



# ABSTRACTS

# 27<sup>th</sup> SCIENTIFIC CONFERENCE OF MICROSCOPY SOCIETY OF MALAYSIA

Advances in Integrated Material and Biological  
Science Research through Microscopy

**3- 4 December 2018**

*The Mudzaffar Hotel, Melaka, Malaysia*

Jointly organised by:



## LIST OF ORAL PRESENTATIONS - BIOLOGICAL

CODE	TITLE	PRESENTER
OB-01	Study the Role of Green Zinc Oxide Nanoparticles Against <i>Burkholderia mallei</i> in Albino Male Rats	Dr. Ahmed Hamad Saleh <i>Al-Qalam College , Iraq</i>
OB-02	Larval Mouth Morphology and Alimentary Tract of Malaysian Mahseer Hybrid ( <i>Tor tambroides</i> ♂ X <i>Barbonymus gonionotus</i> ♀)	Muhammad Azfar Ismail <i>Universiti Putra Malaysia</i>
OB-03	Potential Used of Silver Nanoparticles (AgNPs) as an Antimicrobial Agent on Sugar Palm Starch (SPS) Reinforced Sugar Palm Nanoparticles Crystalline Cellulose (SPNCC) Films	Rozilah Abdullah <i>Universiti Putra Malaysia</i>
OB-04	Edible Bird's Nest (EBN) Ameliorates Progression of Hepatic Steatosis and Atherosclerosis in Hypercholesterolaemic-Induced Rats	Dr. Mohd Akmal Mohd Noor <i>Universiti Putra Malaysia</i>
OB-05	Biodegradation of Mango Seed Starch Films in Soil	Nur'aishah Ahmad Shahrim <i>International Islamic University Malaysia</i>
OB-06	Optimisation of Nanocellulose Production by <i>Gluconacetobacter</i> sp. BCZM 1 Isolated Locally from Fruit Wastes Sample	Mustapha Abba <i>Universiti Teknologi Malaysia</i>
OB-07	In-vivo Antiparasitic Assessment and Toxicity Evaluation of <i>Curcuma longa</i> Against the Growth and Survival of <i>Trypanosoma evansi</i>	Dr. Mohd Shukri Baba <i>International Islamic University Malaysia</i>
OB-08	Transmission Electron Microscopy Analysis of Shiga Toxin Producing <i>E. coli</i> O157:H7 treated with basil ( <i>Ocimum basilicum</i> L.) essential oil	Dr. Haidar Kadum Yakob Al-Salman <i>University of Anbar, Iraq</i>
OB-10	Damage Of Bacterial Cells Envelope by Antimicrobial Extract Of Ajwa Date ( <i>Phoenix Dactylifera</i> ) as Revealed By Scanning Electron Microscopy	Nurul Farhana Mohd Ishak <i>Universiti Sains Islam Malaysia</i>

### LIST OF ORAL PRESENTATIONS - BIOLOGICAL

CODE	TITLE	PRESENTER
<b>OB-11</b>	Application Of Scanning Electron Microscope in Palynology Study of Floral Resources by Indo-Malayan Stingless Bees Genus Tetragonula	Zubaidah Abu Hassan <i>Universiti Malaya</i>
<b>OB-12</b>	Morphometric Study of Hippocampal Ca1 Pyramidal Neurons After Chronic Tualang Honey Administration	AP Dr. Durriyyah Sharifah Hasan Adli <i>Universiti Malaya</i>
<b>OB-13</b>	Synthesis and Characterization of MOF-199 Nanocomposite (MOF-199/GOx) for Simulated Salivary Glucose Measurements	Nurulaina Fasya Saiful Anuar <i>Universiti Tenaga Nasional</i>

**LIST OF ORAL PRESENTATIONS - MATERIAL**

<b>CODE</b>	<b>TITLE</b>	<b>PRESENTER</b>
<b>OM-01</b>	Effect of Gas Flow Rate on the Precipitated Calcium Carbonate Production	Siti Noorzidah Mohd Sabri <i>Department of Minerals and Geoscience Malaysia</i>
<b>OM-02</b>	Effect of Accelerator in Biosynthesis of Silver Nanoparticles by <i>Entada Spiralis</i> Aqueous Extract	Wan Khaima Azira Wan Mat Khalir <i>Universiti Teknologi Malaysia</i>
<b>OM-03</b>	Degradation Properties of Nanoporous Biphasic Calcium Phosphate	Dr. Nur Farahiyah Mohammad <i>Universiti Malaysia Perlis</i>
<b>OM-04</b>	Microanalysis Study on the Lanna-Style Decorative Glass	Dr. Pisutti Dararutana <i>The Royal Thai Army Chemical Department, Thailand</i>
<b>OM-05</b>	Effect of Indentation Parameters in Obtaining Perfect Nanoindentation Test of Soft Alloy	Prof. Dr. Azman Jalar <i>Universiti Kebangsaan Malaysia</i>
<b>OM-06</b>	Characterization of Magnetic Co-Ni Ferrites Nanoparticles	Dr. Rizuan Mohd Rosnan <i>JEOL Malaysia Sdn Bhd</i>
<b>OM-07</b>	Tensile Properties of Citric Acid Crosslinked Nanocrystalline Cellulose/Chitosan Film Composite	Gan Pei Gie <i>Universiti Malaysia Perlis</i>
<b>OM-08</b>	Adipic Acid Crosslinked Nanocrystalline Cellulose/Chitosan Composite: Tensile Properties and Crystallinity	Dr. Sam Sung Ting <i>Universiti Malaysia Perlis</i>
<b>OM-09</b>	Microstructure Characterization and Tensile Properties of Hypereutectoid Al-Mg <sub>2</sub> Si-xYSZ Hybrid Composite by Stir Casting Process	AP Dr. Tuty Asma Abu Bakar <i>Universiti Teknologi Malaysia</i>
<b>OM-10</b>	Structural and Physicochemical Properties of NiO/MCF Catalyst for Syngas Production via CO <sub>2</sub> Reforming of Methane	Mohd Razali Shamsuddin <i>Universiti Putra Malaysia</i>
<b>OM-11</b>	Development of Polyvinyl Alcohol Composite Films Reinforced with Cellulose Nanocrystals Isolated from Coconut Husks Fiber	Nurdiana Othman <i>Universiti Malaysia Perlis</i>
<b>OM-12</b>	Preparation of Graphene Oxide Encapsulated Linseed Oil via Pickering Emulsion Method	Nurul Nadiah Sahir <i>International Islamic University Malaysia</i>
<b>OM-13</b>	Effect of Cooling Rates on Morphology Evolution of Primary Mg <sub>2</sub> Si in Al-15Mg <sub>2</sub> Si-0.3Ba In-situ Composite	AP Dr. Norhayati Ahmad <i>Universiti Teknologi Malaysia</i>

**LIST OF ORAL PRESENTATIONS - MATERIAL**

<b>CODE</b>	<b>TITLE</b>	<b>PRESENTER</b>
<b>OM-14</b>	Sealing Ability of Injectable Dental Composites, Biodentine and MTA in Repairing Furcal Perforation of Permanent Molar Teeth	Dr. Yanti Johari <i>Universiti Sains Malaysia</i>
<b>OM-15</b>	Development of Conductive Graphene/Polyaniline Nanocomposites Produced by In-situ Polymerization and Solvent Blending Method	Prof. Dr. Mariatti Jaafar @ Mustapha <i>Universiti Sains Malaysia</i>
<b>OM-16</b>	Electron Microscopy Analysis of Sputter Deposited Aluminium Nitride Thin Films	AP Dr. Nafarizal Nayan <i>Universiti Tun Hussein Onn Malaysia</i>
<b>OM-17</b>	Study of Carbon Nanostructures Grown From Latex Waste via Chemical Vapor Deposition	Dr. Yazid Yaakob <i>Universiti Putra Malaysia</i>
<b>OM-18</b>	Enhanced Performance of Ni <sub>3</sub> Si <sub>2</sub> Nanowire-Based Supercapacitor Electrodes by Controlling its Morphology and Structural Properties	Dr. Goh Boon Tong <i>Universiti of Malaya</i>
<b>OM-19</b>	In-situ Synthesis and Characterisation of Novel Zinc Doped Chitosan/Hydroxyapatite Composites for Potential Biomedical Applications	Prof. Dr. Ismail Zainol <i>Universiti Pendidikan Sultan Idris</i>
<b>OM-20</b>	Development of Nanostructured Aluminum Alloys by High-pressure Torsion and Subsequent Aging	Dr. Intan Fadhlina Mohamed <i>Universiti Teknologi Malaysia</i>
<b>OM-21</b>	Synthesis of Iron Oxide Nanoparticles with Controlled Size and Magnetic Properties	Auni Hamimi Idris <i>Universiti Putra Malaysia</i>
<b>OM-22</b>	Synthesis Parameters and Stability Study of ZIF-8 Nanocarrier for Potential Anticancer Drug Delivery Application	Nurul Akmarina Mohd Abdul Kamal <i>Universiti Putra Malaysia</i>
<b>OM-23</b>	Nitrogen-Alloyed Steel Wires	AP. Dr. Patthi Hussain <i>Universiti Teknologi Petronas</i>

**LIST OF POSTER PRESENTATIONS - BIOLOGICAL**

<b>CODE</b>	<b>TITLE</b>	<b>PRESENTER</b>
<b>PB-01</b>	Light and Electron Microscopes Study of the Histological Changes Induced in Female SD Rats Liver Tissue by Xylene	Mohd Harissal Ismail <i>Universiti Sains Malaysia</i>
<b>PB-02</b>	Maturity Stages, Effect of Storage Temperatures and Durations on Physical Quality and Ultrastructure of Postharvest Shelf Life of Straw Mushroom ( <i>Volvariella volvacea</i> )	Nur Sakinah Mohd Joha <i>Universiti Putra Malaysia</i>
<b>PB-03</b>	Physicochemical Analysis and Sugar Profiling in Acacia Honey	Anis Syamimi Mohamed <i>Universiti Teknologi MARA</i>
<b>PB-04</b>	Macroscopic and Microscopic Analysis of <i>Luvunga crassifolia</i> Leaves	Sugathini Shunmugam <i>Universiti Putra Malaysia</i>
<b>PB-05</b>	Anatomical Analysis of <i>Glycosmis perakensis</i> , a Member of the Rutaceae family	Previnaa Sundrarajoo <i>Universiti Putra Malaysia</i>
<b>PB-06</b>	Microscopic Evaluation of the Anticancer Efficacy of Docetaxel-loaded Calcium Carbonate Aragonite Nanoparticles (DTX-CaCO <sub>3</sub> NP) on MCF-7 Cell Line	Dr. Intan Shameha Abdul Razak <i>Universiti Putra Malaysia</i>
<b>PB-07</b>	Cellular Structural Changes in <i>Candida albicans</i> Treated <i>Melastoma malabathricum</i> L. Leaves Fractions	Siti Nurulhuda Mastuki <i>Universiti Putra Malaysia</i>
<b>PB-08</b>	Media Formulation for High Microalgal Biomass	Dr. Mohd Razif Harun <i>Universiti Putra Malaysia</i>
<b>PB-09</b>	Oil Palm Root Colonization Study using Endophytic <i>Trichoderma virens</i> 7b Harboring Green Fluorescent Protein (GFP) Gene	Intan Nur Ainni Mohamed Azni <i>Malaysian Palm Oil Board</i>
<b>PB-10</b>	Micrograph of Native <i>Scenedesmus</i> sp (UKM 9) and <i>Chlamydomonas</i> sp (UKM 6) Isolated from Local Agriculture Waste	Dr. Nazlina Haiza Mohd Yasin <i>Universiti Kebangsaan Malaysia</i>

**LIST OF POSTERS PRESENTATION - MATERIAL**

<b>CODE</b>	<b>TITLE</b>	<b>PRESENTER</b>
<b>PM-02</b>	Effect of Loading Rates and Single Edge Notch Bending (SENB) Specimen Thicknesses on Shear Lips Formation for Al6061	Dr. Noradila Abdul Latif <i>Universiti Tun Hussein Onn Malaysia</i>
<b>PM-03</b>	Electrophoretic Deposition of Ba <sub>0.5</sub> Sr <sub>0.5</sub> Co <sub>0.8</sub> Fe <sub>0.2</sub> O <sub>3-δ</sub> -SDC Carbonate Coating for Solid Oxide Fuel Cell Stainless Steel Interconnect	AP Dr. Hamimah Abd.Rahman <i>Universiti Tun Hussein Onn Malaysia</i>
<b>PM-04</b>	Mechanical Properties of Woven Carbon Fiber/Kenaf Fabric Reinforced Epoxy Matrix Hybrid Composites	Mohamad Ikhwan Yusuff <i>International Islamic University Malaysia</i>
<b>PM-05</b>	Fabrication of High Performance Nickel Silicide Nanowire Supercapacitor Electrode	Mohammad Mukhlis Ramly <i>Universiti Malaya</i>
<b>PM-06</b>	Low-Temperature Hydrothermal Synthesis of Enhanced 77s Nano Bioactive Glass	Norsazlina Binti Ahmad Jan <i>Universiti Malaysia Sabah</i>
<b>PM-07</b>	Fracture Surface of Bismuth Glass Doped with Potassium Chromate	Dr. Pisutti Dararutana <i>The Royal Thai Army Chemical Department, Thailand</i>
<b>PM-08</b>	Two Dimensional ZnO Growths Using Hydrothermal Method	AP Dr. Muhammad Azmi Abdul Hamid <i>Universiti Kebangsaan Malaysia</i>
<b>PM-09</b>	Effect of Soda Bicarbonate (NaHCO <sub>3</sub> ) on the Porosity of Tricalcium Phosphate Bioceramic	Farah Jaafar <i>Universiti Sains Malaysia</i>
<b>PM-10</b>	Morphological Study of Cassava Starch Film Influence by Plasticizers in Zinc-Air Fuel Cell	Nur Ain Adila Abd Wahab <i>Universiti Malaysia Kelantan</i>
<b>PM-11</b>	Preparation and Characterisation of Epoxy/Silica/Kenaf Composite Using Hand Lay-Up Method	Dr. Che Nor Aiza Jaafar <i>Universiti Putra Malaysia</i>
<b>PM-12</b>	Formation of Cobalt Coated TiO <sub>2</sub> Nanotubes by Wet Impregnation for Dye Degradation	Dr. Syahriza Ismail <i>Universiti Teknikal Malaysia Melaka</i>
<b>PM-13</b>	Effect of Multi-walled Carbon Nanotubes Concentrations on Heat Transfer in Nanofluid	Dr. Hussin Mamat <i>Universiti Sains Malaysia</i>

**LIST OF e-POSTER PRESENTATIONS****BIOLOGICAL**

<b>CODE</b>	<b>TITLE</b>	<b>PRESENTER</b>
<b>EPB-01</b>	Molecular Characterization of Bacteria Isolated From the Skin of Cantaloupe Fruit Using 16s Ribosomal RNA Sequence Analysis	Musa Ahmed Abubakar <i>Kano State Polytechnic, Nigeria</i>
<b>EPB-02</b>	Anthelmintic Activity of Prophetic Food (Milk): An Electron Micrographic Evidence	Dr. Omaima Adil Najm <i>Universiti Sains Islam Malaysia</i>
<b>EPB-03</b>	The Relative Anthelmintic Efficacy of Goat's Milk and Ajwa Date Palm Fruit Against <i>Toxocara spp.</i> and <i>Ancylostoma spp.</i> in kittens	Dr. Omaima Adil Najm <i>Universiti Sains Islam Malaysia</i>

**MATERIAL**

<b>CODE</b>	<b>TITLE</b>	<b>PRESENTER</b>
<b>EPM-01</b>	Effect of Waste Rice Husk Ash on Microstructures and Physical Properties of Recycled Aluminium Chip AA7075	Nurul Farahin Mohd Joharudin <i>Universiti Tun Hussein Onn Malaysia</i>
<b>EPM-03</b>	Influence of Kenaf Fibers on Flexural Strength of Polymethyl Methacrylate Denture	Pallavaraya Varman Subramaniam <i>Universiti Sains Malaysia</i>
<b>EPM-05</b>	Preparation and Characterisation of Spray Dried Hydroxyapatite Powder from Fish Scale.	Izyan Khairani Mohd Ismail <i>Universiti Putra Malaysia</i>



# **ORAL ABSTRACTS**

## **BIOLOGICAL**

## OB-01

### **Study the Role of Green Zinc Oxide Nanoparticles against *Burkholderia mallei* in Albino Male Rats**

**Ahmed Hamad Saleh\***

*Medical Analysis Department/ Al-Qalam College /Kirkuk*

\*E-mail address of Corresponding Author: [ahmedeagle72@gmail.com](mailto:ahmedeagle72@gmail.com)

**Keywords:** *green zinc oxide nanoparticles, oxidative stress, antioxidant, lung.*

The present study was designed to show the potential role of zinc oxide nanoparticles against the toxicity of *Burkholderia mallei*. The study used 25 adult male rats that distributed to five groups (each group consist 5 rats); control group that received normal saline, second group rat injected intraperitoneal with *B. mallei* at dose  $10^6$  cell/ ml. third group rat injected intraperitoneal with *B. mallei* at dose  $10^8$  cell/ml. fourth group rat injected intraperitoneal with *B. mallei* at dose  $10^6$  cell/ ml and treated with 50mg/kg for four weeks. Fifth group rat injected intraperitoneal with *B. mallei* at dose  $10^8$  cell/ml and treated with 50mg/kg for four weeks. The results show high significant increased ( $P < 0.05$ ) in levels MDA and high significant decreased ( $P < 0.05$ ) in levels GSH, catalase in second and third groups compared with control group. The results of fourth and fifth groups show non-significant changes ( $P < 0.05$ ) in all parameters compare with control group when using green zinc oxide nanoparticles. The histological study to section that prepared from second and third groups that injected with *B. mallei* show thickening wall of bronchiole in most regions with sever inflammatory cells infiltration and damage in wall of alveoli and fibrosis. After treatment, the sections that prepared from fourth and fifth group show a semi-normal structure of bronchiole, alveolar sac and alveoli. It was concluded that green zinc oxide nanoparticles has been potential role against the toxicity of *B. mallei* in adult male rats.

## OB-02

### **Larval Mouth Morphology and Alimentary Tract of Malaysian Mahseer Hybrid (*Tor tambroides* ♂ X *Barbonymus gonionotus* ♀)**

**M.A. Ismail, M.S. Kamarudin\*, F. Syukri, and S.N. Azahar**

*Department of Aquaculture, Faculty of Agriculture, Universiti Putra Malaysia,  
43400 Serdang Selangor, Malaysia*

\*E-mail address of Corresponding Author: [msalleh@upm.edu.my](mailto:msalleh@upm.edu.my)

**Keywords:** *Malaysian mahseer hybrid larvae, SEM, exogenic feeding.*

A new hybrid of Malaysian mahseer was produced from the crossbreed between *Tor tambroides* male and *Barbonymus gonionotus* female in order to provide better strains for the aquaculture industry. This study was carried out through microscopic observation for the morphology, functional capabilities and histological of the mouth development and alimentary tract of Malaysian mahseer hybrid larvae for a better understanding in nutritional and to determine the first feeding (exogenic feeding) and best weaning time to a compound diet for the fry. The mouth development of larvae was observed daily using light and scanning electron microscope (SEM). SEM is used after fixed into 4% glutaraldehyde within 24 hours, preserved in 0.1M sodium cacodylate buffer and gold coated mounting. The larval mouth started to open at 3 Days After Hatch (DAH) with the mouth opening of  $111.01 \pm 5.91 \mu\text{m } \emptyset$  and  $173.11 \pm 10.98 \mu\text{m } \emptyset$  at 45° and 90°, respectively. Exogenic feeding began at 4 DAH when reserved yolk sac was completely reabsorbed in the larvae. Supranuclear protein and supranuclear lipid inclusion appeared in the anterior and posterior intestine at 6 DAH coincided with the acceptance of the formulated diet, however the oesophagus was completed at 7 DAH. In a conclusion, Malaysian mahseer hybrid larvae should be fed with micro-food; rotifer and micro-worm, in early larval stage thereafter able to ingest, digest and absorb a formulated diet from 7 DAH. SEM helps in this study for more descriptive and reliable results in the larval mouth morphology and features.

## OB-03

### **Development and Characterization of Antibacterial Sugar Palm Nanoparticles Crystalline Cellulose (SPNCCs) Reinforced Sugar Palm Starch (SPS) nanocomposite film: Effect on Mechanical Properties and Bactericidal Activity of Silver Nanoparticle (AgNPs)**

**A. Rozilah<sup>1\*</sup>, C.N. Aiza Jaafar, and<sup>1,2</sup> S.M. Sapuan<sup>1,2</sup>**

<sup>1</sup>*Laboratory of Biocomposite Technology, Institute of Tropical Forestry and Forest Products, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia*

<sup>2</sup>*Department of Mechanical and Manufacturing Engineering, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia*

\*Email Address of Corresponding Author: [rozilahabdullahsilver85@gmail.com](mailto:rozilahabdullahsilver85@gmail.com)

The development and characterization of environmentally friendly films from Sugar Palm Starch (SPS), Sugar Palm Nanoparticles Crystalline Cellulose (SPNCCs) and Silver Nanoparticles (AgNPs) were revealed. In addition, the sensibility to water, mechanical and thermal properties were greatly improved after formation of Antibacterial Sugar Palm Starch/Sugar Palm Nanoparticles Crystalline Cellulose (SPS/SPNCCs). Antibacterial SPS/SPNCCs nanocomposite film exhibited strong antimicrobial activity against human strain pathogens at 3 wt.% compositions with an average  $7.83 \pm 0.5$  mm for E.coli,  $0.5 \pm 0.5$  mm for S. aureus and  $7.5 \pm 0.5$  mm for Salmonella. The 3 wt.% compositions shows better maintained in the integrity towards microbial attack and suitable to use as antimicrobial packaging by improving the plastics properties. FE-SEM micrographs show SPNCCs and AgNPs which dispersed homogenously on the surface layer and core surface of the films. Both the size of Sugar Palm Nanoparticles Crystalline Cellulose (SPNCCs) and AgNPs had an average in between 37.3-47.0 nm and 41.1–94.2 nm, respectively. The encapsulation of films with positive (+ve) and negative (-ve) pathogen resulted in bacterial death and cause shrinkage to the cell wall by damaging the lipids order of the cells that resulted from osmotic stress via slow dehydration during drying process. The cells diameter and density shows decreasing with increasing in length of bacterial. Thus, it was possible to develop and characterize the Antibacterial SPS/SPNCCs films based on sago starch with containing active ingredients, which confers them antimicrobial properties. The aim of this

research is to highlight the recent advances in developing of Antibacterial SPS/SPNCCs for plastics packaging in future requirements with quality, lower cost and less toxicity.

## OB-04

# Edible Bird's Nest (EBN) Ameliorates Progression of Hepatic Steatosis and Atherosclerosis in Hypercholesterolaemic-induced Rats

M. N. Akmal<sup>1</sup>, A.R. Intan-Shameha<sup>1\*</sup>, M. Ajat<sup>1</sup>, R. Mansor<sup>2</sup>, and I. Aini<sup>3</sup>

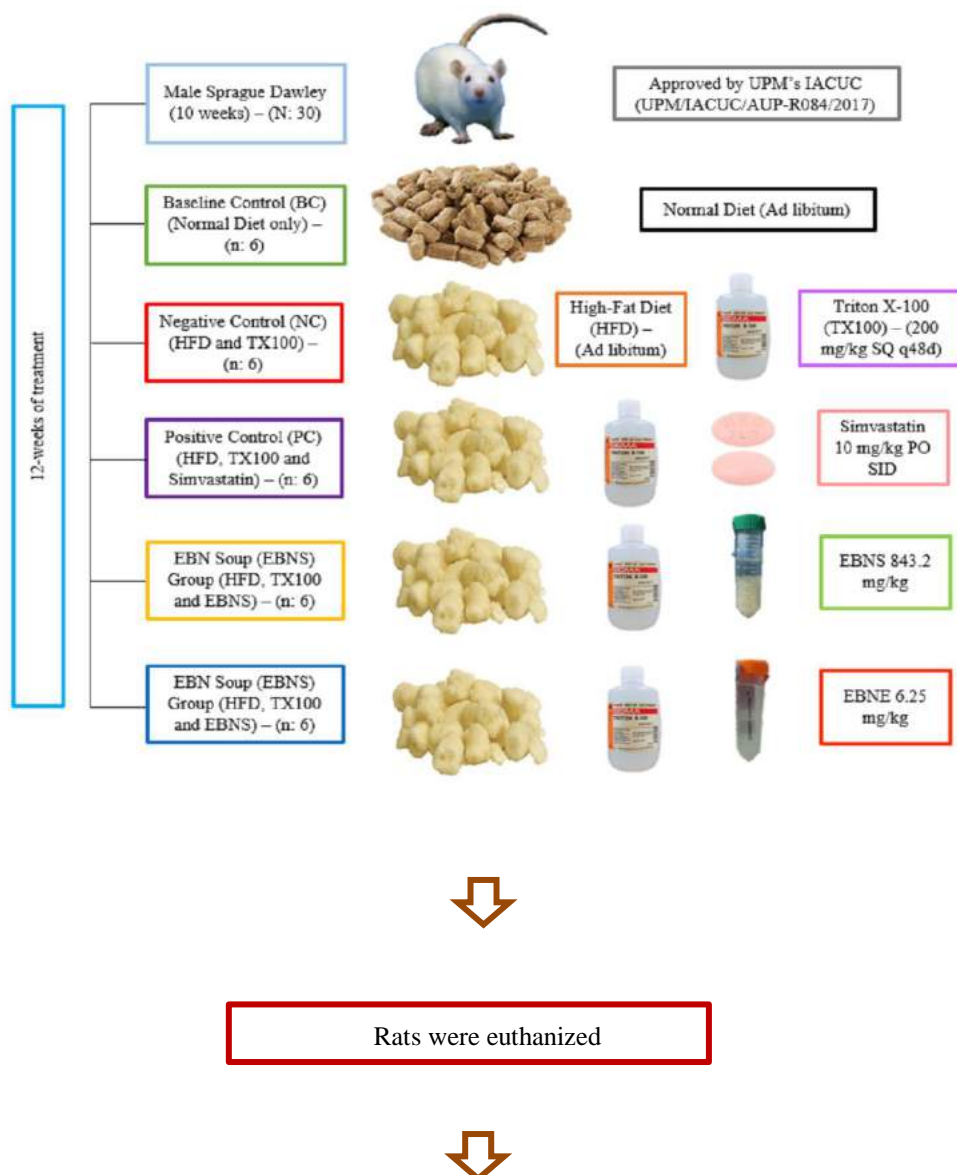
<sup>1</sup>Department of Veterinary Preclinical Sciences,

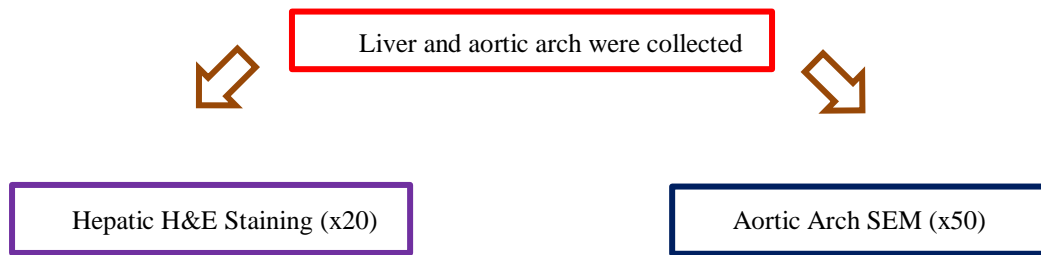
<sup>2</sup>Department of Farm Animal and Exotic Medicine and Surgery,

<sup>3</sup>Department of Veterinary Clinical Studies,

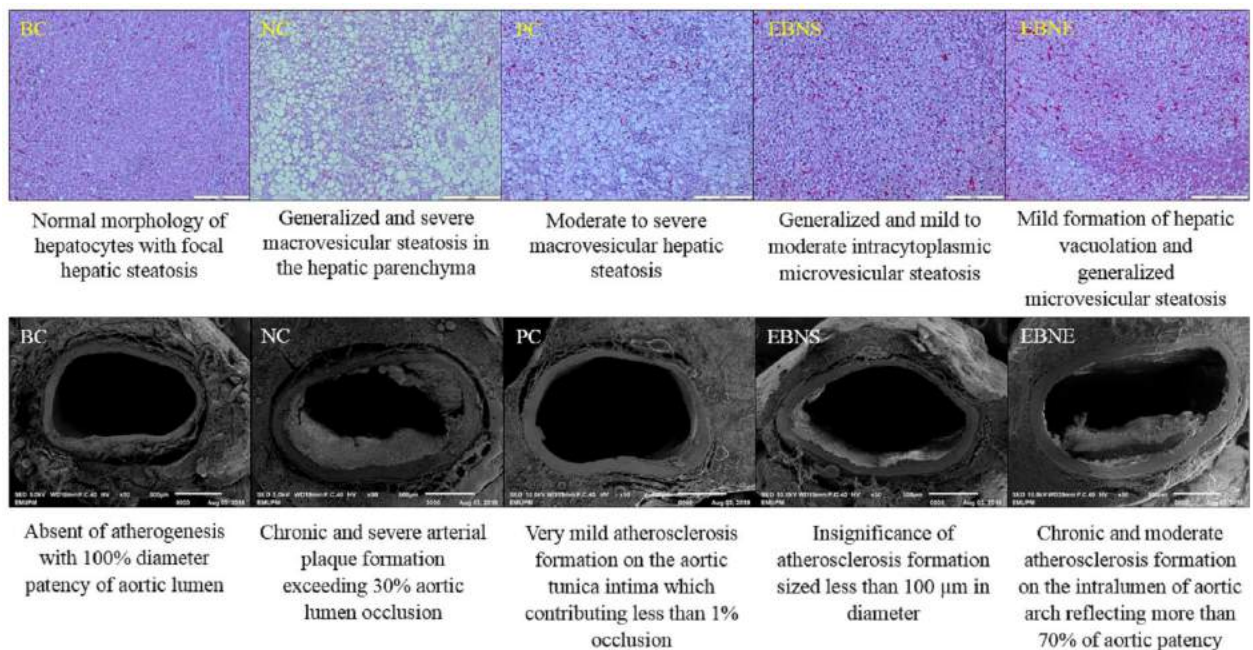
Faculty of Veterinary Medicine, Universiti Putra Malaysia, 43400, UPM Serdang, Selangor, Malaysia

\*Email address of Corresponding Author: [intanshameha@upm.edu.my](mailto:intanshameha@upm.edu.my)





## RESULTS



## OB-05

### Biodegradation of Mango Seed Starch Films in Soil

N.A. Shahrim<sup>1\*</sup>, N. Sarifuddin<sup>2\*</sup>, A.Z.A. Azhar<sup>3</sup>, and H.H.M. Zaki<sup>4</sup>

<sup>1,2,3,4</sup> Department of Manufacturing and Materials Engineering, Kulliyyah of Engineering,  
International Islamic University Malaysia (IIUM), Kuala Lumpur, Malaysia

\*E-mail address of Corresponding Author: [aisydahlia@gmail.com](mailto:aisydahlia@gmail.com)

**Keywords:** Starch, Biodegradable polymer, Soil burial.

Glycerol-plasticized mango seed starch films were prepared with different amounts of citric acid as crosslinking agent via solution casting method. The blend ratio between starch and glycerol was fixed at 3:5 wt. %, while citric acid content varied from 0 to 10 wt. %. The casted films were then subjected to soil burial test for 21 days to assess their biodegradation behaviour in natural environment. Susceptibility of the films to biodegradation reactions were measured at seven days intervals. As the burial time progressed, crosslinked starch films was found to degrade slower than the non-crosslinked starch films as evidenced by the decreasing weight loss percentages, presence of microorganisms and eroded surface on the films when examined under the SEM. It can be concluded from this study that crosslinked starch-glycerol films are biodegradable in soil.



## Biodegradation of Mango Seed Starch Films in Soil

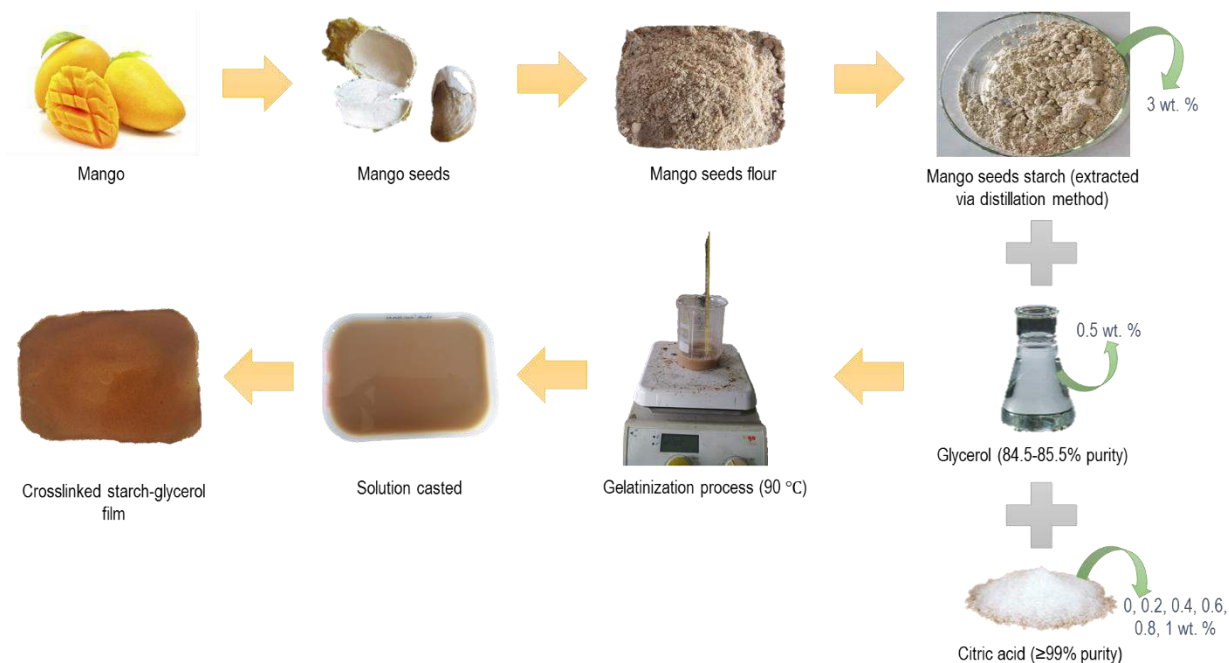


Figure 1. Preparation of mango seed starch-glycerol film crosslinked with citric acid

Sample / Day	GTPS5-CA0	GTPS5-CA2	GTPS5-CA4	GTPS5-CA6	GTPS5-CA8	GTPS5-CA10
0 day						
7 days						
14 days						
21 days						

Figure 2. Macroscopic appearance of non-crosslinked and crosslinked mango seed starch-glycerol films after being buried for 21 days

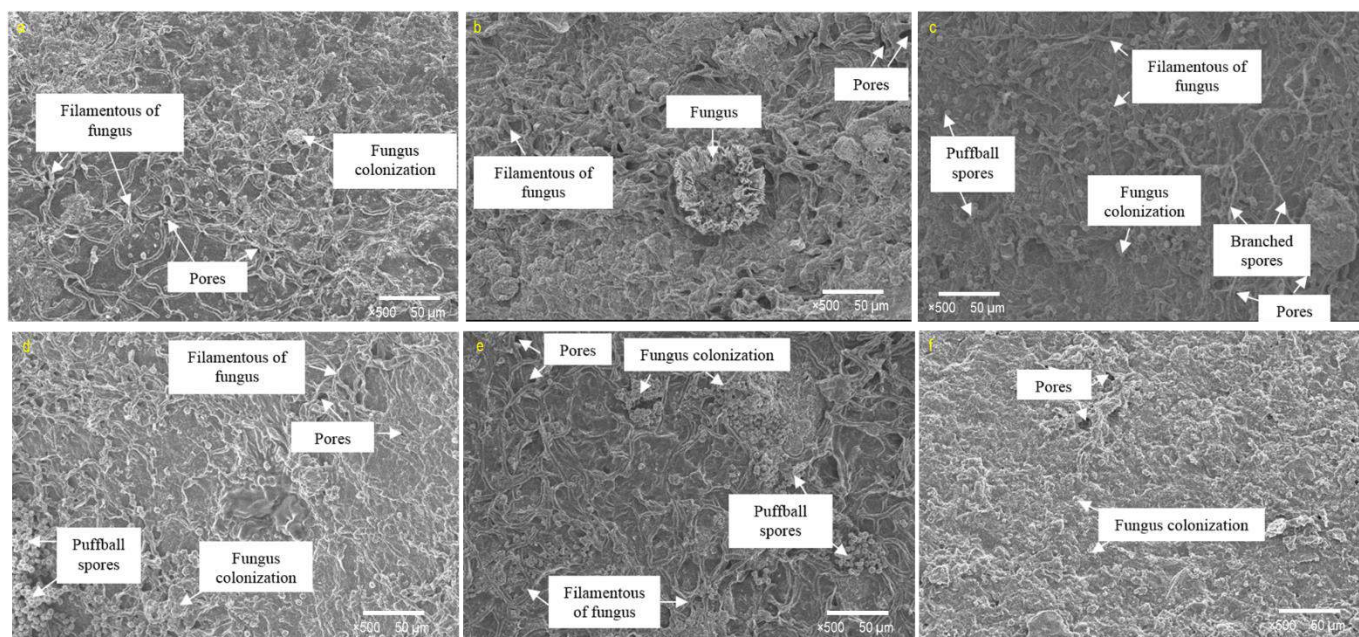


Figure 3. SEM micrographs at 500 $\times$  magnification of crosslinked mango seed starch films with various citric acid concentrations (a) 0, (b) 2, (c) 4, (d) 6, (e) 8, and (f) 10 wt. %

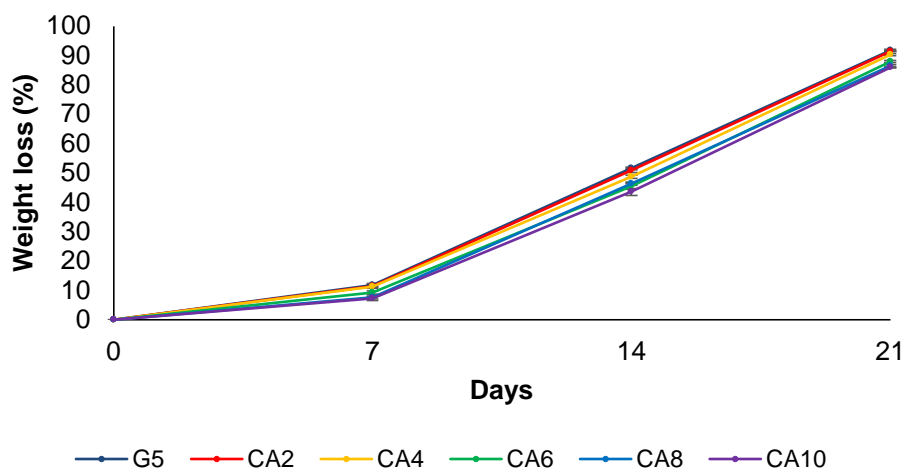


Figure 4. Weight loss of non-crosslinked and crosslinked mango seed starch-glycerol films after buried in soil for 21 days

## OB-06

### **Optimisation of Nanocellulose Production by *Gluconacetobacter* sp. BCZM 1 Isolated Locally from Fruit Wastes Sample**

**M. Abba<sup>1,4\*</sup>, C.S. Chong<sup>2</sup>, S.I.A Razak<sup>3</sup>, and Z. Ibrahim<sup>4</sup>**

<sup>1</sup> *Department of Biosciences and Health Sciences, Faculty of Sciences, Universiti Teknologi Malaysia, 81310 Skudai, Johor, Malaysia.*

<sup>2</sup> *Department of Biotechnology, Faculty of Science, Universiti Teknologi Malaysia, 81310 Skudai, Johor, Malaysia.*

<sup>3</sup> *Centre for Advanced Composite Materials, Universiti Teknologi Malaysia, 81310 Skudai, Johor, Malaysia.*

<sup>4</sup> *Department of Microbiology, Faculty of Science, Bauchi State University, Gadau. PMB 65, Nigeria*

\*E-mail address of Corresponding Author: [mustaphaabba69@gmail.com](mailto:mustaphaabba69@gmail.com)

**Keywords:** *Nanocellulose, characterization, Gluconacetobacter.*

Nanocellulose is synthesized from bacteria for biotechnological purposes including biomedical application due to its high level of purity. Bacterial nanocellulose (BNC) does not contain lignin and other contaminating materials that are commonly found in plants nanocellulose. There is a significant interest in the BNC production and its optimization for over a decade in order to meet up with the global demand for nanocellulose production. It is, therefore, necessary to determine a suitable set of conditions that will allow a high level of BNC production by the potential bacterium. In this study, nanocellulose production by *Gluconacetobacter* sp. BCZM 1 was optimized using one factor at-a-time (OFAT) and central composite design (CCD), Followed by its characterization using Scanning electron microscopy (SEM) and Fourier transformed infrared spectroscopy (FTIR). After successful optimisation, the BNC yield by the bacterium was found to increase with about 1.7 folds, from 2.7 g/L to 4.6 g/L. Different factors including temperature, incubation time, pH, and carbon sources were found to affect BNC production by the selected bacterium. The BNC produced under optimum culture condition was characterized and found to display a characteristics feature of the native form of cellulose, which further indicates its potential to be used for wider applications.

**OB-07**

**In-Vivo Antiparasitic Assessment and Toxicity Evaluation of *Curcuma Longa* against the Growth and Survival of *Trypanosoma evansi***

**F. H. Mohammad and M. S. Baba\***

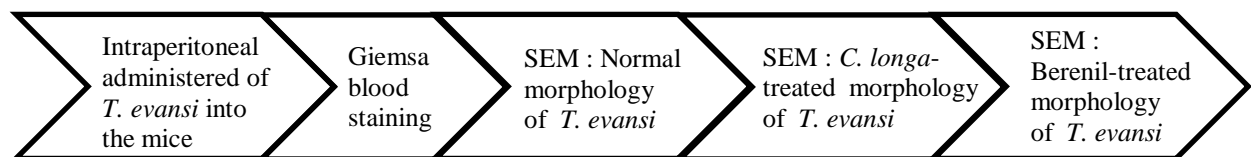
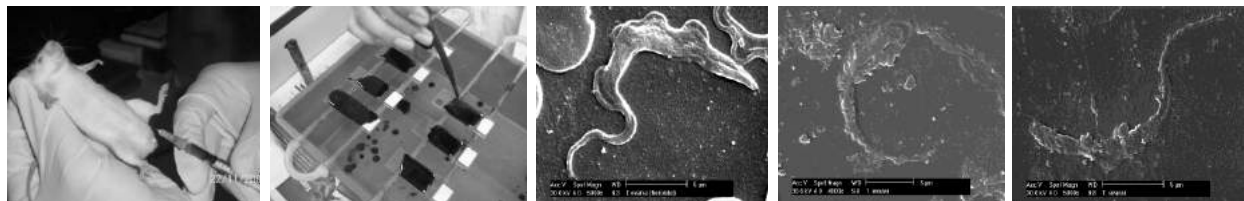
*Department of Biomedical Science, Kulliyyah of Allied Health Sciences, International Islamic University,  
Jalan Sultan Ahmad Shah, 25200 Kuantan, Pahang, Malaysia*

\*E-mail address of Corresponding Author : [mohd\\_shukri@iium.edu.my](mailto:mohd_shukri@iium.edu.my)

**Keywords:** Antiparasitic, *Curcuma longa*, *Trypanosoma evansi*.

Realizing that *Trypanosoma evansi* is now has been potentially trans-infected to human from animals, this study demonstrated how the manipulation of natural spice, *Curcuma longa* (turmeric), promisingly can solve the endemicity of vector-borne zoonotic manifestation of atypical human trypanosomiasis (AHT) and Surra disease in livestock. The effectiveness of *C. longa* roots on the growth and survival of the haemoflagellate protozoa *Trypanosoma evansi* was compared with Berenil ( $C_{18}H_{22}N_8O_3$ ). Groups of male ICR mice (6 – 8 weeks old, 20 – 25g body weight) were intraperitoneally (i.p) administered with the parasite at  $5.0 \times 10^3$  *T. evansi*/mouse and orally given pre- and post-infection treatments with 10 µg/mL of *C. longa*-dH<sub>2</sub>O extract at 0.1 mL/mouse. Using Giemsa stained blood smear and examined under light and scanning electron microscopes (SEM), the morphological changes of parasite cells were assessed. Toxicity level of blood enzymes and selected vital organs and survival rate of the mice were also investigated. The morphological changes of *T. evansi* cells were evidenced. The cell became crescent-shaped and the undulating membrane was destroyed where both posterior and anterior ends were tapered before the flagellum disintegrated in which lead to death of the cells. A positive correlation ( $p \leq 0.05$ ,  $n = 6$ ) were recorded between the mice survival time and the ability to inhibit the parasites growth in pre-infection treatment group. Besides, the mice in PRE14 group (daily treated with *C. longa*-dH<sub>2</sub>O extract from 14 days before infection) was also recorded the longest pre-patent ( $39.15 \pm 3.3$  days) and survival ( $228.75 \pm 2.6$  days) period. Except for AST level for sub-acute regime group which was a bit elevated, the results for biochemical tests were significantly situated in the normal ranged level for all regimens as well

as no abnormalities and injuries found on the selected vital organs. This study significantly evidenced that *C. longa* could be manipulated as a potential antitrypanosomal alternative drug for the preservation and welfare of human and livestock beings.





## OB-08

### **Transmission Electron Microscopy Analysis of Shiga Toxin Producing *E. coli* O157:H7 treated with Basil (*Ocimum basilium* L. ) Essential Oil**

**Haidar Kadum Yakob\***

*Department of Biology, College of Education for Pure Science, University of Anbar, Iraq*

\*E-mail address of Corresponding Author: [h.asalman2006@gmail.com](mailto:h.asalman2006@gmail.com)

**Keywords:** TEM, *E. coli* O 157:H7, medicinal plants, basil oil.

Shiga toxin-producing *Escherichia coli* O157:H7 (STEC) is one of the most important foodborne pathogens and considered a serious threat to public health in recent years. Current therapy for STEC infection is limited to supportive treatment as antibiotics may increase the risk of systemic complications such as acute renal failure. Medicinal plants could be a promising source of alternative treatments of this pathogen. Based on our previous reported findings from concentration-dependent activity of basil oil against the pathogen, oil at 0.25 mg/ml was bacteriostatic while at 0.5 mg/ml was bactericidal. Therefore, in this study, these two concentrations were used to observe its effects on the pathogen under transmission electron microscopy. Stationary phase *E. coli* O157:H7 was treated with 0.25 mg/ml and 0.5 mg/ml basil oil. Untreated *E. coli* O157:H7 was used as a control. A standard procedure of electron microscopy specimen preparation was followed. TEM images showed that the control cells of *E. coli* O157:H7 were rod-shaped and had cellular integrity. The treated cells showed clear ultrastructural damages. When the bacterial cells were exposed to the oil at 0.25 mg/ml, the outer membrane became separated from the cell wall. Meanwhile, extensive damages were observed in the cells treated with the oil at 0.5 mg/ml when a disruption in the outer membrane and cytoplasmic membrane was appeared. Further investigations on the oil are required to identify the bioactive compound(s) and its mode of action.

## OB-10

### **Damage of Bacterial Cells Envelope by Antimicrobial Extract of Ajwa Date (*Phoenix Dactylifera*) as Revealed by Scanning Electron Microscopy**

**M. I. Nurul Farhana<sup>1</sup>, N. Abdullah<sup>2</sup>, and W.S. Wan Shahida<sup>3\*</sup>**

<sup>1,2,3</sup>, Faculty of Medicine and Health Sciences, Universiti Sains Islam Malaysia, Level 13, Menara B, Jalan Pandan Utama, 55100 Pandan Indah, Kuala Lumpur, Malaysia

\*E-mail address of Corresponding Author: [wanshahida@usim.edu.my](mailto:wanshahida@usim.edu.my)

**Keywords:** Scanning Electron Microscope (SEM), *Phoenix Dactylifera*, bacterial gastroenteritis.

Ajwa dates are rich in protein, carbohydrate, minerals, dietary fiber, vitamins, and phytochemicals such as flavonoids, phytosterols, and polyphenol, which have been reported to have antimicrobial properties. Scanning electron microscopy (SEM) was used to examine the ultrastructural changes in bacterial that causing gastroenteritis after induced by Ajwa dates aqueous extract. Five reference strains were selected for investigation; gram positive bacteria: *Staphylococcus aureus* (ATCC 6538) and gram negative bacteria: *Escherichia coli*, *Salmonella typhi*, *Salmonella typhimurium* (ATCC 14028), and *Shigella flexneri* (ATCC 12022). All bacterial strain were exposed to Ajwa dates aqueous extract at concentration 500mg/ml for 16-20 hours. SEM revealed there are ultra structural changes in all tested bacterial. In *S. aureus* cells showed some completely lysed cells. In *S. typhimurium* and *S. typhi* cells, there were formations of dimples and blister seen on the cells surface after treatment. While in *E. coli*, there were surface irregularities observed; where the surface of the bacterial surface seem rougher and shrunken compared to the control. In *S. flexneri*, there were formations of debris-like substance, which were considered to be cellular debris arising from cell lysis. This observation suggests that the Ajwa dates extract exhibit the ability to kill the bacteria through morphological changes. It is suggested that Ajwa dates have a potential value for treatment of bacterial gastroenteritis.

## OB-11

### **Application of Scanning Electron Microscope in Palynology Study of Floral Resources By Indo-Malayan Stingless Bees Genus *Tetragonula***

**Zubaidah Abu Hassan<sup>1,2\*</sup>, Shamsul Bahri Abdul Razak<sup>2</sup>, Nur Azura Adam<sup>3</sup>, Junedah Sanusi<sup>4</sup>, Azura Aladdin<sup>5</sup>, and Hamzah Abdul Hamid<sup>5</sup>**

<sup>1</sup> *Department of Medical Microbiology, Faculty of Medicine, University of Malaya*

<sup>2</sup> *School of Science and Food Technology, Universiti Malaysia Terengganu*

<sup>3</sup> *Faculty of Agriculture, Universiti Putra Malaysia*

<sup>4</sup> *Department of Anatomy, Faculty of Medicine, University of Malaya*

<sup>5</sup> *Electron Microscope Unit, Faculty of Medicine, University of Malaya*

\*E-mail address of Corresponding Author: [zubae@um.edu.my](mailto:zubae@um.edu.my)

**Keywords:** *pollen, Tetragonula, SEM.*

Palynology or study of pollen (pollen analysis) allows the identification of floral sources of stingless bees. The palynology (pollen analysis) was carried out on pollens grains foraged by the Indo-Malayan stingless bees. The objective of this study is to identify the flower preferred by the *Tetragonula* in their surrounding habitat. The pollens collected by eight species of *Tetragonula* and their references flower were investigated using scanning electron microscope (SEM) with some modification on the SEM parameters to suit the samples. Pollen's unique morphology is like fingerprint which can provide a basis for the identification of plant species. About twenty-three (23) pollens have been observed and identified. The predominant pollens were *Antigonon leptopus* (Polygonaceae) and *Elaeis guineensis* (Arecaceae) with each collected by about four (4) species of stingless bees; followed by *Capsicum annum* (Solanaceae), *Citrus microcarpa* (Rutaceae) and *Sphagneticola tribolata* (Asteraceae) with each collected by about three (3) species of stingless bees. *Tetragonula fuscobalteata* was found as the most generalist foragers which had collected almost twelve (12) type of pollens, followed by *Tetragonula laeviceps* with nine (9) species of pollens. It can be concluded the identification of pollens and stingless bee-collected pollens based on morphological ultrastructural detail using SEM can provide the valuable and specific information of pollens and plant-insect interaction.



## OB-12

### **Morphometric Study of Hippocampal Ca1 Pyramidal Neurons after Chronic Tualang Honey Administration**

**N.L. Mohd Yusoff, M.A. Kamarulzaidi, S.Y.X Tiong, and D.S. Hasan Adli\***

*Institute of Biological Sciences, Faculty of Science, University of Malaya,  
Kuala Lumpur 50603, Malaysia.*

\*E-mail address of Corresponding Author: [durriyyah@um.edu.my](mailto:durriyyah@um.edu.my)

**Keywords:** *Morphometric, hippocampal neurons, Tualang honey.*

Tualang Honey is collected from the hives of *Apis dorsata* bee species on Tualang trees. Its various nutritional and curative properties could probably be due to its antioxidant effects. Subsequent to previous studies demonstrating its positive effects on spatial memory performance and hippocampal neuronal count, the current study investigated whether it has morphometric effects on the hippocampal cornu ammonis 1 (CA1) pyramidal neurons. It is important to evaluate the characteristics of hippocampal constituent neurons since this brain structure, which is primarily involved in memory processes, is most vulnerable towards oxidative stress. Male *Sprague Dawley* rats were force-fed five days a week for 12 consecutive weeks with 1.0ml/100g body weight of 70% Tualang honey (HON) or with 0.9% saline (SAL) as control. Nissl's stained dorsal transverse hippocampal sections (8µm thick) of both groups were visualised under Olympus BX51 light microscope. Images were captured using Analyser Life Science software and morphometric analysis was conducted using Image-Pro Premier 9.1 64-bit software. Only neuronal somas with clear nucleus and nucleolus were included in the morphometric analysis. Significant differences were observed between the groups for all five parameters selected (somatic area [SA], somatic perimeter [SP], somatic aspect ratio [SAR], somatic circularity index [SCI], and somatic roundness [SRo]). Values of SA and SP of HON group indicated significantly bigger sized CA1 neurons. Values of SAR, SCI and SRo, which indicated shape of the neuronal somas, are biased towards less rounded shape. These values demonstrated HON has effects at the neuronal morphometric level.

## OB-13

### **Synthesis and Characterization of MOF-199 Nanocomposite (MOF-199/GOx) for Simulated Salivary Glucose Measurements**

**N. F. Saiful Anuar<sup>1</sup>, N. A. Samsudin<sup>2</sup>, S. Z. Othman<sup>a</sup>, M. Akhtaruzzaman<sup>3</sup>, M. A. Alghoul<sup>4</sup>,  
H. Misran<sup>1,2\*</sup> and N. Amin<sup>2</sup>**

<sup>1</sup> *Nanoarchitectonic Laboratory, Department of Mechanical Engineering, College of Engineering, Universiti Tenaga Nasional, 43000 Kajang, Selangor, Malaysia*

<sup>2</sup> *Institute of Sustainable Energy, Universiti Tenaga Nasional, 43000 Kajang, Selangor, Malaysia*

<sup>3</sup> *Solar Energy Research Institute, The National University of Malaysia, 43600 Bangi, Selangor, Malaysia*

<sup>4</sup> *Center of Research Excellence in Renewable Energy (CoRERE), King Fahd University of Petroleum and Minerals, Dhahran, 31261, Saudi Arabia*

In this study, copper based metal-organic framework 199 (MOF-199) had been introduced as the support materials for enzyme immobilization in order to produce high sensitivity glucose sensing material. GOx was immobilized onto MOF-199 using electrostatic adsorption method, which was a facile and easy method for enzyme immobilization. The structure of MOF-199 that was synthesized in house observed using 1.0K zoom Using FESEM were clear orthorombic structure. After the immobilization of GOx using electrostatic adsorption, the MOF-199 were observed to be coated with other particles. From the figure, the orthorombic framework of MOF-199 could be observed with rough particles surrounded. Both MOF-199 and MOF-199/GOx exhibited the C=O vibration stretch at ca.  $1123\text{ cm}^{-1}$  respectively. In addition, the result also exhibited a prominent peak at  $2636\text{ cm}^{-1}$  on MOF-199/GOx attributed to the stretching vibrations of diimide bond (N=C=N). The presence of diimide bond on MOF-199/GOx support the GOx immobilization on MOF-199. The result observed showed the increment of current (mA) with the increase of glucose from 1.0 mM to 5.0 mM concentration for both GOx and MOF-199/GOx. This result supported the active GOx activities on MOF-199/GOx when reacted in different glucose concentrations thus indicated successful immobilization. The loaded samples exhibited detection capabilities of ca. 1.0 mM in simulated salivary glucose content of diabetic patients.

# **ORAL ABSTRACTS**

## **MATERIAL**

## OM-01

### Effect of Gas Flow Rate on the Precipitated Calcium Carbonate Production

M. S. Siti Noorzidah\*, O. Rohaya, and O. Anuar

*Mineral Research Center, Department of Minerals and Geoscience Malaysia, Jalan Sultan Azlan Shah,  
31400 Ipoh Perak*

\*E-mail address of Corresponding Author: [snoorzidah@jmg.gov.my](mailto:snoorzidah@jmg.gov.my)

**Keywords:** *precipitated calcium carbonate.*

In this study, precipitated calcium carbonate (PCC) was successfully synthesized by ionic sucrose technique. Different gas flow rates ranging from 0.2 l/min to 4.0 l/min were introduced into the ionic sucrose solution to perform carbonation and precipitation process. The effect of different gas flow rates on the synthesized PCC powders were characterized by X-ray diffraction (XRD), field-emission scanning electron microscope (FESEM) and X-ray fluorescence (XRF). The results indicated that higher gas flow rate could reduce the time-consuming in the PCC production process. There were no massive impact on morphology and phase transformation had observed at different gas flow rate. The phase formed were calcite PCC with > 98% purity and cubic shape morphologies, which suitable to be exploited as filler in the paper and polymer industries.

## OM-02

### **Effect of Accelerator in Biosynthesis of Silver Nanoparticles by *Entada Spiralis* Aqueous Extract**

**W.K.A.W.M. Khalir<sup>1</sup>, K. Shameli<sup>1\*</sup>, N.A. Othman<sup>2</sup>, and N.M. Hassan<sup>3</sup>**

<sup>1</sup>*Department of Environmental Engineering and Green Technology, Malaysia-Japan International Institute of Technology, Universiti Teknologi Malaysia, Jalan Sultan Yahya Petra, 54100 Kuala Lumpur, Malaysia*

<sup>2</sup>*Department of Mechanical Engineering and Green Technology, Malaysia-Japan International Institute of Technology, Universiti Teknologi Malaysia, Jalan Sultan Yahya Petra, 54100 Kuala Lumpur, Malaysia*

<sup>3</sup>*Department of Pharmaceutical Chemistry, Kuliyyah of Pharmacy, International Islamic University Malaysia, Jalan Istana, Bandar Indera Mahkota, 25200, Kuantan, Pahang, Malaysia*

\*E-mail address of Corresponding Author: [kamyarshameli@gmail.com](mailto:kamyarshameli@gmail.com)

**Keywords:** *pH, silver nanoparticles, microscopy analysis.*

In this study, the natural reductant and stabilizer from *E. spiralis* extract and sodium hydroxide as an accelerator reagent has been used in the biosynthesis of silver nanoparticles (Ag-NPs). The role of sodium hydroxide (NaOH) as accelerator and controlling the size and shape of nanoparticles were investigated using spectroscopy and microscopy techniques. The volume of NaOH was varied from 0.1 to 5.0 mL. The properties of Ag-NPs produced were confirmed using UV-visible spectroscopy, x-ray diffraction (XRD), transmission electron microscopy (TEM), scanning electron microscope and energy dispersive x-ray spectroscopy (SEM-EDX), zeta potential and fourier transform infrared spectroscopy analysis. The colloidal solution of Ag-NPs obtained at different volumes of NaOH show sharp and different Surface Plasmon resonance peaks of silver in UV-visible spectra, which further explained from the TEM images of Ag-NPs and their particle size distribution. The synthesis of Ag-NPs is better at high pH value (pH=9.9; volume of NaOH=0.2 mL). XRD and TEM measurements exhibited Ag-NPs produced were face centered cubic (FCC) structure and  $6.37 \pm 1.79$  nm of Ag-NPs size at volume of 0.2 mL of NaOH. Thus this work provides important advantages in controlling size and shape of Ag-NPs beside speed the reaction time and simplicity of the biosynthesis method.

## OM-03

### Degradation Properties of Nanoporous Biphasic Calcium Phosphate

N.F. Mohammad<sup>1,2\*</sup>, L.M. Koo<sup>3</sup> and S.S. Md Salleh<sup>4</sup>

<sup>1,3</sup> Biomedical Electronic Engineering Programme, School of Mechatronic Engineering, Universiti Malaysia Perlis, Pauh Putra Campus, 02600 Arau, Perlis, Malaysia.

<sup>2</sup> Institute of Nano Electronic Engineering, Universiti Malaysia Perlis, 01000 Kangar, Perlis, Malaysia.

<sup>4</sup> School of Materials Engineering, Jejawi, 02600 Arau, Perlis, Malaysia

\*E-mail address of Corresponding Author: [farahiyah@unimap.edu.my](mailto:farahiyah@unimap.edu.my)

**Keywords:** nanoporous, degradation, biphasic calcium phosphate.

Biphasic calcium phosphate (BCP) is an osteoconductive bioceramic that made from hydroxyapatite ( $\text{Ca}_{10}(\text{PO}_4)_6(\text{OH})_2$ ) (HA) and  $\beta$ -Tricalcium Phosphate ( $\beta\text{-Ca}_3(\text{PO}_4)_2$ ) ( $\beta$ -TCP). Recently, many researchers paid more attention to fabricate biomaterials in a porous form. The research on porous calcium phosphate has been invigorated due to its excellent biocompatibility and effectiveness of the osteo-regeneration. In this study, chemical precipitation with surfactant-templated synthesis method has been used to synthesis nanoporous BCP. The chemical compositions of pure BCP samples were proven using X-ray diffraction (XRD) analysis. The pore size distribution (PSD) shows that the pore size of the samples mainly distributed at 52.8 nm, 49.6 nm and 32 nm. The degradation analysis was conducted in both phosphates buffered saline (PBS) and distilled water for 15 days. The degradation study demonstrated that pH of the medium increases due to the release of  $\text{H}^+$  ions from the BCP pellets into the PBS. The results show that the apatite formation rate increased as the wettability increased while the weight loss of the pellets reduced from day 6 until day 12. This indicate that the degradation rate is lower than the rate of apatite formation. However, from day 12 until the end of the soaking period, the wettability dropped and the weight loss increased, indicating that the degradation rate is higher than the apatite formation rate. After soaking for 15 days, samples were imaged using scanning electron microscope (SEM) to compare the morphological structure prior and after the *in vitro* degradation. Apatite formation was found on the surface of the BCP pellets that soaked in the PBS solution.

## OM-04

### Microanalysis Study on the Lanna-Style Decorative Glass

P. Dararutana<sup>1\*</sup>

<sup>1</sup> *The Royal Thai Army Chemical Department, Bangkok, Thailand*

\*E-mail address of Corresponding Author: [pisutti@hotmail.com](mailto:pisutti@hotmail.com)

**Keywords:** *Lanna-style decorative glass, SEM-EDS,  $\mu$ -XRF.*

Differences of archaeological objects found in Thailand such as glass, pottery and metal ware. Due to the complex nature of materials and objects, extremely sensitive, spatially resolved, multi-elemental and versatile analytical instruments are needed. In this work, scanning electron microscopy coupled with energy dispersive X-ray spectroscopy (SEM-EDS) was carried out to analyze composition of the Lanna-style decorative glass. Proton-induced X-ray emission spectroscopy (PIXE) and micro-beam X-ray fluorescence spectroscopy ( $\mu$ -XRF) based on synchrotron radiation were used to characterize its composition. It was found that the elemental composition was determined. The transition metal ions used as colorants in glasses were analyzed. The elemental distribution was also detected. It can be concluded that the combination of various analytical methods was one of the powerful tools which to answer the archaeology's questions.

## OM-05

### Effect of Indentation Parameters in Obtaining Perfect Nanoindentation Test of Soft Alloy

Azman Jalar<sup>1\*</sup>, Norliza Ismail<sup>1</sup>, Maria Abu Bakar<sup>1</sup> and Ahmad Ghadafi Ismail<sup>1</sup>

<sup>1</sup> Institute of Microengineering and Nanoelectronic (IMEN), Universiti Kebangsaan Malaysia (UKM),  
43600 Bangi, Selangor, Malaysia

\*E-mail address of Corresponding Author: [azmn@ukm.my](mailto:azmn@ukm.my)

**Keywords:** nanoindentation, parameters, solder alloy.

Accuracy of micromechanical properties obtained from nanoindentation test, very much depends on indentation parameters toward materials to be tested. The parameters such as load given, loading rate and dwell time will affect indentation behavior. Sample to be tested either hard or soft also play a role in choosing a correct parameters. This study report parameters selection of nanoindentation procedure on soft sample, a lead-free solder alloy. Infinite Focus Measurement (IFM) has been used to observe 3D surface metrology of indented surface together with depth profiling. The perfect shape of indented surface must shows perfect V-shape with no-pile up. For soft material, lead-free solder alloy containing tin-silver copper possess good shape for nanoindentation test with 10mN maximum load, 0.5s of loading rate and with 30s of dwell time.



## OM-06

### Characterization of Magnetic Co-Ni Ferrites Nanoparticles

R.M. Rosnan<sup>1\*</sup>, Z. Othaman<sup>2</sup>, and R. Hussin<sup>2</sup>

<sup>1</sup>JEOL Malaysia, Kelana Business Center, 47301 Petaling Jaya, Malaysia

<sup>2</sup>Department of Physics, Universiti Teknologi Malaysia, 81310 Johor Bahru, Malaysia

\*E-mail address of corresponding author: [rizuanmr@jeolmal.com](mailto:rizuanmr@jeolmal.com)

Keywords: *ferrites, nanoparticles, magnetic properties.*

Mixed ferrites of the form  $\text{Co}_{0.5}\text{Ni}_{0.5}\text{Fe}_2\text{O}_4$  has been synthesized using the co-precipitation route. The properties of synthesized samples were investigated by XRD, FTIR, TEM, and VSM. Structural analyses are carried out using powder X-ray diffraction to identify pure ferrite phases. The FTIR studies also confirm the bond formation and cation vibrations at low ( $392\text{-}399\text{ cm}^{-1}$ ) and high ( $580\text{-}595\text{ cm}^{-1}$ ) bands that correspond to the tetrahedral and octahedral sites, respectively. TEM analysis revealed high resolution image with relatively uniform sizes with round shape structures. The magnetic properties studied through vibrating sample magnetometer showed that the Ni substituted sample has unique magnetic character by exhibiting the highest saturation magnetization.

**OM-07**

**Tensile Properties of Citric Acid Crosslinked Nanocrystalline  
Cellulose/Chitosan Film Composite**

**P.G. Gan<sup>\*</sup>, S.T. Sam, and M.F. Abullah**

*School of Bioprocess Engineering, Universiti Malaysia Perlis (UniMAP), Kompleks Pusat Pengajian Jejawi 3,  
02600 Arau, Perlis, Malaysia*

\*E-mail address of Corresponding Author: [peigie023@gmail.com](mailto:peigie023@gmail.com)

**Keywords:** *Nanocrystalline Cellulose, Chitosan and Crosslink.*

Nanocrystalline cellulose (NCC) reinforced chitosan-based biodegradable film composites were prepared by solution casting. The addition of crosslinkers improved the tensile strength of the NCC/chitosan film composites significantly compared to the non-crosslinked film composites. The citric acid-crosslinked composites showed the tensile strength of 34.5 MPa and 53.0 MPa for the neat chitosan film and the 4 wt% NCC/chitosan film, respectively. The morphology of the non-crosslinked and the crosslinked NCC/chitosan composites was investigated by the scanning electron microscopy (SEM) analysis. Fourier transform infrared spectroscopy (FTIR) analyses indicated the network formations of NCC and chitosan with the citric acid by the amide linkage.

## OM-08

### **Adipic Acid Crosslinked Nanocrystalline Cellulose/Chitosan Composite: Tensile Properties and Crystallinity**

**S.T. Sam<sup>\*</sup>, P.G. Gan, M.F. Abullah, and C.C. Chow**

*School of Bioprocess Engineering, Universiti Malaysia Perlis (UniMAP), Kompleks Pusat Pengajian Jejawi 3,  
02600 Arau, Perlis, Malaysia*

\*E-mail address of Corresponding Author: [stsam@unimap.edu.my](mailto:stsam@unimap.edu.my)

**Keywords:** *Nanocrystalline Cellulose, Chitosan, Adipic Acid and Crosslink.*

In the present study, empty fruit bunch derived nanocrystalline cellulose (NCC) was prepared and employed as a reinforcing agent to improve the tensile properties of the chitosan composites. Adipic acid was added as a crosslinker. The addition of NCC has greatly improved the tensile strength and modulus of elasticity. The addition of adipic acid has further improved the tensile properties. 3 wt% NCC/chitosan composites displayed the highest tensile strength which is 48.7MPa and 65.3 MPa without and with the addition of adipic acid respectively. The X-ray diffraction (XRD) showed that the crystallinity of composites was significantly enhanced by the incorporation of NCC but the value decreased by the addition of adipic acid.

## OM-09

### **Microstructure Characterization and Tensile Properties of Hypereutectoid Al-Mg<sub>2</sub>Si-xYSZ Hybrid Composite by Stir Casting Process**

**N.A. Sukiman, H. Ghandvar, and T. Abubakar\***

*Department of Materials, Manufacturing and Industrial Engineering, School of Mechanical Engineering,  
Faculty of Engineering, Universiti Teknologi Malaysia (UTM), 81310, Johor Bahru, Malaysia*

\*E-mail address of Corresponding Author: [tuty@utm.my](mailto:tuty@utm.my) , [tuty@mail.fkm.utm.my](mailto:tuty@mail.fkm.utm.my)

**Keywords:** *Aluminium Hybrid Composites, Mg<sub>2</sub>Si/YSZ, Microstructure, Tensile Properties.*

Aluminum matrix composites (AMCs) are widely used in automotive industries such as engine cylinders, pistons and brake disc. It is due to the ability of the AMCs to exhibit better mechanical performance and good physical properties. Recently hypereutectic Al-Mg<sub>2</sub>Si in-situ composite with large amount of hard Mg<sub>2</sub>Si particles achieved considerable attention due to beneficial features of Mg<sub>2</sub>Si particles. However, there are some limitations in application of this composite due to its low tensile strength and machinability properties. Hence, this study is aimed to fabricate Al/(15 Mg<sub>2</sub>Si+xYSZ) and characterize its microstructure and tensile properties. The fabrication of Al/ (15Mg<sub>2</sub>Si+XYSZ) hybrid composite has been done using in-situ reinforcement, magnesium silicide (Mg<sub>2</sub>Si) and ex-situ reinforcement, yttria stabilised zirconia (YSZ). The effect of different concentrations of (YSZ) (3, 6 and 9wt. %) on size, shape and distribution of Mg<sub>2</sub>Si particles was analyzed. Microstructure characterization was carried out using optical microscope (OM), scanning electron microscopy (SEM), and X-Ray Diffraction (XRD). The microstructure observation revealed that with increasing the YSZ amount, the size of primary Mg<sub>2</sub>Si particles was reduced from 74.4 µm without YSZ to 65.2 µm with the addition of 9wt. % YSZ particles. The tensile properties of the composites was improved with the increasing of YSZ particles from 53.54 MPa to 85.65 MPa with 9wt. % YSZ.

## OM-10

### Structural and Physicochemical Properties of NiO/MCF Catalyst for Syngas Production via CO<sub>2</sub> Reforming of Methane

S.M. Razali<sup>1,2</sup>, T.S. Marliza<sup>1,3\*</sup>, M. Surahim<sup>1</sup>, M.S. Ahmad Farabi<sup>1,4</sup>, A. Hakim<sup>3</sup>,  
and Y.H. Taufiq-Yap<sup>1,2</sup>

<sup>1</sup> Catalysis Science and Technology Research Centre, Faculty of Science,

<sup>2</sup> Department of Chemistry, Faculty of Science,

Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia

<sup>3</sup> Department of Basic Science and Engineering, Universiti Putra Malaysia Bintulu Campus, P.O. Box 396,  
Nyabau Road, 97008 Bintulu, Sarawak, Malaysia

<sup>4</sup> Faculty of Science and Technology, Universiti Sains Islam Malaysia, Bandar Baru Nilai,  
71800 Nilai, Negeri Sembilan, Malaysia

\*E-mail address of Corresponding Author: [t\\_marliza@upm.edu.my](mailto:t_marliza@upm.edu.my)

**Keywords:** Physicochemical, catalyst, methane reforming.

A series of nickel oxide, NiO supported on mesostructured cellular foam (MCF) catalysts were synthesized using microemulsion templating followed by wetness impregnation method. The structural and physicochemical properties of NiO loading on MCF were characterized by small-angle X-ray scattering (SAXS), x-ray diffraction (XRD), nitrogen sorption, transmission electron microscopy (TEM), scanning electron microscope (SEM) and field emission scanning electron microscope (FESEM). FESEM and TEM analysis shows MCF has uniform mesopores with disorder array of silica strut interconnected by structural windows pores. NiO particles had uniformly distributed into MCF channel with MCF cell diameter around 20 – 50 nm and wall thickness ranged 4 – 6 nm. Incorporation of NiO onto MCF resulted to the highest window pore size due to the attachment of NiO into MCF framework. The application of NiO/MCF catalysts in the dry reforming of methane at 800 °C for 13 h reaction shows the catalysts were active for the reforming reaction and had higher initial activity due to the presence of more accessible active sites of catalyst surface. NiO/MCF shows good catalytic properties for methane reforming with the conversion of CH<sub>4</sub> increase with the increasing of the NiO content.

## OM-011

### **Development of Polyvinyl Alcohol Composite Films Reinforced with Cellulose Nanocrystals Isolated from Coconut Husks Fiber**

**O. Nurdiana\*, S. T. Sam, and A. M. Faiq**

*School of Bioprocess Engineering, Universiti Malaysia Perlis, Kompleks Pengajian Jejawi 3,  
02600 Arau, Perlis.*

\*E-mail address of Corresponding Author: [nurdianothman@gmail.com](mailto:nurdianothman@gmail.com)

**Keywords:** *Polyvinyl alcohol, cellulose nanocrystals, nanocomposite.*

Eco-friendly nanocomposite films based on polyvinyl alcohol (PVOH) reinforced with cellulose nanocrystals (CNCs) were prepared by solution casting method. The CNCs was successfully isolated from agriculture waste; coconut husks fiber by acid hydrolysis method. The isolated CNCs exhibited a needle-like nanocrystals with their particle size around 12 nm in length. Subsequently, the PVOH films reinforced with various concentrations (1, 3, 5, 7 and 9 wt%) of CNCs were assessed for their morphological features, crystallinity and mechanical properties. It was noted that the addition of 5 wt% of CNCs increased the tensile strength to 65.8 MPa of the PVOH films. Therefore, the present study suggest that the eco-friendly nanocomposite films have great potential in food packaging applications.

## OM-012

### Preparation of Graphene Oxide Encapsulated Linseed Oil via Pickering Emulsion Method

S. N. Nadiah<sup>1</sup>, H. N. Azlina<sup>1\*</sup>, H. Norita<sup>1</sup> and J. N. Hasnidawani<sup>1</sup>

<sup>1</sup> Department of Manufacturing and Materials Engineering, Faculty of Engineering,  
International Islamic University of Malaysia (IIUM), Jalan Gombak, 53100 Kuala Lumpur, Malaysia

\*E-mail address of Corresponding Author: [noorazlina\\_hassan@iium.edu.my](mailto:noorazlina_hassan@iium.edu.my)

**Keywords:** *graphene oxide, Pickering emulsion, microcapsules.*

Encapsulation of healing agent is the most feasible technique to introduce the healing functionality to the coating with in-situ polymerization method predominantly used as one of the options. Desired microcapsule's size also can be obtained by controlling some parameters but the problem remains; tedious synthesis process is required. This paper focused on the preparation of graphene oxide microcapsules (GOMs). GOMs was synthesized through the Pickering emulsion method with linseed oil as a core material. The rotational speed and amount of solid particles involved in the preparation process affect the size and stability of produced microcapsules. Therefore, the rotational shear power and the amount of graphene oxide particles in the emulsion were varied in order to study their effect on the GOM's size. Size distribution of the microcapsules was characterized by using a polarized optical microscope (POM) and particle size analyzer (PSA). POM characterization shows that increasing the rotational shear speed and amount of solid particles led to the finer emulsion with average microcapsule size around 8 $\mu$ m. However, PSA analysis revealed otherwise. It was found that 3 mg/ml of graphene oxide concentration and the rotational speed of 800rpm produced around 1-3 $\mu$ m of GOMs with good stability. Scanning electron microscope (SEM) analysis showed the emulsion droplet possessed a wrinkled outer surface, a proof that the self-assembled graphene oxide acts as a functional surfactant and formed a shell-like structure at the liquid-liquid interface in the Pickering emulsion. The Pickering emulsion technique is a simple and effective encapsulation method of healing agent.

## OM-013

### **Effect of Cooling Rates on Morphology Evolution of Primary Mg<sub>2</sub>Si in Al–15Mg<sub>2</sub>Si–0.3Ba In-situ Composite**

**Hamidreza Ghandvar, Norhayati Ahmad\*, Nor Akmal Fadil, Wan Nazdah Wan Hussin,  
and Mohd Hasbullah Idris\***

*School of Mechanical Engineering, Faculty of Engineering, Universiti Teknologi Malaysia, 81310 UTM Johor  
Bahru, Johor Bahru, Malaysia*

\*E-mail address of Corresponding Author: [nhayati@fkm.utm.my](mailto:nhayati@fkm.utm.my), [hsbullah@utm.my](mailto:hsbullah@utm.my)

**Keywords:** *Al-Mg<sub>2</sub>Si composite, Modification, Cooling rate.*

In this study the effect of cooling rate on morphology evolution of primary Mg<sub>2</sub>Si crystal in 0.3wt. % Ba modified Al-15%Mg<sub>2</sub>Si composite was investigated. The cooling rates were controlled with preheating the mold in various temperatures. The results showed that with increasing the cooling rate by lowering of mold temperature, the primary Mg<sub>2</sub>Si crystal is obtained with different morphologies as a result of strengthening of external factors, i.e. adsorption of Ca atoms on {100} facets of Mg<sub>2</sub>Si crystal. With decreasing the mold temperature from 600 to 400, 200 °C and finally to room temperature, the morphology of primary Mg<sub>2</sub>Si altered from a mixture of an equiaxed-dendrite and an octahedral to a truncated octahedral and then to a truncated cube and finally to a cube; however, the morphology of primary Mg<sub>2</sub>Si in still remained dendritic in the Ba-free-composite. Furthermore, the growth mechanism of the truncated cubic primary Mg<sub>2</sub>Si in the Ba modified composite was identified with observation of the some hillocks on primary Mg<sub>2</sub>Si crystal. This study demonstrates a simple and cost effective method to control the size and morphology of primary Mg<sub>2</sub>Si in Al-Mg<sub>2</sub>Si composite, which is beneficial in application of Al-Mg<sub>2</sub>Si composites with high strength and hardness.



## OM-014

### **Sealing Ability of Injectable Dental Composites, Biodentine and MTA in Repairing Furcal Perforation of Permanent Molar Teeth**

**Y. Johari<sup>\*</sup>, N. Pungut, M. F. Khamis and N. M. Yusoff**

<sup>1</sup> *School of Dental Sciences, Universiti Sains Malaysia, 16150 Kubang Kerian, Kelantan, Malaysia*

\*E-mail address of Corresponding Author: [yjohari@usm.my](mailto:yjohari@usm.my)

**Keywords:** *furcal perforation, repair material, microleakage.*

Furcal perforation is one of the most common undesired complications during dental treatment. It requires immediate seal to ensure the prognosis of the involved tooth. The aim of this study is to compare the sealing ability of injectable dental composites, namely G-aenial Universal Flo and ParaCore Coltene with Biodentine and MTA as furcal perforation materials. This study was conducted on 68 extracted teeth. Upon decoronation of the tooth 4mm above cemento-enamel junction, endodontic access cavity was done followed by the creation of furcal perforation in the pulp chamber floor. The teeth were assigned randomly into four experimental and two control groups. These perforations were then repaired with the intended materials. The teeth were submerged in 2% basic fuchsin for 24 hours then sectioned and evaluated for dye leakage. The data were analysed using Median's Test and Mann Whitney U Test. One specimen for each test group were inspected under scanning electron microscope (SEM). The results showed that the percentage of dye penetrations were significantly lower in Paracore and GAUF compared to Biodentine and MTA groups ( $p < 0.001$ ). Paracore demonstrated less gap at material tooth interface under SEM. Both Paracore and GAUF sealed furcal perforation better than Biodentine and MTA.

## OM-015

### **Development of Conductive Graphene/Polyaniline Nanocomposites Produced by In-Situ Polymerization and Solvent Blending Method**

**Mariatti Jaafar<sup>\*</sup>, Muhammad Firdaus Shafee, and Syazana Ahmad Zubir**

School of Materials and Mineral Resources Engineering, Universiti Sains Malaysia, Engineering Campus, 14300  
Nibong Tebal Pulau Pinang Malaysia

\*E-mail address of Corresponding Author: [mariatti@usm.my](mailto:mariatti@usm.my)

**Keywords:** *graphene, polyaniline, nanocomposites.*

Polyaniline (PANI) is one of the most promising conducting polymers due to the unique electrical properties, easily prepared and excellent environmental stability. Introduction of graphene as a filler in PANI was found to enhance the conductivity of PANI. Generally, conductive nanocomposites have been developed using three methods, including in-situ polymerization, solvent blending and melt blending. The present paper aims to study and compare the properties of conductive nanocomposites graphene/PANI fabricated using two methods which are in-situ polymerization and solvent blending method. Electrical conductivity and field emission scanning electron microscopy (FESEM) were used to analyze the sample. Sample produced by in-situ polymerization method showed higher electrical conductivity compared to that of solvent blending method. FESEM images showed that better dispersion of graphene filler and thinner PANI nanofiber is produced by in-situ polymerization method.

## OM-016

### Electron Microscopy Analysis of Sputter Deposited Aluminium Nitride Thin Films

M. Tahan<sup>1</sup>, N. Nafarizal<sup>1\*</sup>, A. S. Bakri<sup>1</sup>, N. A. Raship<sup>1</sup>, M. K. Ahmad<sup>1</sup>, A. S. Ameruddin<sup>2</sup>, M. K. Mustafa<sup>2</sup>, M. Z. Sahdan<sup>3</sup>, M. H. Mamat<sup>4</sup>, A. S. Abu Bakar<sup>5</sup>, and F. Adriyanto<sup>6</sup>

<sup>1</sup> Microelectronics and Nanotechnology-Shamsuddin Research Centre (MiNT-SRC), Institute for Integrated Engineering, Universiti Tun Hussein Onn Malaysia (UTHM) Batu Pahat, 86400 Johor, Malaysia

<sup>2</sup> Faculty of Applied Science and Technology, Universiti Tun Hussein Onn Malaysia (UTHM) Batu Pahat, 86400 Johor, Malaysia

<sup>3</sup> Preston GeoCEM Sdn. Bhd., No.33A Jalan Universiti 4, Taman Universiti, 86400 Parit Raja, Johor, Malaysia

<sup>4</sup> Nano-ElecTronic Centre (NET), Faculty of Electrical Engineering, Universiti Teknologi MARA (UiTM), 40450 Shah Alam, Selangor, Malaysia

<sup>5</sup> Low Dimensional Materials Research Centre, Department of Physics, Faculty of Science, University of Malaya, 50603 Kuala Lumpur, Malaysia

<sup>6</sup> Department of Electrical Engineering, Sebelas Maret University, Jl. Ir. Sutami No.36A, Jebres, Kota Surakarta, Jawa Tengah 57126, Indonesia

\*E-mail address of Corresponding Author: [nafa@uthm.edu.my](mailto:nafa@uthm.edu.my)

**Keywords:** Magnetron sputtering deposition, aluminium nitride thin film, electron microscope.

In recent progress of aluminum gallium nitride (AlGaIn) optoelectronic devices for ultraviolet (UV) applications, the devices performance drastically decays when approaching to the aluminium nitride (AlN) end. The main reason was due to the low internal quantum efficiencies (IQEs) and high defect density. Utilizing nitrogen-polar of AlN thin films grown directly on Si substrate can solve these challenges. In this study, optimizing the ions density and flux in highly ionized magnetron sputtering plasma system controlled the growth of AlN and GaN thin films on silicon substrate. To optimize the nanostructures and thin film properties and to evaluate the quality of the LEDs structure, high-resolution X-ray diffraction technique, field emission electron microscopy, and Raman spectroscopy were utilized. At the end of this study, it has been understood that the pulse-power supply used for the deposition of AlN thin films was suitable to achieve smooth and flat thin films.

## OM-17

### Study of Carbon Nanostructures Grown From Waste Latex via Chemical Vapor Deposition

M. A. Hazan<sup>1</sup>, K. A. Jofri<sup>1</sup>, M. S. Mamat<sup>1</sup>, S. Liza<sup>2</sup>, I. Ismail<sup>3</sup>, M. Z. Hussein<sup>3</sup>, and Y. Yaakob<sup>1\*</sup>

<sup>1</sup> *Department of Physics, Faculty of Science,*

*Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia*

<sup>2</sup> *TriPrem i-Kohza, Malaysia-Japan International Institute Technology,*

*Universiti Teknologi Malaysia, 54100 Kuala Lumpur, Malaysia*

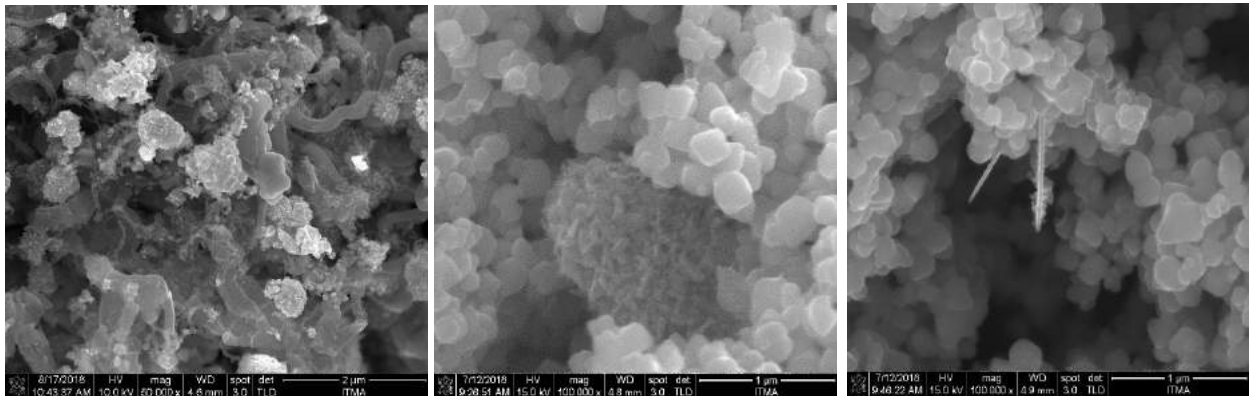
<sup>3</sup> *Materials Synthesis and Characterization Laboratory, Institute of Advanced Technology,*

*Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia*

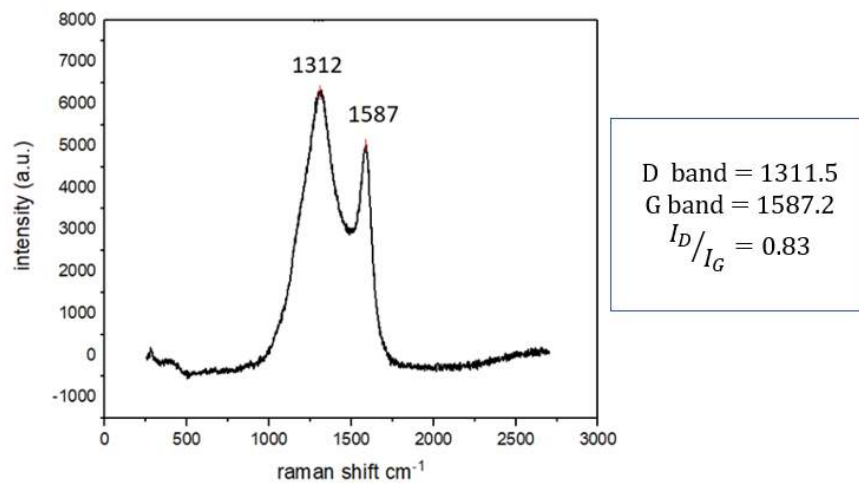
\*E-mail address of Corresponding Author: [yazidakob@upm.edu.my](mailto:yazidakob@upm.edu.my)

**Keywords:** carbon nanostructures, waste latex, natural rubber

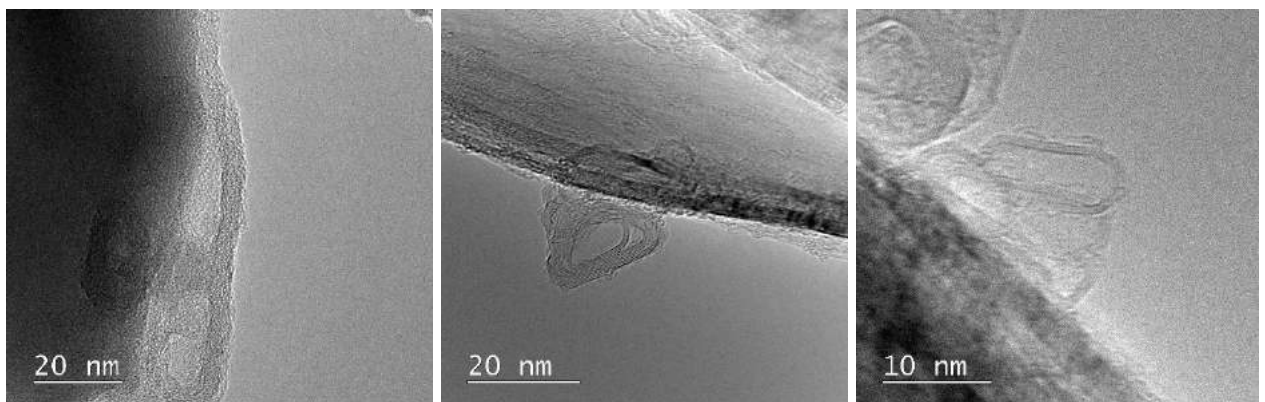
Carbon nanostructures (CNS) such as nanotubes, nanofibers, nanorods and graphene layers are promising candidate for numerous applications due to high aspect ratio, chemical stability, electrical properties and mechanical strength. Many efforts have been done by researchers to fulfill the demands from industries, and one of them are the materials production methods. Utilizing waste product as precursor has been concern as it can reduce the CNS production cost and promote green technology. In this work, CNS were successfully synthesized using waste latex from natural rubber gloves as carbon source via chemical vapor deposition. The synthesized process has been done at reaction temperature of 600-800°C using iron oxide as catalyst. The CNS characterization were investigated by atomic force microscopy (AFM), field emission scanning electron microscope (FESEM), transmission electron microscopy (TEM), Energy-dispersive X-ray spectroscopy (EDS) and Raman spectrum techniques. It was found that the obtained carbon material existed in the form of nanotubes, nanofibers and nanorods with diameter of ~50 nm. EDS results shows sulfur content in the waste latex, which have affect the growth of CNS. Morphology and structural properties for those CNS will be discuss in detail. This study demonstrates that waste latex can be an alternative and inexpensive carbon source for CNS production.



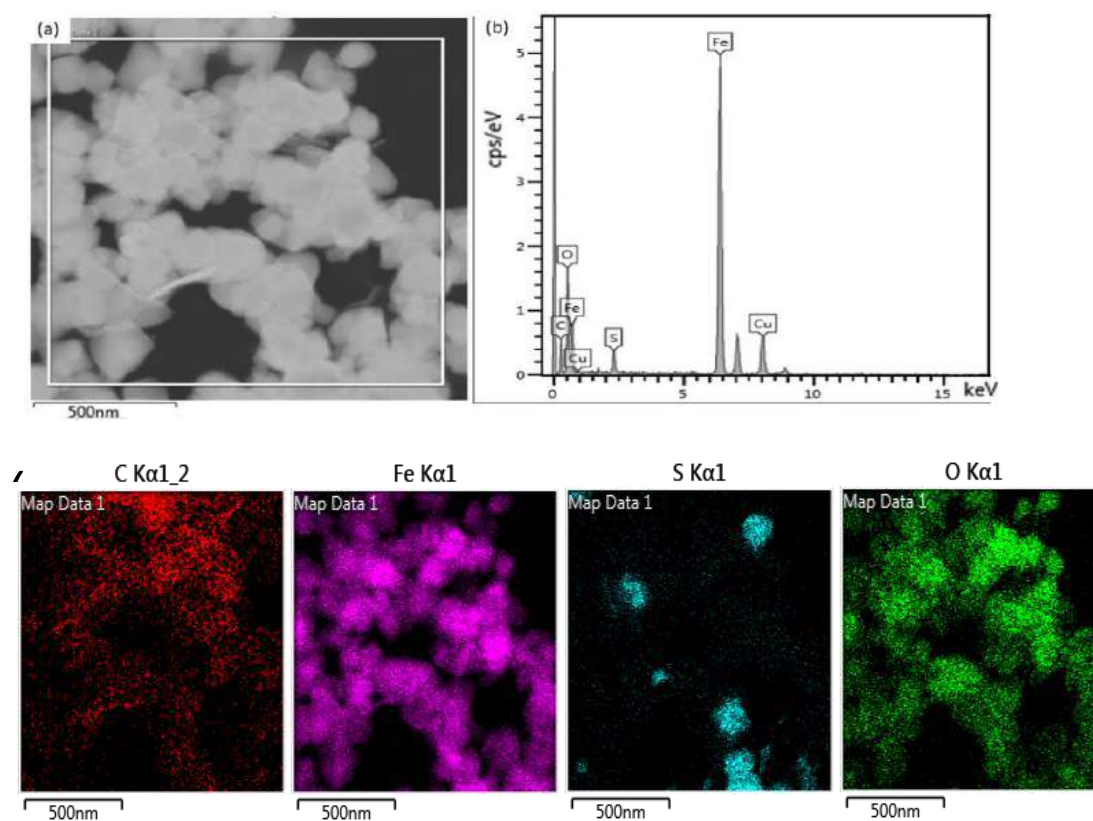
FESEM image of distribution of synthesized CNS on iron oxide powder at 50 k and 100k x magnification.



Raman spectra of CNS and  $I_D/I_G$  ratio.



HRTEM image of distribution of hollow CNS on iron oxide powder.



EDS mapping corresponding to STEM image of CNS.

## OM-18

### Enhanced Performance of Ni<sub>3</sub>Si<sub>2</sub> Nanowire-Based Supercapacitor Electrodes by Controlling Its Morphology and Structural Properties

Mohammad Mukhlis Ramly<sup>1</sup>, Zarina Aspanut<sup>1</sup>, Saadah Abdul Rahman<sup>1</sup>, and Boon Tong Goh<sup>1\*</sup>

<sup>1</sup> Department of Physics, Faculty of Science, University of Malaya, 50603 Kuala Lumpur, Malaysia

\*E-mail address of Corresponding Author: [gohbt@um.edu.my](mailto:gohbt@um.edu.my)

**Keywords:** Ni<sub>3</sub>Si<sub>2</sub> nanowires, Solid-Phase Diffusion-Control, Supercapacitor

One-dimensional based nanowire electrode has been recently attracting extensive interest in energy storage and conversion applications owing to its unique physical properties of extremely large surface areas and good electrochemical capability. In this work, nickel silicide nanowires (Ni<sub>3</sub>Si<sub>2</sub> NWs) grown at different silane flow-rates followed a solid-phase diffusion-control growth mechanism were studied. These NWs were grown on Ni film (thickness  $140 \pm 5$  nm) on Ni foil substrates at temperature of 500 °C. The NWs exhibited various morphologies such as dendritic, thin, and root-tips NWs. These NWs mainly were structured by a single-crystalline Ni<sub>3</sub>Si<sub>2</sub> with a preferred orientation of (100) plane. The high densely packed of thin NWs produced the highest specific capacity with a maximum value of 313.3 C/g attributing to their extremely large surface reaction area which increasing the capability of redox reaction rates. The fabricated Ni<sub>3</sub>Si<sub>2</sub> NWs/activated carbon-based asymmetric supercapacitor demonstrated a maximum specific capacity of 289.15 C/g and energy density of 62.24 Wh/kg at 387.5 W/kg, and good cyclic stability with 73 % of capacity retention after 4000 cycles. The correlations of these electrochemical performances with the morphological, structural, and compositions properties of Ni<sub>3</sub>Si<sub>2</sub> NWs are discussed.



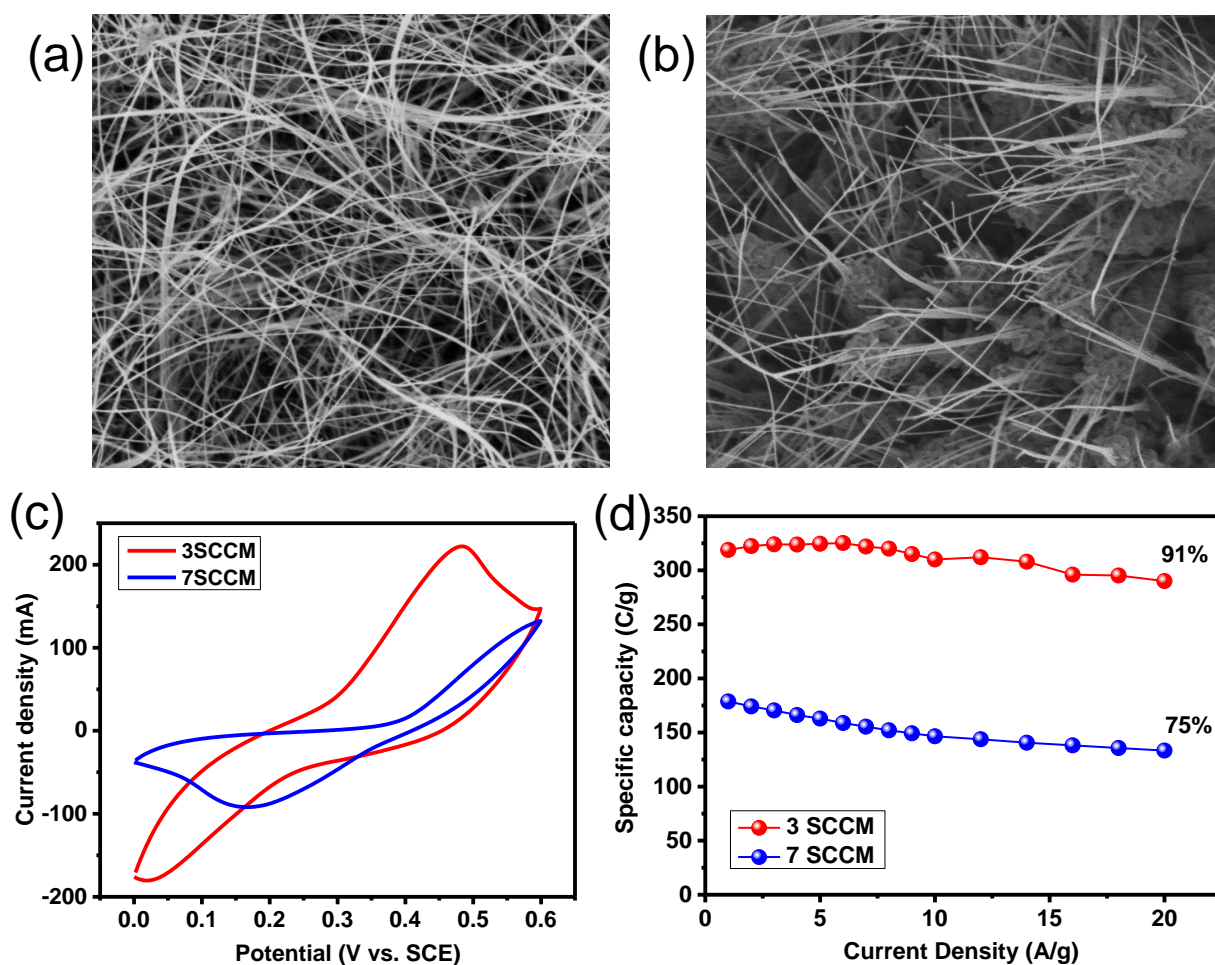
**Graphical abstract:**

Figure 1 (a & b) FESEM images of  $\text{Ni}_3\text{Si}_2$  nanowires grown at silane flow-rates of 3 and 7 sccm respectively. (c) Cyclic voltammetry curves of  $\text{Ni}_3\text{Si}_2$  nanowire-based supercapacitor electrodes prepared at silane flow-rates of 3 and 7 sccm. (d) Variations of the specific capacity for the nanowire electrodes prepared at 3 and 7 sccm.



## OM-19

### ***In Situ* Synthesis and Characterisation of Novel Zinc Doped Chitosan/Hydroxyapatite Composites for Potential Biomedical Applications**

**I. Abdullahi<sup>1</sup>, and I. Zainol<sup>2\*</sup>**

<sup>1</sup>Chemistry Department, University of Abuja, PMP 117 Abuja, Abuja, Nigeria.

<sup>2</sup>Department of Chemistry, Faculty of Science and Mathematics, Universiti Pendidikan Sultan Idris, Proton City, 35900 Tanjung Malim, Perak, Malaysia.

\*E-mail address of Corresponding Author: [ismail.zainol@fsmt.upsi.edu.my](mailto:ismail.zainol@fsmt.upsi.edu.my)

**Keywords:** *hydroxyapatite, chitosan, composite.*

In this study synthesis, characterization and *in vitro* response of a novel zinc doped chitosan-hydroxyapatite composite were investigated. The novel zinc doped chitosan-hydroxyapatite composite were synthesised *via in situ* co-precipitation method. The effects of zinc and chitosan incorporation on the structural properties of the samples were studied by X-ray diffraction (XRD), Fourier transformed infrared spectroscopy (FTIR), thermogravimetric analysis (TGA), differential thermal analysis (DTA), and energy dispersive X-ray spectroscopy (EDX). Bioactivity studies of the samples in simulated body fluid (SBF) and antimicrobial activity against *E. coli* were carried out. The incorporation of zinc and chitosan into the lattice of the HA influenced the crystallinity, crystallite size and lattice parameters of the HA. The chemical composition of the novel zinc doped chitosan-HA composite is found to have resemblance to that of bone mineral. The novel zinc doped chitosan-HA showed improved bioactivity in SBF over other samples. Field emission scanning electron microscopy (FESEM) images of the novel composite material also showed a good apatite forming ability. The novel composite material show substantial antimicrobial effect against the *E. coli* bacteria.

## OM-20

### **Development of Nanostructured Aluminum Alloys by High-Pressure Torsion and Subsequent Aging**

**I.F. Mohamed<sup>1\*</sup>, Z. Horita<sup>2</sup>, M.Z. Omar<sup>1</sup> and W.F.H.W. Zamri<sup>1</sup>**

<sup>1</sup> Centre for Materials Engineering and Smart Manufacturing (MERCU),  
Faculty of Engineering and Built Environment, National University of Malaysia

<sup>2</sup> Department of Materials Engineering, Kyushu University, Kyushu, Japan

\*E-mail address of Corresponding Author: [intanfadhlin@ukm.edu.my](mailto:intanfadhlin@ukm.edu.my)

**Keywords:** Severe plastic deformation, high-pressure torsion, aluminium alloys.

To develop high strength structure and advanced system, the creation of new materials and associated systems is one of the key directions. This presentation will feature recent development of nanomaterials with high improvement in mechanical properties of aluminum alloys such as AA6061, AA2618, AA2024, Al-Cu binary alloy. All aluminum mentioned here are heat-treatable alloys developed mostly for automobile and aircraft engine components industries. This research presents a study related to the grain refinement of aluminum alloys achieved by a Severe Plastic Deformation (SPD) technique through High-Pressure Torsion (HPT). The HPT is conducted on 10mm disks of the alloy under an pressure of 6 GPa for 0.75, 1 and 5 turns with a rotation speed of 1 rpm at room temperature. The HPT processing leads to microstructural refinement with an average grain size of ~160 nm to ~250 nm at a saturation level after 5 turns. Gradual increases in hardness are observed from the beginning of straining up to a saturation level. In most samples after 5 turns ( $N = 5$ ) shows that the hardness further increases by the aging above the as-HPT-processed level when the disks are aged between 100 °C to 200 °C. However, different behavior was observed in AA6061 alloy. Nevertheless, the hardness rise indicates that simultaneous hardening due to grain refinement and fine precipitation occurred through HPT processing and subsequent aging between 100 °C to 200 °C.

## OM-21

### Synthesis of Iron Oxide Nanoparticles with Controlled Size and Magnetic Properties

A.H. Idris<sup>1,4\*</sup>, C.A. Che Abdullah<sup>2,3</sup>, NA Yusof<sup>1,3</sup>, E Abdulmalek<sup>1</sup>, and M.B. Abdul Rahman<sup>1</sup>

<sup>1</sup> Department of Chemistry, Faculty of Science, Universiti Putra Malaysia

<sup>2</sup> Department of Physics, Faculty of Science, Universiti Putra Malaysia

<sup>3</sup> Institute of Advanced Technology, Universiti Putra Malaysia

<sup>4</sup> Faculty of Chemical Engineering and Natural Resources, Universiti Malaysia Pahang

\*Email address of Corresponding Author: [auni.idris@outlook.com](mailto:auni.idris@outlook.com)

**Keywords:** iron oxide nanoparticles, magnetic nanoparticles, thermal decomposition.

Superparamagnetic iron oxide nanoparticles (SPIONs) have found widespread applications including magnetic drug delivery and magnetic resonance imaging (MRI). Their magnetic properties are tunable depending on their size and crystallographic phase. Synthesis of SPIONs by thermal decomposition method is here presented to obtain monodisperse SPIONs with control over their size, size distribution and their magnetic properties. The aim of this work is to synthesize spherical SPIONs with diameters between 8 to 12 nm for drug delivery purposes. Reaction parameters such as stirring rate and aging time were adjusted to control the physical and magnetic properties of produced SPIONs. Images by Transmission Electron Microscopy (TEM) showed that spherical monodisperse particles were produced within the size range of 4 to 15 nm. FTIR analyses demonstrated covalent binding of oleic acid to the nanoparticles surface and X-ray powder diffraction confirmed the presence of iron oxide phase. Vibrating Sample Magnetometer (VSM) showed that magnetization saturation increased with longer aging time. Reaction kinetics could be altered by increasing the stirring rate to produce larger particles. However, at higher stirring rate, increasing the aging time has resulted in aggregation of particles and reduced magnetization saturation.

## OM-22

### Synthesis Parameters and Stability Study of ZIF-8 Nanocarrier for Potential Anticancer Drug Delivery Application

N.A. Mohd Abdul Kamal<sup>1,2\*</sup>, E. Abdmalek<sup>1,2</sup>, S. Fakurazi<sup>3</sup>, and M.B. Abdul Rahman<sup>1,2</sup>

<sup>1</sup>*Integrated Chemical BioPhysics Research, Faculty of Science, Universiti Putra Malaysia, Serdang, Selangor, Malaysia*

<sup>2</sup>*Department of Chemistry, Faculty of Science, Universiti Putra Malaysia, Serdang, Selangor, Malaysia*

<sup>3</sup>*Department of Human Anatomy, Faculty of Medicine and Health Science, Universiti Putra Malaysia, Serdang, Selangor, Malaysia*

\*E-mail address of Corresponding Author: [nurulakmarina@gmail.com](mailto:nurulakmarina@gmail.com)

**Keywords:** ZIF-8, nanocarrier, drug delivery.

Zeolitic imidazolate framework-8 (ZIF-8) is one of the non-toxic materials that potentially act as carrier while reducing unpleasant side effect due to non-specific of anticancer drug. There are many previous works reported the information of synthesis parameters of ZIF-8. However, there are still lack information to synthesis tiny ZIF-8 (nZIF-8) with compliment morphology for specific drug delivery application. In addition, the dissociation study of nZIF-8 with different pH stimuli in different time interval remain scarce. Herein, we studied the effect of various synthesis parameters including solvent, time and temperature of the synthesis mixture in the formation of tiny, good morphology and stable of nZIF-8. The stability and dissociation study of nZIF-8 in methanol, medium pH 5.5 and 7.4 were also investigated up to 72 hours. This study demonstrates methanol is a good choice of synthesis solvent in producing the uniform spherical nZIF-8 with the size <80 nm. The morphology of the nZIF-8 changed from spherical to hexagonal after 24 hours reaction in the room temperature. The 60 °C of solvent temperature was slightly induced the aggregation of nanoparticles. This work also revealed that the nZIF-8 was stable in methanol storage up to 72 hrs. However, medium pH 5.5 and 7.4 induced the dissociation of nZIF-8 framework in different time intervals and this is beneficial for anticancer drug delivery application.

## OM-23

### Nitrogen-Alloyed Steel Wires

**Patthi Hussain\* and Hassan Mahmoud**

*Mechanical Engineering Department, Universiti Teknologi PETRONAS, 32610 Bandar Seri Iskandar,  
Perak Darul Ridzuan.*

\*E-mail address of Corresponding Author: [patthi\\_hussain@utp.edu.my](mailto:patthi_hussain@utp.edu.my)

**Keywords:** *austenitic stainless steel, nitrogenizing, cold working and solid solution hardening.*

Austenitic Stainless Steel was treated with nitrogen as one method to achieve the solid solution hardening. The material was further strengthened by cold working. The effect of nitrogenizing and work hardening were investigated by optical and electron microscopy. Sample were nitrogenized at 1200°C. Duration and gas flow rate were varied to study the rate of nitrogen concentration. Samples were air cooled or water quenched. Examinations were conducted on as-supplied rod, nitrogenized, solution treatment, hydrogen and ammonia treated samples. Thus the selection of materials of materials for wire drawing test were accomplished from the nitrogenized samples. The results showed the microstructural changes and increasing in hardness is due to nitrogenized effect. This is further improved by work hardening.

# **POSTER ABSTRACTS**

## **BIOLOGICAL**

## PB-01

### Light and Electron Microscopes Study of the Histological Changes Induced in Female SD Rats Liver Tissue by Xylene

Mohd Harissal Ismail<sup>1</sup>, Nurul Aiman Mohd Yusof<sup>1\*</sup>, Hasmah Abdullah<sup>2</sup>, and  
Yasrul Izad Abu Bakar<sup>3</sup>

<sup>1</sup>*School of Medical Sciences, University Sains Malaysia,*

<sup>2</sup>*School of Health Sciences, Universiti Sains Malaysia,*

<sup>3</sup>*Faculty of Medicine, Universiti Sultan Zainal Abidin*

\*E-mail address of Corresponding Author: [aimannur@usm.my](mailto:aimannur@usm.my)

**Keywords:** Xylene, Liver, Hepatotoxic.

Xylene is well known as aromatic irritant and sensitizing agents and it belong to the group of aromatic hydrocarbons. Studies showed that xylene exposure may lead to liver damaged. The purpose of this study was to investigate the hepatotoxic effect of xylene at the cellular level of liver by observing the histological changes of liver tissues. Twelve 28 days old female Sprague-Dawley rats were divided into control and xylene group. The xylene group was given 8.47mmol/kg/day of xylene in olive oil vehicle *via* oral gavage for 2 weeks. The control group received only olive oil vehicle *via* oral route for 2 weeks. Then, the rats were sacrificed, and the sections of liver were stained with Haematoxylin & Eosin, Periodic Acid-Schiff, and Reticulin staining. The fine structure of sectioned specimens from the liver was investigated in the scanning electron microscope. The study found that there was a significant difference ( $P < 0.05$ ) in the distance between portal triad and central vein. In conclusion, the present study has confirmed that xylene exposure can cause significant hepatotoxic effect on liver as evidence by the cellular reduction in distance between portal triad and central vein.

## PB-02

### **Maturity Stages, Effect of Storage Temperatures and Durations on Physical Quality and Ultrastructure of Postharvest Shelf Life of Straw Mushroom (*Volvariella volvacea*)**

**Nur Sakinah Mohd Joha<sup>1</sup>, Azizah Misran<sup>1\*</sup>, Mahmud Tengku Muda Mohamed<sup>1</sup>, Sumaiyah Abdullah<sup>1</sup>, and Azhar Mohamad<sup>2</sup>**

<sup>1</sup>Faculty of Agriculture, Universiti Putra Malaysia, 43400 Serdang, Selangor, Malaysia.

<sup>2</sup>Malaysian Nuclear Agency, Bangi, 43000 Kajang, Selangor, Malaysia.

\*E-mail address of Corresponding Author: [azizahm@upm.edu.my](mailto:azizahm@upm.edu.my)

**Keywords:** *Volvariella volvacea*, postharvest, ultrastructure.

*Volvariella volvacea* or also known as straw mushroom is highly perishable after harvest. Since this mushroom matures very fast, farmers collect both the button (immature) and veil opening (mature) stage together and sell at the market. Present study was conducted to investigate the ultrastructure of mushroom at immature and mature stage, and to observe physical appearance and ultrastructure of straw mushrooms at different storage temperatures over storage time. Cultivated mushroom on oil palm empty fruit bunch (EFB) compost were harvested and subjected to different storage temperatures (10, 15, 20 °C, and room temperature) for two days interval until day 8. The qualities and structure of mushrooms were determined. *V. volvacea* at veil opening stage shows the presence of numerous spores that might contribute increase in metabolic activity compared to absence of spores at button stage. *V. volvacea* stored at 15 °C showed significantly lowest percentage of veil opening along storage period. Analysis of physical appearance and ultrastructure demonstrated there was bacterial contamination on the surface of *V. volvacea* as well as tissue shrinkage when stored at 10, 20 °C and room temperature. Button stage was chose for its practical to handle to its size and absence of basidiospores which might lessen its metabolic activity and perishability. *V. volvacea* mushrooms were best stored at 15 °C storage temperature which could extend their shelf life.



## PB-03

### Physicochemical Analysis and Sugar Profiling in Acacia Honey

A. S. Mohamed<sup>1</sup>, M. A. Abdah<sup>2</sup>, K. Ramasamy<sup>3</sup>, M. H. Hasan, I. Aida Hamimi<sup>4</sup>  
and E. Zolkapli\*

<sup>1</sup> Department of Pharmacology and Chemistry, Faculty of Pharmacy, Universiti Teknologi MARA (UiTM),  
Puncak Alam, Malaysia.

<sup>2</sup> Department of Biomedical Sciences, Faculty of Medicine and Health Sciences, Universiti Putra Malaysia, Seri  
Kembangan, Malaysia.

<sup>3</sup> Department of Pharmaceutical and Life Sciences, Faculty of Pharmacy, Universiti Teknologi MARA  
(UiTM), Puncak Alam, Malaysia.

<sup>4</sup> Department of Food Technology Research Centre, MARDI, Selangor, Serdang, Malaysia.

\*E-mail address of Corresponding author: [zolkapli\\_eshak@puncakalam.uitm.edu.my](mailto:zolkapli_eshak@puncakalam.uitm.edu.my)

**Keywords:** Physicochemical, Sugar profile, Acacia honey.

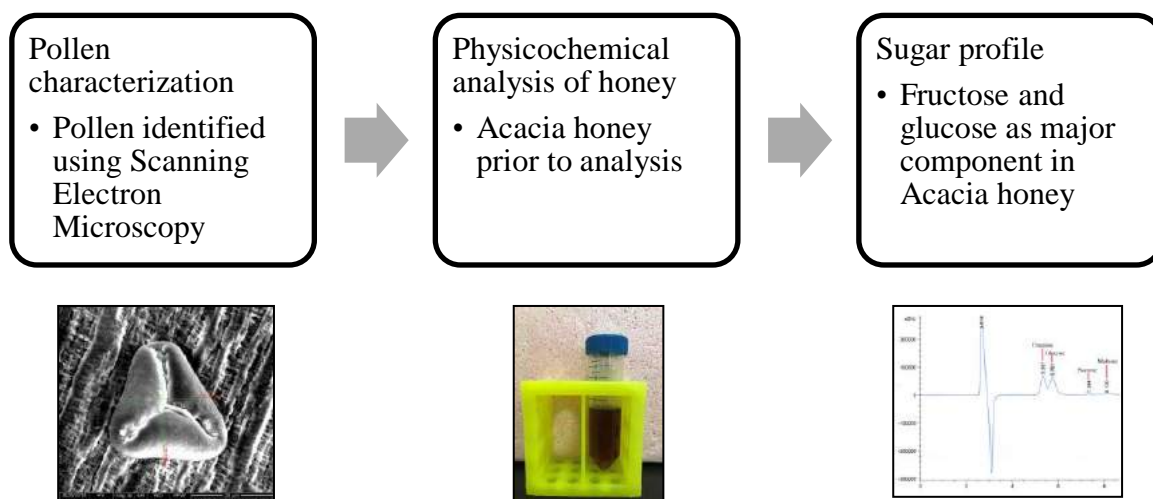


Table 1: Physicochemical analysis of acacia honey.

		<b>Free acidity (meq/KG honey)</b>	<b>Moisture content (%)</b>	<b>Ash content (g/100g honey)</b>	<b>EC (mS.cm<sup>-1</sup>)</b>	<b>Insoluble matter (%)</b>	<b>HMF (mg/kg)</b>
<b>Mean</b>	3.62 ±	99.3 ±	19.6 ±	0.9 ± 0.516	0.813 ± 0.003	0.0713 ± 0.003	17.5 ±
(± SEM)	0.003	0.882	0.115				2.08

## PB-04

### Macroscopic and Microscopic Analysis of *Luvunga crassifolia* Leaves

Sugathini Shunmugam<sup>1</sup>, Sugumaran Manickam<sup>2</sup>, Nur Fatimah Mohd Yusoff<sup>1</sup>, Noorjahan Banu Mohammed Alitheen<sup>1</sup>, and Parameswari Namasivayam<sup>1\*</sup>

<sup>1</sup> Department of Cell and Molecular Biology, Faculty of Biotechnology and Biomolecular Sciences, University Putra Malaysia, 43400, UPM Serdang, Selangor, Malaysia.

<sup>2</sup> Institute of Biological Sciences, Faculty of Science, University of Malaya, 50603, Kuala Lumpur, Malaysia.

\*E-mail address of Corresponding Author: [parameswari@upm.edu.my](mailto:parameswari@upm.edu.my)

**Keywords:** light and electron microscopy, secretory cavities, pellucid dots.

*Luvunga crassifolia* is an underutilized plant from the *Rutaceae* family. As no reports have been published on the basic identification of this plant the current study is aimed at investigating the macroscopic and microscopic diagnostic features of *Luvunga crassifolia* leaves. Macroscopic characterization, optimization of histological procedure and histochemical analysis of differential stains were carried out on leaves of *Luvunga crassifolia*. Optimization of histological method was carried out by modifying the following parameters: number of days for fixation, dehydration duration with ascending grades of series of ethanol and butanol, clearing duration, and infiltration duration. The best paraffin section results was obtained from two days of fixation, dehydration with degraded series of butanol, one hour of tissue clearing and four days of infiltration. Histochemical analysis was carried out by differential staining to identify the cellular components in the leaf tissue sections. This study showed that *Luvunga crassifolia* leaf has paracytic stomata, pellucid dots on both adaxial and abaxial leaf surfaces, secretory cavities, collenchyma and incomplete ring of sclerenchyma cells. It also has very large air spaces in between the spongy mesophyll cells. The information obtained from this study is useful for identification and taxonomic purposes.

**PB-05**

**Anatomical Analysis of *Glycosmis perakensis*, a Member of the  
Rutaceae family**

**Previnaa Sundrarajoo<sup>1</sup>, Sugumaran Manickam<sup>2</sup>, Nur Fatihah Mohd Yusoff<sup>1</sup>, Noorjahan  
BanuMohammed Alitheen<sup>1</sup>, and Parameswari Namasivayam<sup>1\*</sup>**

<sup>1</sup>*Department of Cell and Molecular Biology, Faculty of Biotechnology and Bimolecular Sciences, University  
Putra Malaysia, 43400, UPM Serdang, Selangor, Malaysia*

<sup>2</sup>*Institute of Biological Sciences, Faculty of Science, University of Malaya, 50603, Kuala Lumpur, Malaysia.*

\*E-mail address of Corresponding Author: [parameswari@upm.edu.my](mailto:parameswari@upm.edu.my)

**Keywords:** *light microscopy, stem, leaf.*

There are a number of underexplored plant species from the family of *Rutaceae* in spite of their economic importance. *Glycosmis perakensis* is one of them and the main objective of this study is to enhance its taxonomic characterization and species identification through examination of its anatomical parts. The procedure for preparing the histological sections of *Glycosmis perakensis* stems and leaves were optimized by increasing the fixation duration, clearing and infiltration steps of the standard paraffin embedding method. Different type of stains was also used to identify and differentiate the plant tissues. The anatomy of different parts of plants such as stem, leaf and fruit were studied under the light microscopy and scanning electron microscopes. Pellucid dots and stomata exists on both abaxial and adaxial leaf surfaces. Histological analyses showed the presence of sclerenchyma, collenchyma and parenchyma cells, vascular bundle and schizogeneious glands on the plant leaf transverse sections. This study is the first report on the anatomy of the stem, leaf and fruit of *Glycosmis perakensis* and serves as a valuable tool for identification of this plant species.

## **PB-06**

# **Microscopic Evaluation of the Anticancer Efficacy of Docetaxel-loaded Calcium Carbonate Aragonite Nanoparticles (DTX-CaCO<sub>3</sub>NP) on MCF-7 Cell Line**

**Nahidah Ibrahim Hammadi<sup>1</sup>, Md Zuki Abu Bakar<sup>1</sup> and Intan Shameha Abdul Razak<sup>1</sup>**

<sup>1</sup>*Department of Veterinary Preclinical Sciences*

<sup>2</sup>*Department of Farm Animal and Exotic Medicine and Surgery*

<sup>3</sup>*Department of Veterinary Clinical Studies*

*Faculty of Veterinary Medicine, Universiti Putra Malaysia,*

*43400, UPM Serdang, Selangor, Malaysia*

\*E-mail address of Corresponding Author: [intanshameha@upm.edu.my](mailto:intanshameha@upm.edu.my)

Breast cancer is among the most devastating cancers affecting women worldwide. Therapeutic drugs such as taxanes have been used to limit its metastasis but with adverse toxic side effects which can only be reduced by reducing the dosage administered or shortening the schedule of administration. This study evaluated the in vitro efficacy of docetaxel (DTX)-loaded CaCO<sub>3</sub>NP on MCF-7 cell line. This was achieved by evaluating the following, MTT assay for toxicity of DTX and DTX-CaCO<sub>3</sub>NP in MCF-7 cell line, fluorescence imaging apoptosis with scanning (SEM) and transmission electron microscopy (TEM). Based on the results. DTX and DTX loaded NP demonstrated a progressive decline in the viability of cancer cells after 72h. The highest concentration used was 4µg/mL and the viability was found to be 29% and 32%, respectively. Fluorescence and apoptosis assay showed a higher ( $p < 0.05$ ) number of apoptotic cells in both free DTX and DTX-CaCO<sub>3</sub>NP groups. SEM showed the presence of cellular blebbing, while TEM showed nuclear fragmentation, apoptosis, and vacuolation in the treatment groups. This study showed that DTX-CaCO<sub>3</sub>NP has comparable anticancer effects on MCF-7 cells as DTX.

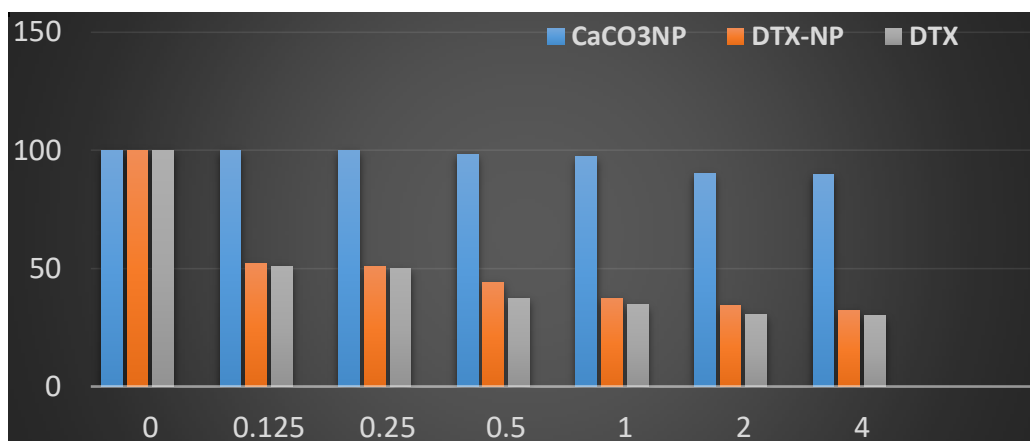


Figure 1: *In vitro* cytotoxicity study of MCF-7 cells treated with CaCO<sub>3</sub>NP, DTX-CaCO<sub>3</sub>NP and DTX after 72 hour's incubation period. The value represent mean  $\pm$  standard deviation.

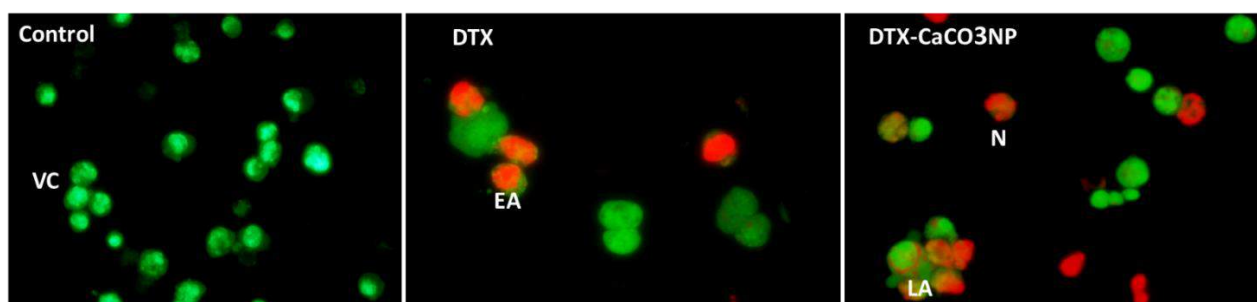


Figure 2: Fluorescent images of 4T1 cells stained with Acridine orange (AO) and Propidium Iodide (PI) at 72hrs. Control cells showing viable cells (VC); DTX and DTX-CSCaCO<sub>3</sub>NP treated cells showing early apoptosis (EA), late apoptosis (LA) and necrosis at different time of incubation. Magnification  $\times 200$ , Scale bar 50 $\mu$ m

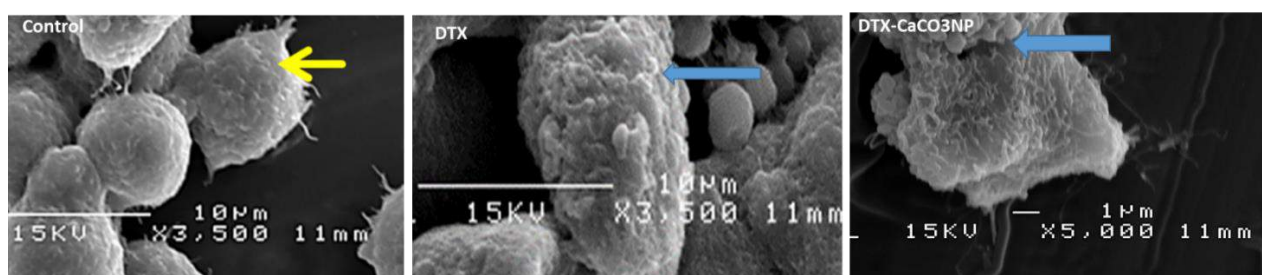
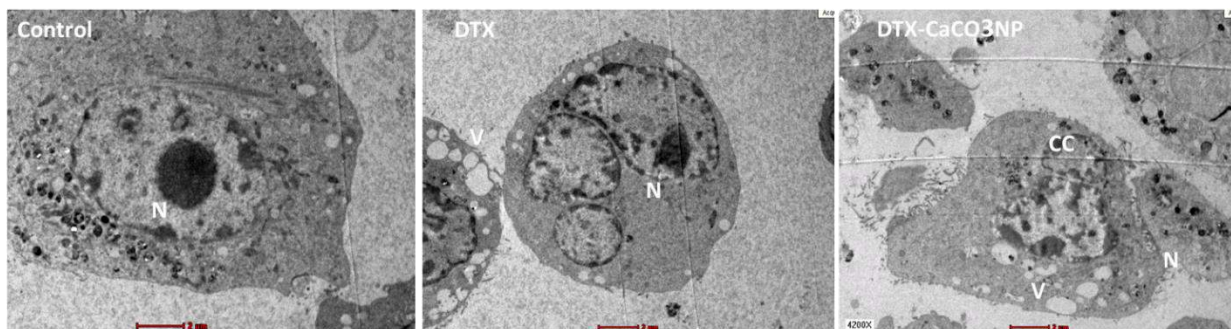


Figure 3: Typical morphological apoptotic bodies on the cell surfaces including cell membrane blebbing and disappearance of the microvilli, separated apoptotic bodies (Blue arrows), shrinkage of cells. Control group showed numerous microvilli cover the surface of cells (Yellow arrow).



**Figure 4:** Transmission electron micrographs showing the apoptotic cells (4T1 breast cancer cell line). The nucleus (N) is fragmented. The chromatin is condensed and aggregated at the periphery of the nuclear membrane. The cell membrane is still intact. Some vacuoles (V) are also observed in the cytoplasm of DTX and DTX-CaCO<sub>3</sub>NP (CC) compared with control.

**PB-07**

**Cellular Structural Changes in *Candida albicans* Treated  
*Melastoma malabathricum* Leaves Fractions**

**S. N. Mastuki<sup>1\*</sup>, I.S. Ismail<sup>1,2</sup>, and Y. Rukayadi<sup>1,3</sup>**

<sup>1</sup> Laboratory of Natural Products, Institute of Bioscience,

<sup>2</sup> Faculty of Science,

<sup>3</sup> Faculty of Food Science and Technology,

Universiti Putra Malaysia, Serdang, Selangor, Malaysia

\*E-mail address of Corresponding Author: [ctnurulhuda@upm.edu.my](mailto:ctnurulhuda@upm.edu.my)

**Keywords:** *Candida albicans*, *Melastoma malabathricum*, Electron microscopy.

*Candida albicans* strain represents 90% of yeast colony isolated from the vagina candidiasis, a disease caused by the abnormal growth of yeast-like fungi in the mucosa of the female genital tract. This study evaluates the anti-vaginal candidiasis activity of *Melastoma malabathricum* (MM) leaves fractions and possible structural changes resulting in *C. albicans* treated MM leaves fractions and using scanning electron microscopy (SEM) and transmission electron microscopy (TEM). The MM ethyl acetate fraction was significantly active in inhibiting the *C. albicans* with 11.2 ± 0.93 mm of inhibition diameter, minimum inhibitory concentration (MIC) and minimum fungicidal concentration (MFC) values of 0.3125 ± 0.03 mg/L and 0.3175 ± 0.006 mg/L, respectively. After 24h treatments, the fluconazoles (positive control) and MM ethyl acetate fraction groups showed death of *C. albicans* with deformation structure includes wrinkling of the cell wall and shrinkage of outer morphology. No filamentation could be observed and the presence of hyphal structures was not seen in treated samples. TEM analysis revealed that the cell wall became thicker, which might due to the increase of trans-membrane leakage of amino acids and other cytoplasmic contents after the fluconazoles and MM ethyl acetate fraction exposure. The *C. albicans* cells were very densed and the cell membrane invaginated with notable structural disorganization within the cell cytoplasm. In conclusion, *C. albicans* structural were affected by the treatment with MM ethyl acetate fraction, providing an alternative



therapeutic strategy against the vaginal candidiasis. However, the exact mechanism of its action has yet to be examined.

## PB-08

### Media Formulation for High Microalgal Biomass

Tang Zi Yi<sup>1</sup>, Michael K. Danquah<sup>2</sup>, Razif Harun<sup>1\*</sup>

<sup>1</sup> Department of Chemical and Environmental Engineering, Universiti Putra Malaysia, Serdang, Malaysia

<sup>2</sup> Department of Chemical and Petroleum Engineering, Curtin University of Technology, Sarawak, Malaysia

\*Email address of Corresponding Author: [mh\\_razif@upm.edu.my](mailto:mh_razif@upm.edu.my)

**Keywords:** *Microalgae, biomass, cultivation, medium, formulation.*

Algae have been signified due to its effectiveness of capturing carbon dioxide (CO<sub>2</sub>), rapid growth and high biomass productivity. Although algal biofuels is sustainable source, however, its feasibility is still yet to be established due to high production cost of its biomass. The challenges in producing high yield of biomass make researchers to do research in finding the potential approach in maximizing the biomass concentration. One of the options is by formulating its nutrients composition. Therefore, this chapter investigates an alternative approach to increase microalgae biomass production, covering the growth medium formulation. A laboratory scale cultivation process was carried out using 1L flask as cultivating vessel and air pump for aeration purposes. It was found that the highest growth rate of 0.10g/L per day was obtained at pH 6, 24°C and under the fluorescent light. Growth medium that contained excessive amount of nitrate and phosphate (F\*\* medium) resulted the highest concentration of *Nannochloropsis sp.* The modified medium (F\*\*) showed almost double in growth rate compared to the F medium, indicating the growth medium composition is a major controlling factor during the cultivation process. Therefore, these results provide a potential approach to yield higher biomass concentration for biofuel and pharmaceutical development from microalgae.

**PB-09**

**Oil Palm Root Colonization Study using Endophytic *Trichoderma virens* 7b  
Harbouring Green Fluorescent Protein (GFP) Gene**

**Intan Nur Ainni Mohamed Azni, Shamala Sundram\* and Idris Abu Seman**

*Malaysian Palm Oil Board (MPOB), No. 6, Persiaran Institusi, Bandar Baru Bangi,  
43000 Kajang, Selangor, Malaysia*

\*E-mail address of Corresponding Author [shamala@mpob.gov.my](mailto:shamala@mpob.gov.my)

**Keywords:** *Trichoderma virens*, *Agrobacterium tumefaciens*, SGFP gene

*Trichoderma virens* 7b, isolated from the roots of oil palm is an endophyte. It is a potential biological control agent present as a protective root shield to combat against *Ganoderma* infestation. In order to investigate its mechanism *in vivo*, transformation of *T. virens* 7b via *Agrobacterium tumefaciens*, AGL1 strain carrying vector pCAMBgfp containing Sesma green fluorescent protein (SGFP) gene and hygromycin (HygB) resistance gene was carried out. Putatively transformed colonies were screened using SGFP-forward and SGFP-reverse primer pairs generating amplicon sized ~750 bp. Restriction analysis using SalI generated three fragments sized ~9700 bp, ~2865 bp and ~1435 bp, confirming the presence of desired genes. *T. virens* 7b harbouring GFP gene were selected on PDA media supplemented with 200 µg/ml HygB. Inoculation of transformed *T. virens* 7b into the roots of 3 months old oil palm tissue culture ramets showed positive colonization of the fungus examined via histology analysis and visualization under confocal laser scanning microscopy (CLSM). This results suggested that *Agrobacterium*-mediated transformation of *T. virens* 7b harbouring SGFP reporter gene can be used as a tool to monitor the colonization and detection of this beneficial biocontrol agent in the oil palm root system.

.

**PB-010**

**Micrograph of Native *Scenedesmus* sp (UKM 9) and  
*Chlamydomonas* sp (UKM 6) Isolated from Local Agriculture Waste**

**M.Norzila<sup>1,4\*</sup>, J.Jannatulhawa<sup>1</sup>, M.Y.Nazlina Haiza<sup>2</sup> and T.Mohd Sobri<sup>3</sup>**

<sup>1</sup> Faculty of Engineering and Built Environment, University Kebangsaan Malaysia, 43600 Bangi, Selangor

<sup>2</sup> Faculty of Science and Technology, Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor

<sup>3</sup> Research Centre for Sustainable Process Technology, Faculty of Engineering and Built Environment, Universiti Kebangsaan Malaysia, 43600 Bangi, Selangor

<sup>4</sup> Faculty of Chemical Engineering, Universiti Teknologi MARA Terengganu Campus, Bukit Besi Branch, 23200 Dungun, Terengganu

\*E-mail address of Corresponding Author: [norzi085@tganu.uitm.edu.my](mailto:norzi085@tganu.uitm.edu.my)

**Keywords:** *Scenedesmus*, *Chlamydomonas*, Ultrastructure.

Green microalgae are increasingly recognised as the most promising and renewable source for the production of biofuels, pharmaceutical and nutraceutical products. The precise information of microalgae morphology and ultrastructure is essential for industrial product development. Thus, the ultrastructure morphology of *Scenedesmus* sp (UKM 9) and *Chlamydomonas* sp (UKM 6) locally isolated from different agriculture waste were studied. The morphology observations of cells and colonies was performed using a light microscope (LM). Three-dimensional shape, size, spine and flagella of native local isolated microalgae were visualized by Scanning Electron Microscope (SEM). Whereas, ultrastructure analysis was conducted using Transmission Electron Microscope (TEM). Results obtained showed that UKM 6 and UKM 9 cells occupied by a large cup shape of chloroplast. Variations in the fine structure and position of pyrenoids, starch granule, chloroplast envelope and thylakoids system also observed. Interestingly, there were mislocated of eyespot in UKM 6 micrograph. The irregular arrangement of eyespot granules proved that UKM 6 is a wild *Chlamydomonas* sp. Overall the results obtained useful for the industries to fitting up downstream process design.

# **POSTER ABSTRACTS**

## **MATERIAL**

## PM-02

### **Effect of Loading Rates and Single Edge Notch Bending (SENB) Specimen Thicknesses on Shear Lips Formation for Al6061**

**N. Abdul Latif<sup>1\*</sup>, A. Auspan<sup>1</sup>, M. S. Mustapa<sup>1</sup>, A. L. Mohd Tobi<sup>1</sup>, and N. F. Nasir<sup>2</sup>**

<sup>1</sup> *Structural Integrity and Monitoring Research Group (SIMReG), Department of Engineering Mechanics  
Faculty of Mechanical and Manufacturing Engineering, Universiti Tun Hussein Onn Malaysia (UTHM)  
86400 Parit Raja, Batu Pahat, Johor.*

<sup>2</sup> *Energy Technologies Research Group (EnRG), Department of Energy and Thermofluid Engineering  
Faculty of Mechanical and Manufacturing Engineering, Universiti Tun Hussein Onn Malaysia (UTHM)  
86400 Parit Raja, Batu Pahat, Johor.*

\*E-mail address of Corresponding Author: [noradila@uthm.edu.my](mailto:noradila@uthm.edu.my)

**Keywords:** *Shear lips ratio, fracture behavior, ductile.*

Aluminium alloy is a well-known material that has been widely used in automotive industry as automobile parts i.e., car chassis, engine blocks, cylinder heads and pistons. In order to have a further investigation on the fracture behavior of this alloy, as-received Aluminium 6061 alloy was used in current study to fulfill the requirement in automotive industry. It found that the effect of single edge notch bending (SENB) specimen thicknesses on shear lips ratio for Aluminium 6061 is rarely investigated under three-point bending test. Investigation on effect of SENB specimen thicknesses on the shear lips ratio for Aluminium 6061 is crucial to identify alloy's behavior under increasing loading rates. Three point bending test under different loading rates was conducted using different thicknesses of SENB specimen to measure the shear lips ratio on the fracture surface of Aluminium 6061. Loading rates of 5, 25 and 50 mm/min, while SENB specimen thicknesses of 10, 15, 20 and 25 mm were performed under three-point bending test. From fractograph of Aluminium 6061, shear lips were formed both sides at the notch tip. Shear lips ratio dependence on loading rates and SENB specimen thicknesses were determined. Based on the result of analysis, the shear lips ratio was decreased as the thickness of specimen increases and, shear lips ratio was decreased as the loading rate increases. High loading rate and large thickness of SENB specimen indicating less ductility of alloy due to the shortest time to undergo plastic deformation.

**PM-03**

**Electrophoretic Deposition of  $\text{Ba}_{0.5}\text{Sr}_{0.5}\text{Co}_{0.8}\text{Fe}_{0.2}\text{O}_{3-\delta}$ -SDC Carbonate Coating for Solid Oxide Fuel Cell Stainless Steel Interconnect**

**K.H.Tan<sup>1</sup>, H.A.Rahman<sup>1\*</sup>, H.Taib<sup>1</sup>, and M.F.Sazali<sup>1</sup>**

<sup>1</sup> Faculty of Mechanical and Manufacturing Engineering, Universiti Tun Hussein Onn Malaysia, 86400 Parit Raja, Batu Pahat, Johor, Malaysia

\*E-mail address of Corresponding Author: [hamimah@uthm.edu.my](mailto:hamimah@uthm.edu.my)

**Keywords:** Perovskite coating, Electrophoretic deposition, interconnect

Application of protective coating on ferritic stainless steel (FSS) as interconnect is crucially essential to restrict cell performance degradation. In the present study perovskite composite,  $\text{Ba}_{0.5}\text{Sr}_{0.5}\text{Co}_{0.8}\text{Fe}_{0.2}\text{O}_{3-\delta}$ - $\text{Sm}_{0.2}\text{Ce}_{0.8}\text{O}_{1.9}$  carbonate (BSCF-SDCC) has been investigated as promising protective coating on ferritic stainless steel by the electrophoretic deposition (EPD) method. BSCF-SDCC composite perovskite powder were fabricated by low speed wet milling method from BSCF powder and SDCC powder. X-ray diffraction (XRD) and scanning electron microscopy (SEM) displayed prominent powder characterization after going through the milling process. EPD deposition of composite perovskite powder on ferritic stainless steel was conducted from 5 to 10 volt in the coating duration range from 5 to 20 minutes in an organic solvent. Ten volt for 10 minutes was found to the best coating parameter via SEM analysis on coating morphology and deposition thickness. Crack free and uniform coating were observed with highest deposition weight obtained 7.0 mg by 10 volt and 10 minutes. Highest deposition thickness was proportional to the highest deposition weight indicating 81.6 $\mu\text{m}$ . Based on the result obtained EPD had successfully deposited perovskite BSCF-SDCC on stainless steel with excellent coating characteristics.

**PM-04**

**Mechanical Properties of Woven Carbon Fiber/Kenaf Fabric Reinforced  
Epoxy Matrix Hybrid Composites**

**Mohamad Ikhwan Yusuff<sup>1,\*</sup>, Norshahida Sarifuddin<sup>1</sup>, Zuraida Ahmad<sup>1</sup>, Nor Khairusshima  
Muhamad Khairussaleh<sup>1</sup>, Afifah Mohd Ali<sup>1</sup>, and Suhaily Mokhtar<sup>1</sup>**

<sup>1</sup>*Department of Manufacturing and Material Engineering, Kuliyyah of Engineering, Jalan Gombak,  
53100 Kuala Lumpur, Malaysia*

\*E-mail address of Corresponding Author: [mohamadikhwan.yusuff@gmail.com](mailto:mohamadikhwan.yusuff@gmail.com)

**Keywords:** *Hybrid composite, vacuum infusion (VI), carbon/kenaf fiber.*

The demand for composite materials in the manufacturing industries are on the increase especially in structural application attributed to its outstanding properties such as high impact strength and high fatigue strength. Nowadays fabrication of hybrid composite has been widely developed where the combination of natural and synthetic fiber with a matrix constituent had attracted a major interest among many researchers due to the unique combination of mechanical and physical properties such as high mechanical strength, good thermal properties, non-corrosive, as well as translucency good bonding properties. In the present study a hybrid composite was fabricated where the combination of two different reinforcements - fine kenaf fiber and carbon fiber were used together with the epoxy matrix via vacuum infusion technique. The fiber content was varied from 40, 50 and 60 vol%. The effect of different fibers/matrix ratio of the hybrid composite was carefully evaluated by examining the tensile and flexural test according to ASTM D3039 and ASTM D790, respectively. The morphology and mode of failure of the hybrid composite were characterized using scanning electron microscopy (SEM). Result showed that hybrid composite with fibers/matrix ratio of 40/60 vol% exhibited acceptable mechanical properties which justify the improved wetting between fibers and matrices.



## PM-05

# Fabrication of High Performance Nickel Silicide Nanowire Supercapacitor Electrode

Mohammad Mukhlis Ramly<sup>1\*</sup>, Zarina Aspanuta<sup>1</sup>, and Boon Tong Goh<sup>1</sup>

<sup>1</sup>Low Dimensional Materials Research Centre, Department of Physics, Faculty of Science, University of Malaya, 50603 Kuala Lumpur, Malaysia

\*E-mail address of corresponding author: [mukhlis.ramly88@gmail.com](mailto:mukhlis.ramly88@gmail.com)

**Keywords:** NiSi nanowires, solid-phase diffusion control, supercapacitor.

This work studies on the influence of nickel thickness on the growth of nickel silicide nanowires (NiSi NWs) using a solid-phase diffusion controlled growth. The NiSi NWs were grown on Ni foil coated with Ni film at different thicknesses of  $110 \pm 5$  and  $220 \pm 5$  nm. FESEM images revealed that the shape, the size and the density of NiSi NWs were strongly dependent on the thickness of Ni film. These NWs exhibited morphology of straight NWs with diameter and length of between 16 to 23 nm and 2.9 to 3.9  $\mu\text{m}$ , respectively. The NWs showed a single-crystalline  $\text{Ni}_3\text{Si}_2$  phase with a preferred orientation in the (100) plane. The  $\text{Ni}_3\text{Si}_2$  NWs electrode exhibited the highest specific capacity with a maximum value of 313.3 C/g owing to the high density of NWs which increasing in redox reaction rates. The fabricated NiSi NWs//activated carbon-based asymmetric supercapacitor demonstrated the maximum energy density of 13.37 Wh/kg at 200 W/kg and good cyclic stability with 79 % capacity retention after 3000 cycles.

## PM-06

### Low-Temperature Hydrothermal Synthesis of Enhanced 77s Nano Bioactive Glass

N.A. Jan <sup>1</sup>, C.S. Sipaut<sup>2\*</sup>, and S.E. Arshad<sup>1</sup>

<sup>1</sup>Faculty of Science and Natural Resources, Universiti Malaysia Sabah, Kota Kinabalu, Malaysia

<sup>2</sup>Faculty of Engineering, Universiti Malaysia Sabah, Kota Kinabalu, Malaysia)

\*E-mail address of Corresponding Author: [norsazlinaaj@gmail.com](mailto:norsazlinaaj@gmail.com) , [sazmal@ums.edu.my](mailto:sazmal@ums.edu.my)

**Keywords:** Bioactive glass, Hydrothermal treatment, hydroxyapatite.

77S bioactive glass (BG) was successfully synthesized, by using sol-gel precursor aided with hydrothermal treatment. Bioactive glass with composition on 80mol% SiO<sub>2</sub>, 14mol% CaO and 6% P<sub>2</sub>O<sub>5</sub> by using phosphoric acid as the phosphate precursor were synthesized in thermal condition of 250°C and characterized with regard to morphology, chemical composition, crystallinity and bioactivity of this material. The bioactivity of 77S BG was evaluated by immersion in stimulated body fluid (SBF) for 14 days. Investigation for corresponding formation mechanism, morphologies and bioactivity of the 77S BG were conducted by Fourier transform spectroscopy (FTIR), X-ray diffractometer (XRD), Scanning electron microscopy (SEM) and Transmission electron Microscopy (TEM). The results showed that an amorphous nanostructure 77S BG have been successfully synthesized and the XRD findings confirm the amorphous nature of the obtained material. Surface observation after in-vitro test revealed the presence of abundant micron scale (250 - 345um) grain of hydroxyapatite was formed with a log-like morphology on the surface of the material. This technique provides a facile method for the production of highly bioactive glass.

## PM-07

### Fracture Surface of Bismuth Glass Doped with Potassium Chromate

P. Dararutana<sup>1\*</sup>

<sup>1</sup> *The Royal Thai Army Chemical Department, Bangkok, Thailand*

\*E-mail address of Corresponding Author: [pisutti@hotmail.com](mailto:pisutti@hotmail.com)

**Keywords:** *fracture surface, bismuth glass, potassium chromate.*

Bismuth glasses were prepared by using commercial grade chemicals glass mixture and doped with potassium chromate in difference contents. They were melt in electrical furnace at 1250 °C dwell time 4 hours quench in metal plate and annealing at 500 °C for 20 minute. Fracture surface of glass samples was studied by using scanning electron microscope. Glass samples were also evaluated dielectric properties and UV-NIR-IR Spectroscopy. It was found that colors of glass were changed from colorless to green and opaque with more content of potassium chromate. Micrograph showed the cubic structures in glasses were grown with increase of potassium chromate content. Glasses show low absorption light at 450-580 nm and more than 800 nm.

## PM-08

### Two Dimensional ZnO Growths Using Hydrothermal Method

M.A Abdul Hamid<sup>1\*</sup>, N. Rohiman<sup>1</sup>, N. Al-Hardan<sup>2</sup>, and R. Shamsudin<sup>1</sup>

<sup>1</sup> School of Applied Physic, Faculty of Science & Technology, UKM, Bangi, Malaysia

<sup>2</sup> School of Physics, USM, Penang, Malaysia

\*E-mail address of Corresponding Author: [azmi@ukm.edu.my](mailto:azmi@ukm.edu.my)

**Keywords:** ZnO, 2D, Hydrothermal.

Two dimensional (2D) nanostructured materials have received an increasing attention in the field of technology due to its ultra slim size and great features. A semiconductor compound ZnO is an interesting material in optoelectronic application mainly attribute to its wide bandgap and high exciton energy. In this study 2D ZnO structure is grown by a hydrothermal method. The effect of precursor concentration, zinc sulphate, on the shape and size of ZnO grown is investigated. Four different precursor concentrations were used i.e 25mM, 50mM, 75mM and 100mM. FESEM revealed hexagonal like morphology for all samples with variety of diameter and thickness. At lowest precursors concentration, hexagonal like structure can be seen with thickness measured about 400 nm. As the concentration increased it loses its hexagonal shaped and becoming irregular flakes. The flakes thickness decreased with increased concentration. XRD results confirm the formation of 2D structures with (002) peaks associated with c growth direction of ZnO are lowered compared to (101). Photoluminiscence analysis revealed that the bandgap of the structure is 3.17 eV for all samples. The outcome shows precursors concentration has some effect on the morphology but not that significance on its optical properties.

## PM-09

### Effect of Soda Bicarbonate ( $\text{NaHCO}_3$ ) on the Porosity of Tricalcium Phosphate Bioceramic

J. Farah<sup>1,a</sup>, M. N. Ahmad-Fauzi<sup>1,b\*</sup>, O. Radzali and S. Khairul-Anuar<sup>1</sup>

<sup>1</sup> Biomaterials Niche Group, School of Materials and Mineral Resources Engineering, Engineering Campus, Universiti Sains Malaysia, 14300 Nibong Tebal, Penang, Malaysia

\*E-mail address of Corresponding Author: <sup>b\*</sup> [srafauzi@usm.my](mailto:srafauzi@usm.my); <sup>a</sup> [farah8576@yahoo.com](mailto:farah8576@yahoo.com)

**Keywords:** Porous, Tricalcium phosphate, pore forming agent.

The development of porous bioceramics as well as tricalcium phosphate (TCP) is rapidly increased year by year and numerous studies on using pore forming agents to increase the porosity of porous bioceramics had been reported. This study is to investigate the ability of sodium bicarbonate ( $\text{NaHCO}_3$ ) from food products, also known as baking soda as a pore forming agent to produce porous TCP bioceramics. Calcium hydrogen phosphate dehydrate, calcium carbonate and  $\text{NaHCO}_3$  (0wt%, 5wt% or 10wt%) were mixed and pressed into pellet form at two different compaction pressure; 20 and 30 MPa, and subsequently, the pellets were sintered at 1200 and 1250°C to produce porous TCP bioceramics. Without the addition of  $\text{NaHCO}_3$ , pure  $\beta$ -TCP phase formed at 1200°C while  $\alpha$ -TCP phase appeared as secondary phase at 1250°C. With the amount of  $\text{NaHCO}_3$  added, hydroxyapatite (HA) and sodium calcium phosphate ( $\text{NaCaPO}_4$ ) phases were obtained. The porosity of TCP bioceramics is decreased with the addition of 5wt% of  $\text{NaHCO}_3$  and slightly increased for 10wt% of  $\text{NaHCO}_3$ . The reason for this is that during sintering, the NaO became an auxiliary flux and produce a denser pellet. Consequently, the used of  $\text{NaHCO}_3$  as a pore forming agent had negatively impact for this study. However, as  $\text{NaCaPO}_4$  was also produce, this may also be beneficial for biomaterial applications. The morphology of the fracture surfaces were also observed.

## PM-10

### **Morphological Study of Cassava Starch Film Influence by Plasticizers in Zinc-Air Fuel Cell**

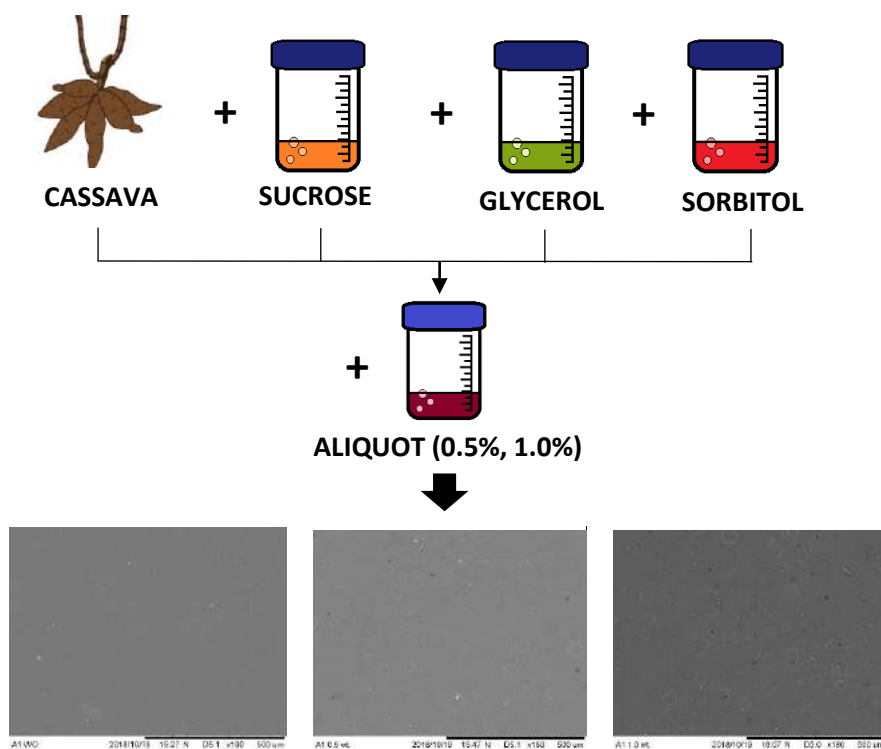
**Nur Ain Adila Abd Wahab, Mohamad Najmi Masri\*, Noor Fazliani Shoparwe**

*Faculty of Bioengineering and Technology*

\*E-mail address of Corresponding Author: [adeelawahab95@gmail.com](mailto:adeelawahab95@gmail.com)

**Keywords:** *glycerol, sorbitol, sucrose, plasticizer, starch film.*

The effect of plasticizers, glycerol, sorbitol and sucrose on structural, mechanical and chemical properties of cassava starch film has been investigated. The morphologies of cassava films studied by addition of different type of plasticizers. Mixtures of cassava starch and distilled water with combination of glycerol, sorbitol, sucrose as plasticizers was well heated at gelatinized by heating to temperature 70°C- 80°C. Homogenous starch solution was cast onto acrylic plate and allowed to dry in room temperature (25°C). Dried films plasticized showed the results under Scanning Electron Microscope (SEM) as smooth film surfaces were observed in mixture of glycerol, sorbitol and sucrose due to the fact that glycerol and sucrose are more hydrophilic than sorbitol, thus the presence of more hydroxyl groups (-OH groups) in the molecule, sorbitol interacted with water by hydrogen bonding resulting in less plasticizing effect compared to glycerol and sucrose. As a results, the presence of sorbitol as plasticizer with glycerol and sucrose in cassava starch films provided the more compact and homogenous surface, improves the stability and flexibility on cassava starch films.



SEM images for the cassava films without Aliquot and starch -Aliquot blend films at different Aliquot concentration. All bars: 500 µm

## PM-11

### Preparation and Characterisation of Epoxy/Silica/Kenaf Composite Using Hand Lay-Up Method

**Che Nor Aiza Jaafar<sup>1,\*</sup>, Ismail Zainol<sup>2</sup> and Muhammad Asyraf Muhammad Rizal<sup>1</sup>**

<sup>1</sup>Faculty of Engineering, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia

<sup>2</sup>Chemistry Department, Faculty of Science and Mathematics, Universiti Pendidikan Sultan Idris, 35900 Tanjung Malim, Perak, Malaysia

\*E-mail address of Corresponding Author: [cnaiza@upm.edu.my](mailto:cnaiza@upm.edu.my)

**Keywords:** *kenaf fibre, alkaline treatment, hand lay-up, epoxy composites.*

Epoxy/silica/kenaf composites was fabricated using a simple technique of hand lay-up method. The effect of silica content on mechanical properties of epoxy composites was investigated by varying the silica content from 7 to 30 wt% whereas the effect of kenaf addition on the epoxy/silica composites was studied by addition of 13 wt% of alkaline treated kenaf fibre. The composites was fabricated in 180 mm x 180 mm iron plate and procured at 80 °C and post cured at 110 °C. Non-woven kenaf fibre was treated with 1M NaOH to improved surface interaction between epoxy matrixes. Mechanical properties of composites were analyzed through flexural and impact test. The results and analysis show that the 20 wt% silica content produced epoxy/silica compsoites with highest flexural and impact strength i.e 50 MPa and 3.1 kJ/m<sup>2</sup> respectively. Addition of kenaf fibre however, produce stronger composite with 54 MPa and 10.6 kJ/m<sup>2</sup> of highest flexural and impact strength respectively. Scanning electron microscope (SEM) was used to observe the surface morhphology of the fractured surface of composites. SEM Microscopy analysis revealed that epoxy composites with treated kenaf fibre showed better surface interaction between kenaf fibre and epoxy resin thus exhibit higher mechanical properties. The composite produced in this research has high potential to be used in household and domestic product application.



## PM-012

### Formation of Cobalt Coated TiO<sub>2</sub> Nanotubes by Wet Impregnation for Dye Degradation

S. Ismail<sup>1\*</sup>, K. F. Kie<sup>1</sup>, K.A. Khairul<sup>1</sup>, R.F. Munawar<sup>1</sup>, and M.N Masri<sup>2</sup>

<sup>1</sup> Carbon Research Technology, Faculty of Manufacturing Engineering, Universiti Teknikal Malaysia Melaka, Hang Tuah Jaya, 76100, Durian Tunggal, Melaka, Malaysia.

<sup>2</sup> Advanced Materials Research Cluster, Faculty of Bioengineering and Technology, Universiti Malaysia Kelantan, 17600 Jeli, Kelantan, Malaysia

\*E-mail address of Corresponding Author: [syahriza@utem.edu.my](mailto:syahriza@utem.edu.my)

**Keywords:** TiO<sub>2</sub> nanotubes, anodization, wet impregnation.

Highly ordered and well aligned TiO<sub>2</sub> (titanium oxide) nanotubes were successfully synthesized through anodization of Ti (titanium) foil in ethylene glycol (C<sub>2</sub>H<sub>6</sub>O<sub>2</sub>) containing ammonium fluoride (NH<sub>4</sub>F) and hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>) at 60 V for 30 minutes. The wide band gap and high recombination rate have restricted the utilization of TiO<sub>2</sub> photocatalyst in solar spectrum. Cobalt coating was applied to solve the TiO<sub>2</sub> drawbacks. Cobalt coated TiO<sub>2</sub> nanotubes were formed by wet impregnation technique. TiO<sub>2</sub> nanotubes were dipped into cobalt chloride (CoCl<sub>2</sub>) precursor for certain soaking period. This diffusion interstitial process via wet impregnation was time dependent, which altered the amount of cobalt loaded in the nanotubes surface. The optimum condition for the highest degradation rate was exhibited by the cobalt coated TiO<sub>2</sub> nanotubes that soaked in 0.3M CoCl<sub>2</sub> precursor and with 2 hour soaking time. However, the highest molarity of the precursor and longer soaking time indicated excess amount of cobalt was loaded in the TiO<sub>2</sub>. The characterization for phase formation, structural, morphology of the coated TiO<sub>2</sub> nanotubes will be determined by field emission scanning electron microscope (FE-SEM), X-ray diffraction (XRD) and also Raman spectroscopy. Photodegradation test by methyl orange (MO) aqueous solution will be used to evaluate the photocatalytic activities of the nanotubes.

## PM-13

### Effect of Multi-walled Carbon Nanotubes Concentrations on Heat Transfer in Nanofluid

Hussin Mamat\* and Muhammad Imran Salim Asrab Ali

*School of Aerospace Engineering, Universiti Sains Malaysia, Engineering Campus, 14300 Nibong Tebal,  
Pulau Pinang, Malaysia*

\*E-mail address of Corresponding Author: [\\*hussinm@usm.my](mailto:hussinm@usm.my)

**Keywords:** *multi-walled carbon nanotubes, nanofluids, thermal conductivity.*

Nanofluid is a fluid engineered by dispersing nanoparticles into a base fluid. Nanofluids are being widely used in many applications due to their ability to increase heat transfer in the fluids. Particles having a diameter smaller than 100 nm are often called as nanoparticles. The present study is aimed to investigate the potential of multi-walled carbon nanotubes (MWCNT) in the based fluid as a coolant for battery application. Nanofluids based on MWCNT and pure distilled water was prepared in the experimental work. Different weight percentage of MWCNT was used to prepare the nanofluids; 0.1%, 0.2%, 0.3%, 0.4% and 0.5%. Analysis was done experimentally and through simulation using ANSYS Workbench to identify the best composition of nanoparticles required in nanofluid to enhance heat transfer. From the simulation of the nanofluid, it can be concluded that 0.5% MWCNT nanofluid provides the highest heat transfer enhancement. This is contrary to the experimental result where the highest heat transfer enhancement percentage is produced by 0.4% MWCNT nanofluids. In the experimental values, heat transfer coefficient for 0.5% MWCNT nanofluid reduced compared to that of 0.4% MWCNT nanofluids. The difference in the heat transfer is due to dispersion of MWCNT and errors in experimental works.

# **E-POSTER ABSTRACTS**

## **BIOLOGICAL AND MATERIAL**

## EPB-01

### **Molecular Characterization of Bacteria Isolated From the Skin of Cantaloupe Fruit Using 16s Ribosomal RNA Sequence Analysis**

**A.A. Musa<sup>1</sup>\*, A. A. Saif<sup>2</sup> and Idris Shehu<sup>3</sup>**

<sup>1</sup>*Department of Science Laboratory Technology, Kano State Polytechnic, Kano, Nigeria*

<sup>2</sup>*Department of Applied Biological Sciences & Arts, Jordan University of Science & Technology Irbid, Jordan*

<sup>3</sup>*Department of Microbiology, Kaduna State University, Kaduna, Nigeria*

\*E-mail address of Corresponding Author : [aamusadiso@yahoo.com](mailto:aamusadiso@yahoo.com)

**Keywords:** *Cantaloupe fruit; Bacterial isolate, rRNA sequence analysis.*

Fresh cut-fruits produce is one of the fastest developing food industries in the world. The fundamental issue that makes cut-fruit grown from the ground a very perishable item is the microbial development. The present study was conducted with the aim to isolate bacteria from cantaloupe fruit skin sample collected from cut fruit industry in Johor Baharu, Malaysia and to identify the bacteria using 16S ribosomal (rRNA) gene analysis. Four unique bacterial strains were isolated and distinguished based on their morphological appearance through culture and microscopy. For bacterial identification, the PCR products of the 16S rRNA gene were amplified, purified and sent for sequencing to 1<sup>st</sup> Base Sdn. Bhd Malaysia. The sequence data were then compared with other gene sequences in GenBank database (NCBI) using a BLAST search to find closely related sequences. The isolated bacteria were identified as *Exigubactirum sp.* (CG1), *Exigubactirum sp.* (CG2), *Pseudomonas sp.* (CG3), and *Microbacterium sp.* (CG4) after sequencing. Therefore, the association of fresh cut fruits with these bacteria can possibly cause contamination which might lead to outbreaks of human disease. Thus, proper cut fruits processing method that could inhibit the growth or kill these bacteria is important to ensure the safety of cantaloupe cut fruits.

## EPB-02

### **Anthelmintic Activity of Prophetic Food (Milk): An Electron Micrographic Evidence**

**Omaima Adil Najm<sup>1</sup> ; Faizul Helmi Addnan<sup>1</sup> ; Mohamed Adel Elkadi<sup>1</sup> ; Wan Omar Abdullah<sup>1</sup> ;  
Nur Fariha Mohd Manzor<sup>1</sup> ; Noor Amiza Zainal Abidin<sup>1</sup> ; Fadlul Azim Fauzi Mansur<sup>1\*</sup>**

<sup>1</sup> Faculty of Medicine and Health Sciences, Universiti Sains Islam Malaysia, Kuala Lumpur, Malaysia

\*E-mail address of Corresponding Author: [fadlul@usim.edu.my](mailto:fadlul@usim.edu.my)

**Keywords:** Prophetic food, milk, anthelmintic, SEM.

In the wake of anthelmintic resistance many researchers screen natural products for any anthelmintic activity. Many have detected anthelmintic activity mainly from plants. Animals are also important sources for medicine. Milk is an important prophetic food frequently mentioned in the holy Quran and prophetic traditions. Bovine, caprine and cameline milk have been shown to affect parasitic worms in vitro and in vivo through various worm biological assays. Evaluating how milk affects worm cuticle is critical in understanding the mechanistic basis of milk anthelmintic activity. We provide electron micrographic evidence of bovine and caprine milk affecting the canine hookworm *Ancylostoma caninum* cuticle in vitro. In both types of milk the cuticle underwent proteolytic erosion similarly seen with fruit derived enzymes. This effect is different when compared to conventional anthelmintic like benzimidazoles which affect worms internally through inhibition of microtubule polymerization leading to defective cellular structure. However, there was also worm wrinkling and shrinking which mimics the effect of pyrantel which affect worm neuromuscular junction resulting in spastic paralysis. Understanding this anthelmintic mechanism through electron micrography has provided critical information in developing novel therapies from natural products. It also provides basis for consumption of milk as functional food for parasitic worm control.

### EPB-03

## **The Relative Anthelmintic Efficacy of Goat's Milk And Ajwa Date Palm Fruit Against *Toxocara spp.* and *Ancylostoma spp.* in kittens**

**Omaima Adil Najm<sup>1\*</sup> ; Faizul Helmi Addnan<sup>1</sup> ; Mohamed Adel Elkadi<sup>1</sup> ; Wan Omar Abdullah<sup>1</sup> ;  
Nur Fariha Mohd Manzor<sup>1</sup> and Fadlul Azim Fauzi Mansur<sup>1</sup>**

<sup>1</sup> Faculty of Medicine and Health Sciences, Universiti Sains Islam Malaysia, Kuala Lumpur, Malaysia

\*E-mail address of Corresponding Author: [omaimaadil2@gmail.com](mailto:omaimaadil2@gmail.com)

**Keywords:** *Ancylostoma*, *Toxocara*, hookworm, goat's milk, Ajwa date fruit.

Gastrointestinal helminth infection in both humans and animals is a global problem. Control relies principally on chemotherapy. However, there is an urgent need for novel classes of anthelmintic due to development of resistance to conventional chemotherapy. Companion animals like cats are important animals to humans for both psychosocial and economic reasons due to the booming pet industry. Many researchers screen natural compounds like milk from cow and camel for potential anthelmintic activity. Sourcing ethno medical knowledge like the Islamic prophetic traditions we tested the efficacy of goat's milk and Ajwa date fruit extract in vivo in stray kittens infected with gastrointestinal helminths like *Toxocara spp.* and *Ancylostoma spp.* The effect of whole goat's milk, diluted milk and Ajwa date extract solution was assessed by worm fecundity index through faecal egg count. The efficacy seen against both nematodes however was only relative due to lack of control and unconvincing reduction pattern which did not warrant statistical analyses .

## EPM-01

### Effect of Waste Rice Husk Ash on Microstructures and Physical Properties of Recycled Aluminium Chip AA7075

N.F. Mohd Joharudin<sup>1,2,3,\*</sup>, N. Abdul Latif<sup>1,2,3</sup>, M.S. Mustapa<sup>1,2,3</sup> and N.A. Badarulzaman<sup>2,3</sup>

<sup>1</sup>Structure Integrity Monitoring Research Group (SIMReG)

<sup>2</sup>Faculty of Mechanical and Manufacturing Engineering

<sup>3</sup>Universiti Tun Hussein Onn Malaysia, Johor, Malaysia

\*E-mail address of Corresponding Author: [gd170072@siswa.uthm.edu.my](mailto:gd170072@siswa.uthm.edu.my)

**Keywords:** Recycled aluminium chip, rice husk ash, cold compaction.

The use of low cost metal matrix composites (MMC) is increasing rapidly in various engineering fields because of their better mechanical properties. This paper presents the effects of recycled aluminium chips AA7075 with waste rice husk ash (RHA) on the microstructure and physical properties. Recycled aluminium chip AA7075 was reinforced with agro waste of RHA i.e., 2.5 wt.%, 5 wt.%, 7.5 wt.%, 10 wt.% and 12.5 wt.%. The presence of silica exists in RHA obtained after through chemical treatment and burning process of rice husk (RH) at temperatures of 700°C for 2 hours. The samples of chip AA7075/RHA were prepared by cold compaction method due to the lower energies consumption and operating cost compared to conventional recycling by casting. Microstructures analysis, physical testing of density, apparent porosity, water absorption and hardness tests of the chip AA7075/RHA samples were examined in current study. The microstructures of chip AA7075/RHA were observed via optical microscope (OM) to analyze the dispersion of the reinforced composites. The microstructures of chip AA7075/RHA were found random distribution and non-homogeneous of RHA and aluminium chip AA7075 compared to 100% recycled aluminium chip AA7075. The density of chip AA7075/RHA was increased up to 5% of RHA and then decreased with increasing mass fraction of RHA. Porosity and water absorption of chip AA7075/RHA were significantly consistent at increasing mass fraction of RHA, while the hardness of chip AA7075/RHA was increased at increasing RHA. Based on investigation to aluminium reinforced rice husk ash chemical composites, it has good potential to

improve the material behavior of MMC by appropriate composition amorphous chemical silica to composite.



## EPM-03

### **Influence of Kenaf fibers on flexural strength of polymethyl methacrylate denture**

**P.V. Subramaniam<sup>1</sup>, Y. Johari<sup>1\*</sup>, I.A. Rahman<sup>1</sup>, M. F. Khamis<sup>1</sup>, Z. Ariffin<sup>1</sup>, N. M. Yusoff<sup>1</sup>**

<sup>1</sup> *School of Dental Sciences, Universiti Sains Malaysia, 16150 Kubang Kerian, Kelantan, Malaysia*

\*E-mail address of Corresponding Author: [yjohari@usm.my](mailto:yjohari@usm.my)

**Keywords:** *polymethyl methacrylate, kenaf, natural fibre.*

Conventional polymethyl methacrylate (PMMA) is a commonly used material for denture base. Research continues to improve its flexural strength to reduce the rate of denture fracture during mishaps. The aim of this study is to evaluate the flexural strength of conventional PMMA reinforced with Kenaf fibres. Ten specimens, each with dimension of 65mmx10mmx3mm were prepared through flasking method for both groups; conventional PMMA and PMMA reinforced with Kenaf fibres. One specimen from each group was subjected to Cone Beam Computed Tomography for radioopacity assessment. All the specimens were subjected to flexural strength test using three-point bend test with Universal Testing Machine (Shimadzu, Japan) and one specimen from each group was observed under Scanning Electron Micrograph (SEM) to assess the fracture pattern. The results were analysed using the independent t-test with the level of significance defined at  $p < 0.05$ . There was a statistically significant difference between the two groups ( $p < 0.05$ ) in regards to flexural strength values. Under SEM observation, PMMA reinforced with Kenaf fiber revealed rough edges while PMMA alone has a clean fracture. Within the limitations of the study, PMMA reinforced with Kenaf fibres showed higher flexural strength than conventional PMMA.

## EPM-05

### **Preparation and Characterisation of Spray Dried Hydroxyapatite Powder from Fish Scale.**

**C. N. Aiza Jaafar<sup>1,\*</sup> M. I. Izyan khairani<sup>1</sup>, I. Zainol<sup>2</sup> and M.Y.M Zuhri<sup>1</sup>**

<sup>1</sup>*Department of Mechanical and Manufacturing Engineering, Faculty of Engineering, Universiti Putra Malaysia, 43000 Serdang Selangor, Malaysia.*

<sup>2</sup>*Chemistry Department, Faculty of Science and Mathematics, Universiti Pendidikan Sultan Idris, 35900 Tanjong Malim, Perak, Malaysia.*

\*E-mail address of Corresponding Author: [cnaiza@upm.edu.my](mailto:cnaiza@upm.edu.my)

**Keywords:** *hydroxyapatite; spray dry; fish scales*

Fish scales was identified to be used as main source of hydroxyapatite (HAp) since it is cheaper than synthetic HAp and safer than animal origin. This study investigates the preparation of natural hydroxyapatite from fish scales by thermal method, ball milling, oven dry and spray dryer. The effect of milling time and particles size was investigated. Field emission scanning electron microscope (FESEM) was used to study the morphology of HAp powders dried using conventional oven and spray dryer. The X-ray diffraction (XRD) and Fourier transform infrared (FTIR) was used to confirm the production of natural HAp. The results show that the longer the milling time, the smaller the particle size. The particle size of HAp obtained was in the range of 1 to 10 micron. FESEM micrograph has showed the spray dried HAp powder is well separated as compared to agglomerated powder in oven dried HAp. FTIR and XRD analysis show the prominent peaks corresponding to high crystalline HAp produced from fish scales.