leucocephala* wood and torrefied *Leucaena leucocephala* biochar. The amount of chemical properties reduces as both holding temperature and residence time increase, and this holds true across the board for all of the mentioned holding temperatures and residence time. This study was carried out with the purpose of distinguishing and contrasting the composition of chemical properties at various holding temperatures and residence times in order to provide evidence that the torrefaction process is affected by both factors.

**Keywords:** *Leucaena leucocephala*, torrefaction, chemical properties

## UMK44

### **Extraction of Natural Dye from Roselle Calyces (*Hibiscus sabdariffa*) apply on Cotton Fabric**

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**Abstract.** Roselle's calyces (*Hibiscus sabdariffa*) was extracted to investigate the presence of anthocyanin pigment that can produce natural colorant. The process of extraction is using distilled water as a solvent by cold maceration for 48 hours. The dark red color were obtained from the extraction of roselle calyces. In order to determine the antocyanine content, distilled water was produce higher anthocyanin content compared to acetone. The natural colorant from extraction were applied on cotton fabric. Aluminium sulphate, and Potassium dichromate were found more stable as a mordant compared to copper sulphate. Spectroscopic characterisation (FTIR) confirmed the successful presence of anthocyanine compound which situated on selected wavelength number. UV visible is used to calculate antocyanine content. Result from this research shown that natural color from roselle calyces can be apply on cotton fabric with the added of chemical mordant. Different hue color were obtained on cotton fabric for natural dye when add chemical mordant. The color degradation also occur on natural dye that applied on cotton fabric after a few weeks.

**Keywords:** Natural dye, roselle calyces, *Hibiscus sabdariffa*, anthocyanin pigment, cold maceration, chemical mordant, Aluminium sulphate, Copper sulphate, Potassium dichromate



## UMK47

### **Modified Starch Extracted from Oil Palm Trunk as A Water Reducing Agent in Gypsum Board**

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**Abstract:** Water-reducing agent (WRA) is an additive added in the calcium sulphate hemihydrate,  $\text{CaSO}_4 \cdot 0.5\text{H}_2\text{O}$  (also known as Plaster of Paris and gypsum) mixture mainly to reduce the amount of water needed to achieve the desired consistency and hence affecting the setting time of the paste. The setting time significantly influence the workability of the paste and provide sufficient time for the workers to mould the paste based on their preference. In this study, the potential of starch extracted from oil palm trunk (OPT) as WRA are further evaluated. The starch undergo a chemical modification process produced a cross-linked carboxymethyl starch (CMS). The CMS were added in 3 different percentages (0.5, 0.6 and 0.7 % w/v) and one control sample (without WRA) mainly to study the effect of consistency to the setting time of gypsum paste. The flexural strength of gypsum board produce from these 3 different WRA percentages added were evaluated to investigate the effect of WRA on the mechanical properties of gypsum board. The collected data shown CMS made from OPT starch (0.6 % w/v) have a potential to be commercialized as WRA to reduce the amount of water added during the mixing process hence, reduce the production cost.

**Keywords:** Water-reducing agent, carboxymethyl starch, setting time, gypsum

## UMK54

### **The study of Okra, *Abelmoschus esculentus* and Chickpea, *Cicer aritenum* as Coagulant in Removing Turbidity of Water**

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**Abstract.** Water is very important for the survival of both plant, animal and humans as well. Consumption of safe water is a must for humans because polluted water causes different types of water borne diseases. Coagulation is a conventional step of water purification and bio-coagulant is a new horizon to go green. *Cicer arietinum*, which is known as chickpea and *Abelmoschus esculentus* or Okra, can be used for the treatment of surface water. The coagulant of such kind may not replace synthetic conventional coagulant like alum but be an alternative at times of crisis. In this study, removal of turbidity, pH level and the difference between natural coagulant and synthetic coagulant were conducted at the same level of turbidity for polluted water with the Okra and Chickpea were extract using different solvent which are distilled water and HCl. The turbidity removal efficiency for Okra that extract with distilled water and HCl are 64.7% and 79.95%, while for chickpea are 62.55% and 69.93%, for alum the turbidity removal efficiency is 86.10%.

**Keywords:** Turbidity, coagulant, Okra, Chickpea

## UMK55

### Rubberized Glutaraldehyde-Modified Starch Plasticized with Triethanolamine

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**Abstract.** The characteristic and mechanical properties of rubberized glutaraldehyde-modified starch plasticized with triethanolamine, TEA have been studied. A study of the morphological surface has been conducted in SEM test indicating that the thermoplastic starch panel that consists of 50% rubber content had a lot of rough, clothed dark grey surface that is a rubber molecule. A study of the morphological surface indicated that the thermoplastic starch panel with 50% rubber content presented has a rough, clothed and dark grey surface, which shows that the sample lacks of interfacial adhesion. Therefore, the 50% thermoplastic starch panel show the lowest Young's modulus and tensile strength, that is 397.115 N/mm<sup>2</sup>, 13.63 N/mm<sup>2</sup>, respectively, while the highest elongation break record is 7.043 mm. Meanwhile, increasing rubber content in the thermoplastic starch panel will increase the value of the bending modulus and bending strength. In the FTIR test, there is some Carboxylate functional group in the 20% and 50% rubber content samples. This result indicated that both samples contain some rubber molecules in the sample. All three samples contain hydroxyl groups and ammonium ions. The hydroxyl group is a hydrophilic, which is why all of the sample do not so durable when there are soak in the water in water the absorption test. While for the ammonium ion is come from the plasticizer that been use in the experiment that is Triethanolamine, TEA. The TGA test shown that thermoplastic starch panel decomposition temperature starting point is decrease as the increasing of the rubber content. The highest density is the thermoplastic starch panel that has 50% rubber contain while the lowest density is the panel that has 0% rubber contain. This is because of the density difference between the cornstarch and the natural rubber.

**Keywords:** Starch, thermoplastic, glutardialdehyde, triethanolamine, rubber

**ABSTRACT:  
MINING AND MINERAL  
TECHNOLOGY**

## UMK06

### **Ferrous Precipitation from Recycled Steel Slag for Treating Water of Sungai Chalil, Gua Musang, Kelantan**

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**Abstract.** Iron salts have long been used in wastewater treatment to remove phosphorus, total organic carbon, and nitrogen via the coagulation-flocculation process. This study aims to evaluate the potential of using steel slag as a source of salt solution to treat wastewater. The ferrous solution was prepared using the milled steel slag with sulphuric acid at different pHs and stirring speed with collected wastewater at different speeds. The trace elements and morphology of the precipitated solution and residue were examined for treated water and filtered residue. The results showed that at pH11, most trace elements at 400 and 1000 rpm constant stirring are reduced. Flocking the ferrous solution with wastewater leads to the coalescence of the particle. Increased stirring speed efficiently reduces Ba, Cr, Ga, Mg, and Ni while removing In, Mo, and Li. The coagulation-flocculation process for treating wastewater can be effectively induced by using steel slag as a source of iron salt.

**Keywords:** Iron salts, steel slag, wastewater treatment

## UMK45

### **Leaching of Non-Radioactive Rare Earth Element (NR-REE) from Ion Adsorption Clay (IAC) Using Monovalent Salt Solution**

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**Abstract:** Rare Earths Elements (REE) become the ‘vital materials’ for magnets performance, catalyst and chemical processes especially in high-tech technologies. The valuable heavy rare earth element (HREE, Gadolinium – Lutetium) from ion adsorption clay (IAC) is now majorly mined in Southern China. Some conventional methods for REE leaching can release radioactive waste from the extraction processes which can caused pollution to the environment. IAC or known as non-radioactive rare earth element (NR-REE) potentially release low greenhouse gasses and radioactive elements. IAC is accumulated in horizon of soil profile that resulted from the weathering process of rocks majorly from igneous granitic rocks. IAC deposited in tropical and climate regions as aluminosilicate minerals generally in granitic rocks, was weathered and form clay minerals that could be the major host of REE carrier. NR-REE from IAC is reported easy to be extracted by monovalent salt solutions using the concept of ion exchange. Ammonium sulphate (NH<sub>4</sub>)<sub>2</sub>SO<sub>4</sub>, ammonium nitrate (NH<sub>4</sub>NO<sub>3</sub>) and magnesium chloride (MgCl) salts are used as the lixiviant solutions for extraction process in this study. Time, pH and lixiviant salt solution are the parameters or control variables that need to be determined for the ideal condition of REE extraction. The results have shown that ammonium nitrate (NH<sub>4</sub>NO<sub>3</sub>) at room temperature is the optimum condition for maximum recovery of total REE. pH also affects the leaching efficiency and the best condition to increase the leaching efficiency is acidic pH (in the range of 3 to 4).

**Keywords:** NR-REE, leaching, ion adsorption clay

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