

ICoFMST 2019

**INTERNATIONAL CONFERENCE
ON FRONTIERS IN MATERIALS
SCIENCE & TECHNOLOGY**

23-24 December, 2019
Langkawi, Malaysia.

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INTERNATIONAL CONFERENCE ON FRONTIERS IN MATERIALS SCIENCE & TECHNOLOGY

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Universiti Malaysia Pahang, Malaysia

Asst. Prof. Dr. Gomaa A.M. Ali
Al-Azhar University, Egypt

Assoc. Prof. Dr. Suchada Chantrapromma
Prince of Songkla University, Thailand

Assoc. Prof. Dr. Wilairat Cheewasedtham
Prince of Songkla University, Thailand

Asst. Prof. Dr. Thitima Rujiralai
Prince of Songkla University, Thailand

Dr. Hamidreza Sadegh
West Pomeranian University of Technology, Poland

**INTERNATIONAL CONFERENCE ON FRONTIERS IN MATERIALS SCIENCE & TECHNOLOGY
(ICoFMST 2019 Conference Program)**

23 Dec 2019, Monday, Hotel Lobby			
15:00 – 18:00	Registration session		
24 Dec 2019, Tuesday, Dayang 2 Meeting Room			
(Chairperson: Assoc. Prof. Dr. Chong Kwok Feng)			
09:00 – 09:40	(MST018)	Assoc. Prof. Dr. Wilairat Cheewasedtham (Invited Speaker)	Electrical conductivity, a robust tool for natural rubber latex quality monitoring
09:40 – 10:00	(MST005)	Dr. Auwal Abdulkadir	Effect of silver nanoparticles layer thickness towards properties of black silicon fabricated by two-step silver-assisted electroless wet chemical etching for photovoltaics
10:00 – 10:20	(MST006)	Assoc. Prof. Dr. Weerapan Srichan	Mineralogy, Geochemistry and Genesis of Bentonite deposits in Lam Narai Volcanic Belts, Lop Buri Province, Central Thailand
Coffee Break, Dayang 2 Foyer			
(Chairperson: Professor Insik In)			
10:40 – 11:20	(MST003)	Assoc. Prof. Dr. Kwok Feng Chong (Invited Speaker)	Sheets Size Effect of Graphene in Corrosion Resistant Behavior
11:20 – 11:40	(MST013)	Dr. Nadiah Ramlan	The Implementation of Sustainability Elements in Games Development
11:40 – 12:00	(MST009)	Dr. Shariff Ibrahim	Chitosan-Lignin for Recovery of Lanthanum (III) ions from Aqueous Solutions
12:00 – 12:20	(MST010)	Assoc. Prof. Dr. Thitima Rujiralai	L-Cysteine functionalized gold nanoparticles as a selective colorimetric probe for determination of carbamates
12:20 – 13:00	(MST025) Virtual	Asst. Prof. Dr. Gomaa A.M. Ali (Invited Speaker)	MnO2 Nanoflowers from Spent Batteries to Supercapacitors Application: Waste to Wealth
Big Group Photo			

Lunch, Seagull Restaurant			
(Chairperson: Assoc. Prof. Dr. Thitima Rujiralai)			
14:00 – 14:40	(MST022)	Assoc. Prof. Dr. Yufridin Wahab (Invited Speaker)	Process Development And Characterization Towards Microstructural Realization Using Laser Micromachining For MEMS
14:40 – 15:00	(MST023)	Assoc. Prof. Dr. Yufridin Wahab	Fabrication of Arrayed Rectangular Microcantilever by Laser Micromachine
15:00 – 15:20	(MST016)	Dr. Foo Chuan Hui	Parameter estimation of tank Panulirus Ornatus
15:20 – 15:40	(MST012) Virtual	Dr. Ibrahim Awad Mohammed	Study the effect of Extracts and inhibitory potency of the plant Capparis spinosa on breast cancer cells
Coffee Break, Dayang 2 Foyer			
(Chairperson: Assoc. Prof. Dr. Wilairat Cheewasedtham)			
16:00 – 16:40	(MST019)	Professor Insik In (Invited Speaker)	Mussel-Inspired Functionalization of Nanomaterials
16:40 – 17:00	(MST020)	Professor Insik In	σ - π interaction between graphene and aliphatic polymers
17:00 – 17:20	(MST007) Virtual	Dr. Fatima Zahra Majoubi	Olive mill wastewater treatment using infiltration percolation in column followed by aerobic biological treatment with soil microorganisms
17:20 – 17:40	(MST008)	Dr. Nurhafizah Binti Md Disa	Low-Temperature Exfoliated Graphene Oxide Incorporated with Different Types of Natural Rubber Latex: Electrical and Morphological Properties and Its Capacitance Performance
End of ICoFMST 2019			

Invited Speakers



Assoc. Prof. Dr. Wilairat Cheewasedtham

Analytical Chemistry and Environment Research Unit, Department of Science,
Faculty of Science and Technology, Prince of Songkla University, Thailand.

Email: wilairat.c@psu.ac.th

1. Position:
 - 1.1. Vice Director of Scientific Equipment Center, Prince of Songkla University (PSU)
 - 1.2. Consultant of the Director of the Southern Thailand Science Park, Prince of Songkla University (PSU)
2. Education:
 - 2.1. Ph.D. (Chemistry), University of Aberdeen, United Kingdom
3. Rewards:
 - 3.1. 2015 Leader in Innovation Fellowship, Newton Fund
 - 3.2. 2005 Outstanding research, Thailand Research Fund
 - 3.3. 2005 Best Alumni, Prince of Songkla University
4. Working, Training and Academic Experience
 - 4.1. 1990 - 2019 Lecturer at Department of Science, Faculty of Science and Technology, PSU, Pattani campus
 - 4.2. Project head, research funding of DUO-Denmark Fellowship Program
 - 4.3. Vice Chairman. International workshop on MANURE: Management of Resources in urban areas and Industries, focus on Nutrient Recycling and CHASE: Chemical Assessment of the Environment. 15-16 June 2004. Supported by The Linked University Consortium for Environment and Development - Industry and Urban Areas (LUCED-I&UA), Surat Thani, Thailand.
 - 4.4. Project Leader in ISO method development for magnesium determination in latex.

Invited Speakers



Assoc. Prof. Dr. Kwok Feng Chong
Faculty of Industrial Sciences & Technology
Universiti Malaysia Pahang, Malaysia
Email: ckfeng@ump.edu.my

Dr. Chong received his chemistry education in Universiti Teknologi Malaysia where he was awarded Bachelor of Science in Industrial Chemistry in 2004. He was then employed as an engineer in water industry for a year in Malaysia, before admitted into National University of Singapore for his postgraduate studies in 2005. He joined under Prof. Dr. Kian Ping Loh group to study carbon nanomaterials for electrochemical applications. His achievement in the group has earned him the postgraduate conversion into PhD. degree where he completed his PhD. in Chemistry. He started his academic life in Temasek Polytechnic by serving as a chemistry lecturer. Due to his ambition to contribute to the nation's chemistry development, Dr. Chong returned to Malaysia in 2010 and joined Universiti Malaysia Pahang where he established his research group (Electrochemical Materials & Interfaces Research). Currently, his research group has a postdoctoral researcher, 5 PhD. students, 3 MSc. students and more than 30 postgraduate and undergraduate students had graduated from his group. Dr. Chong was promoted to Associate Professor in 2016. His research group mainly focuses on the utilization of electrochemical processes to produce nanostructured materials as well as their electrochemical properties investigation. To date, Dr. Chong has published 67 research articles and accumulated total (Google Scholar) citation of 1213 with h index of 22 (citation from SCOPUS of 939 with 19 h index). His research findings also receive numerous awards internationally, with the highest achievement in British Invention Shows 2015 by winning Obelisk Award for his "Biowaste as Energy Storage Supercapacitor". Dr. Chong contribution is well recognized internationally and he has been appointed as Visiting Professor in Prince of Songkla University from 2017 to 2020. Apart from research work, Dr. Chong also actively contributes in the development of chemistry education from the role as management level. He had been appointed as Head of Programme (Industrial Chemistry), Deputy Dean (Research & Postgraduate Studies) and currently he is heading the office of University Corporate Quality and Affairs Center as Deputy Director. Besides university duties, Dr. Chong was one of the pro tem committee to establish the Pahang state branch for Malaysian Institute of Chemistry (Institut Kimia Malaysia) and currently serving as the Deputy Chairman for Institut Kimia Malaysia Pahang Branch.

Invited Speakers



Asst. Prof. Dr. Gomaa A. M. Ali
Chemistry Department, Faculty of Science
Al-Azhar University, Egypt
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Dr. Gomaa A. M. Ali is an assistant professor at Chemistry Department, Faculty of Science, Al-Azhar University, Assist, Egypt. He has 12 years of experience working in research area of Materials Science, Nanocomposites, Humidity Sensing, Graphene, Supercapacitors, Water Treatment and Drug Delivery. He obtained his B.Sc. and M.Sc. in Physical Chemistry from Al-Azhar University, Egypt. He was awarded his Ph.D. in Advanced Nanomaterials for Energy Storage from UMP, Malaysia. He is the recipient of some national and international prizes and awards. Dr. Gomaa has published over 75 journal articles, as well as 4 book chapters on a broad range of cross - disciplinary research fields including advanced multifunctional materials, nanotechnology, supercapacitor, water treatment, humidity sensing, biosensing, corrosion, drug delivery, and materials for energy applications. Dr. Gomaa has served as both a Senior Editor and board member of many international journals, as well as reviewer for more than 24 WoS journals. To date, Dr. Gomaa has published 75 research articles and accumulated total (Google Scholar) citations of 966 with h index of 18 (citations from SCOPUS of 639 with 16 h index).

Invited Speakers



Assoc. Prof. Dr. Yufridin Wahab

Advanced MEMS Based Integrated Electronics NCER Centre of Excellence (AMBIENCE)
Universiti Malaysia Perlis (UniMAP), Malaysia.
Email: yufridin@gmail.com

Assoc. Prof. Dr. Yufridin Wahab received his Bachelor of Engineering in Electrical and Electronic Engineering (honours) from Universiti Sains Malaysia (USM) in 1996, with specialization in Microelectronic Engineering. In 1999, he completed his M.Sc. in Electrical and Electronic Engineering in the same university. During his study, he successfully design, fabricated and characterized an integrated circuit using the USA based MOSIS MPW service. He completed his Doctorate in Electrical Engineering degree studies in 2009 during which he successfully design, fabricated and characterized another integrated circuit with MEMS Pressure Sensor using Infineon Technologies MPW process in Europe. In 1999, he started his industry experience in LSI Logic Corp. in Gresham, Oregon, USA for a one year technology transfer program. Upon completion of one year tenure in USA, he started his job as one of the pioneering engineering group in the Malaysia's first silicon wafer foundry, namely Wafer Technology Sdn Bhd (which later changed name to Silterra Malaysia Sdn Bhd). In 2002, he joined the pioneering group of the first five lecturers from USM to set-up a new university in Perlis named Kolej Universiti Kejuruteraan Utara Malaysia (KUKUM) which later was flourished to become Universiti Malaysia Perlis (UniMAP). In 2011, he was awarded a special grant by NCIA and Silterra to develop and set-up the first of its kind industry standard MEMS fabrication laboratory in UniMAP named Advanced MEMS Based Integrated Electronics NCIA Centre of Excellence (AMBIENCE). He is also currently in charge of the setting up and operations of UniMAP industry centred Research Training and Continuing Education Centre (UniMAP RETRACE) in Kulim Hi-Tech Park where many engineers in Kulim high-technology industries and Penang enrolled for Masters and PhD degree programmes in microelectronic design and manufacturing fields. He was also awarded and successfully completed many long term semiconductor/electronics industry human capital development projects for the multinationals such as the 11 years long Agilent-UniMAP- Development Programme, 1 year long Silterra-NCIA-UniMAP programme, Hewlett-Packard 6 months FETMEMS program and many others. He had trained a total of more than 1000 fresh graduate microelectronic engineers and also 1000 working industry engineers for the semiconductor industry. He had more than 90 publications in the field on semiconductor device, IC design, MEMS design and fabrication in journals, books and international conferences. He also collected many internationally recognized innovation awards and patents in electronics and semiconductor fields.

Invited Speakers



Professor Insik In

Department of Polymer Science and Engineering, Department of IT Convergence
Korea National University of Transportation, Chungju, South Korea
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B.S. 1992~1996

Department of Chemistry

Korea Advanced Institute of Science and Technology [KAIST, South Korea]

M.S. 1996~1998

Department of Chemistry

Korea Advanced Institute of Science and Technology [KAIST, South Korea] - Adviser : Prof.

Sang Youl Kim

Ph.D. 1998~2003

Department of Chemistry

Korea Advanced Institute of Science and Technology [KAIST, South Korea] - Adviser : Prof.

Sang Youl Kim

Exchange Researcher 2002

Department of Organic and Polymeric Materials

Tokyo Institute of Technology (TIT, Japan) - Advisor : Prof. Mitsuru Ueda

Post-Doc. 2003~2004

Department of Polymer Science and Technology

Korea Advanced Institute of Science and Technology [KAIST, South Korea] - Adviser : Prof.

Sang Youl Kim

Post-Doc. 2004~2007

Department of Materials Science and Engineering

University of Wisconsin-Madison [UW-Madison, USA] - Adviser : Prof. Padma Gopalan

Associate Professor 2007~Present

Department of Polymer Science and Engineering & Department of IT Convergence (Brain
Korea PLUS 21 Program)

Korea National University of Transportation [KNUT, South Korea]

MST003

Sheets Size Effect of Graphene in Corrosion Resistant Behavior

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Abstract

Graphene oxide emerges as an effective corrosion resistant coating. However, the influence of graphene oxide sheets size on the corrosion protection remains unclear. In this report, we investigate the effect of different graphene oxide (GO) sheets size in the formation of corrosion resistant coating. We provide valuable input for electrophoretic deposition in which GO sheets in smaller size diffuse faster during deposition to cause more oxygen reduction, thereby forms a coating with higher hydrophobicity, stronger adhesion, and lesser pinholes. Detailed electrochemical impedance analysis shows that the coating formed from GO sheets in smaller size exhibits higher activation energy for water diffusion, causing slower water diffusion rate and lower permeation into the coating. The findings suggest that GO sheets in smaller size produce a reliable coating with excellent corrosion resistance behavior.

Keywords: Sheet size; Coating; Electrodeposition; EIS; Corrosion Protection.

Effect of silver nanoparticles layer thickness towards properties of black silicon fabricated by two-step silver-assisted electroless wet chemical etching for photovoltaics

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Abstract

This paper investigates the effect of silver nanoparticles (Ag NPs) layer thickness towards properties of black silicon (b-Si) fabricated by two-step electroless wet chemical etching for potential application in photovoltaics (PV). Ag NPs with different layer thicknesses (1.3-5.1 μm) are deposited on monocrystalline silicon (mono c-Si) wafers by dipping the wafers in AgNO_3/HF aqueous solution (5:6 volume ratio) for 10-40 s. This is followed by etching the wafers in $\text{HF}:\text{H}_2\text{O}_2:\text{DI H}_2\text{O}$ aqueous solution (2:1:5 volume ratio) for 20 s. Surface morphological investigation confirms presence of b-Si nanowires with height of 250-577 nm and diameter of 100-200 nm. The b-Si nanowires suppress weighted average reflectance (WAR) from the wafers over 300-1100 nm wavelength region, due to refractive index grading effect. Sample with Ag NPs layer thickness of 5.1 μm exhibits average height of 577 nm and average diameter of 200 nm. This sample demonstrates the lowest WAR (5.5%) compared to other samples, with improved broadband light absorption. For this sample, the absorption is 96.5% at wavelength of 600 nm. The enhanced broadband light absorption leads to maximum potential short-circuit current density ($J_{\text{sc(max)}}$) of up to 39.7 mA/cm^2 , or 51% relative enhancement compared to mono c-Si reference sample (planar).

Keywords: silver nanoparticles, black silicon, absorption, short-circuit current density.

MST006

**Mineralogy, Geochemistry and Genesis of Bentonite deposits in Lam Narai
Volcanic Belts, Lop Buri Province, Central Thailand**

Nuchit Siritongkham^{1,a}, Weerapan Srichan^{2,b*}, Somboon Khositanont^{1,c}, Phisit Limtrakun^{2,d}

¹ *Department of Mineral Resources, Bangkok, Thailand*

² *Department of Geological Sciences, Faculty of Science, Chiang Mai University, Chiang
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Abstract

Alteration in the subaqueous basaltic rock of the Lam Narai volcanic belts, Lop Buri province, central Thailand has resulted in the formation of bentonite deposits. The bentonite deposits have been geological, mineralogical and geochemical studied to determine their genesis. The characteristics of the bentonites were examined by using X-ray Diffractometer and Scanning Electron Microscope with Energy Dispersive Spectroscopy. The mineralization zone of bentonite shown X-ray diffraction patterns of montmorillonite as the major constituent with minor hematite and calcite. Morphology of the minerals and groundmass in the bentonite deposits display the "cornflake," "oak leaf," or "cellular" textures that are typical and representative of montmorillonite in smectite group and composed of Si, Al, O, Ca, Mg and Fe in their chemical compositions. Geochemistry of the bentonite and their parental volcanic associations were analyses by using X-ray Fluorescence Spectrometry for major and trace elements. The representative samples were selected for the analysis of the rare-earth elements by using Inductively Coupled Plasma – Mass Spectrometry (ICP-MS). The AI-CCPI alteration box plot revealed that the bentonite is mainly altered by hydrothermal alteration associated with basaltic layer in the Lam Narai volcanic belt. The basaltic layers in this area are composed

of pillow lavas, inter-pillow and basic glassy inter-pillow (hyaloclastite) that indicated the subaqueous environment. The smectite formed by hydrothermal alteration from altered basic glassy inter-pillow (hyaloclastite) in the basaltic layers. Hydrothermal fluids in this area are possibly derived from the major fault along Pa Sak River or the youngest intrusive rocks in the Lam Narai volcanic terrain.

Keywords: Bentonite, basaltic layer, Lam Narai volcanic belt, hydrothermal alteration.

MST007

Olive mill wastewater treatment using infiltration percolation in column followed by aerobic biological treatment with soil microorganisms

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¹ *Université Sultan Moulay Slimane, Equipe de Spectro – Chimie Appliquée et Environnement, FST Béni Mellal, B.P. 523, Béni Mellal, Morocco*

² *University Sultan Moulay Slimane, research group in Environmental Sciences and Applied Materials (SEMA), FP Khouribga, B.P. 145, 25000 Khouribga, Morocco*

³ *Université sultan Moulay Slimane, Ecole Supérieure de Technologie de Beni Mellal, Laboratoire d'Ingénierie et Technologies Appliquées (LITA), Maroc*

⁴ *Chemistry Department, Faculty of Science, Al-Azhar University, Assiut 71524, Egypt Al-Azhar*

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Abstract:

The objective of this work is to treat OMWW by infiltration percolation in different columns containing filtration sand, granular activated carbon and lime, and thus followed by biological treatment using the soil microorganisms to the treatment that will give the best results. Optimum removal efficiency was obtained using granular activated carbon column (T4) mixed with 15 % of lime with percentages removal of 39.33 %, 60.28 %, 53.17 % and 88.74 % for biological oxygen demand (BOD5), chemical oxygen demand (COD), Polyphenols and suspended matter (SM) respectively. Aerobic treatment 30 days of OMWW obtained from the column of activated carbon mixed with 15 % of lime (T4), neutralized and diluted 15 times with distilled water was investigated. The results showed a significant percentage reduction of 79.78 %, 69.43 %, and 60.67 % respectively for BOD5, COD, and Polyphenols, in parallel the pH went from 7.04 to 9.14. The global removal percentages after the two successive treatments were 87.86% for COD, 87.39 % for BOD5 and 81.59 % for polyphenols compounds. Fourier Transformed Infrared spectroscopy analysis (FT-IR) of crude OMWW, infiltrated percolated (T4) and biologically treated, showed a difference between the spectra that manifests by the reduction of the spectrum intensity bands after each

treatment stage, which confirmed our analytical results. Soil microorganisms have shown their biodegradation efficiency of organic matter and polyphenols of these much polluted effluents under aerobic conditions. The results indicated that the pretreatment of raw olive mill wastewater could be realized before biological treatment to obtain a satisfactory reduction.

Keywords: Olive Mill Wastewater, Infiltration percolation, Biological treatment, Fourier Transformed Infrared spectroscopy (FT-IR).

MST008

Low-Temperature Exfoliated Graphene Oxide Incorporated with Different Types of Natural Rubber Latex: Electrical and Morphological Properties and Its Capacitance Performance

M.D. Nurhafizah^{1,2,a*}, A.B. Suriani^{3,4,b}

¹*Nano-Optoelectronics Research Centre,*

²*School of Physics, Universiti Sains Malaysia, 11800 Minden Penang, Malaysia.*

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⁴*Department of Physics, Faculty of Science and Mathematics, Universiti Pendidikan Sultan Idris, 35900 Tanjung Malim, Perak, Malaysia.*

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Abstract

In this work, the different types of latex polymer, namely low ammonia natural rubber latex (NRL), radiated vulcanized NRL (RVNRL), and epoxy NRL 25 (ENRL 25) were fabricated with the exfoliated graphene oxide (GO) using one- and two-step approaches. The electrical conductivity (I - V) and capacitive behaviour (C - V) of nanocomposites samples were investigated under four-point probe and cyclic voltammetry measurements, respectively. Meanwhile, the morphological properties were observed using field emission scanning electron microscopy (FESEM), elemental dispersive X-ray (EDX), optical polarizing microscope (OPM), high resolution tunnelling electron microscopy (HRTEM), Fourier transform infrared (FTIR), micro-Raman, and X-ray diffraction (XRD) spectroscopies. The thermal stabilities of the nanocomposites are also investigated by thermogravimetric analysis (TGA). Among all, the GO/RVNRL polymer nanocomposites sample performed a better homogeneity with an improved in the electrical conductivity ($8.64 \times 10^{-4} \text{ Scm}^{-1}$) as compared to the GO/ENRL 25 ($3.17 \times 10^{-4} \text{ Scm}^{-1}$) and GO/NRL ($2.65 \times 10^{-4} \text{ Scm}^{-1}$) polymer nanocomposites. In addition, the GO/RVNRL polymer nanocomposite electrodes produced have shown acceptable specific capacitance which calculated to be 5 Fg^{-1} . The successfully fabricated conductive GO-based rubber nanocomposites is suitable for a new supercapacitor electrodes.

Keywords: Graphene Oxide, Nanocomposites; electrical conductivity; Electrodes

MST009

Chitosan-lignin for Recovery of Lanthanum (III) ions from Aqueous Solutions

Shariff Ibrahim^{1,a}, Nur Shuhaidah Shamsul Kamal^{1,b}, Megat Ahmad Kamal Megat Hanafiah^{2,c},
Noorul Farhana Md Ariff^{1,d}, Nesamalar Kantasamy^{1,e}

¹*Faculty of Applied Sciences, Universiti Teknologi MARA, 40450, Shah Alam, Malaysia*

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Abstract

Chitosan-lignin adsorbent was prepared, characterized, and applied as an efficient adsorbent to recover precious rare earth Lanthanum (III) ions. Characterization studies reveal that chitosan-lignin composite consists of slightly acidic groups as both pH_{zpc} and pH of the slurry were 6.17 and 5.47, respectively. The specific surface area of the composite was found to be 1.4110 m²/g using Brunauer Emmett Teller (BET) which was lower than raw chitosan surface area. FTIR spectrum showed the disappearance of primary amine peak of chitosan at 1648 cm⁻¹ due to interaction with the benzene ring in lignin. Factors influencing the behaviour of La(III) adsorption, include pH of the solution, and adsorbent dosage. The maximum adsorption of La(III) was at pH 4 with an adsorbent dosage of 0.5 g/l. Freundlich isotherm model fitted well to the experimental isotherm data with regression coefficient of $R^2 = 0.99$ compared to the Langmuir ($R^2 = 0.77$). The maximum adsorption capacity of chitosan-lignin adsorbent was 769.2308 mg g⁻¹ at 300 K. Competitive ion experiment revealed Ce(III), another lanthanide group member was adsorbed more than La(III) with chitosan-lignin adsorbent when both metal ions were mixed in a binary system. Maximum desorption of 90% La(III) was noted with EDTA as the desorbing agent.

Keywords: adsorption, chitosan, lignin, La(III), kinetics, isotherm

MST010

L-Cysteine functionalized gold nanoparticles as a selective colorimetric probe for determination of carbamates

Thitima Rujiralai^{1,2,a}, Wilairat Cheewasedtham^{2,b}, Titilope John Jayeoye^{2,3,c},
Sujitra Kaewsara^{4,d}, Siwat Plaisen^{1,2,e}

¹ *Department of Chemistry and Center of Excellence for Innovation in Chemistry, Faculty of Science, Prince of Songkla University, Songkhla, Thailand*

² *Analytical Chemistry and Environment Research Unit, Division of Chemistry, Department of Science, Faculty of Science and Technology, Prince of Songkla University, Pattani, Thailand*

³ *Department of Chemistry/Biochemistry/Molecular Biology, Alex Ekwueme Federal University, Ndufu Alike Ikwo, Abakaliki, Ebonyi State, Nigeria*

⁴ *Department of Chemistry, Faculty of Science, Prince of Songkla University, Songkhla, Thailand*

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Abstract

Carbamate pesticides are one of the commonly used agricultural pesticides due to their effective insecticides. They affect majorly cholinesterase inhibition, endocrine disruption and immune alterations in human. Thus, they are listed on the priority hazardous substances according to the US Environmental Protection Agency. Herein, the L-cysteine functionalized gold nanoparticles (Cys-AuNPs) was developed for carbamate pesticides (for example carbaryl and methomyl), by using hydrolyzed carbamate products as an aggregation agent to induce the Cys-AuNPs in the presence of 50 mM phosphate buffer (pH 5.8) and 150 mM sodium chloride. The assay can be easily detected by naked eye and UV-visible spectrophotometry. Under an aggregation state, the color of Cys-AuNPs was changed from ruby red to purple and blue-gray

within 10 min, with the swift decrease in absorbance from 522 to 650 nm. Under optimal conditions, the plot of absorbance ratio (A_{650}/A_{522}) against concentrations of carbaryl and methomyl was found to be linear ranging from 14.0-71.0 $\mu\text{g/mL}$ and 7.0-36.0 $\mu\text{g/mL}$, respectively. The limit of detection defined as a signal to noise of 3 for carbaryl and methomyl was achieved at 7.15 $\mu\text{g/mL}$ and 3.49 $\mu\text{g/mL}$, respectively. Good precisions reported as relative standard deviations and recovery values were between 1.0 and 3.4% and 86.5 and 90.7%, respectively. The assay is successfully used as a screening probe in detecting carbamate residues in chili samples.

Keywords: AuNP, Pesticide, Cysteine, Chili, Hydrolysis, Colorimetry

MST012

**Study the effect Extracts and inhibitory potency of plant Capparis spinosa
on breast cancer cells**

Amjed Abbawe Salih, Nadea Ahmed Salih^{1,2}, Mohsen Omer Mohammed³, IBRAHIM
Awad^{4a}

¹ *The College of Education for Pure Sciences at the University of Kirkuk, Iraq*

² *The College of Education for Pure Sciences at the University of Tikret, Iraq*

³ *The College of Education to Sciences at the University of Kirkuk, Iraq*

⁴ *Affiliation The Faculty of Applied Science, Chemistry Department, Universiti Teknologi
MARA, Malaysia*

^a email: ib.awad1992@gmail.com

Abstract

The objective of this study was to analysis of the Iraq The objective of this study was to analysis of the Iraq Capparis spinosa and the main component was and identified by NMR experiments is and the main component was and identified by NMR experiments is Stachydrine. Capparis spinosa belongs to the family family (Capparidaceae) and is described as a herbaceous plant with simple leaves together edge and forked ears and bear flowers on long necks and fruits pear shape. Capparis contains bitter materials, claycosides, enzymes, mayonnaise, acetic acid, bric, soap and volatile oils with a smell similar to the smell of garlic, as well as sulfuric klycosides. All parts of plants used as a treatment as roots that are used as a diuretic and leg used as a dentin for diarrhea as well as fruit is used as a treatment for cancer We observe measurements of significant decrease in the level of breast cancer cells at ≥ 0.05

Keywords: Fruits of Capparis spinosa; Ethanol; Aceton and Hexane.

MST013

The Implementation of Sustainability Elements in Games Development

Nadiah Ramlan, Norasikin Fabil, Zawawi Ismail, Roesnita Ismail

Faculty of Science and Technology, Islamic Science University of Malaysia (USIM)

Faculty of Education, University of Malaya (UM)

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Abstract

Right now, the design and development of a game with the implementation of sustainability has become one of the fundamental importance elements. The aim of this is to create a sustainable game. Many studies had claimed that game-based learning (GBL) were successful develop and be as a platform in increasing students` motivation, their cognitive skill, and social learning. Nevertheless, there is a lack of evidence in the research which illustrate the value of applying the sustainability elements in game development. Sustainability is viewed as the ability to exist constantly, but it is more than that involving green technology and environment. Thus, this paper reviewed the related works and discussed to understand the important of sustainability elements in designing quality games. Literatures are based on the focus area of sustainability study on games development which are manufacturing, building, game development, and education. During the first phase of the literature review process, the scope and planning of the search term, in which the keywords “sustainability” and “games” were searched in combination with the keywords “sustainable *,” “game-based learning,” “serious games” and “sustainability elements” in the scientific databases Web of *Science*® and *Scopus*®. As a result, the researcher proposes guidelines for the development of game design that include elements of sustainability which are fun, focus, useful interface, motivation, and reward. Finally, this article may contribute in particular to the development of quality games for game designers and educators, in order to overcome some of the main challenges in developing quality games and to better understand the sustainability aspects of game design.

Keywords: Game-based learning, sustainability elements, Islamic games, game development

Parameter Estimation of tank *Panulirus Ornatus*

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Abstract

In the fisheries study, growth models for fish are normally assumed to follow a continuous function. Majority of organisms is based on continuous trajectories, however, it hinders us from modelling discontinuous growth in crustacean species such as lobsters. In this context, a different type of model is required for crustacean growth. Crustaceans must moult in order for them to grow. A moulting process is of periodical shedding of the exoskeleton and thus the crustacean growth is known to be a discontinuous process. A sudden growth of crustaceans through the moulting process makes the growth estimation more complex. In order to model the discontinuous growth, we consider stochastic approaches where the stochastic growth model results in only positive jumps. To this end, we introduce a subordinator that is a special case of a Levy process. A subordinator is a non-decreasing Levy process, that enabling the individual variability and environmental perturbation to be included in modelling growth. A dataset in the laboratory setting (e.g. in an aquarium) is developed. The motivational dataset is from the ornate rock lobster, *Panulirus ornatus*, which can be found between Australia and Papua New Guinea. For tank data, the growth parameter can be estimated through inter-moult periods and moult increment. We derive a joint density function, one for moult increments and another one for time intervals between moults. Both variables moult increments and time intervals between moults are assumed to be independent based on the Markov property. Therefore, the parameter estimation can be implemented separately. Subsequently, we convolute both of the functions through a Monte Carlo approach to get a population mean curve for crustaceans.

Keywords: Subordinator; Crustacean; Moulting; Stochastic growth; Parameter estimation.

MST018

Electrical conductivity, a robust tool for natural rubber latex quality monitoring

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Abstract

Up to now, hevea brasiliensis natural rubber (NR) latex is still an outstanding sustainable raw material, especially with low chemical preservation type. To achieve any satisfied material from natural rubber (NR), several parameters such as KOH (Potassium hydroxide) number, VFA (Volatile fatty acid), proteins and metal contents, *etc.*, in concentrated latex need to be monitored. However, since it is a natural material therefore it could be infected very fast by microorganisms. Different groups of microorganism can grow slow or fast differently. The rapid methods and understanding about the fluctuation of quality are, hence, always important. In this study, the electrical conductivity (EC) has been monitored together with KOH number and VFA content in order to determine the relationship and the impact of these parameters on EC value. Moreover, the mechanical stability testing has also been determined since the increase of volatile fatty acid content can affect the coagulation of latex particle. In this study, the clear evident of the relationship between EC *versus* KOH, VFA and MST values has been found in samples from three latex production factories. The R^2 values of the relationship between EC and MST values were found in the range of 0.4465 - 0.9322.

Keywords: hevea brasiliensis, electrical conductivity, EC, KOH, VFA, MST

Mussel-Inspired Functionalization of Nanomaterials

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Abstract

Poly- or mono-catecholic compounds can effectively bind on the surface of various nanomaterials based on ceramics, metals, and carbons through the mussel-inspired chemistry of catecholic compounds. Through the precise selection and designing of catecholic compounds, either hydrophilic or hydrophobic surface functionalization of nanomaterials can be attempted, resulting in effective dispersion of nanomaterials in specific solvents. Also, hybridization of two different nanomaterials is easily enabled through the exploitation of polycatecholic compounds, resulting in multifunctional hybrid nanomaterials.

Keywords: Mussel-inspired chemistry, catechol, surface functionalization, hybrid nanomaterials.

σ - π interaction between graphene and aliphatic polymers

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Abstract

Preparation of highly dispersible graphene is a key issue for the practical application of graphene-based nanomaterials through various wet processes such as spray coating, ink-jet printing, and spin coating. Noncovalent surface functionalization of chemically reduced graphene oxide (rGO) through σ - π interaction is a unique surface functionalization method for the preparation of water-dispersible quasi-graphene nanomaterials. Exploitation of the σ - π interaction between aliphatic polymers and rGO elucidates that most high molecular weight and water-soluble polymers spontaneously bind on the surface of rGO plate.

Keywords: Graphene, σ - π interaction, graphene oxide, chemically reduced graphene oxide

Process Development And Characterization Towards Microstructural Realization Using Laser Micromachining For MEMS

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Abstract

This paper presents the Process Development and characterization towards microstructural realization using Laser Micromachining for MEMS. Laser micromachining technique is environmental friendly, fast patterning and able to avoid multi steps in conventional lithography based microfabrication techniques. Process starts with cleaning the wafer surface from any contaminations or particles that might disturb the result of the study by using Buffered Oxide Etchant (BOE). This research focus on understanding the dimensional properties of materials of the laser beam on the silicon wafers where microstructures were fabricated. Four main parameters like Rectangular Variable Aperture (RVA-XY) size, number of pulse, stage/table feed rate and laser energy play important role in laser ablation process. The pattern of the microchannel or line with 1cm length was drawn by AutoCAD software or any CAD software. The pattern in the CAD software is then transferred onto the silicon wafer by using laser micromachining. Finally, High Power Microscope (HPM) and Stylus Profiler will be used as measurement tools to observe and analyse the width and depth of the microchannel structures fabricated by laser micromachining. When using bigger size of Rectangular Variable Aperture [RVA], it will lead to bigger microchannel width. There is not much effect or almost comparable in term of microchannel depth if varying all parameters' value. Surface roughness test also need to be considered before choosing the best setting for the laser ablation.

Keywords: laser, micromachining, parameter, microstructure.

Fabrication Of Arrayed Rectangular Microcantilever By Laser Micromachine

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Abstract

This project presents the design of arrayed rectangular silicon microcantilever using laser micromachine. A cantilever, which is a beam fixed firmly at only one end and left freely at other end is the most simplified MEMS based device. Microcantilevers have been typically applied for chemical, biological and physical sensing. RapidX-250 series of 248 nm KrF excimer laser micromachine is used to fabricate the arrayed rectangular microcantilever structures. Laser micromachining processes propose distinctive capabilities in terms of materials flexibility, three dimensional devices processing, cost-efficient and less environmental impact than many existing technologies. By using a focused laser for direct patterns writing, the needs for photomasks can be avoided. There are four main laser parameters should be set up first before doing laser micromachining. The parameters are laser energy, number of pulse, laser frequency and size of Rectangular Variable Aperture (RVA) in X and Y direction. Prior to the fabrication, wet etching process using KOH solution are carried out on silicon wafer. Etching process is necessary to thin the silicon wafer for the laser micromachine purpose. Based on the fabricated microcantilevers, dimension of length and width are little bit shorter than the designed one around 0.68 μ m to 8.22 μ m shorter. Microcantilever should also have good surface roughness.

Keywords: laser, micromachining, microstructure, parameter.

MnO₂ Nanoflowers from Spent Batteries to Supercapacitors Application: Waste to Wealth

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Abstract:

The electrochemical performance of MnO₂ nanoflowers recovered from spent Zn-C battery was studied by cyclic voltammetry, galvanostatic charge-discharge, and impedance spectroscopy. For comparison, MnO₂ has been prepared by electrodeposition (galvanostatic and potentiostatic) of KMnO₄. In an effort to utilize recovered MnO₂ nanoflowers as energy storage supercapacitor, it is crucial to understand their structure and electrochemical performance. MnO₂ deposited by galvanostatic condition showed smaller particle size, less compact layered structure, wider band gap and higher specific capacitance in comparison to potentiostatic deposition. Charge-discharge results showed that the MnO₂ possess good capacitive behavior (207, 195 and 188 F g⁻¹, respectively at 0.5 A g⁻¹, for galvanostatic and recycled and potentiostatic MnO₂, respectively) with stable cycling up to 900 charge-discharge cycles. In addition, impedance analysis suggests that the MnO₂ could be a potential candidate for a fast charge-discharge supercapacitor with low charge transfer resistance and low time constant. The prepared MnO₂ materials have been widely used in supercapacitor application and our findings show that MnO₂ recovered from batteries and obtained by galvanostatic are more suitable to be applied as supercapacitor electrode, due to the higher specific capacitance, lower resistance, and higher electroactive surface area.

Keywords: Nanoflowers, Battery Recycling, electrodeposition, Supercapacitance, Cyclic Voltammetry

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We hope all of you enjoy ICoFMST 2019 and find productive to learn, exchange ideas, establish new contacts. We wish you also a pleasant stay in Langkawi Island during this festive season.

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Thank you so much to you and we wish to see you again in our upcoming conference on year 2020!