PROGRAM BOOK

01-03 SEPTEMBER 2021

Langkawi Island, Malaysia

MICNC

MALAYSIA INTERNATIONAL CONFERENCE ON NANOTECHNOLOGY AND CATALYSIS

1st MALAYSIA INTERNATIONAL CONFERENCE ON NANOTECHNOLOGY AND CATALYSIS

A NEW DAWN OF INNOVATION AND TECHNOLOGY

Organized By

UNIVERSITI MALAYA

NANOCAT NANOTECHNOLOGY AND CATALYSIS RESEARCH CENTRE

Supported By

ICTP The Abdus Salam International Centre for Theoretical Physics

IAEA

1st MALAYSIA INTERNATIONAL CONFERENCE ON NANOTECHNOLOGY AND CATALYSIS

A NEW DAWN OF INNOVATION AND TECHNOLOGY

CONTENTS

WELCOME MESSAGE

Will be officiated by

Yang Teramat Mulia
Dato' Seri DiRaja Tan Sri Tunku Puteri Intan Safinaz binti Almarhum Sultan Abdul Halim Mu'adzam Shah,
DKH., DKYR., SHMS., SSDK., PSM., PAT., JP.Hon.PhD.(UUM), Hon.PhD. (KUIN),Hon.PhD. (UPNM).
Tunku Temenggong Kedah

السلام عليكم ورحمة الله وبركاته

In the Name of ALLAH, the Most Beneficent, the Most Merciful.

It is my great pleasure to congratulate the Nanotechnology & Catalysis Research Centre, Universiti Malaya for the organization of the 1st Malaysia International Conference on Nanotechnology & Catalysis 2021 (MICNC2021).

I always have strong faith that research has a great virtue in development of the morals and intellectual excellences among educational communities with the conjunction of the technology and innovation advancement. In parallel with this, MICNC 2021 will serve as a great platform to bridging the researchers, serve as the knowledge sharing medium and hopefully will sparks new international collaborations.

In this opportunity, I also would like to give my appreciation to Prof. Dr. Mohd Rafie Johan and the organizing committee for the kind invitation to send a warm message to all speakers, presenters and participants of MICNC2021.

Hope you all can leverage as much as you can from this conference.

Best wishes.

WELCOME MESSAGE

Ambassador of Italy in Kuala Lumpur

His Excellency Cristiano Maggipinto

Ambassador of Italy in Kuala Lumpur

"A NEW DAWN OF INNOVATION & TECHNOLOGY"

-MICNC 2021-

Greetings,

It is an honour and with great pleasure that I welcome you to the 1st Malaysia International Conference on Nanotechnology & Catalysis 2021 (MICNC2021).

I strongly believed that this conference will be a good opportunity for scientists, researchers and students with passion and interest in nanotechnology and catalysis to present and discuss their research findings on a range of topics and learn from the best practices from other colleagues across the world. I hope that this program will be continue as an annual or biannual program organised by Nanocat Research Centre.

I would also like to express my sincerest appreciation to Prof. Dr. Mohd Rafie Johan, the Director of Nanotechnology & Catalysis Research Centre, Universiti Malaya and the organizing committee members for the kind invitation to welcome you to the MICNC 2021.

We look forward to welcoming you in this conference to meet and exchange ideas and network. And, please also take time to experience Malaysia while you are here.

Wishing you a successful 3 days conference.

Best wishes.

WELCOME MESSAGE

Deputy Vice-Chancellor (Research & Innovation), Universiti Malaya

Professor Noorsaadah Abd. Rahman

Deputy Vice-Chancellor
(Research & Innovation), Universiti Malaya

"LIVE-STREAMED AND INTERACTIVE EVENT"

-MICNC 2021-

السلام عليكم ورحمة الله وبركاته

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I would also like to express my sincerest appreciation to Prof. Dr. Mohd Rafie Johan, the Director of Nanotechnology & Catalysis Research Centre, Universiti Malaya and the organizing committee members for the kind invitation to welcome you to the MICNC 2021.

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Best wishes.

FOREWORDS

Chairman of MICNC 2021 -cum– Director of NANOCAT Research Centre, Universiti Malaya

Prof. Dr. Mohd Rafie Bin Johan

Chairman 1st Malaysia International Conference on Nanotechnology and Catalysis

"MICNC 2021 WILL BE A GREAT PLATFORM FOR RESEARCHERS, ACADEMICS, STUDENTS AS WELL AS PRACTITIONERS FROM INDUSTRIES TO ENGAGE IN KNOWLEDGE AND TECHNOLOGY SHARING"

-MICNC 2021-

السلام عليكم ورحمة الله وبركاته

Warmest greetings,

Nanotechnology & Catalysis Research Centre, Universiti Malaya was honoured to organize the 1st Malaysia International Conference on Nanotechnology & Catalysis (MICNC 2021) for the very first time. This conference was initially planned to be held at Langkawi Island, Kedah Darul Aman, Malaysia, However, due to this unprecedented COVID-19 outbreak, we acceded that it has to be run in fully virtual. Nevertheless, the organizing committees are very optimist and delighted to make this conference successful. Our aim is to serve a great platform for researchers, academics, students as well as practitioners from industries to engage in knowledge and technology sharing in nanotechnology and catalysis related field at our very level best.

We are pleased to acknowledge the official sponsorship of the conference by The Abdus Salam, International Centre for Theoretical Physics (ICTP) and the financial and technical support by Universiti Malaya in general towards the success of this conference.

It is our great pleasure and honour to welcome all speakers, presenters and participants to 1st Malaysia International Conference on Nanotechnology & Catalysis, I hope we all can leverage as much as we can from this conference. Thank you very much for your support.

Wishing all the best to all.

WELCOME MESSAGE

Director of 1st Malaysia International Conference on Nanotechnology and Catalysis 2021

Dr. Nor Aliya Binti Hamizi

Director 1st Malaysia International Conference on Nanotechnology and Catalysis

"MICNC 2021 ENCOURAGES PARTICIPANTS TO ECHANGE EXPERIENCES AND CHALLENGES INDEPENDENTLY. BESIDES, IT PROMOTES FUTURE COLLABORATIONS AND KNOWLEDGE TRANSFER BETWEEN PARTICIPANTS"

-MICNC 2021-

السلام عليكم ورحمة الله وبركاته

Warmest greetings,

On behalf of MICNC 2021 organizing committees, it is my great pleasure to welcome all the speakers, presenter and participants to the 1st Malaysia International Conference on Nanotechnology & Catalysis (MICNC 2021). We hope you can leverage as much as you can from this conference with plenty of beneficial take away. Thank you all of your supports.

I would like take this opportunity to express my highest appreciation to each of the conference committee members for your kind cooperation, dedication and commitment.

In extent, I would like to send my appreciation to Universiti Malaya for the continuous support in overall. Resonated from MICNC 2021 Chairman, we also would like to thanks the The Abdus Salam, International Centre for Theoretical Physics (ICTP) for being the official sponsorship for this conference.

I hope we will have a fruitful conferencing experience. I pray for all the great thing ahead for all of us.

Thank you with best wishes.

MICNC 2021 ORGANIZATION

Organizing Committee

Chairman	Prof. Dr. Mohd Rafie Johan
Director	Dr. Nor Aliya Hamizi
Finance	Dr. Yasmin Abdul Wahab
Sponsorship & Exhibition	Dr. M. A. Motalib Hossain
Local & Regional Relation	Dr. Marlinda Ab Rahman
Conference Proceeding/Journal	Assc. Prof. Dr. Suresh Sagadevan
Head of evaluator (Oral presentation):	Ts. Dr. Asmalina Mohamed Saat
Head of evaluator (Poster presentation):	Dr. Siti Mariah Mohd Yasin
Participant	Dr. Yusliza Yusof
Speakers	Assc. Prof. Dr. Norazilawati Muhamad Sarih
	Dr. Zaira Zaman Chowdhury
Publicity	Mrs. Nur Azimah Abd Samad
Secretariat	Dr. Mohd Hafiz bin Ahmad
	Dr. Nurul Aida binti Mohamed
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	Mrs. Nurul Fatimah bt Abdul Basir
	Mr. Abu Hashem
	Ms. Afrin Jahan
	Mrs. Noorsaiyyidah binti Darma Singho

MICNC 2021 ORGANIZATION

International Advisory Committee

1. Distinguished Professor Dr Suresh Bhargava (RMIT University, Australia)
2. Distinguished Professor Dr Panchanan Pramanik (GLA University, Mathura, India)
3. Professor Dr Wataru Ueda (Kanagawa University, Japan)
4. Professor Dr Nabeel E. Arif (Tikrit University, Iraq)
5. Professor Dr M. Bououdina (University of Bahrain, Bahrain)
6. Professor Dr Luciano Feo (University of Salerno, Italy)
7. Professor Dr Adawiya H. Jumaa (University of Technology, Iraq)
8. Professor Dr Ali Zaoui (University of Lille 1, France)
9. Professor Dr Huseyin Ekinci (Erzincan University, Turkey)

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1. Distinguished Professor Dr David A. Bradley (Sunway University, Malaysia)
2. Professor Dr Arnold C. Alguno (MSU-Iligan Institute of Technology, Philippines)
3. Datin Professor Dr Saadah Abdul Rahman (University of Malaya, Malaysia)
4. Professor Dr Dao Hua Zhang (Nanyang Technological University, Singapore)
5. Professor Dr Aye Aye Thant (University of Yangon, Myanmar)
6. Associate Professor Dr Yuny Erwanto (Universitas Gdjah Mada, Indonesia)
7. Associate Professor Dr Ho Thi Thanh Van (HCMC University of Natural, Vietnam)
8. Dr Hideki Nakajima (Synchrotron Light Research Institute, Thailand)
9. Dr Irwan Nurdin (Lhokseumawe State Polytechnic, Indonesia)
10. Dr M. V. Reddy (National University of Singapore, Singapore)
11. Dr Shijie Wang (IMRE, Singapore)
12. Dr Lim Yu Dian (Nanyang Technological University, Singapore)
13. Dr Mohammad Mansoob Khan (Universiti Brunei Darussalam, Brunei Darussalam)
14. Dr Sorya Proum (Royal University of Phnom Penh, Kingdom of Cambodia)

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1. Professor Dr Wan Jefrey Basirun (University of Malaya, Malaysia)
2. Professor Dr Abdul Rohman (Gadjah Mada University, Indonesia)
3. Professor Dr Sivakumar Manickam (University of Nottingham, Malaysia)
4. Professor Dr I. Istadi (Diponegoro University, Indonesia)
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7. Ir Dr Lai Chin Wei (University of Malaya, Malaysia)
8. Dr Ho Kah Chun (Universiti Kebangsaan Malaysia, Malaysia)
9. Dr Chee Chin Fei (University of Malaya, Malaysia)
10. Dr Lee Hwei Voon (University of Malaya, Malaysia)
11. Dr Nurhidayatullaili Muhd Julkapli (University of Malaya, Malaysia)
12. Dr Wageeh Abdulhadi Yehya Dabdawb (University of Malaya, Malaysia)
13. Dr Zaira Zaman Chowdhury (University of Malaya, Malaysia)

PLENARY AND KEYNOTE SPEAKERS

Plenary Speakers

Professor Dr Jackie Y. Ying
A*STAR Senior Fellow and
Director of NanoBio Lab

Jackie Y. Ying received her Ph.D. from Princeton University. She was Professor of Chemical Engineering at MIT (1992-2005), and Founding Executive DireActor of Institute of Bioengineering and Nanotechnology (2003-2018). She is currently A*STAR Senior Fellow and Director of NanoBio Lab, Institute of Materials Research and Engineering.

For her research on nanostructured materials and bioengineering, Prof. Ying has been recognized with the American Ceramic Society Ross C. Purdy Award, David and Lucile Packard Fellowship, Office of Naval Research Young Investigator Award, National Science Foundation Young Investigator Award, Camille Dreyfus Teacher-Scholar Award, American Chemical Society Faculty Fellowship Award in Solid-State Chemistry, Technology Review's Inaugural TR100 Young Innovator Award, American Institute of Chemical Engineers (AIChE) Allan P. Colburn Award, International Union of Biochemistry and Molecular Biology Jubilee Medal, Academy of Sciences of Iran Medal of Honor, Islamic World Academy of Sciences-COMSTECH Ibrahim Memorial Award, Clarivate Analytics Highly Cited Researcher, Turkish Academy of Sciences (TÜBA) Academy Prize in Science and Engineering Sciences, and *Journal of Drug Targeting*'s Lifetime Achievement Award.

Prof. Ying is an elected Member of the German National Academy of Sciences - Leopoldina, TÜBA, and U.S. National Academy of Engineering. She is a Fellow of Materials Research Society, Royal Society of Chemistry, American Institute for Medical and Biological Engineering, American Association for the Advancement of Science, Singapore National Academy of Science, Islamic World Academy of Sciences, and U.S. National Academy of Inventors. Prof. Ying was elected a World Economic Forum Young Global Leader. S

he was named one of the "One Hundred Engineers of the Modern Era" by AIChE in its Centennial Celebration. She was an Inaugural Inductee for the Singapore Women's Hall of Fame. She was the inaugural winner of the Mustafa Prize "Top Scientific Achievement Award" in 2015 for her research in bio-nanotechnology. She was the Founding Editor-in-Chief of *Nano Today*.

PLENARY AND KEYNOTE SPEAKERS

Plenary Speakers

Professor Dr Amanda Barnard
Australia's Computational Scientists
Australian National University

Professor Dr Amanda Barnard is one of Australia's most highly awarded computational scientists. She currently leads research at the interface of computational modeling, high performance supercomputing, and applied machine learning and artificial intelligence (AI). She was awarded her BSc (Hons) in applied physics in 2000, and her PhD in theoretical condensed matter physics in 2003 from RMIT University. After graduating she accepted a Distinguished Postdoctoral Fellow in the Center for Nanoscale Materials at Argonne National Laboratory (USA), and the prestigious senior research position as Violette & Samuel Glasstone Fellow at the University of Oxford (UK) with an Extraordinary Research Fellowship at The Queen's College. Prior to joining ANU she was an ARC QEII Fellow, Office of the Chief Executive Science Leader, and then Chief Research Scientist in Data61 at CSIRO, between 2009 and 2020. With more than 20 years experience in high performance computing and computational modeling, Prof Barnard is an advocate and champion for computational research in Australia and sits on boards for various institutions, including the Scientific Advisory Board for the Centre for Biomedical Data Visualisation (BioViS) at the Garvan Institute, the External Advisory Board for the Centre for Theoretical and Computational Molecular Science (CTCMS) at the Australian Institute for Bioengineering and Nanotechnology (AIBN) at the University of Queensland, the Advisory Board of the Our Health in Our Hands (OHIOH) Grand Challenge at ANU, and the external Advisory Board of ChoiceFlows Inc. Prof Barnard is a member of the Board of Directors for New Zealand eScience Infrastructure (NeSI), the Expert Panel for the CRP scheme of the National Research Foundation of Singapore, the Panel of Expert Advisors (Physical Sciences) for The Nature Index (NPG), the International Executive Board of Nano Futures (IOP), the Senior Advisory Board for the Journal of Physics: Materials (IOP) and the Editorial Advisory Board of Nanoscale (RSC). She was formerly a Senior Associate Editor for Science Advances (AAAS) from 2014-2017, and the Chair of the Australian National Computational Merit Allocation Scheme (NCMAS) from 2018-2019, having served as Deputy Chair from 2016-2017, and as a committee member since 2012. Prof Barnard is currently the Chair of the Australasian Leadership Computing Grants (ALCG) scheme at the National Computational Infrastructure (NCI), a member of the Programme Committee for Pawsey Supercomputing Centre PaCER Scheme, and a member of the ANU Academic Board. She has been recognised for leadership, including as a 2017 Woman of Achievement from the Black & White Foundation, as a Finalist for the 2015 Daily Life Women of the Year, and was named as one of the Top 10 Business Women in Australia by the Huffington Post in 2015. Her research has been awarded in five scientific disciplines, including the 2009 Young Scientist Prize in Computational Physics from the International Union of Pure and Applied Physics, the 2009 Mercedes Benz Environmental Research Award, the 2009 Malcolm McIntosh Award from the Prime Minister of Australia for the Physical Scientist of the Year, the 2010 Frederick White Prize from the Australian Academy of Sciences, the 2010 Distinguished Lecturer Award from the IEEE South Australia, the 2010 Eureka Prize for Scientific Research, the 2014 ACS Nano Lectureship (Asia/Pacific) from the American Chemical Society, the 2014 Feynman Prize in Nanotechnology (Theory) from the Foresight Institute, and the 2019 AMMA Medal from the Association of Molecular Modellers of

PLENARY AND KEYNOTE SPEAKERS

Plenary Speakers

Distinguished Professor Dr Suresh Bhargava
Director of the Centre for Advanced Materials and Industrial Chemistry (CAMIC)
RMIT University, Melbourne, Australia

Distinguished Professor Suresh Bhargava is a world-renowned interdisciplinary scientist who has achieved excellence in five disciplines and is recognized for delivering research excellence that underpins significant industrial applications. He has published more than 450 journal articles and more than 200 industrial reports. His research has been cited more than 12,000 times amounting to over 5 citations per day with a h-index of 53 and i10-index of 273.

Out of his seven patents, five have gone to industries or licensed to commercialisation. He has been quoted as being among the top 1% scientists in the resource sector and as the number one in mercury sensing research (Air pollution control). As a passionate supporter of technological science and engineering for innovation, he provides consultancy and advisory services to many government and industrial bodies around the world, including BHP Billiton, Alcoa World Alumina, Rio Tinto and Mobil Exxon. Professor Bhargava has also been on the Board of Directors of one of the Aditya Birla Group of industries for over seven years.

Keynote Speakers

Professor Ir. Dr. Norhayati Soin
Director
Center of Printable Electronics
Universiti of Malaya

Prof. Ir. Dr. Norhayati Soin received the B.Eng. (Hons.) in Electrical and Electronic Engineering from Liverpool Polytechnic, U.K, in 1991 and M.Sc. degree in Microelectronic and Information systems from Liverpool John Moores University, Liverpool, U.K., in 1998. She received Ph.D. degree in Electrical and Electronic Systems (MEMS Technology) from the National University of Malaysia, Malaysia, in 2006. She is currently a Professor with the University of Malaya, Kuala Lumpur, Malaysia. Her current research focuses on reliability of semiconductor devices/ integrated circuit and MEMS sensor. Norhayati Soin leads the VLSI reliability Research Group and Center of Printable Electronics at University Malaya. She has extensive international collaborative networks and has served as an invited researcher for Liverpool John Moores University, United Kingdom. She has been awarded IEEE Senior Member and currently is the Chair of IEEE Electron Device Society Malaysia Chapter. She was the Chairman for IEEE International Conference in Semiconductor Electronics 2020. She served astechnical committee member for International Symposium on the Physical and Failure Analysis of Integrated Circuits (IPFA)and Electron Devices Technology and Manufacturing Conference (EDTM) technical committee member from 2016. Her work has been published both locally and internationally in more than 150 papers in journals and proceedings locally and internationally.

PLENARY AND KEYNOTE SPEAKERS

Keynote Speakers

Distinguished Professor Dr Panchanan Pramanik
GLA University, Mathura, India

Distinguished Professor Panchanan Pramanik, Indian chemist, educator and an expert in nanoscience and nanotechnology. Achievements include development of of many chemical methods for making nano-structured materials. Recipient medal, Indian Institute of Technology, 1969. Member of Indian Science Congress, Chemical Research Society India (medal 2003), Materials Research Society India (medal 1993). Graduate of Science, Scottich Church College, Kolkata, 1966. Master of Science, Indian Institute of Technology, Kharagpur, 1969. Doctor of Philosophy in Chemistry, Indian Institute of Technology, 1976. His carrier starts as junior research assistant Indian Institute of Technology, Kharagpur (1970-1976), senior research assistant (1976-1977), lecturer chemistry (1977-1984), assistant professor chemistry (1984-1990), associate professor chemistry (1990-1993) and professor chemistry, since 1993.

Distinguished Professor Dr Lakshmi Kantam Mannepalli
Indian Scientist & Director of CSIR-IICT

Prof. Lakshmi Kantam (PhD, 1982, Kurukshetra University, India) is Dr.B.P. Godrej Distinguished Professor at Institute of Chemical Technology, Mumbai, India. Earlier, she served as Director at CSIR-IICT, Hyderabad. She is an Adjunct Professor at Tezpur Central University, Tezpur, Assam and RMIT University, Melbourne, Australia. She is a fellow of Indian National Science Academy , National Academy of Sciences, India ; J.C. Bose Fellow(SERB-DST) ; Fellow of The world Academy of Sciences, Italy and Royal Society of Chemistry, UK. Her prizes include Goyal Award-Applied Sciences, Kurukshetra University, Kurukshetra; Indian Chemical Council(ICC) - D.M.Trivedi Life time Achievement Award; Eminent Scientist Award – Catalysis Society of India and Vasvik award. She is a Member of scientific councils, DST, DRDO, GAIL, IIT-Hyderabad, CSIR, DAE. She is Non-Executive Independent Director, Godavari Biorefineries Ltd, Vinati Organics Ltd and Indo-Amines Ltd. She has 37 years of experience in the research, design and development of catalysts for innovative green and economical processes for chemical industry. She has authored more than 347 publications, 52 patents and five book chapters.

Professor Dr Abdul Rohman
Universitas Gadjah Mada, Yogyakarta, Indonesia

Professor Dr Abdul Rohman completed his S-1, Pharmacist and S-2 programs at the UGM Faculty of Pharmacy in 2002,

his doctorate was completed at the Halal Product Research Institute, Universiti Putra Malaysia, Malaysia in the field of Halal Food Analysis in 2011. The focus of his research is analysis of product halalness and authentication of food products and pharmaceutical products. Some of his studies have been published in Scopus indexed journals, to date as many as 134 articles, with the h-index in Scopus = 21. In the SINTA (Science and Technology index) system, Abdul Rohman is ranked 6th nationally. Currently, Abdul Rohman is listed as an Associate Editor at the Indonesian Journal of Pharmacy (Scopus indexed journal) and a reviewer in several Thompson and Scopus indexed journals. Some of the awards received were the Young Scientist Scopus award 2014 and the recipient of the Extraordinary Intellectual Property Award in the Field of International Publication from the Ministry of Research, Technology and Higher Education in 2014.

Professor Dr Volker Hessel
University of Adelaide, Australia

Professor Dr Volker Hessel studied chemistry at Mainz University (PhD in organic chemistry, 1993). In 1994 he entered the Institut für Mikrotechnik Mainz GmbH. In 2002, Prof. Hessel was appointed Vice Director R&D at IMM and in 2007 as Director R&D. In 2005 and 2011, Prof. Hessel was appointed as part-time and full professor at Eindhoven University of Technology, the Netherlands, respectively. In 2018, he was appointed at the University of Adelaide, Australia, as Deputy Dean (Research) at ECMS Faculty and Prof. Pharmaceutical Engineering. He was honorary professor at TU Darmstadt, Germany 2009-2018, and is guest professor at Kunming University of Science and Technology, China (2011-). Prof. Hessel is (co-)author of > 460 peer-reviewed (h index 57). He received the AIChE Award "Excellence in Process Development Research" in 2007, the ERC Advanced Grant "Novel Process Windows" in 2010, the ERC Proof of Concept Grant in 2017, the IUPAC ThalesNano Prize in Flow Chemistry in 2016, and the FET OPEN Grant in 2016. From 2014-2016, Prof. Hessel was authority in the 35-man teamed Enquete Commission "Future of the Chemical Industry" in Germany's State Parliament in Nordrhine-Westfalia.

Professor Dr Gabriele Centi
University of Messina, Italy

Professor Dr Gabriele Centi is Full Professor of Industrial Chemistry at the University of Messina, Italy, and President of the European Research Institute of Catalysis (ERIC). Research interests concern the areas of applied heterogeneous catalysis, sustainable energy

and chemical processes, biomass conversion and environmental protection. He was coordinator of the European network of excellence IDECAT, and is currently president of IACS (International Association of Catalysis Societies), in the past also president of EFCATS (European Federation of Catalysis Societies). He has been coordinator or PI in over twenty EU projects (including the Network of Excellence on catalysis IDECAT), as well as many other national and industrial projects. He recently initiated and coordinated an ERC Synergy project on plasma catalysis. He is also a member of the board of SUNERGY, the European initiative on solar fuels. He has received several awards, including the International Fellowship Initiative of the President of the Chinese Academy of Science, PIFI, as a Distinguished Scientist, and the Humboldt Research Award, and is involved in various publishing activities. He chaired the editorial board of ChemSusChem until 2019 and is co-editor in chief of the Journal of Energy Chemistry (both elevated to high IF journals) and the Studies in Surface Science and Catalysis series of books, one of the oldest and best known in catalysis. He has been president of numerous international conferences, including Europacat 2017 in Florence and the 16th International Conference on Zeolite together with the 7th International Symposium on Mesostructured Materials (Sorrento, Italy, 2010). He is the author of nearly 500 scientific publications, 12 books and editor of over 20 special issues of journals. The current h-index is 86 with around 29,000 citations and over 350 articles with more than 10 citations (Google Scholar, March 2021).

Professor Dr Karen Wilson
Royal Melbourne Institute of Technology (RMIT)

Professor Dr Karen Wilson is Professor of Catalysis at the Royal Melbourne Institute of Technology (RMIT), having recently left her role as Research Director and Professor of Catalysis at the European Bioenergy Research Institute (EBRI) at Aston University. In her previous position at Cardiff University in 2011, she was awarded an Industry Fellowship to work with Johnson Matthey on the development of catalysts for biofuel synthesis.

Professor Dr Saifollah Abdullah
Universiti Teknologi MARA, Malaysia

Professor Dr Saifollah Abdullah, Malaysian physics professor that has been listed as a noteworthy physics professor by Marquis Who's Who. He obtained his Bachelor of Science in Physics (honorary), University Malaya in 1986 and Doctor of Philosophy in Physics and Nanostructured Materials, University Malaya in 2004. Prof. Dr. Saifollah bin Abdullah is currently the Director of Centre of Foundation Studies in Universiti Teknologi MARA (UiTM) . His area of Expertise are nanostructured materials, quantum dots (QDs), nano-oxide materials, herbal nano-powder/ particles.

PLENARY AND KEYNOTE SPEAKERS

Keynote Speakers

Assocate Professor Dr Ruslinda A. Rahim
Director at National Nanotechnology Centre &
Institute of Nano Electronic Engineering,
Universiti Malaysia
Perlis, Malaysia

Associate Professor Dr Ruslinda A. Rahim obtained her PhD in Nanoscience and Nanoengineering from Waseda University, Japan in 2012, Currently, Director at National Nanotechnology Centre under Ministry of Science, Technology and Innovation (MOSTI) and Associate Professor at Institute of Nano Electronic Engineering, UniMAP. Her research interests include Aptamer, Electrochemical, Nanoelectronics, Nanocarbons and Nanobiosensors.

Professor Dr Azhar Ariffin
Universiti Malaya, Malaysia

Professor Dr. Azhar Ariffin obtained his PhD from University of Nottingham in Asymmetry Organic Synthesis. After graduation in 1999, he returned to Malaysia and joined Chemistry Department, Universiti Malaya working as young lecturer. In 2003 he was promoted to Associate Professor, then to full Professor in 2016. His research interest mainly focus on Organic Synthesis. Currently he have two research projects. One is on the synthesis of Quinazoline derivatives as anti cancer agents and the other one is on the synthesis of carbazole derivatives for application in OLED.

Professor Dr Wan Jeffrey Basirun
Universiti Malaya, Malaysia

Professor Dr Wan Jeffrey Basirun graduated with a BSc degree in Chemistry from the University of Malaya in 1991. He then furthered his studies to the University of Southampton and was conferred a PhD in Electrochemistry in 1997. He started his career as a senior lecturer in the Department of Chemistry University of Malaya in the same year, was promoted to Associate Professor in 2003 and Professor in 2011. He is currently supervising more than 10 PhD students and has supervised/co-supervised 12 PhD students to completion. His research areas are Electrochemistry, Material Science and Nanotechnology, has published more than 130 research papers. He has managed to establish research collaboration with several groups in South Korea, Australia and Iran.

TENTATIVE OF PROGRAMME MICNC 2021

1 SEPTEMBER 2021 (WEDNESDAY)

8:00	Registration

Opening Ceremony	
08:00-08:45	Arrival of participants and guest
08:45-09:00	Arrival of VVIPs
09:00-09:15	Malaysia National Anthem "Negaraku" and Universiti Malaya songs Doa Recitation
09:15-09:30	Welcoming Remarks **Prof. Dr. Mohd Rafie Johan** Chairman of MICNC 2021
09:30-09:45	Conference Remarks **Prof. Dr. Noorsaadah binti Abd Rahman** Universiti Malaya Deputy Vice Chancellor (Research & Innovation)
09:45-10:00	Message from ICTP representative **His Excellency Cristiano Maggipinto** Ambassador of Italy in Kuala Lumpur
10:00-10.30	Officiate Remarks **Her Highness Dato' Seri DiRaja Tan Sri Tunku Puteri Intan Safinaz binti Almarhum Sultan Abdul Halim Mu'adzam Shah** Tunku Temenggong Kedah
10:30-10:35	MCIJ & MNIJ, Nanocat Journal Officiation Ceremony **Her Highness Dato' Seri DiRaja Tan Sri Tunku Puteri Intan Safinaz binti Almarhum Sultan Abdul Halim Mu'adzam Shah** Tunku Temenggong Kedah
10:35-10:45	Violin Show
10:45-10:50	Photo Session & Token of Appreciations Giving Ceremony to Guests of Honoured Departure of Her Highness Tunku Temenggong Kedah

TENTATIVE OF PROGRAMME MICNC 2021

Plenary Session 1	
10.50-11.50	**Prof. Dr. Jackie Yi-Ru Ying** A*STAR Senior Fellow and Director of NanoBio Lab **Title: Nanomaterials and Nanosystems for Catalytic, Energy and Biomedical Applications**
11.50-11.55	Token of Appreciations Giving Ceremony to Prof. Dr. Jackie Ying MICNC2021 Opening ceremony dismissal
Introduction to State of the Art Instrument	
11:55-12:00	**Hitachi Regulus Cold FESEM HD (HTI)** Hi-Tech Instruments Sdn. Bhd.
Plenary Session 2	
12:10-12:40 MYT 14:10-14:40 AEST	**Distinguished Prof. Dr. Suresh Bhargava** Director of the Centre for Advanced Materials and Industrial Chemistry (CAMIC), RMIT University, Melbourne, Australia **Title: Unlocking Next-Generation Catalysis through Advanced 3D Printing**
Keynote Session 1	
12:40-13:10	**Assoc. Prof. Dr. Ruslinda A. Rahim** Director at National Nanotechnology Centre & Institute of Nano Electronic Engineering, Universiti Malaysia Perlis, Malaysia **Title: Nanosafety: Current and Future Scenario of Nano-based Industry in Malaysia**
13:10-14:00	Lunch Break
Plenary Session 3	
14:00-15:00 MYT 16:00-17:00 AEST	**Prof. Dr. Amanda Barnard** Australia's Computational Scientists, Australian National University **Title: Structure/Property and Property/Structure Relationships of Nanoparticle Catalysts from Machine Learning**
Keynote Session 2	
15:00-15:30 MYT 09:00-09:30 CET	**Prof. Dr. Gabriele Centi** University of Messina, Italy **Title: Electrocatalysis: role and prospects to defossilize chemical and energy production**

TENTATIVE OF PROGRAMME MICNC 2021

Parallel session 1					
Session Cluster	**Nanocrystal, Nanoparticles**	**Biomaterials, Polymers**	**Biomaterials, Polymers**	**Nanoelectronics, Photonics, Optics**	**Advanced (Nano) Materials for Catalysis**
15:40-16:00	**Mr. Muhammad Nur Syafiq bin Mohamad Ismail**	**Mr. Mohamad Hilmi Hisyamuddin bin**	**Mr. Tuerxun Duolikun**	**Dr. Norazriena binti Yusoff**	**Dr. Muhammad Adil Mansoor**
	Fabrication and characterization of single and bimetallic nanoparticles	A fundamental characterization of corn stalk fiber and its absorption ability in liquid mediums	Rubber/Kenaf-based Nanocellulose Reinforced Green-Materials with Their Toxicity	Metal oxide-biopolymer film as saturable absorber for q-switched fiber laser generation at 1.0 μm wavelength region	Fabrication of bimetallic Cr2O3-Mn2O3 thin film for photocatalytic water oxidation
16:10-16.20	**Ms. Mudrikah Sofia binti Mahmud**	**Dr. Siti Aisyah binti Shamsudin**	**Ms. Anusha Wei a/p Asohan**	**Mr. Muhammad Aiman Saufi bin Ahmad Fahri**	**Mdm. Nur Azimah Abd Samad**
	Size reduction via ball milling and acid leaching effect on rice husk ash-derived nano-silica	Gamma irradiation-induced cross-linking of latex/ poly-styrene-block-polyisoprene polymer blend	Preparation and character-isation of cellulose nanocrystal-alginate-polyethylene glycol diacrylate as bioink paste	Nonlinear optical properties of molybdenum disulfide (MoS2)	Progress in Binary ZnO Heterojunction for Polluted Water Restoration
16:20-16:40	**Invited Speaker 1** **Ts. Dr. Asmalina Mohamed Saat**	**Dr. Norsyahidah Mohd Hidzir**	**Invited Speaker 4** 16:20-16:50 **Dr. Nurhidayatullaili**	**Mdm. Rabiatuladawiyah binti Md Akhir**	**Mdm. Nurul Fatimah Basir**
	The effectiveness of nanoparticle and natural antifouling additive: A comparison of seawater immersion	Mechanical Properties of Polymeric Biomaterials: Modified Expanded Polytetrafluoroethylene (ePTFE) using gamma	Light sensitivity modifica-tion of TiO2 photocatalyst by chitosan biopolymer for decomposition of synthetic dyes compounds	A Review on Zinc Oxide Nanorods for Optoelectron-ic Applications: A Perspective on Biosynthesis Approach	Development of New Organosulfur Extreme Pressure Additive (EPAs) for Metalworking Fluid (MWF)

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16:40-17:10	**Invited Speaker 2** **Mr. Taifunisyam Taib**	**Invited Speaker 3** **Dr. Yew Ming Chian**	**Invited Speaker 5** **Prof. Dr. Ir. Zuraida binti Ahmad**	**Invited Speaker 6** **Ir. Dr. Hanim Hussin**	**Invited Speaker 8** **Dr. Ricca Rahman binti Nasaruddin**
	Optical Properties of Silver Silica Nanocomposite Thin Film Synthesized Via Sol-Gel Technique at Various Volume Ratio	Influences of nano bio-filler on the physical, mechanical and fire protection properties of the intumescent coating	Inkjet-Printed Embedment of PEDOT: PSS Doped SNP as Electrodes on Fabrics	Investigation on sensitivity amplification effect of double-gate field effect transistor based pH sensor	Enhancing catalytic properties of ligand - protected gold nanoclusters by silver doping
17:00-17:40	Networking	Networking	Networking	**Invited Speaker 7** **Assoc. Prof. Dr. Ong Boon Hoong** Metal oxides nanostructures based gas sensors	Networking

2 SEPTEMBER 2021 (THURSDAY)

8:00	Registration

Keynote Session 3

09:00-09:30	**Prof. Dr. Saifollah Abdullah** Universiti Teknologi MARA, Malaysia **Title: Recent trend application of nanocoating**
09:30-10:00 07:00-07:30 IST	**Distinguished Prof. Dr. Panchanan Pramanik** GLA University, Mathura, India **Title: Nano-science and nanotechnology – a new era in science and technology**

Introduction to State of the Art Instrument

10:00-10:10	**TOF SIMS How does it work (HTI)** Hi-Tech Instruments Sdn. Bhd.

Parallel session 2					
Session Cluster	**Green Synthesis**	**Photochemistry & Electrochemistry**	**Energy, Oil & Gas; Synthetic Chemistry Techniques**	**Nanocomposite, Hybrid**	**Homogeneous and Heterogeneous Catalysis**
10:10-11:30	**Mrs. Nur'ain Nadia binti Shapril**	**Ms. Aminatul Sobirah binti Zahari**	**Dr. Najiah binti Nadir**	**Ms. Intan Najwa Humaira binti Mohamed Haneef**	**Ms. Lia Zaharani**
	Synthesize of silver nanodendrites with optical and thermal effect via green method	Dielectric properties and piezoelectric constant of electrospun polyvinylidene fluoride (PVDF) with different molecular weight	Surfactant evaluation for enhanced oil recovery: Phase behavior and interfacial tension	Effect of reinforcing halloysite nanotubes on morphological, mechanical and thermal behaviour of 70/30 polylactic lactic acid/ polypropylene carbonate nanocomposite	Synthesis and characterization of a new diprotic Acid Molten salt as an efficient catalyst for the synthesis of triazolo-pyrimidines
10:30-10:50	**Ms. Noor Fadhila Syahida Ghazali**	**Dr. Khuzaimah Arifin**	**Mrs. Hazira binti Ngah**	**Mr. Mohd Azam Mohd Adnan**	**Ms. Rose Fadzilah Abdullah**
	Sensory Characterization of Emollients Synthesized Using Plant-based Feedstocks	Photoelectrochemical hydrogen production of TiO2/CoS composite	Carbohydrate-based Amphoteric Surfactant for Improved Mildness and Consumer Benefits for Body Wash Formulation	Effect of concentration of MnO2 On the formation of MnO2/ZnO thin films and its degradation towards malachite green	Synthesis of Biomass Based Bifunctional Catalysts for Biodiesel Production from Waste Cooking Oil

TENTATIVE OF PROGRAMME MICNC 2021

10:50-11:10	**Dr. Rasha M Sheltami**	**Invited Speaker 10** 10:50-11:20 **Dr. Nurul Aida binti**	**Ms. Syabilah Sazeli**	**Ms. Noorsaiyyidah Binti Darman Singho**	**Prof. Dr. Andanastuti Binti Muchtar**
	An overview on the adsorption of organic dyes onto graphite and graphene	Electrodeposition of BiVO4 with needle-like flower architecture for high performance photoelectro-chemical splitting of water	Synthesis and Antioxidant Study of New Semicarbazide and Thiosemicarbazide Derivatives with Application on Synthetic Lubricant Oil	Recent Advances on Ag/ Fe3O4/Graphene Ternary Nanocomposites	Feasibility of Ni-Cu-Mn spinel as a catalyst for biogas fuelled solid oxide fuel cells: An overview
11:10-11:40	**Invited Speaker 8** **Dr. Ruhaida Rusmin**	**Invited Speaker 11** 11:20-11:50 **Assoc. Prof. Dr. Juan Joon**	**Invited Speaker 12** **Assoc. Prof. Dr. Norazi-lawati Muhamad Sarih**	**Invited Speaker 14** **Dr. Marlinda binti Ab Rahman**	**Invited Speaker 15** **Ir. Ts. Dr. Lai Chin Wei**
	Insight Into structural features of magnetic kaolinite nanocomposite and its potential for methylene blue dye removal from aqueous solution	Highly Active Oxygen Vacancies of Nickel doped SrTiO3 as Cathode for Rechargeable Alkaline Zinc Battery	Synthesis of poly(triazine-co-pyrrole) as a conjugated microporous polymer for carbon capture application	Electrical properties based on low content of graphene filler in natural rubber/ graphene composites	Modified titanium dioxide nanomaterials and its potential photocatalysis related applications
11:40-12:10	Networking	Networking	**Invited Speaker 13** **Prof. Dr. Asad Ali**	Networking	Networking
			Trends in desalination re-search for energy efficient and low-cost water		

Poster Session 1	
12:15-12:25	**Dr. Nur Eliyanti Ali Othman** Title: The Effect of Different Concentration of Sodium Hydroxide On Carboxymethyl Cellulose Properties
12:25-12:35	**Ms. Salwa Jamal M Kamal** Title: Mesomorphic And Optical Studies Of Azo-Ester Materials: Effect Of Lateral Fluoro And Terminal Substituents
12:35-12:45	**Ms. Nurul Hazierah Kamaruddin** Title: Simple dispersion of graphene incorporated rubber composite for resistive pressure sensor application
12:45-12:55	**Mr. Abdul Khaliq bin Mokhtar** Title: Synthesisation Of Polymer-Grafted Gold Nanoparticles Via Gamma Radiation
12:55-13:05	**Dr. Natasya binti Ahmad Nawawi** Title: Rapid sintering of hydroxyapatite synthesized through solid-state reaction method
13:05-13:15	**Ms. Nurul Azri Khalisah Aznan** Title: Effect of graphene and graphene oxide to polyvinylidene flouride (Pvdf) for biomaterials
13:15-13:25	**Dr. Chee Chin Fei** Title: Regioselective C-H Oxygenation of Anthraquinones
13:35-14:00	Lunch Break

TENTATIVE OF PROGRAMME MICNC 2021

Keynote Session 4	
14:00-14:30 MYT 15:30-16:00 CAST	**Prof. Dr. Volker Hessel** University of Adelaide, Australia **Title: Economic and Environmental Assessment of Small-scale Plasma-Assisted Ammonia Production Pathways – 'at-Farm'**
14:30-15:00 MYT 12:00-12:30 IST	**Distinguished Prof. Dr. Lakshmi Kantam Mannepalli** Indian Scientist & Director of CSIR-IICT, India **Title: Development of Efficient Catalysts for Sustainable Chemical Industry**
15:00-15:30	**Prof. Dr. Wan Jeffrey Basirun** Universiti Malaya, Malaysia **Title: Nanocellullose for electrochemical applications**

Parallel session 3					
Session Cluster	**Nanomedicine**	**Nanofabrication & Characterizations**	**Graphene, Fullerenes, CNTs, Cellulose, Fibre**	**Biofuels, Biomass, Biodiesel**	**Chemical Kinetics & Catalytic Activity**
15:40-16:00	**Dr. Rida Tajau**	**Dr. Fadhlina Che Ros**	**Ms. Khairul Zakirah Binti Abu Bakar**	**Mr. Teguh Riyanto**	**Ms. Shamala Gowri Krishnan**
	Targeted breast cancer therapy utilising copolymer nanoparticles derived from palm oil	The Bulk Properties and the Equivalent Circuit of $CaTa_4O_{11}$ and Solid Solutions	A systematic review on the physicochemical and adsorption properties of activated carbon synthesized from different biomass for dye removal application	Palm oil conversion to hydrocarbon-rich biofuels over Co and Mo modified ZSM-5 catalyst	Esterification reaction catalyzed by oil palm EFB supported magnetic catalyst: optimization using response surface methodology

16:00-16:20	**Ms. Nur Fathin Amirah binti Shafie**	**Ms. Atiena Husna binti Abdullah Ripain**	**Ms. Nurshafiqah Jasme**	**Dr. Mimi Hani Binti Abu Bakar**	**Ms. Lama Alafandi**
	Thermo-Responsive Drug Delivery System: The Role Played by 2-Dimethylamino Ethyl Methacrylate (DMAEMA) Concentration	TLM analysis of metal contacts for 2D MoS2 nanoflakes deposited by chemical vapour deposition -free technique	First report of cellulose production by an indigenous yeast, pichia kudriavzevii USM-YBP3 isolated from rotten pineapple: Isolation, characterisation and enhancement	Aryl diazonium anode modification performance in air cathode microbial fuel cell	Green synthesis of silver nanoparticles using coffee extract for catalysis
16:20-16:40	**MS. Ain Athirah binti Rozali**	**Invited Speaker 17** 16:20-16:50 **Dr. Tan Kim Han**	**Dr. Rasha M Sheltami**	**Dr. Mimi Hani binti Abu Bakar**	**Mr. Muhammad Luqman Hakim bin Hashim**
	Conformational Stability of Proteins on the Surface of Ti-6Al-4V, 316L SS and Nitinol Alloys using 2D Correlation Analysis	Investigation of improved optical and conductivity properties of poly(methyl methacrylate)-MXene (PMMA-MXene) nanocomposite thin films for electronic applications	Effect of acid hydrolysis time on Mengkuang cellulose properties	Mitigating membrane biofouling in biofuel cell system – A review	Characterisation of SiO2-NiO foam at low reaction temperatures in steam methane reforming catalyst
16:40-17:10	16:40-17:00 **Assoc. Prof. Dr. Lim Teck Hock**	**Invited Speaker 18** 16:50-17:20 **Dr. Nor Aliya Hamizi**	**Invited Speaker 19** **Dr. Nurul Ezaila Alias**	**Invited Speaker 21** **Dr. Yasmin Abdul Wahab**	**Invited Speaker 21** **Dr. Hwei Voon Lee**
	Biocompatible Silver Sulfide Nanoparticles as Potential Cost-effective Photothermal Therapy Agents for Skin Cancers: Synthesis, Characterization, Cytotoxicity and Photothermal Heating Studies	II-VI quantum dots in LED application: A review	Reliability of Graphene Floating Gate Flash Memory Cell with High-k/Low-k Tunnel Barrier	Optimization of cobalt nanoparticles for biogas enhancement from green algae using response sureface methodology	Efficient deoxygenation of biomass to hydrocarbon-based biochemicals over mesoporous catalyst

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17:10-17:40	**Invited Speaker 21** 17:00-17:20 **Dr. Lina Adnan Fadhel Al-Ani** Green nanomedicine form ulation: Hybrid curcumin - capped gold nanoparticles - reduced graphene oxide as potential anti - oxidant and	Networking	Networking	**Invited Speaker 21** **Dr. Muhammad Nihal Naseer** Statistical modelling and performance optimization of a two-chamber microbial fuel cell by response surface methodology	Networking

3 SEPTEMBER 2021 (FRIDAY)

8:00	Registration

Keynote Session 5	
09:00-09:30	**Prof. Dr. Abdul Rohman** Universitas Gadjah Mada, Yogyakarta, Indonesia **Title: Analysis of porcine gelatin in food and pharmaceutical products for Halal authentication**
09:30-10:00 MYT 11:30-12:00 AEST	**Prof. Dr. Karen Wilson** Royal Melbourne Institute of Technology (RMIT), Australia **Title: Sustainable Catalytic Bio-refining - Challenges and opportunities for catalyst design**
10:00-10:30	**Prof. Dr. Norhayati Soin** Universiti Malaya, Malaysia **Title: Printed Flexible and Stretchable Electronics for wearable health care**

10:30-10:33	**Horiba LabRAM Soleil New Confocal Raman Spectroscopy HR (HTI)** Hi-Tech Instruments Sdn. Bhd.

Parallel session 4					
Session Cluster	**Nano-sensor, Nanosafety**	**Sensing, Separation, Membrane Reactor; Nanofabrication & Characterizations**	**Nanofabrication & Characterizations**	**Biofuels, Biomass, Biodiesel**	**Chemical Reaction Engineering (not pure chemical process)**
10:40-11:00	**Mr. Wong Zheng Wei**	**Prof. Dr. Ong Keat Khim**	**Mr. Muhamad Isyraf bin Aznam**	**Mr. Abdul Rahman bin Abdul Rahim**	**Ms. Nur Irdina Syahirah binti Abdul Ghani**
	A Label-free Optical Nanobiosensor for the Sensitive Detection of miRNA in Breast Cancer	Methylphosphonic Acid Detection using DNA Aptamer -Citrate Capped Gold Nanoparticles	Effect of mixing time of precursor powders on the structural properties of ni-cu-mn spinel produced via glycine nitrate process	Removal of heavy metal by emulsion liquid membrane	Various Synthesis Methods of Sulfonated SnO2 Catalysts for Esterification of PFAD Feedstock into Biodiesel
11:00-11:20	**Ms. Sharifah Sarah Shazwani binti S.Shahrulidzafa**	**Ms. Obaid Asma Omar**	**Dr. Susmita Pramanik**	**Ms. Afrin Jahan**	**Mr. Lim Hong Hua**
	Development and Characterization of Nanostructured Lipid Carrier Loaded Flavonoid-Enriched Zingiber Officinale Extract for Topical Application	Gold nanoparticles with L-cysteine as chiral recognition sensor for ketoprofen enantiomers	Flexible polymeric electrode imbedded with nano-structured sensing material for simultaneous detection of Adenine (AD) Guanine (GU) Thymine (TY) Cytosine(CY) for medical diagnosis	Adsorptive Nanocomposite of 2-D Carbon and Amorphous Carbon Derived from Indigenous Lignocellulosic Residue: Present Status and Future Perspective	Synthesis of Carbide Lime Waste Derived Base Catalyst, KF/CLW-Fe3O4 for Methyl Ester Production: An Optimization Study

TENTATIVE OF PROGRAMME MICNC 2021

11:20-11:40	**Invited Speaker 23** 11:20-11:50 **Dr. Md. Ibrahim Khalil**	**Mr. Abu Hashem**	**Dr. Hoda M. Elnawawy**	**Invited Speaker 27** 11:20-11:50 **Dr. Adeola Akeem Akinpelu**	**Invited Speaker 29** 11:20-11:50 **Dr. Mohd Hafiz Ahmad**
	Dual Platform Based Surface Enhanced Raman Scattering DNA Biosensor – A Sensitive Detection Approach For Species Authentication	The Development of an oligonucleotide-based electrochemical biosensor for the detection of Sus scrofa using graphene-gold nanoparticles modified screen printed carbon electrode	A Systematic Review and Meta Analysis on The Properties of Nano-Calcium Silicate-Based Cements	Adsorptive removal of poly-cyclic aromatic hydrocar-bons from contaminated water by biomass from dead leaves of halodule uninervis: Kinetic and ther-modynamic studies	Synthesis of butylated hydroxytoluene-ligands conjugated with gold nanoparticles: Antioxidant activity and cytotoxic effect against cancer cells
11:40-12:10	**Invited Speaker 24** 11:50-12:20 **Dr. Leo Bey Fen**	**Invited Speaker 25** **Dr. Mohammad Aminul Islam**	**Invited Speaker 26** **Dr. Mohd Shahadan bin Mohd Suan**	**Invited Speaker 28** 11:50-12:20 **Dr. Zaira Zaman Chowdhury**	**Invited Speaker 30** 11:50-12:20 **Assoc. Prof. Dr. Suresh Sagadevan**
	Nanotechnology-based Electrochemical Biosensor for the Rapid and Sensitive Detection of Foodborne Pathogens	Synthesis of Lead Sulfide Nanoparticles by Modified Chemical Precipitation Method for Perovskite Solar Cell Application	Synthesis and characteriza-tions of black phosphorus via ball-milling technique: Effects of the milling materials	Environmental Perspective and Toxicity Profile of Poten-tial Surface Engineered Car-bon and Its Derivatives	Enhanced photocatalytic activity under visible light of g-C3N4@ZnO composites

Technical Talk	
12:15-12:35	**Dr. Abby Soo** Hi-Tech Instruments Sdn. Bhd.

Keynoted Session 6	
12:35-13:05	**Prof. Dr. Azhar Ariffin** Universiti Malaya, Malaysia **Title: Carbazole-Based Dendrimers in Organic Light Emitting Diodes, OLED, Applications**

12:50-14:00	Lunch Break

Parallel session 5					
Session Cluster	**Food, Agriculture, Environment**	**Nanofabrication & Characterizations**	**Catalysis Processes & Applications; Theory & Simulation of Nanosystem**	**Nanocomposite, Hybrid**	**Homogeneous and Heterogeneous Catalysis**
14:00-14:20	**Ms. Mizan Izzati binti Mat Zin**	**Ms. Chiam Sin Ling**	**Mr. Jonathan Ting Yik Chang**	**Assoc. Prof. Dr. Norli binti Abdullah**	**Mrs. Suzaimi Johari**
	Chitin nanopaper from mushroom: Effect of pretreatment process on its mechanical properties	Facile one step synthesis of MnO2 nanostructure using rapid heating method for rhodamine B dye removal	Characterising metallic nanoparticle surfaces using unsupervised machine learning	MWCNT dispersed conducting polymer (MWCNT/P3HT) nanocomposites: structural and morphological studies	Recent Advances in the Base-Catalytic Knoevenagel Condensation

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14:20-14:40	**Dr. Florentinus Dika Octa Riswanto**	**Ms. Nur Farhana binti Shahrul Azhar**	**Mr. Ibrahim Abdulrauf Onimisi**	**Mr. Mohammed Bashir Abdullahi**	**Mr. Muhammad Nur Iman Amir**
	FTIR Spectroscopy Combined with Multivariate Calibration Techniques for Determining Content of Three Isoflavone Aglycones in Soybean Milk	Temperature dependent photoluminescence of core CdSe quantum dots	Thermodynamic study of methane and water adsorption on Ir(111), Pd (111), Pt(111) and Ni(111) surfaces	Experimental investigation of silica nanoparticle on bentonite types for CMC polymer treated water based mud in shale formation	Gold Nanoparticles Supported on Reduced Graphene Oxide as Green Catalyst for Solventless System of Hydrosilylation Process
14:40-15:00	**Invited Speaker 31** 14:40-15:10 **Dr. M. A. Motalib Hossain**	**Invited Speaker 33** 14:40-15:10 **Dr. Siti Mariah Mohd Yasin**	**Mr. Poonanulkarage Ruwan Dinesh Weerasooriya**	**Dr. Tuan Sheikh Ahmad Izaddin Sheikh Mohd Ghazali**	**Ms. Shamala Gowri Krishnan**
	Innovative approaches of nanotechnology in food authentication	Strength of Kenaf/Glass Fibre Reinforced Epoxy (GRE) Composite Lap Joint	Evaluating the performance of bismuth ferrite incorporated regenerated cellulose nanocomposites as a potential photocatalyst	Calcium-Aluminium Hydrotalcite-Like Compounds: A Review of Synthesis and Applications	Synthesis of magnetic base catalyst from industrial waste for transesterification of palm oil

15:0-15:30	**Invited Speaker 32** 15:10-15:40 **Dr. Nina Naquiah Ahmad Nizar**	Networking	**Invited Speaker 34** **Dr. Lee Kian Mun**	**Invited Speaker 35** **Dr. Yusliza Yusof**	Invited Speaker 36 Dr. Syazwan Hanani Meriam Suhaimy
	Food Detection Technologies in Halal Supply Chain		A statistical modeling-optimization approach for photocatalytic degradation of organic pollutants using ZnO based photocatalysts	Electromagnetic behavior of carbon-based polymer nanocomposites.	Current doped TiO2 studies
15:30-15:50	Networking	Networking	Networking	Networking	Networking

Closing Ceremony	
16:00-16:30	Violin show Awards Presentation (Best Presenter & Best Poster)

ABSTRACT

Plenary Session 1
Prof. Dr. Jackie Yi-Ru Ying

Nanomaterials and Nanosystems for Catalytic, Energy and Biomedical Applications

Nanostructured materials can be designed with sophisticated features to fulfill the complex requirements of advanced material applications. This talk describes the synthesis of metallic, metal oxide and semiconducting nanocrystals of controlled size, morphology and architecture. The nanocrystalline building blocks are used to create multifunctional systems with excellent dispersion and unique properties. Nanoporous materials of metal oxide and organic backbone have also been synthesized with high surface areas and well-defined porosities. The nanostructured materials are successfully tailored towards catalysis and pharmaceuticals synthesis, as well as fuel cells and batteries.

Our laboratory has also designed organic and inorganic nanoparticles and nanocomposites for advanced drug delivery, antimicrobial, antifouling, stem cell culture, tissue engineering, and biosensing applications. In addition, we have fabricated nanofluidic systems for drug screening, *in vitro* toxicology, clinical sample preparation, and diagnostic applications. The nanosystems allow for the rapid and automated processing of drug candidates and clinical samples in tiny volumes, greatly facilitating drug testing, genotyping assays, infectious disease detection, point-of-care monitoring, as well as cancer diagnosis and prognosis

Plenary Session 2
Distinguished Prof. Dr. Suresh Bhargava

Unlocking next-generation catalysis through advanced 3D printing

Catalysis is an ever-important field of science impacting our quality of life and driving forward many technological advances for tomorrow. Much research is therefore dedicated to understanding and improving catalytic processes, including the development of heterogeneous catalysts for application in chemical synthesis and environmental pollution control. Owing to the need for improved catalytic reaction systems, A novel approach is growing in the combination of catalysis with 3D printing technology. This presents enormous scope for use in industrial processes, with the technology having significantly advanced (with precision now extending to the micrometer level) while the cost has simultaneously decreased. In addition, exquisite structures which were previously impossible to fabricate can now be mass produced, based upon computer-aided design (CAD) templates. Additive manufacturing therefore presents a unique opportunity to synthesize tailored designed three-dimensional supports upon which catalytic materials can be anchored. Through this approach the applicability of 3D printing is greatly expanded for industrial applications. Professor Bhargava is one of the pioneers who has introduced this concept into catalysis.

Keynote Session 1
Assoc. Prof. Dr. Ruslinda A. Rahim

Nanosafety: Current and Future Scenario of Nano-based Industry in Malaysia

Industries that manufacture nano-related products have low awareness on the importance of nanorelated standards for their product. The number of products containing nanomaterials in the market with claims of added benefits has been on the rise. However, concerns have emerged regarding their potential risk posed to human health and the environment. Here, we demonstrated a risk potential of nano-based products in Malaysia to gather nanosafety data comprising physical-chemical characteristics, toxicology, and effects towards the environment. In addition, a life cycle analysis was also carried out to demonstrate sustainability of nanotechnology related industry and promote a safe application of useful nanomaterials. A local inventory of 400 nano-based products were examine to allow a nanosafety referral system will be made

accessible for the general public on the safety issue. It is hoped that this project will strengthen nanotechnology as an economic contributor for the country all the way to the next decade and educate people on the awareness on the health and safety impact of nanomaterials in products.

Plenary Session 3
Prof. Dr. Amanda Barnard

Structure/property and property/structure relationships of nanoparticle catalysts from machine learning

Inverse design, where we can prescribe the structure based on a desired property, is a singular ambition of data-driven material design, and if successful will finally enable "market-pull" innovation as opposed to "technology-push". This is extremely challenging however, since there could be numerous combinations of materials characteristics that present the same properties and predicting a structure/property relationship does not distinguish between them. It is even more challenge in nanomaterials design since the design space is even greater, and inverse property/structure relationships will typically need to encompass multi-functionality. Optimization based on hypothetical databases predicted using machine learning has shown promise in recent years, but suffers from a high computational cost, lack of specificity, and no guarantees that the optimal nanomaterial has been found. There are simply too many unknown variables (structural characteristics) and not enough known variables (properties) for optimization to be reliable. In this presentation we will describe an alternative approach to inverse design that overcomes each of these limitations. By drawing on the multi-functionality of nanomaterials and using multi-target machine learning methods, we develop a workflow that is fast, easy to use, and predicts the characteristics of a single nanoparticle that simultaneously meets a set of performance criteria, with a fault tolerance. The method focusses the outcome on the most important characteristics in an entirely data-driven way, and with comparable accuracy and generalizability as traditional forward structure/property machine learning predictions. We have demonstrated the new inverse design workflow on platinum nanoparticles, an important electrocatalyst with significant potential for chemical engineering.

Keynote Session 2
Prof. Dr. Gabriele Centi

Electrocatalysis: role and prospects to defossilize chemical and energy production

Although electrochemistry is an old technology, the development of a new sustainable chemistry overcoming the use of fossil fuels and based on renewable electricity poses completely new challenges: i) the need to pass from electrochemistry to electrocatalysis, and ii) to develop a full framework where chemistry based on oil (petrochemistry) becomes substituted by chemistry based on alternative C sources and electrons (e-chemistry). However, addressing these major challenges require to introduce conceptually a new approach in electrocatalysis, from the design of the electrocatalysts and other components, to the design of electrocatalytic reactors with characteristics suitable for industrial use, a problem going largely beyond a simple problem of scale-up. A large gap between current results and those necessary for industrial exploitation is still present, as well as the need to pass from the current electrocatalytic reactions studied to more complex possibilities which can enable electrocatalysis as the backbone of future chemical production. However, this challenge requires to turn current approaches, still too much conditioned from the idea of equivalence between "thermal" and "electro" catalysis. A possibility is to understand better the parallelism between enzymatic and electrocatalysis, but other creative approaches would also be necessary, together with the development on a holistic theoretical framework which could effectively indicate the key factors to develop novel electrocatalysts bridging the gap to the application. Current approaches, although impressive in terms of publications, result unsatisfactory in terms of effective progress. A series of examples related to ammonia direct synthesis and CO_2 conversion are presented to support these indications.

ABSTRACT

Mr. Muhammad Nur Syafiq Bin Mohamad Ismail

Fabrication and Characterization of single and bimetallic nanoparticles

Nowadays, nanoparticles has been widely used in industries such as solar, electronic and also medicine. This risen due to its properties such as high mobility in ideal state which led it to have better conduction. Besides, nanoparticles also will experience surface plasma resonance (SPR) when light enter it. However, single metallic nanoparticles (NPs) such as gold (Au) and silver (Ag) give a very narrow absorption spectra. So, this make single metallic nanoparticles has less reliability in selective detection. Thus, in this research, we proposed to fabricate bimetallic nanoparticles (BNNPs) in order to have wider absorption spectra for SPR to occur. Our interest in this research is Au and Ag NPs and BNNPs with different deposition thickness. Both single NPs is fabricated with deposition thickness of 6, 8, 10 and 12 nm for Au and 8, 10, 12 and 15 nm for Ag using E-beam evaporation technique. After deposition process, the NPs will then annealed for 1 minute at 600oC for Au while 450oC for Ag. BNNPs obtained by hybridly fabricate Au NPs first and then Ag NPs on top of it. These nanoparticles were then characterized using FESEM for topography and morphology image and UV-Vis for optical effect. Results obtain shows that BNNPs give wider absorption spectra compared to single NPs.

Mr. Mohamad Hilmi Hisyamuddin bin Mohamad Rosdi

A Fundamental Characterization of Corn Stalk Fiber and its Absorption Ability in Liquid Mediums.

The corn stalk fiber, is one of the agricultural wastes, are composed mainly by hemicellulose, cellulose and lignin, which can be used as filler to replace the synthetic fiber in polymer matrix. The main objective of this research work is to analyse the fundamental characterizations of the natural fiber from corn stalk which have potential as bio-filler in combination with eco-friendly polymer matrices thus leading to high renewable contents materials. Previously, the corn stalk was collected, washed, dried and grinded. The small size of fiber obtained and characterized by using FTIR to identify chemical bonds. The common chemical content such as hemicellulose, cellulose, lignin and also ash was examined by chemical analysis. To understand and predict the thermal properties of corn stalk fiber, we investigated it by thermogravimetric analysis (TGA). The fiber surface morphology was determine carried by scanning electron microscopy (SEM). The ability of corn stalk to absorb liquid mediums also was studied by conducted absorption test in distilled water, oil, salt, and sugar solution.

Mr. Tuerxun Duolikun

Rubber/Kenaf-based Nanocellulose Reinforced Green-Materials with Their Toxicity

Nanocellulose (NC) has gained an increased interest because of its potential for numerous applications. Although cellulosic fibres are increasingly used for potential products, current methods for the production of cellulose-based products suffer certain economic and environmental drawbacks, such as systematic economic optimization, economic viability, as well as air water pollution in the production process. In this work, we demonstrated new, cost-effective, and environmentally friendly fabric materials that overcome the shortcomings of existing technologies. A comparison between kenaf vs rubber-based nanocrystalline cellulose (NCC) was examined. Kenaf-based NCC was found to have better performances by improving the yield and toxicology effect. The cytotoxicity assessment was done to compare the NCC and nanofibrilline cellulose (NFC). From the MTT results, NCC did not show cytotoxicity effect at a concentration range of 0–1,000 µg.mL-1 after 24 h. However, NFC was found to be toxic at a concentration > 500 ug.ml-1.

ABSTRACT

In this work, the mechanical properties after the addition of different types of NC (5 wt%) to PE/PP/PEO matrix were examined. The tensile strength increased up to 105.33% (PE), 135.35% (PP), and 134.35% (PEO) for NCC-based and 120% (PE), 194.42% (PP) and 196.18% (PEO) for NFC-based, respectively. Ultimately, the information generated through this study will be used to inform regulators and the government about which classes of nanomaterials (NMs) are safe to produce and how they might be designed to reduce any hazard associated with their handling and potential applications. Although cellulose-based reinforced green nanomaterials are applied as our final product in industry, due to its high mechanical performance, certain cost-effective and environmental benefits are highlighted.

Dr. Norazriena Binti Yusoff

Metal oxide-biopolymer film as saturable absorber for q-switched fiber laser generation at 1.0 μm wavelength region

A metal oxide-biopolymer film is proposed as a saturable absorber (SA) to assist the generation of a modulated pulse output in a fiber laser at the 1.0 μm wavelength region. The thin film composes of nickel oxide which was synthesized using a simple sonochemical technique and Chitosan as the host biopolymer. It is suggested that the properties of the Chitosan that possess high thermal resistance, non-poisonous quality, and biocompatibility, along with the cost effective, simple fabrication process and nonlinear optical properties of NiO may bring beneficial for photonics applications. In this work, stable and self-starting modulated pulses were observed at a central wavelength of 1040.86 nm with the incorporation of the NiO-Chitosan film SA into a Ytterbium-doped fiber laser cavity. The proposed laser has a shortest pulse width of 0.73 μs and the maximum repetition rate of 111.61 kHz. Our finding demonstrates that the proposed SA is capable of modulating laser outputs in the 1.0 μm wavelength region. Furthermore, the use of Chitosan as a host material provides allows for a safe and non-toxic SA with high thermal resistance to be realized. The SA is also cost effective and simple to fabricate, realizing a broad range of applications particularly in the pulse fiber laser production.

Dr. Muhammad Adil Mansoor

Fabrication of bimetallic Cr2O3-Mn2O3 thin film for photocatalytic water oxidation

In present studies Cr2O3-Mn2O3 composite thin films are fabricated from dual source precursors, chromium acetate and manganese acetate, in tetrahydrofuran (THF) via aerosol-assisted chemical vapour deposition (AACVD) method at 400 oC. The thin films were properly characterized by X-ray diffraction (XRD), field emission scanning electron microscopy (FESEM), energy dispersive X-ray (EDX), Raman spectroscopy and UV-Vis spectroscopy to evaluate their crystalline structure, chemical composition, topography, and band gaps. Finally, the films were subjected to record their photo-electrochemical response in terms of linear scan voltammetry (LSV) and electrochemical impedance spectroscopy (EIS) using 0.5 M NaOH electrolyte solution. A promising photocurrent density of 470 μA.cm-2 was observed at 0.7 V Vs Ag/AgCl/3M KCl. Furthermore, impedance studies revealed a decrease in charge transfer resistance (Rct) under illumination conditions that further supports a better electron transport under light conditions.

Ms. Mudrikah Sofia binti Mahmud

Size reduction via ball milling and acid leaching effect on rice husk ash-derived nano-silica

Among the common sources of silica from agricultural waste are rice husk and rice husk ash (RHA). In this study, RHA used was prepared through the controlled burning of the rice husk. Two different RHA sizes were used in the synthesizing process via precipitation method: the original RHA (without ball milling) and the ball-milled RHA. Prior to the precipitation method, RHAs were acid leached using hydrochloric acid (HCl) as the

leaching agent and then subjected to heat treatment. This study strives to highlight the effect of ball milling of RHA and acid leaching treatment on the acquired silica properties. The silica properties obtained, including silica purity, silica content (%), phase structure, morphology, and particle size, are investigated by XRF, EDAX, XRD, FESEM and PSA. The results of this study could suggest a convenient and reproducible method for the preparation of high-purity nano-silica in an amorphous structure with a high potential to be used in a wide range of applications.

Dr. Siti Aisyah Binti Shamsudin

Gamma irradiation-induced cross-linking of latex/ polystyrene-block-polyisoprene polymer blend

The gamma irradiation treatment on polymer blend, an alternative over conventional hazardous chemical methods such as sulphur and peroxides vulcanisation has received interest in many fields including transportation and medical sectors. This is due to its high penetration power, clean and fast technology. However, competitive reactions between chain scissoring (degradation) and cross-linking occur in irradiated system. Therefore, determination of suitable irradiation dose is an essential aspect in developing new polymer blend with desired properties. This work demonstrates the influence of irradiation dose on cross-linking phenomenon of natural rubber latex/polystyrene-block- polyisoprene (NRL/PS-b-PI) polymer blend. The PS-b-PI diblock copolymer at a fixed content of 30 wt% is added into latex and polymer blend films are prepared using casting method. The films are characterised using tensile and swelling tests, before and after irradiation with Co-60 gamma source of various irradiation doses ranged from 2-10 kGy. From the swelling analysis, the irradiation leads to an increase of cross-linking density in polymer blend, proving the tendency of cross-linking induced by gamma irradiation. The swelling index decreased in blend with higher irradiation dose. An enhancement of tensile strength and Young's modulus of polymer blend were shown after irradiation, with the highest tensile properties at an optimum dose of 8 kGy. These results revealed that the gamma irradiation can successfully cross-linked the NR/PS-b-PI polymer blend.

Ms. Anusha Wei a/p Asohan

Preparation and Characterisation of Cellulose Nanocrystal-Alginate-Polyethylene Glycol Diacrylate as Bioink Paste for Bioprinting Application

Hydrogels have been recognised as a promising biomaterial for 3D bioprinting application because of their cross-linking properties and the ability to absorb large amounts of water. However, attempts to formulate the ideal hydrogel for bioprinting has not yet been successful because of their weak and unstable structure. For cartilage bioprinting, biomaterials that are durable and stable are the main requirements of an ideal bioink. In this study, double network hydrogels were formulated using cellulose nanocrystals (CNC), alginate (Alg) and polyethylene glycol diacrylate (PEGDA) to create a more stable structure. Nine CNC-Alg- PEGDA formulations were formulated with different concentrations to determine the formulation with the best potential as a bioink for cartilage bioprinting. CNC-Alg-PEGDA formulations consist of a double network hydrogel formed through physically crosslinked Ca2+ ions and chemically UV-induced crosslinks at 365 nm. The CNC-Alg-PEGDA formulations were then subjected to manual compression tests, rheology analysis, and swelling tests to determine their properties. From the findings, CNC-Alg-PEGDA formulations demonstrated enhanced durability and stability during the manual compression tests. It is important to note that the formulations with CNC demonstrated elastic tendencies whereas the formulations without CNC displayed rigid

and brittle properties. The rheology analysis conducted on the CNC-Alg-PEGDA formulations showed that two formulations with concentrations of [CNC:Alg:PEGDA = 4:4:10] and [CNC:Alg:PEGDA = 4:4:40] possess shear thinning and viscoelastic behaviour, both of which are characteristics important for extrusion bioprinting. The swelling studies performed also showed satisfactory water content and swelling ratios that are consistent with the native articular cartilage. These properties suggest that the CNC-Alg- PEGDA formulations satisfy the mechanical properties required in cartilage bioprinting and are promising potentials for further optimisation.

Mr. Muhammad Aiman Saufi Bin Ahmad Fahri

Nonlinear optical properties of molybdenum disulfide (MoS2)

Nonlinear optical properties of material are a highly interest field of study since it offers promising contribution towards laser technology and ultrafast photonics app lication. The recent vast discovery of physical properties of 2D material has opened up to various contributions. But the findings on nonlinear optical properties of 2D material is still lacking. Thus, for this research, we proposed a study of nonlinear optics on 2D material to investigate the quantitative and qualitative measurement of nonlinear properties of 2D material. In this research, we will implement the use of Z-scan measurement to study the second- and third-order nonlinear optical properties. For the preparation of material, we will approach the most suitable method to grow 2D nanolayer as proposed; exfoliation or chemical vapor deposition (CVD). 2D material that will be grown is the transition metal dichalcogenide (TMDC) and 2D allotropes. At the end of the investigation, we would expect to obtain the quantitative value of nonlinear absorption coefficient and nonlinear refractive index. Apart from that, the characterization of the material to validate the deposited layer will be done using FESEM, EDX, and Raman spectroscopy. By qualitative measurement, we will characterize the material using UV-Vis to check the linear absorption of the material. All these results will give a great contribution to ultrafast photonics application.

Mdm. Nur Azimah Abd Samad

Progress in Binary ZnO Heterojunction for Polluted Water Restoration

The removal of pollution or contaminants from environmental media such as soil, groundwater, sediment, or surface water is referred to as environmental remediation. Metal oxide ZnO involvement in water treatment has significant advantages. ZnO outstanding performance in the photocatalysis and electronic field, nanostructured ZnO materials received a broad attention and became an active field of research since the 1960s. The formation of binary ZnO will increase the wastewater catalytic restoration activity by providing new energy level or heterojunction formation in the original nanostructured ZnO. Recently there have been studies of a number of possible alterations to improve ZnO performance. One of the strategies is the incorporation of nanostructured ZnO with different noble metals (e.g., palladium, silver, osmium, iridium, platinum, and gold). This technique, therefore, helps to prevent moist air from causing photocorrosion and oxidation. The addition of metal transition ions to nanostructured ZnO semiconductor is another technique (e.g., titanium, nickel, cobalt, manganese, ferum, cotton, chromium, and vanadium). In particular, transition metal with incomplete d-orbitals. Metal incorporating with nanostructured ZnO works at Fermi levels differently. By tuning the work function of nanostructured ZnO and metal band structure, the material efficiency could be enhanced. In combined semiconductors, the transmission of charge carrier is rectified. Appropriate incorporation of CB and VB of two different semiconductors could reduce charge carrier recombination losses. The reason is that the charge carriers are transported from one semiconductor to another. This will extend the charge carrier transportation and inhibit the recombination process from happening. Depending on the energy of the semiconductor used, the binary ZnO can be

activated in the visible region. The level of impurity has existed because cationic ions have been replaced in crystal lattices, which facilitate better absorption in the visible region. Also, the interfacial potential gradient between materials will be modified by altering the semiconductor. In this case, the interfacial charge transfer to water is also significantly increased, thus increase the photocatalytic performance. It is also critical to understand that an optimum concentration of the second semiconductor will improve the efficiency of the binary ZnO by promoting a level of impurity. However, an excessive second semiconductor can cause an unfavourable level of impurity and show poor performance.

Invited Speaker 1
Ts. Dr. Asmalina Mohamed Saat

The effectiveness of nanoparticle and natural antifouling additive: A comparison of seawater immersion

Biofouling is the aggregation process of marine organisms on a ship's hull that causes the hydrodynamic efficiency of the ship to decrease due to the continuous development of the drag penalty. The biofouling problem also leads to corrosion problems thus reduce the properties of a ship hull. Nanoparticle and natural antifouling have been widely explored to improve the properties of the antifouling coating after the banned of tributyltin (TBT) by IMO in 2008. Many researchers focused on laboratory assessment related to the physical, chemical, biological, mechanical, and corrosion properties of the coating. However, less was found for the actual seawater immersion performance for both nanoparticle and natural antifouling coating. Thus, this research evaluated the nanoparticle (Zinc oxide and Silica) and natural (aloe vera and charcoal) antifouling additives performance immersed in seawater for 6 months. Both nanoparticle and natural antifouling show good antifouling properties in comparison to bare metals and commercial antifouling coating. Nanoparticle antifouling additive with 10 wt% silica nanoparticle shows optimum performance in the percentage of thickness, marine growth, and weight change analysis. Meanwhile, natural antifouling additive 10 wt% aloe vera observed good performance in all analyses. In conclusion, nanoparticle with 10 wt% silica antifouling additives shows better performance compared to natural additives in all analysis.

Dr. Norsyahidah Mohd Hidzir

Mechanical properties of polymeric biomaterials- modified expanded polytetrafluoroethylene (ePTFE)

The evaluation of mechanical properties of expanded polytetrafluoroethylene (ePTFE) is important to provides a measure of its resistance to permanent deformation with respect to an applied force and must be comparable to mimic the real tissue. After surface modification using gamma irradiation-induced grafting method, the properties of ePTFE is altered especially its hydrophobicity which also including its mechanical properties. Thermosensitive monomer; 2-Hydroxyethyl Methacrylate (HEMA), N-isopropylacrylamide (NIPAAM) and N-vinylcaprolactam (NVCL) and pH sensitive; Acrylic acid (AA) were used as the comonomer to be grafted onto ePTFE. The mechanical properties of ePTFE changed after the modification process due to the grafted polymer on the ePTFE surface. The young modulus (ε) increased, elongation at break and ultimate tensile strength (UTS) were decreased after the modification process which indicates that the modified ePTFE loses its mechanical strength correletes well with the percentage of the grafting yield after the modification process and dependent with the parameter (such as irradiation dose and total monomer concentration).

Invited Speaker 4
Dr. Nurhidayatullaili Muhd Julkapli

Light sensitivity modification of TiO2 photocatalyst by chitosan biopolymer for decomposition of synthetic dyes compounds

This work focusses on the incorporated Chitosan (CS) biopolymer into TiO2 nanoparticles as a support or adsorption site, forming an effective photocatalyst system. TiO2 and

CS in beads form were mixed through simple mechanical stirring process, and further processed into bead features. The photocatalytic activity of different composition ratio (0.5:1, 1:1, 1.5:1, and 2:1) of TiO2-CS hybrid photocatalyst was demonstrated on the simulated MB solution (10 ppm), irradiated under visible light. The morphology, crystallinity, surface interactions and band gap of TiO2-CS hybrid photocatalyst was determined by FESEM, XRD, FTIR, and DRS. FTIR analysis of the interface between CS and TiO2 showed the shifts and changing intensity of the OH, NH2, and the R-NH stretching and bending modes from the interaction between the TiO2 and CS molecules. The sample of (2:1) reported a degradation of 99% for MB at pH 12 in 360 minutes with the optimum amount of 3 g photocatalyst. The photocatalytic activities of TiO2-CS hybrid bead reported a promising increment with better adsorptions under different photocatalytic conditions in the context of the concentration and pH of MB, composition ratio, and catalyst dosage.

Mdm. Rabiatuladawiyah Bt Md Akhir

A Review on Zinc Oxide Nanorods for Optoelectronic Applications: A Perspective on Biosynthesis Approach

Recently, the versatility of zinc oxide (ZnO) has increased the industrial demands, hence become a motivation towards facile synthesis. In this review paper, we comprehensively summarize the current developments in the fabrication of ZnO nanorods using solution immersion methods and their application in a few optoelectronic devices. In addition, we also briefly include other classification morphology such as nanowires, nanoflowers, nanotubes, nanosheets, etc. Contrasted with polycrystalline thin films, ZnO nanorods typically have high phase purity, no grain boundaries, and long-distance order. Hence, making them attractive for carrier transport in advanced optoelectronic devices. We start by briefly surveying the recent progress in the fabrication methodologies such as physical and chemical methods. And then, we will elaborate on the solution immersion methods. The technique has been improvised using a microwave and sonication-assisted solution immersion process, which gave advantages towards eliminating agglomeration of the sample. Due to an environmental-friendly approach, the synthesis method has evolved towards a greener approach, such as biosynthesis. However, no extensive studies have been performed in this direction, which deals with the fabrication of ZnO nanorods by employing the biosynthesis-assisted solution immersion method. Considering these improvements, this review includes a brief description of the conventional synthesis method of ZnO nanorods, emphasizing the biosynthesis of ZnO nanorods using plant extract, fruits, fungi, and microbes. The influence of the growth parameters on the growth rate and morphology are critically discussed. Some of the emerging applications that can be explored using ZnO nanorods via the biosynthesis method also will be summarized. Finally, we close with some unresolved issues and challenges in this field.

Mdm. Nurul Fatimah Basir

Development of New Organosulfur Extreme Pressure Additive (EPAs) for Metalworking Fluid (MWF)

Since it was first discovered by Fischer in 1882 and later explored by Busch and colleagues, 1,3,4-thiadiazole and its derivatives have attracted the interest of various researchers due to its enormous medical and industrial importance. In this work, we utilized 1,3,4-thiadiazole-2,5-dithiol as a heteroaromatic core to produce its symmetrical and unsymmetrical sulfide and disulfide derivatives having three and five sulfur atoms in their backbone and side chains containing aliphatic cyclic compounds, including five- and six□membered rings, and long-chain and short-chain linear alkanes. The above-mentioned symmetrical and asymmetrical polysulfides were prepared in clean, practical, and efficient methods using alkylation of an

alkyl halide with Bunte salt and thiourea. Their chemical structure was characterized by several spectroscopic techniques such as FTIR, 1D and 2D NMR, elemental analysis, LC-MS, and GC -MS. In addition, thermal phase transition and thermal stability are investigated by DSC and TGA/DTA. The mono-S-alkylated and bis-S□alkylated 1,3,4-thiadiazole were separated and isolated by column chromatography using appropriate eluents. The appropriate organic polysulfides were selected based on their solubility in naphthenic and paraffinic oils, which will be investigated for their metalworking fluid properties, including reducing tear and wear in extreme pressure and hindering the corrosion effect, through Four-Ball and EP Test and copper corrosion test.

Invited Speaker 2
Mr. Taifunisyam Taib

Various volume ratio of Silver Silica Nanocomposite (AgSiO2 NC) thin films have been deposited onto indium tin oxide (ITO) by Electrophoretic Deposition (EPD) technique. The optical properties of the thin film were studied. Ellipsometric analysis shows that the optical properties of the thin film is tunable by varying the amount of Silver Nanoparticles (AgNPs). The real permittivity of AgSiO2 NCs NC shows significant decreases in the visible region. Morphology studies shows the interparticle distance between the nanoparticles effected by the volume ratio of Ag/SiO2.

Invited Speaker 3
Dr. Yew Ming Chian

Influences of nano bio-filler on the physical, mechanical and fire protection properties of the intumescent coating

Absorption rate of 3.23 %), freeze-thaw durability (no crack, color change and blister) and fire resistance (118.6 °C for an hour under an hour of Bunsen burner test) as compared to other coating samples. These performances revealed that the addition of appropriate amount of renewable flame retardant nano sized bio-filler into intumescent fire protective coating has proven to be efficient in maintaining its properties against environmental degradation and preventing the heat rises to the underneath of the protected substrate. Significantly, flame retardant nano sized eggshell bio-filler is one of the dominant biodegradable and sustainable nanomaterials found in nature as well as its potential role in various fields of engineering applications towards sustainable development goals.

Invited Speaker 5
Prof. Dr. Ir. Zuraida binti Ahmad

Inkjet-Printed Embedment of PEDOT: PSS Doped SNP as Electrodes on Fabrics

Current developments in printed electronics have made it possible to mass-produce devices employing precise additive printing technologies, cutting costs and enhancing large-scale production potential. This includes inkjet printing technology, which has piqued the interest of numerous researchers for use in the commercial electronic device industry. Ink formulation has been identified as one of the critical parameters for preventing the clogging of print-head nozzles and avoiding particle agglomeration when printing successfully. This work demonstrates the effect of co -solvents like dimethyl sulfoxide (DMSO), isopropyl alcohol (IPA), ethylene glycol (EG), ethanol (EtOH), and deionized (DI) water on the conductive polymer specifically poly (3,4-ethylene dioxythiophene): poly (styrene sulfonate) (PEDOT: PSS) doped with silver nanoparticles (SNP) thin films deposited on fabric using an inkjet printing method, as well as their electrical, morphological and functional properties as an outcome of composite ink formulation approaches through ultrasonically dispersion technique. It was found that the resistivity of the printed pattern lowered to 4.17 × 107 Ωcm from 1.63 × 108 Ωcm after measured using a two-point probe test. The mechanism of the

PEDOT: PSS/ SNP conductivity enhancement was attributed to the phase separation between PEDOT and PSS caused by charge screening of the co-solvent additives. The findings were supported by the well-dispersed of ink on the fabric observed by scanning electron microscope (SEM). Fourier transforms infrared (FTIR) spectra indicate prominent peaks related to the success of inkjet-printed embedded PEDOT: PSS/ SNP composite inks on the fabrics. This work provides an insight into the conductive polymer inks based on PEDOT: PSS doped SNP and opens up another platform for future work related to the development of flexible and conductive fabric for suitable purposes especially biomedical applications.

Invited Speaker 6
Ir. Dr. Hanim Hussin

Investigation on Sensitivity Amplification Effect of Double-Gate Field Effect Transistor Based pH Sensor

According to the Nernst equation, the greatest detectable change in electrochemical potential is limited to 59 mV/pH for ion-sensitive field-effect transistors (ISFETs). In this work, recent double-gated devices are investigated to understand the super-Nernstian response which is more than 59 mV/pH by amplifying the sensitivity capability through the back-gate operation. The amplification dependence on DGFET design, biasing conditions, and surface functionalization are not extensively studied in the literature. Hence, the BioSensorLab tool is employed to evaluate the pH-sensitivity amplification which modeled using Poisson-Boltzmann and Drift-Diffusion equations for electrolyte screening and conductance modulation. The pH sensitivity is investigated based on the different geometrical configurations of the DGFET devices, biasing conditions, and top oxide-electrolyte interfaces. It is shown that the pH sensitivity responds differently based on scaled W/L channel, top and bottom oxide of DGFETs. DGFET with a sensitivity of 32.1 mV/pH operated through front-gate operation can be amplified to 178.6 mv/pH through the back-gate operation with a drain voltage of 0.5 V. Higher pH-sensitivity responses is observed as Al2O3 is used as the top oxide-electrolyte interfaces as compared to SiO2 due to reactions with proton H+ in the electrolyte. It can be concluded that pH sensing back gate operation ensure the DGFET operating beyond the Nernst limit and scaling of channel and oxide thicknesses contribute to different pH sensing responses.

Invited Speaker 8
Dr. Ricca Rahman Binti Nasaruddin

Enhancing Catalytic Properties of Ligand - protected Gold Nanoclusters by Silver Doping

Herein, we explored metal engineering (e.g., foreign metal doping) to engineer homogeneous Au25(SR)18 NC catalysts without compromising the presence of ligands and the unique structure of 25-metal NCs. Bimetallic AuAg NCs (i.e., Au25-xAgx(SR)18 NCs with x = 4-12) were successfully synthesized by co-reduction method with various feeding ratios (RAu/Ag = 24/1, 22/3 and 18/7). We found that Ag dopants favourably replaced Au(0) atom on the vertex of the icosahedral core and enhanced the catalytic properties of bimetallic Au25-xAgx (SR)18 NCs as compared to Au25 (SR)18 NCs, due to combinations of several factors: 1) synergistic effects of Au and Ag; 2) weaker Ag -SR bond than Au-SR bond; 3) weaker Ag-H bond than Au-H bond; and 4) higher stability Au25-xAgx(SR)18 NCs than Au25 (SR)18 NCs). The study reveals a wider opportunity to engineering ligand-protected Au NCs with atomic precision and well-defined structure for catalytic application.

Invited Speaker 7
Assoc. Prof. Dr. Ong Boon Hoong

Size reduction via ball milling and acid leaching effect on rice husk ash-derived nano-silica

Among the common sources of silica from agricultural waste are rice husk and rice husk ash (RHA). In this study, RHA used was prepared through the controlled burning of the rice husk. Two different RHA sizes were used in the synthesizing process via precipitation method: the original RHA (without ball milling) and the ball-milled RHA.

Prior to the precipitation method, RHAs were acid leached using hydrochloric acid (HCl) as the leaching agent and then subjected to heat treatment. This study strives to highlight the effect of ball milling of RHA and acid leaching treatment on the acquired silica properties. The silica properties obtained, as FESEM, TEM, XRD, XPS, TGA and UV-Vis. Overall, the annealing treatment improved the sensitivity and response and recovery times of the sensor towards NH_3. However, overheating the sample disrupted the gas adsorption due to its metastable characteristic. The optical NH_3 gas-sensing behaviour was significantly correlated with the non-stoichiometric Mo5+ content, which showed a similar phenomenon to an electrical sensor. The chemisorbed oxygen species and physiosorbed NH_3 altered the refractive index and its absorption coefficient on the nanorod, which manipulated the optical signal and acts as a sensing mechanism. Chemical bath deposition growth of the h-MoO_3 nanorod exhibits a promising optical sensing characteristic, which paves a path for emerging gas-sensing technology.

Keynote Session 3
Prof. Dr. Saifollah Abdullah

Recent trend application of nanocoating

Nanotechnology was introduced by physicist Richard Feynman in 1959. Nanotechnology can be defined as a science, engineering, and technology conducted at the nanoscale, which is about 1 to 100 nanometres. Nanotechnology-based devices are very potential in many applications due to their high accuracy and efficient performance. Instead of that, it offered a new development in nanomaterials and it will be an alternative for current materials due to high demand in current technology application. Nanocoating is one of the new areas with high demand, it is becoming more visible in the consumer market and it is a high potential for wide application including in oil and gas industries, building construction, transport, medical equipment, electronic communications. Nanocoating is representing between product and environment in the application such as anti-bacterial surface products, anti-corrosion, and self-cleaning. Therefore, the special properties of nanocoating are one of the major considerations in each particular application. Various type of materials was used in nanocoating including oxide materials, polymers, and other nanomaterials. While there are many methods to produce nanocoating including electroplating, physical and chemical deposition, and self-assembly. In a current trend, it is also a candidate for preventing the spread of COVID-19 using surface nanocoating, it is preventing in many ways of spreading of COVID-19 including through surface contact and filtration system.

Keynote Session 3
Distinguished Prof. Dr. Panchanan Pramanik

Nano-science and nanotechnology – a new era in science and technology

Chemists and physicists have utilized unknowingly in the field of catalyst, surface chemistry , thin-film and composites. After inventions of various electron-microscopes (TEM, SEM, HRSEM) the subject got maturity and flourished very fast. It is a unique class of science which is late discovered and adapted very effectively for various applications in most of the branches of science and engineering during last 2 decades. The sizes of nano -materials are in borderline of macro and micro particles. The materials consist of particles having sizes between 100 nm to 300nm. All the particles have unique optical, electronic and chemical properties due to high surface/volume ratio and size effect. Nano-science and technolog has faster adaption to various applications in wide

fields of general science, engineering and medical science .Major inventions have been facilitated in the fields of medical science and material science for application in various engineering sciences. In medical scienc, the concept has adapted a new class of medicines (nano-medicine), diagnostics with advanced concepts and therapies. It has effectively introduced a revolution in medical science. In material world a new revolution has come through nano-structured carbon such carbon nano-tub, grapheme exotic applications. In this presentation, some exotic applications of nano-science and nanotechnology will be illustrated briefly.

Mrs. Nur'ain Nadia binti Shapril

Synthesize of silver nanodendrites with optical and thermal effect via green method

Silver nanodendrites (Ag ND) were put into interest because of the surface plasmon resonance effect and the branching figure that make the properties different from other nanostructure. Ag NDs were synthesized via green method which involved reducing silver nitrate (AgNO3) by ethanol and polyvinyl pyrrolidone (PVP) as the stabilizer. The Transmission Electron Microscope (TEM) confirmed the dendritic structure of the synthesized samples. Ag NDs samples shows the surface plasmon resonance (SPR) band and strong emission peak in visible range of UV-Vis spectra and photoluminescence spectra. Thermogravimetric (TGA) shows one step thermal degradation while Differential Scanning Calorimetry (DSC) shows thermal stability occurred around 231oC. Ag NDs illustrate interesting behavior and great potential for optical and thermal application.

Ms. Aminatul Sobirah Binti Zahari

Dielectric properties and piezoelectric constant of electrospun polyvinylidene fluoride (PVDF) with different molecular weight

The molecular weight of electrospun PVDF shows an incredible impact on piezoelectric constant and dielectric properties. It has been found that the smallest molecular weight of PVDF has higher dielectric properties and the piezoelectric constant depends mainly on the β-phase content. The most common crystalline phase of PVDF, however, is the alpha phase, which does not trigger any piezoelectric response. By electrospinning, the β-phase content of PVDF can be increased because of the shear force during the solution ejection from the needle. Therefore, in this report, PVDF was prepared using an electrospinning method to increase the β-phase content of PVDF as a function of molecular weight. Analytical techniques such as field emission scanning electron microscope (FESEM), X-ray diffraction (XRD) and Fourier transform infrared (FTIR) were used to characterize the four values of molecular weight electrospun PVDF membranes. Electrospun PVDF membranes were compared for the presence of the β-phase using XRD and FTIR. Besides, piezoelectric constant and dielectric properties such as dielectric constant and dielectric loss were evaluated by using d33 meter and electrochemical impedance spectroscopy (EIS) respectively. Electrospinning PVDF resulted in the formation of the piezoelectric β-phase with the highest β-phase fraction of 80.25 % for electrospun PVDF membrane with the lowest molecular weight (180,000 g/mol) and found to possess a reasonably high piezoelectric constant of 21.0 pC/N and dielectric constant of 2.9 at 50 Hz. Thus, this study shows that the piezoelectric and dielectric constant are affected by the molecular weight of electrospun PVDF membranes.

Dr. Najiah Binti Nadir

Surfactant evaluation for enhanced oil recovery: Phase behavior and interfacial tension

Surfactant flooding is one of the successful techniques employed in enhanced oil recovery (EOR) to extract the remaining original oil in place (OOIP) after primary and secondary recovery are performed. Selection of the right surfactant EOR is an important but

demanding task due to a series of screening procedures need to be executed to have a comprehensive evaluation. This paper presents the experimental work done on the initial screening of 10 surfactants from three different classes, namely nonionic, anionic and amphoteric. Screening were completed with three consecutive series of testing, that are surfactant compatibility, phase behavior and interfacial tension (IFT). Results shown that an anionic surfactant, sodium decylglucosides hydroxypropyl phosphate, passed all the test with the lowest IFT value of 8×10-3 mN/m at 0.1 wt% of surfactant concentration.

Ms. Intan Najwa Humaira Binti Mohamed Haneef

Effect of Reinforcing Halloysite Nanotubes on Morphological, Mechanical and Thermal Behaviour of 70/30 Polylactic Lactic Acid/ Polypropylene Carbonate Nanocomposite

Recent investigation has demonstrated that the addition of polypropylene carbonate (PPC) had improved the toughness of polylactic acid (PLA). However, the addition of PPC in PLA/PPC blends caused a decrease in its tensile strength and stiffness. The addition of filler such as halloysite nanotubes (HNTs) can result in a balance of properties in these nanocomposites. Hence, in this work, we reported the preparation of nanocomposite PLA/PPC (70:30 wt/wt) reinforced with HNT. Nanocomposites varied with different compositions of HNT (0 wt%, 2 wt%, 4 wt%, and 6 wt%) were prepared by using the melt-mixing method. The effect of HNTs loading on mechanical properties, thermal and morphological of PLA/PPC/HNTs will be investigated and discussed.

Ms. Lia Zaharani

Synthesis and characterization of a novel diprotic Brönsted molten salt as an efficient catalyst for the synthesis of triazolo-pyrimidines

In the current work, a less corrosive diprotic molten salt is synthesized through a simple process. Different tools were employed to approve the chemical structure of the new molten salt, including FTIR, 1D NMR, 2D NMR, and mass analyses. The corresponding molten salt show spectroscopic data and physical properties such as ^{1}H NMR, ^{13}C NMR, melting point, and mass spectrum and mass analysis, which are entirely different from the previous report in the literature. Furthermore, the formation of hydrogen sulfate instead of sulfate anion was supported by FTIR analysis, pH determination, and titrimetric measurement. Also, the transition phases and thermal stability of new diprotic ionic salt were studied by DSC and TGA/DTA spectra, and the crystallization point of molten salt was determined. Then, the catalytic activity of new diprotic ionic salt was investigated for the preparation of triazolo-pyrimidine derivatives at room temperature in mixed green solvents. The corresponding products were obtained in 71-90% yield using a simple workup under the following conditions: 10 mol% of the new ionic salt at room temperature for 90 minutes. The separation of catalyst and products was conducted through a simple and cost-effective extraction. The residue could be reused in the next runs without any purification after the separation of the corresponding products. The catalytic activity of the new diprotic ionic salt was demonstrated even after the fifth run.

Ms. Noor Fadhila Syahida Ghazali

Sensory Characterization of Emollients Synthesized Using Plant-based Feedstocks

The incorporation of emollient into cosmetics, skin care and personal care products has started in the past 5000 years ago. Being one of the most used ingredients in the formulation of skincare, cosmetics and personal care products, emollient helps to break the dry skin cell and maintain the smoothness of the skin. In order to create a good product that suits consumer's choice of applications, there will be numerous requirements to be fulfilled. One of the requirements is the sensory profile. In this study, several emollients were evaluated in order to determine the sensory profile possessed by emollient of different

manufacturers. Results showed that the properties of the polyol-ester based emollients are at par with several commercial emollients at five different attributes consisted in the established sensory profile.

Dr. Khuzaimah Arifin

Photoelectrochemical hydrogen production of TiO2/CoS composite

Photoelectrochemical (PEC) water splitting has been considered as the ideal method to produce hydrogen gas. Both water and sunlight as the hydrogen source and the energy are free, abundant and available everywhere. The challenge is difficult to find the materials that fulfill the PEC water -splitting requirement. TiO2 is one of the most investigated material because of photoactive, cheap and chemically stable. However, the wide bandgap of TiO2 around 3.2 eV causing the photoexcitation product electron and hole are easy to recombine, and the sunlight energy that can be utilized limited to ultraviolet energy. Few approaches have been used to overcome this problem; one of them is by making composite with other semiconductor material. In this study, a composite of TiO_2 with CoS have prepared by the hydrothermal method assisted ball milling crushing process. Two variations of TiO2/CoS composite that is 90/10 and 80/20 have been used. The XRD and Raman analyses confirm the presence of the TiO2 and CoS in the composite. The LSV test shows that the photocurrent produced by both TiO2/CoS composites higher than those TiO2. The composite of 80/20 given the highest photocurrent about eight-folds compared to the TiO2 bare. The highest hydrogen generation rate also produced by the sample of 80/20 with amount 0.4 μmolh-1g-1 after 30-minute photocatalytic process.

Mrs. Hazira Binti Ngah

Carbohydrate-based Amphoteric Surfactant for Improved Mildness and Consumer Benefits for Body Wash Formulation

Surfactants are the main component in body wash products as their function is to remove dirt and gems besides to boost foams. The right choice of surfactant in formulating a personal care product is very important to avoid skin dryness, improve mildness, and minimize cutaneous damage by surfactant, since it may damage protein structures and solubilize lipids. This paper studies on the effect of three types of amphoteric surfactants, which are cocoamidopropyl betaine (CAPB), cocoamidopropyl hydroxysultaine (CAHS), and alkyl polyglucoside (APG) sultaine, in body wash application. Three body wash formulations were developed using these surfactants at 10 wt% of surfactant concentration. These formulations were then evaluated for their mildness, foaming behavior, and stability test. From the results, APG sultaine passed all evaluation tests with the lowest value of below 2.0% solubility for mildness, which shows that APG sultaine gave the lowest skin irritation, compared to CAPB and CAHS.

Mr. Mohd Azam Mohd Adnan

Effect of concentration of MnO2 On the formation of MnO2/ZnO thin films and its degradation towards malachite green

This study focusses on fabrication MnO2/ZnO thin films using chemical bath deposition (CBD) technique. The effect of concentration of MnO2 on the thin film at second stage was studied. Thus, several tests were conducted to study the thin films such as FESEM, EDX, photocatalytic activity, thermal insulation test and wettability contact angle (WCA) test. Two-stage CBD method was used in fabricating the thin films which improved the thin films properties compared to single-stage CBD. The performance of thermal insulation is promising due to the fabricated thin film proved that it has the thermal insulation property that reduced 9.2% from normal glass window. The outcome for photocatalytic activity indicates that the thin film managed to degrade 10 ppm of malachite green (MG) with 6.45% of degradation. The wettability contact angle (WCA) test showed an improvement

in contact angle (CA) to the thin film surface with average CA of 14.45°. In conclusion, by comparing all the findings, the best finding was Zn 12% ratio of MnO2/ZnO nanocomposite thin film.

Ms. Rose Fadzilah Abdullah

Synthesis of Biomass Based Bi-functional Catalysts for Biodiesel Production from Waste Cooking Oil

Hydrothermal carbonization (HTC) provides alternatives technique to produce a nanosize activated carbon from biomass with a high surface area. Herein, this study we evaluated the HTC technique as pretreatment to produce high surface mesoporous empty fruit bunch-based activated carbon (EFBHAC). The activated carbon was then functionalized with K2CO3 and Cu(NO3)2 to produce a bifunctional nano-catalyst for simultaneous esterification-transesterification of waste cooking oil (WCO). The physico-chemical properties were performed i.e. N2 sorptions analysis, TPD-CO2/NH3, FESEM, EDX, FTIR and XRD analysis. The results revealed that the produced EFBHAC possessed a BET surface area of 4056.17 m2 g-1, with pore volume of 0.827 cm3 g-1 and 5.42 nm of pore diameter resulting from hydrolysis and dehydration decarboxylation, aromatization and re-condensation during HTC process. Impregnation of EFBHAC with K2CO3 and Cu (NO3)2 granted a high amount of basicity and acidity of 9.21 mmol g -1 and 31.41 mmol g-1, respectively, accountable to high biodiesel yield of 97.1 %, produced at the optimum condition of 5 wt.% of catalyst loading, 12:1 of methanol to oil molar ratio at 70 °C for 2 h. More than 80 % of biodiesel was produced after the 5th cycle depicted the good reusability. The transformations from WCO to biodiesel was confirmed via 1H-NMR, FTIR and TGA analysis. Fuel properties revealed kinematic viscosity of 3.3 mm2 sec-1, cetane number of 51, flash point of 160.5 ° C, cloud and pour point of 11 °C and -3 °C, respectively, have potential usage in cold region countries and also within the limit of ASTM D6751. These results show the excellent potential of waste materials to prepare bifunctional nano-catalysts to produce higher biodiesel yield which has potential to be commercialized.

Dr. Rasha M Sheltami

An overview on the adsorption of organic dyes onto graphite and grapheme

Cellulose extracted from mengkuang leaves (Pandanus tectorius) was used in this research for the preparation of cellulose nanocrystals (CNC). Sulfuric acid (60 wt%) hydrolysis was carried out over different time to produce nanocrystals. The effects of hydrolysis time on the morphology, chemical structure and crystallinity index of CNC were investigated using transmission electron microscopy (TEM), Fourier transform infrared spectroscopy (FTIR), and X-ray diffraction (XRD). The results displayed that the acid degradation process starts via expanding the cellulose chains and the degradation process is dependent on the time of hydrolysis as well as the crystalline domains of cellulose fibres. FTIR results showed that no change in the chemical structure of the nanocrystals during the hydrolysis reaction. The results demonstrated that the optimum hydrolysis time to produce cellulose nanocrystals from mengkuang cellulose, with crystallinity index about 74% and aspect ratio of 15, was 45 min at 45 °C using 60 wt% H2SO4.

Invited Speaker 10
Dr. Nurul Aida Binti Mohamed

Electrodeposition of BiVO4 with Needle-like Flower Architecture for High Performance Photoelectrochemical Splitting of Water

Photoelectrochemical (PEC) water splitting is a green and sustainable approach capable of driving mass hydrogen production in the future. To realize this vision, development of a well-performing photoelectrode is highly demanded. In this comprehensive study, electrodeposition technique was applied for fabricating BiVO4 films by regulating the deposition time from 1 min until 9 min. Interestingly, the morphology, crystallinity, chemical structure, and optical properties of BiVO4 films depend strongly on

the deposition time. It is found that BiVO4 layer deposited for 7 min with a cross-section thickness of around 321.1 - 326.5 nm showed the optimum performance, whereby the photocurrent reached up to ~ 0.32 mA/cm-2 at 1.23 V vs. RHE. The deposited BiVO4 forms tiny and long petals like a \\\"needle\\\" nanostructures which embedded closely into compact agglomerates. Such morphology enables the BiVO4 films to perform efficiently as photoanode in PEC cells. Besides, high crystallinity as detected from the sharp peak intensity of XRD and Raman analysis as well as good light absorption capability as observed in UV-Vis spectroscopy are the main contributors to the enhancement of PEC cells. In addition to the facile fabrication offered by electrodeposition method, the non-toxic attribute and the impressive PEC performance of the optimum BiVO4 layer could serve as an interesting option for other applications such as gas sensors, solar cells, degradation of pollutants and photocatalytic water splitting.

Ms. Syabilah Sazeli

Synthesis and Antioxidant Study of New Semicarbazide and Thiosemcarbazide Derivatives with Appl cation on Synthetic Lubricant Oil

New multipotent antioxidants (MPAOs) series, namely semicarbazides and thiosemicarbazides bearing thiolated butylated hydroxyphenyl (BHP) were synthesized by a simple reaction between acid hydrazide and aryl isocyanates, and isothiocyanates, respectively. The antioxidant activity of synthesized compounds was evaluated by using in vitro DPPH assay. Compounds containing thiosemicarbazides (5a'-h') were found more active in free radical scavenger than semicarbazides (5a-h). Among the other compounds, compound 5f' (IC50 of 25.47 ± 0.42 μM) showed the best antioxidant activity against DPPH radical compared to the widely used standard antioxidant BHT. High radical scavenging properties of thiosemicarbazides might be attributed to antioxidant synergism and thioamide-thioimidic acid tautomerism. Based on DPPH results, compound 5f' and its corresponding semicarbazide 5f were blended into trimethylolpropane trioleate (TMPTO) as synthetic lubricant oil with 0.25 wt.% and were carried out for isothermal differential scanning calorimetry (DSC) at 125 oC and 150 oC to investigate the oxidative stability of blended synthetic lube oil. At 125 oC isothermal DSC, TMPTO with 0.25 wt.% of 5f' showed 1.5 times higher oxidation stability than its corresponding semicarbazide 5f and two times better than BHT. It was anticipated that due to the strong auto-synergistic effect, compound 5f' showed promising oxidative stability to TMPTO by protecting from pre-mature oxidative degradation.

Mrs. Noorsaiyyidah binti Darman Singho

Recent Advances on Ag/Fe3O4/ Graphene Ternary Nanocomposites

Ternary nanocomposites have been widely used in a number of applications including wastewater treatment, renewable energy, photocatalytic and magnetic activities owing to their peculiar characteristics. Indeed, ternary nanocomposites display multifunctional intrinsic properties that generate new properties not found in single nano-components and therefore can produce an efficient hybrid nanocomposites with high activity. These excellent combinations of properties have led to an increasing number of works focusing on ternary nanocomposites. Along these lines, the present work attempts to provide an overview on the current advances on the ternary nanocomposites. Three scientific databases are consulted in order to collect relevant published papers: Web of Science, Scopus and Google Scholar, with special emphasis being laid on works related to Ag/G/Fe3O4 ternary nanocomposites. The collected papers are analyzed with the objective to identify the current trends and challenges along with future needs in the study of Ag/G/Fe3O4 ternary nanocomposites.

ABSTRACT

Prof. Dr. Andanastuti Binti Muchtar

Feasibility of Ni-Cu-Mn spinel as a catalyst for biogas fuelled solid oxide fuel cells: An Overview

The fuel flexibility of solid oxide fuel cells (SOFCs) enables the device to utilise hydrocarbons in biogas as fuel for generating electricity with low carbon emissions. Biogas is extensively produced from various feedstocks, such as wastewater treatment plants and agriculture organic waste. The combination of SOFC technology and feedstocks is ideal for waste management and as a sustainable energy source. However, the performance of SOFCs is low and unstable without a support catalyst to reform the biogas into working fuels (e.g., H2 and CO2). Transition metals, such as Ni, Cu, and Mn, are known to have the catalytic ability to reform biogas and are widely used as protective coating materials for interconnect components. The presence of a support catalyst on the interconnects in addition to anode components may lead to a high surface area for biogas reformation, which can increase the efficiency of SOFCs. Thus, this review aims to elucidate the feasibility of Ni-Cu-Mn spinel as a catalyst for biogas reforming.

Invited Speaker 8
Dr. Ruhaida Rusmin

Insight Into Structural Features Of Magnetic Kaolinite Nanocomposite And Its Potential For Methylene Blue Dye Removal From Aqueous Solution

An in-depth understanding on the structural features of engineered magnetic adsorbent is important to correctly forecast its environmental transformation in aqueous medium. A magnetic kaolinite nanocomposite (MKN) was prepared via co-precipitation method with three different kaolinite: iron mass ratio denoted as MKN1:1, MKN2:1 and MKN 5:1. The morphology and structural features of the magnetic composite were systematically investigated using techniques such as Fourier Transform Infrared spectroscopy (FTIR), Scanning Electron Microscope (SEM), surface area analysis, Vibrating Sample Magnetometer (VSM), and zeta potential measurement. The removal efficiencies of the adsorbent for Methylene Blue (MB) dye were studied in batch method as a function of pH and initial concentration. MKN1:1 demonstrated the highest magnetisation susceptibility (Ms) of 35.9 emu/g with almost four-fold-increase in specific surface area as compared to the pristine kaolinite. Preliminary experiment reveals that all MKNs showed almost 100% removal of MB at low initial MB concentration (< 50 ppm). A slight reduction of MB removal by MKN in contrast to the pristine kaolinite could be due to the accumulation of iron oxide aggregates on active sites, yet the MKN demonstrated an easy separation of spent adsorbent via external magnetic field. This research gives an insight on the structural features of magnetic clay for future study on its transformation and fate in contaminated water.

Invited Speaker 11
Assoc. Prof. Dr. Juan Joon Ching

Highly Active Oxygen Vacancies of Nickel doped SrTiO3 as Cathode for Rechargeable Alkaline Zinc Battery

Although Li-ion batteries (LIBs) possess remarkably high energy density than other batteries, it suffers from safety concerns and high cost of raw materials. Therefore, Li-ion free batteries are widely investigated to replace the LIBs. Rechargeable alkaline zinc batteries (RAZBs) are promising aqueous battery due to the low cost, non-toxic, and intrinsic safety of Zn metal as the anode. However, metal oxide cathode has the demerits of poor discharge capacity and energy density, resulting in low energy density of RAZBs. In this study, Nickel doped SrTiO3 (Ni-STO) and pristine STO are successfully synthesized and used as cathode for RAZB. Ni-STO reaches the highest discharge capacity of 596 mAh cm-3 (2 mA cm-2) with energy density of 68 mWh cm-3. The discharge capacity of Ni-STO is 1.5 times higher than that of pristine STO as cathode. This proven that the formation of oxygen vacancies

(Vo □) after doped with nickel play an important role. The presence of Vo □ provide more charge storage sites and also enhance the electric conductivity which facilitates the diffusion of ions/electrons. Based on the charge-transfer resistance, the electrical conductivity of Ni-STO has improved 79% from the 7.8 to 1.6 Ω. This outstanding performance of Ni-STO as cathode has benefited RAZBs.

Invited Speaker 12
Assoc. Prof. Dr. Norazilawati Muhamad Sarih

Synthesis of poly(triazine-co-pyrrole) as a conjugated microporous polymer for carbon capture application

A series of conjugated microporous polymers (CMPs) were synthesized under iron(III) chloride catalyst oxidative polymerization between 2,4,6-tris(5-bromothiophene-2-yl)- 1,3,5-triazine (triazine) and pyrrole, followed by the utilization for carbon dioxide (CO2) capture application. The polymerization was proceeded at room temperature and subsequently by solvothermal condition to form a microporous network with three ratios of monomers of triazine and pyrrole. TPCMP1, TPCMP2 and TPCMP3 were the three copolymers synthesized with triazine : pyrrole ratios; 1:1, 2:1 and 1:2 respectively. Based on the morphological analysis using Brunauer-Emmet-Teller (BET) isotherms, the highest surface area of 556 m2 /g was given by TPCMP2 resulting in the lowest average pore diameter of 2 nm. Moreover, the studies of CO2 adsorption at 298 K/1 bar illustrated a correlation pattern to the BET analysis which gave the maximum adsorption of 1.09 mmol/g by the same copolymer.

Invited Speaker 14
Dr. Marlinda Binti Ab Rahman

Electrical properties based on low content of graphene filler in natural rubber/graphene composites

Natural rubber/graphene (NR/G) composites with low graphene content are successfully produced by a simple mixing method. The presence of a small amount of graphene in the NR matrix dramatically affects the properties of G composites, which is ascribed to the efficient dispersion of graphene in the NR matrix. The strong rubber-to-filler bonding increased the interfacial interaction between graphene and NR matrix, resulting in better electrical properties performance. This finding indicates that incorporating a low percentage of graphene into the NR/G composites has significantly improved the composites morphology, optical and electrical properties.

Invited Speaker 15
Ir. Ts. Dr. Lai Chin Wei

Modified titanium dioxide nanomaterials and its potential photocatalysis related applications

Environmental problems have drawn much attention owing to rapid population growth and accelerated economic development. For instance, photocatalysis, "a green technology", plays an important role to solve energy and environmental problems. Recently, many efforts have been devoted to improving visible-light photocatalytic activity by using titanium dioxide as a photocatalyst as a result of its wide range of applications in the environment fields. However, fast charge recombination and an absorption edge in the UV range limit the photocatalytic efficiency of titanium dioxide (TiO_2) under visible-light irradiation. Many investigations have been undertaken to overcome the limitations of TiO_2 and, therefore, to enhance its photocatalytic activity under visible light. The present study will discuss a simple and effective strategy to promote the charge carrier's separation efficiency of electron–hole pairs and to shift the absorption edge of TiO_2 to the visible region. The photocatalytic activity of resultant samples using the organic dye degradation studies will be investigated in detail. We believe that this study will help in the development of new strategies to improve the visible-light photocatalytic performance of TiO_2 -based materials further.

Invited Speaker 13
Prof. Dr. Asad Ali

Trends in desalination research for energy efficient and low-cost water

Over the span of last few decades various desalination technologies have been evolved. Among all available technologies of desalination, industrially appreciable technologies are reverse osmosis, multi effect distillation and multi stage flash distillation. All other technologies are still categorized under emerging technologies owing to no substantial applications in the real world. The main aim of this study is to first compare industrially available desalination technologies by employing analytical hierarchy process (AHP) to identify energy efficient and low production cost technology. For comparative analysis, eight parameters are selected and mapped for implication of APH followed by construction of decision matrix. All the parameters are ranked and prioritized for their importance by constructing normalized comparison matrix. It is inferred that energy demand, portable water cost and amount of CO2 released in the process are dominant factors. The results of AHP proves that reverse osmosis is best available technology for desalination. In the second phase of this study, research trends in the of desalination are mapped out by conducting quantitative analysis of desalination literature published in last 30 years. The data analysis of yearly publications reveals that desalination has got much attention after 2000. The era of three decades before 2000 and two decades afterwards contributes 5.25% and 95.4% in total publications on the topic of desalination. Text mining technique is used to determine most frequently used keywords by authors. A total of 22871 keywords were extracted. The basic criteria for selection of frequently occurring keywords was set to minimum of 50 occurrences. Only 0.5028% (115 words) meet the criteria. From this analysis it is inferred that most emerging areas of the desalination research are reverse osmosis optimization, graphene implications, interfacial polymerization, capacitive deionization, carbon nanotube implications and antifouling techniques. In this way, this study spots the hot research topics of the field to provide a stepping stone for future research.

Dr. Nur Eliyanti Ali Othman

The Effect of Different Concentration of Sodium Hydroxide On Carboxymethyl Cellulose Properties

Carboxymethyl cellulose (CMC) is a versatile polymer derived from cellulose, most common natural polymer. The source of cellulose can range from woods, cottons to even agriculture waste. CMC is important as its water soluble, where have been used in food industry, pharmaceutical, detergent, drugs, cosmetics, textile, paper and as well as oil drilling operation. α-Cellulose extracted from oil palm empty fruit bunch (OPEFB) was used as a raw material for the production of different grades of carboxymethyl cellulose (CMC). The objective in producing different grades of CMC is to diversify the applications in varieties products as mention earlier. The important parameter for the preparation of different quality and the grade of CMC is concentration of sodium hydroxide (NaOH) used during mercerization process. Presence of NaOH will enhanced the reactivity of cellulose towards chemical reaction with monochloroacetic acid (MCAA). Preparation of CMC from cellulose was carried out by an etherification process, using different concentration of NaOH (25-40% v/v) and monochloroacetic acid (MCAA), with isopropanol as the supporting medium. The properties of resulting CMC were determined according to ASTM D 1439-03. From results, the content of CMC moisture ranged from 8.27% to 13.45% while the purity of all CMC produced was 90% and above. In addition, the chemical structure of resulting CMC were found comparable to standard CMC based on FTIR spectra. Different concentration of NaOH tended to produce different CMC characteristics and properties. This palm based CMC has huge potential for future green-chemical demand since it is being produced from renewable resource and it is sustainable.

ABSTRACT

Ms. Salwa Jamal M Kamal

Mesomorphic And Optical Studies Of Azo-Ester Materials: Effect Of Lateral Fluoro And Terminal Substituents

A series of azo-ester linked three-benzene-ring mesogen containing fluoro lateral substituent at the 2-position to the azo linkage with 2-methylbutoxy group on the terminal side was designed, while the other terminal substituent alternatively changed between electron-donating and electron-withdrawing group (i.e. -H, -OCH3, -OC4H9, -Br and -NO2). The chemical structure of the synthesized compounds was determined by FT-IR, 1H and 13C NMR spectroscopy. The mesomorphic behaviours of all compounds were investigated by differential scanning calorimetry (DSC), polarizing optical microscopy (POM) and small-and wide-angle X-ray scattering (SWAXS). The introduction of the lateral fluorine group on the mesogenic core exhibited a decrease in the nematic mesophases thermal stability compared with the unsubstituted analogues. Meanwhile, the terminal nitro substituent analogues showed higher mesophase stability compared to the other terminal-substituted analogues. Thermogravimetric analysis revealed that the investigated compounds exhibited excellent thermal stability. UV-Vis study displayed a broad absorption band (λmax) around 300–425 nm, whereas in fluorescence spectra blue emission was observed for all liquid crystal derivatives and was red-shifted with the incorporation of terminal nitro-substituents.

Ms. Nurul Hazierah Kamaruddin

Synthesis, characterization, and antibacterial activity investigation of silver nanoparticle coated graphene oxide thin film

Antibiotic resistance phenomenon is an alarming problem in healthcare today. A practical solution needed to overcome emergence of widespread antibiotic resistance in disease-causing bacteria. In recent years, studies have reported on the silver nanoparticles as a promising antibacterial surface that can disrupt bacteria. In this work, silver nanoparticles (AgNPs) were deposited on graphene oxide (GO) by the thermal evaporation using home built hot wire chemical vapor deposition (HWCVD) system. The structural, compositional and optical properties of the nanoparticles were evaluated using the Field Emission Scanning Electron Microscopy (FESEM), Raman spectroscopy, and UV-visible spectroscopy techniques, respectively. The AgNPs-GO films showed well defined spherical shape. The FESEM studies indicated the formation of spherical nanoparticles in the size range of 15–20 nm. The UV-visible spectroscopy and Raman studies confirmed the formation of AgNPs on GO. The AgNPs-GO were tested for antibacterial activity against Gram-positive (Staphylococcus aureus) and Gram-negative (Escherichia coli) bacteria strains by the agar-well diffusion method. The diameter of the zone of inhibition (ZOI) determines the effectiveness of the antibacterial activity. The ZOI results exposed that the synthesized nanoparticles exhibit antibacterial activity against both bacterial strains, indicating the future potential of the material in biocidal applications.

Mr. Abdul Khaliq bin Mokhtar

Synthesisation Of Polymer-Grafted Gold Nanoparticles Via Gamma Radiation

Polymer grafter gold nanoparticle-based (P-AuNP) is a promising agent in theranostic field, catalysing tumour injury while be able to be tracked inside organism via CT scan and other diagnostic imaging. It is also appreciated for its unique biocompatibility and physical characteristics in human body. Nevertheless, the complex steps of synthesising P-AuNP via chemical processes and delivery of optimum concentrations of AuNP to the targeted tumour remains a great challenge to administer into biological system without taking into account of biotoxicity of AuNP. Hydrogen tetrachloroaurate is reduced to gold nanoparticles (AuNPs) by methanol. AuNP with approximately 10 nm in size were grafted with

polytetrafluoroethylene (PTFE) and poly (methyl methacrylate) (PMMA) using gamma radiation to form a corona structure around it forming P-AuNP. In order to confirm the formation of P-AuNP, the viscosity and thermogravimetric analysis (TGA) characterisation were used. This approach of grafting polymer to AuNP backbone via gamma radiation is a novel approach to synthesis P-AuNP and eliminating the use of toxic chemical in conventional method of synthesising AuNP via chemical approach.

Ms. Nurul Azri Khalisah Aznan

Effect of Graphene and Graphene Oxide to Polyvinylidene Flouride (Pvdf) For Biomaterials

Polyvinylidene (PVDF) has received much attention and generated considerable interest among the scientific community involved in polymer science due to its excellent piezoelectric and pyroelectric properties. The β-phase content is of prime importance in these properties so that increasing β-phase content of the polymer has always been of great concern. Graphene (G) and graphene oxide (GO) were used as nanofillers to promote the formation of β-phase. FTIR spectra show the appearance of β-phase in the samples of thin film PVDF-G and PVDF-GO produced using solution mixing technique.

Dr. Chee Chin Fei

Regioselective C-H Oxygenation of Anthraquinones

Anthraquinones are the most widely studied organic redox active species that soluble in aqueous solutions. These organic molecules are essential for redox flow battery to function properly. Redox flow battery is rechargeable electrochemical energy storage device that utilises the oxidation and reduction of two soluble electroactive species for charging (absorbing energy) and discharging (delivering energy). It solves the mismatch between the intermittent supply of renewable energy resources and their variable demand. However, recent development of anthraquinone-based redox flow battery has been stagnant due to lack of a method to produce hydroxylated anthraquinones, such as 1,8-dihydroxy-9,10-anthraquinone-2,7-disulphonic acid (compound 1), that has been shown to possess excellent electrochemical properties. Most of the anthraquinones discovered are either prepared from multi-steps synthesis or rely on natural products isolation. Both these processes are tedious and unproductive. In this work, our aim is to develop a new method for direct hydroxylation of anthraquinones. Specifically, hydroxy group will be introduced at the ortho position(s) of anthraquinones by using inexpensive and environmentally benign reagents via C-H activation approach. This method avoids multiple-steps synthesis, the use of hazardous oxidants, and cost effective. Preliminary findings will be discussed.

Keynote Session 4
Prof. Dr. Volker Hessel

Economic and environmental assessment of small-scale plasma-assisted ammonia production pathways – 'at-Farm'

Ammonia synthesis using the Haber-Bosch (HB) process is one of the most important inventions of the last century due its contribution to agriculture. Yet, this process requires a lot of energy and releases carbon emissions since hydrogen input is obtained by steam methane reforming and the reaction performed in harsh conditions. In addition, given that this process highly depends on non-expensive natural gas, ammonia production is concentrated in few countries at large-scale plants, adding emissions due to transportation. Distributed plants next to farmers can reduce these impacts, as well as reduce large storage needs, shortage risks and price volatility of imported fertilizers, promote local employment and bespoke production. Mini HB plants have been proposed, but they still need high pressure and heat, mainly produced by fossil sources. A proposed alternative is a non-thermal (NT) plasma reactor operating under ambient conditions, using only electricity. Yet, this technology has only reached energy efficiencies below 20%, whereby its high electricity consumption makes it more expensive than the conventional pathway. The feasibility of these emerging technologies can be promoted by the internalization of environmental benefits of its products life cycles in their economic analyses. In this sense, a life cycle assessment of different ammonia production pathways is performed in order to quantify, from cradle-to-utilization, credits of

avoided emissions in the production, storage and transportation phases, by-products utilization, use of local renewable resources, reduction of product wastes, and soil beneficiation. Different scenarios are analysed for centralized and distributed ammonia production in Australia for the conventional large-scale HB process, alternatives using mini-HB reactor supplied by hydrogen from water electrolysis and thermal plasma methane pyrolysis, and the NT plasma-assisted synthesis supplied by water electrolysis, using different renewable energy sources according to the location. The best energy sources and plant configurations for each environmental impact category would be identified and their characterized results monetized and internalized in costing analyses for each alternative, which can contribute to the deployment of green ammonia distributed production.

Keynote Session 4
Distinguished Prof. Dr. Lakshmi Kantam Mannepalli

Development of efficient catalysts for sustainable chemical industry

Catalysis is a highly demanded technology for sustainable society and drives innovation in many other fields. The impact of catalysis and catalysts is substantial. Today over 90 % of all industrial chemicals are produced with the aid of catalysts. World catalyst demand is forecast to grow to $34.1 billion in 2025 and earlier global sales of catalysts is around 20.6 billion dollars. The catalysis of organic reactions by homogeneous and heterogeneous catalysts Remains a vibrant field of scientific inquiry. It attracts a diverse group of scientists with specialties spanning synthetic organic chemistry, inorganic chemistry, surface science, material science, reaction engineering and computational modeling.

Bio-compatible materials as supports and catalysts: Hydroxyapatite (HA) is a hydrated calcium phosphate material, which is an important biomaterial because of its similarity to the mineral component of mammalian bone. We have utilized these materials and their metal exchanged materials as catalysts for C-C and C-N coupling reactions. Similarly, hydrotalcites, anionic clays and the metal exchanged hydrotalcites have successfully applied in C-C coupling, C-H activation and oxidation reactions. Reactive nanocrystalline metal oxides are newly discovered materials that could change dramatically the way these organic transformations are carried out where the acidic/base properties and the catalytic activities are closely related to the size and morphology of the oxides. Heterogeneous catalysts in the form of nanosize transition metal particles dispersed onto microporous supports have been applied to chemical conversion technologies for many decades. We have been exploiting different nanocrystalline metal oxides (ex., MgO, CuO, ZnO, TiO_2 etc.) prepared by Prof. Klabunde for a number of organic reactions viz., Claisen-Schmidt, Wadsworth–Emmons, Wittig, aldol, asymmetric epoxidation, Henry, Michael, and hydrosilylation reactions etc. Highly basic nanocrystalline magnesium oxide stabilized palladium(0) catalyst has been prepared by counterion stabilization of $PdCl_4^{2-}$ with nanocrystalline MgO followed by reduction and used in the Heck reaction of haloarenes. This catalyst is also proved to be very efficient in the reduction of aromatic and aliphatic nitro compounds to their corresponding amines under ambient conditions. Overview of our work on the design and development of catalysts for green, and economical processes & technologies for chemical industry will be presented.

Keynote Session 4
Prof. Dr. Wan Jeffrey Basirun

Nanocellullose for electrochemical applications

Nanocellulose which is derived and extracted from biomass is an emerging biopolymer which has seen wide applications in biomedical and materials engineering due to the amazing physicochemical characteristics. The enhanced electronic conductivity of nanocellulose composites with graphene, conducting polymers such as polyaniline and polypyrrole, has witnessed applications as supercapacitors in energy storage devices. The applications of nanocellulose as membranes in primary energy storage devices such as lithium ion batteries and solar cells, in addition as anti-corrosion additives in paint coatings and recently as modified electrodes for electrochemical sensing of biological compounds are presented. The presence of OH groups in nanocellulose provides more binding sites for different analytes, which also conforms to the high specificity of the sensing material towards the target analyte detection.

ABSTRACT

Dr. Rida Tajau

Targeted breast cancer therapy utilising copolymer nanoparticles derived from palm oil

Palm oil is a natural resource that has sparked interest in the production of polymeric nanoparticles attributed to its biodegradable and biocompatible advantages as compared to synthetic-based polymers. The synthesis of palm oil-based nanoparticles utilising radiation processing has emerged as a successful and viable technology in the manufacture of smart nanoparticles, with a promising future as a biomaterial that can guarantee affordable costs, bioavailability, and biodegradability in biomedical applications. This study had attempted to synthesize a palm oil-based cross-linked-nano-copolymer from acrylated palm olein (APO) and polyol ester via gamma radiation-induced reversible addition-fragmentation chain transfer (RAFT) polymerization. These poly(APO-b-polyol ester) nanoparticles were found to have good biodegradability, spherical particle diameters less than 300 nm, specific targeted delivery, and a drug diffusion-controlled mechanism in the physiological environment. These properties revealed that the nanoparticles obtained had the opportunity to support the development of nanostructures for targeted drug delivery systems in cancer therapy.

Dr. Fadhlina Che Ros

The Bulk and Microwave Properties of CaTa4O11 and Solid Solutions Ceramics

CaTa4O11 solid solutions, CaTa4-xNbxO11: $0 \leq x \leq 2$ have been successfully synthesised using conventional solid state reaction method and produced phase pure hexagonal of α-U3O8-type structures which were fully indexed on hexagonal unit cell, space group P6322 at room temperature. The electrical properties carried out at low temperature ranges 10 K – 320 K show that the capacitance data are independent of temperature and frequency over the entire measurement range for all compositions. At high temperatures ranges 25 oC - 800 oC, the permittivities are in the range $33 \leq \varepsilon' \leq 44$ and increased with the increasing Nb content. The frequency-independent of capacitance at high frequency behaviour resulted to the estimation of bulk permittivities in the range 32.5 – 44 for $x = 0$, 1 and 2. Microwave properties of these samples indicated that bulk permittivities obtained at 1 MHz and GHz are very different. The values of Qf and Tf were obtained and the values increase with the increasing Nb content.

Ms. Khairul Zakirah Binti Abu Bakar

A systematic review on the physicochemical and adsorption properties of activated carbon synthesized from different biomass for dye removal application

Activated carbon is a material made up of a highly porous structure used for various applications due to its high adsorption properties. The production of activated carbons can be sourced from various materials made up of enough carbon, including biomass wastes. The abundant wastes generated by the agricultural sector in Malaysia have been converted into activated carbons for toxic dye removal application in the wastewater treatment process of the textile finishing industry. This systematic review describes the trend of study in the production of activated from various biomass, specifically coconut shell, rice husks, and bamboo for dye removal application. The review also discusses the synthesis procedures and relationship between the physicochemical properties of the synthesized activated carbons (e.g., surface area, pore size and volume, composition, etc.) to the adsorption properties (adsorption performance and isotherm, recovery, etc.) of dye in wastewater (i.e., methylene blue). Data acquisition and extraction from online databases (ScienceDirect, Lens.org, Scopus) were performed systematically and concisely to get reliable recent articles for the

ABSTRACT

study. This systematic literature review could be a guideline for researchers and manufacturers to understand the correlation between the synthesis procedure to the physicochemical properties and the performance of the activated carbon in the removal of dye in wastewater. The study also highlights the significance of activated carbon as a low-cost value-added product that can solve the problem of solid waste management of biomass in the agricultural industry.

Mr. Teguh Riyanto

Palm oil conversion to hydrocarbon-rich biofuels over Co and Mo modified ZSM-5 catalyst

Palm oil conversion to biofuels through catalytic cracking is still challenging, especially in catalyst development. A highly selective catalyst in hydrocarbon is needed in the catalytic cracking of palm oil. Therefore, the purpose of this study is to investigate the effect of metals (Co and Mo) impregnation to ZSM-5 catalysts on the catalysts' performance for palm oil cracking to produce high-hydrocarbons-content biofuels. The metals were impregnated to ZSM-5 catalyst using the wet-impregnation method. The catalysts were characterized using X-ray diffraction (XRD), Brunauer–Emmett–Teller (BET), and Pyridine-probed Fourier-transform infrared (Py-FTIR) spectroscopy methods. The catalysts were performed to convert palm oil to biofuels in a fixed-bed catalytic reactor. In order to determine the composition of the liquid product (biofuels), it was analyzed using a gas chromatography-mass spectrometry (GC-MS) method. The result showed that the impregnation of Co and Mo on the ZSM-5 catalyst decreased the catalysts' surface area due to the pore blocking by metals. In addition, the Brønsted to Lewis acid site ratio (B/L ratio) of the catalysts decreased after Co and Mo impregnation. Interestingly, the co-impregnation of Co and Mo to ZSM-5 highly increased the B/L ratio; however, the total acid site amount decreased. It was obtained that by utilizing Co and Mo-modified ZSM-5 catalysts, the yield of biofuels decreased from 67.57% to 41.35% due to the high acid site amount. Interestingly, the hydrocarbons selectivity increased from 86.20% to 93.09%. The increase in hydrocarbon selectivity was due to acid site distribution which was represented by the B/L ratio. It was concluded that the catalyst with a low B/L ratio has high activity in hydrocarbon-rich biofuels production through the palm oil cracking process.

Ms. Shamala Gowri Krishnan

Esterification reaction catalyzed by oil palm EFB supported magnetic catalyst: optimization using response surface methodology

Biomass, renewable, abundantly available and a good source of energy. The conversion of biomass waste into valuable products has received wide attention. In this study, oil palm empty fruit bunch (oil palm EFB) supported magnetic acid catalyst for esterification reaction was successfully prepared via the in-situ impregnation process. The new magnetic catalyst achieved a higher surface area of 188.87 m2/g with total acidity of 2.4 mmol/g and was identified the presence of iron oxide as γ-Fe2O3. The magnetization value of 24.97 emu/g demonstrated that the superparamagnetic catalyst can be easily recovered and separated after the reaction using an external magnet. The catalytic performance of oil palm EFB supported magnetic acid catalyst was examined by esterification of oleic acid. Esterification process parameters were optimized via the Response Surface Methodology (RSM) optimization tool with Box-Behnken design (BBD). The following optimum parameters were determined: an amount of 9 wt% catalyst, the molar ratio of methanol to oil of 12:1, the reaction time of 2 h and reaction temperature of 60oC with a maximum conversion of 94.91% was achieved. The catalyst can be recycled up to five cycles with minimal loss in its activity. The oil palm waste-based magnetic acid catalyst indicates that its potential replacement to the existing solid catalysts which is economical and environmentally friendly for the esterification process in biofuel applications.

ABSTRACT

Ms. Nur Fathin Amirah Binti Shafie

Thermo-Responsive Drug Delivery System: The Role Played by 2-Dimethylamino Ethyl Methacrylate (DMAEMA) Concentration

The utilization of smart drug-delivery systems based on stimuli-responsive polymers are widely studied recently due to their leads in the controlled release of anticancer drugs in response to induced stimuli. Briefly, this contributions main principle is to investigate the influence of the incorporated 2-Dimethylamino Ethyl Methacrylate (DMAEMA) concentration on the temperature sensitivity of the resulted nanogel. A series of nanogel based on N-Isopropylacrylamide (NIPAAM), 1-Vinyl-2-Pyrrolidinone (PVP), Polyethylene Glycol Diacrylate (PEGDA), and DMAEMA were designed, prepared, and synthesized via random copolymerization by using gamma radiation-induced polymerization. The characterizations of the resulted nanogels were demonstrated by dynamic light scattering (DLS) and Zeta Potential measurements. A decline in P(NIPAAM-PVP-PEGDA-DMAEMA) nanogels size at the elevated temperature indicated that temperature contributed to the swelling of nanogel thus initiating encapsulated drugs above the LCST. The nanogel shows a promising material system and has great potential in the drug delivery system as higher DMAEMA concentration seems to encourage the formation of nanogel and the shrinkage at the same formulation.

Ms. Atiena Husna binti Abdullah Ripain

TLM analysis of metal contacts for 2D MoS2 nanoflakes deposited by chemical vapour deposition-free technique

In the past decade, two-dimensional (2D) nanomaterials are gaining significant attention due to their novel properties in electrical, optical, mechanical which is different from their bulk forms. Therefore, it becomes one of the most promising materials for sensing application. However, to connect the 3D world with 2D materials require excellent communication links which is a contact that renders remarkable electrical properties and specifically 2D nanomaterials based sensor has been suffering from high resistance and low sensitivity due to the loss caused by poor contact between the 2D nanomaterials and interface. This work explores one of the best strategies in reducing the Schottky barrier height by using different type of metal contacts. The behavior of different metals (silver and gold) contacts to 2D MoS2 nanoflakes deposited on Si substrate by spray coating technique are observed. The metals are chosen based on the work function relative to the electrons affinity, χ of MoS2. TLM analysis is carried out to investigate the electrical behavior of metal/2D MoS2 contacts. UV-Vis and Raman spectroscopy analysis are used to estimate the concentration and number of 2D MoS2 nanoflakes layer respectively.

Ms. Nurshafiqah Jasme

First report of Cellulose Production by an Indigenous Yeast, Pichia kudriavzevii USM-YBP3 Isolated from Rotten Pineapple: Isolation, Characterisation and Enhancement

Nowadays, a significant attention has been given to microorganism producing cellulose owing to its' unique and versatile properties as compared to plant cellulose. Herein, we describe the first report of Pichia strain producing biocellulose (BC). This yeast was successfully isolated from rotten pineapple and was identified as Pichia kudriavzevii USM-YBP3 sp. based on the morphological characterisation and molecular analysis using 18S rDNA gene. Biocellulose production was investigated in the batch mode using shake flasks. Production of BC using different carbon, nitrogen and culture conditions were initially evaluated. The BC production by Pichia kudriavzevii USM-YBP3 was optimally found when grown in glucose and peptone as the main carbon and nitrogen source, respectively. In addition, agitation speed of 200 rpm enhances the BC production. Then, a two-level factorial design was used to evaluate the effect of glucose

concentration, peptone concentration and inoculum size on production yield. The optimised parameters for maximum BC production were % (w/v): glucose 8.0, peptone 2.0, yeast extract 0.5, disodium phosphate 0.270, citric acid 0.115, ethanol 0.5% (v/v) and inoculum size 10% (v/v) with BC production yield and productivity were of 12.24 ± 0.43 g/L and 0.128 g/L/hr, respectively. The obtained BC was then pre-treated using acid hydrolysis for extraction of nanocellullose (NC) and the physicochemical characteristics of the NC produced were inspected adopting scanning electron microscopic (SEM), attenuated total reflection-fourier transform infrared spectroscopy (ATR-FTIR), X-ray diffraction (XRD) and transmission electron microscopy (TEM) analysis. The SEM characterisation revealed that the morphological structure of the NC produced was in an Interwoven network of cellulose fibers whereas the TEM depicted a NC morphology structure with spherical cellulose nanocrystals (SCNCs) or cellulose nanospheres. Furthermore, a high crystallinity index was estimated by XRD up to 82% for the NC produced by Pichia kudriavzevii USM-YBP3, while the FTIR analyses exhibited very similar profiles for all NC produced by other bacteria species. Our findings substantiated that isolate USM-YBP3 showed notable nanocellulose production ability with a high degree of purity, a promising material that can be used in various fields of applications such as food, textile and medicine.

Dr. Mimi Hani Binti Abu Bakar

Aryl diazonium anode modification performance in air cathode microbial fuel cell

Microbial fuel cell (MFC) is a promising bioelectrochemical system that converts chemical energy in organic matters into electrical energy. Even though MFC is an excellent electrochemical system, this system has relatively low power productions due to the low rate of extracellular electron transfer from bacteria to anode material. Anode modification becomes one effort to increase the rate performance of extracellular electron transfer in the MFC system. In this study, graphite brush electrodes were modified using aryl via the electrografting method. The aryl diazonium modification is one of the simple anode modification methods, especially on graphitic carbon substrates. Carbon-based electrodes are the standard material used in aryl diazonium modification due to covalent bonding formation stability. This electrochemical solution was in situ generated by p-phenylenediamine and NaNO2 in HCl solution. From this study, power density from a one-month anode modified system gained 1009 mW/cm2, with COD reduction up to 89% (951 mg/L to 103 mg/L) compared to the much less performance form the unmodified anode system. The power performance achieved from the unmodified was up to 398 mW/cm2, with its COD reduction up to 82% (951 mg/L to 163 mg/L). This study shows that aryl diazonium can enhance the performance of anode material.

Ms. Lama Alafandi

Green synthesis of silver nanoparticles using coffee extract for catalysis

Green synthesis of metal nanoparticles has gained increased attention due to growing need for an environmentally friendly and non-toxic synthesis method. This study used a clean approach for the synthesis of silver nanoparticles (AgNPs) using coffee Arabica bean's extract as the reducing and stabilizing agents. The concentration of phenols in the coffee extract was studied using Folin-Ciocalteau colorimetry method. The effect of various parameters such as temperature, time, pH, and amount of coffee extract to the formation of AgNPs were studied using UV-Vis spectroscopy. As this is still an ongoing study, the AgNPs will be then characterized using TEM, EDX and FTIR to understand the role of phenols on the formation of AgNPs. The catalytic properties of the as-synthesized AgNPs will be evaluated using a model reaction which is hydrogenation of 4-nitrophenol to 4-aminophenol using NaBH4 in solution. The study can promote the development of novel catalysts from a clean approach and the potential use of green synthesized AgNPs in

ABSTRACT

MS. Ain Athirah Binti Rozali

Conformational Stability of Proteins on the Surface of Ti-6Al-4V, 316L SS and Nitinol Alloys using 2D Correlation Analysis

Ti-6Al-4V, 316L SS and Nitinol are often used as metallic bio-implants. The requirement of biocompatibility of bio-implant materials with environment of a living organism implant surfaces need to be enhanced by exposing it to proteins such as albumin in the human body. An analysis of the adsorption of bovine and human serum albumin on the surface of the bio-implants were investigated to confirm its biocompatibility. The adsorption of both albumins was done to obtain the time for the proteins to establish a stable contact with the outermost surface of the metallic bio-implant. The application of 2D correlation spectroscopy was displayed as a contour map from vibrational spectra of Amide III bands. This has allowed for the selection of an optimal time of conformational stability of proteins adsorption on the surface of the biomaterials. The findings revealed that albumin was in contact with the surface of Ti-6Al-4V after 30 minutes in BSA, while 316L SS and Nitinol took longer at 60 minutes. HSA achieves a stable configuration after only 15 minutes for Ti-6Al-4V, while 316L SS and Nitinol took about 40 minutes. Dynamic changes were observed through the conformation of that shows a significant difference between both types of protein.

Invited Speaker 17
Dr. Tan Kim Han

Investigation of improved optical and conductivity properties of poly (methyl methacrylate)-MXene (PMMA-MXene) nanocomposite thin films for electronic applications

Both optical and conductivity properties of poly(methyl methacrylate) (PMMA)-MXene nanocomposite thin films are studied as a function of MXene concentration. The recent emerging 2D materials known as MXenes ($Ti_3C_2T_x$) is combined with PMMA by using direct solution blending and casting technique. The resulted PMMA-MXene thin films display thickness in micrometre range (8.10-8.88 μm). The MXenes with multi-layered structure are embedded within the PMMA and results in a high degree of structural disorder with the increasing concentration of MXenes within the nanocomposites. Detailed optical studies include UV-Vis absorption, optical absorption coefficient, extinction coefficient, and band gap energy values are reported to investigate electromagnetic wave absorption capability of the nanocomposites. Resistivity measurement. associated with electrical conductivity is studied as well. The conductivity of PMMA is significantly improved with at least 1000 times as compared to pure PMMA (1×10-11 or 10-13 Sm-1). The nanocomposites with 8wt% Mxene display the highest σ value of 8.35 $\times$ 10-5 Sm-1 with calculated optical absorption coefficient in range 3500-4000 cm-1. Both tunable optical findings and the enhanced conductivity exhibited by these nanocomposites accelerate the route to integrate MXenes into polymers to form more promising multifunctional nanocomposites for various applications such as conductive filler, electromagnetic absorbers, and optoelectronics, as for the development of high performance composite materials.

Dr. Rasha M Sheltami

Effect of acid hydrolysis time on Mengkuang cellulose properties

Cellulose extracted from mengkuang leaves (Pandanus tectorius) was used in this research for the preparation of cellulose nanocrystals (CNC). Sulfuric acid (60 wt%) hydrolysis was carried out over different time to produce nanocrystals. The effects of hydrolysis time on the morphology, chemical structure and crystallinity index of CNC were investigated using transmission electron microscopy (TEM), Fourier transform infrared spectroscopy (FTIR), and X-ray diffraction (XRD). The results displayed that the acid degradation process starts via expanding the cellulose chains and the degradation process is dependent on the time of hydrolysis as well as the crystalline domains of cellulose

fibres. FTIR results showed that no change in the chemical structure of the nanocrystals during the hydrolysis reaction. The results demonstrated that the optimum hydrolysis time to produce cellulose nanocrystals from mengkuang cellulose, with crystallinity index about 74% and aspect ratio of 15, was 45 min at 45 °C using 60 wt% H2SO4.

Dr. Mimi Hani Binti Abu Bakar

Mitigating membrane biofouling in biofuel cell system – A Review

The past few decades have seen work done on biofuel cells (BFC) connected with the energy crisis. Researchers utilizing new features of unconventional materials at the atomic and molecular levels such as nanotube, nanosheets and nanoparticles to generate useful electricity from biological substrates using various biocatalysts. BFC system has the capability of transforming chemical to electrical energy through electrochemical reactions and biochemical pathways. However, BFC faced several obstacles hindering it from commercialisation, such as biofouling. The biofouling phenomenon occurs when microorganisms, algae, fungi, plants, or small animals accumulate on wetted surfaces. This accumulation causes severities such as increasing the ohmic and charge transfer resistance of the electrode, impeding proton transfer, reducing membrane life, and diminishing product quality. These phenomena lead to a rapid decline in the power performance of BFC. Using biofouling prevention methods is crucial in BFC system operation to reduce biofilm development on the surface of the membrane, thus maintaining the energy demand, boost operational performance, and support cost savings. This study aims to identify the severity of biofouling occurring on the separator materials towards the BFC system's performance by understanding the biofouling formation mechanism and the other effects on all BFC system membrane. Strategies on preventing biofilm formation through chemical or physical methods and the effectiveness of methods performed to reduce or mitigate the biofouling effect were discussed in this study. This context also reviews the most effectively applied methods as anti-biofouling strategies for all BFC systems, recent research findings, benefits, disadvantages, and theoretical framework.

Mr. Muhammad Luqman Hakim bin Hashim

Kinetics of Tandem Hydrogenation-Esterification of Furfural on RHSiO2-(M=Cu, Pd, Ni)-Al-Mg Nanohybrid Catalysts

The exploration of renewable resource such as rice husk for nanotechnology application is important against the fossil counterparts. Developing one-pot reaction methodologies is crucial for sustainable production of bio-derived fuels and chemicals, which typically requires a multifunctional catalyst system. This work reports one-pot hydrogenation-esterification of furfural to furfuryl acetate using a bifunctional metal-based nanostructured catalyst, composed of rice husk (RH) derived SiO2, Cu, Al, and Mg species (RHSiO2-Cu-Al-Mg). To further improve the catalyst's reusability and performance, Al and Mg metals were introduced to form RHSiO2-Cu-Al and RHSiO2-Cu-Al-Mg respectively. The catalyst improved in terms of their surface area with the latter catalyst having a specific surface area of 150 m2/g. The change is coupled with both of these new catalysts' amorphous nature as observed in the XRD. For comparison, the catalytic efficiency of RHSiO2-Cu and RHSiO2-Cu-Al were tested. Various analytical techniques were used to elucidate the physicochemical, textural, and acid-redox properties of the catalysts. It was found that the RHSiO2-Cu-Al-Mg catalyst contains an optimum amount of acid and redox sites, as illustrated by NH3-TPD and H2-TPR studies, respectively. Especially, Mg addition played a vital role in tailoring the acidity of the RHSiO2-Cu-Al catalyst to promote the in-situ esterification of furfuryl alcohol with acetic acid to yield furfuryl acetate. As a result, the RHSiO2-Cu-Al-Mg catalyst exhibited the best performance in one-pot hydrogenation-esterification of furfural to furfuryl acetate (24.5% selectivity), outperforming various noble metal/silica-

open up potential opportunities for the rational design of novel, bifunctional heterogeneous catalysts for efficient production of bio-derived chemicals.

Assoc. Prof. Dr. Lim Teck Hock

Biocompatible silver sulfide nanoparticles as potential cost-effective photothermal therapy agents for skin cancers: Synthesis, characterization, cytotoxicity and photothermal heating studies

With the soaring incidence rate of cancers and cost of treatments, there is a pressing need to develop an efficient therapy with reduced treatment cost and minimized long -term side effects. For this reason, photothermal therapy (PTT) of cancers is emerging as a promising alternative to conventional chemotherapies because it is minimally invasive. PTT works by killing cancer cells through hyperthermia with localized heat produced from the absorption of tissue-transparent near-Infrared (NIR) light by an agent. Despite a long list of agents reported, challenges remain to find an agent with five critical attributes: biocompatibility, biodegradability, cost-effectiveness, cancer-selectivity and the capability to work with NIR (960-1064 nm) to allow lesser tissue damage. In this work, core-shell and non-stoichiometric silver sulfide (Ag1-xS) nanoparticles of targeted size of 50-60 nm ("Ag1-xS agents") were successful synthesized using cost-effective and non-toxic precursors in water within 1-hour. The Ag1-xS agents were characterized using Powder X-ray Diffraction (PXRD), Field Emission Scanning Electron Microscopy (FESEM), High Resolution Transmission Electron Microscope (HRTEM), Energy Dispersive X-ray Spectroscopy (EDAX) mapping and zeta-potential analysis. The cytotoxicity of Ag1-xS agents toward A431 skin cancer cells and the effect of 960 nm NIR laser on the A431 cells incubated with Ag1-xS -agents were evaluated using MTT assay and flow cytometry. Under the illumination of 960 nm NIR laser at 2.5 W/cm^2, a significant localised light-to-heat conversion was observed in the Ag1-xS-agents-loaded-solutions.The best conditions found led to a respectable temperature increase of 25 oC within 5 minutes at an agent concentration as low as 370 mg/ml. This would translate to an effective localised hyperthermia of cancer cells with cells' temperature reaching ~62 oC after 5-minutes of induced hyperthermia. Evaluation of the Ag1-xS-agents against the five critical attributes of PTT agents would be discussed.

Invited Speaker 18
Dr. Nor Aliya Binti Hamizi

II-VI Quantum Dots in LED Application: A Review

II-VI QDs have unique optical and electronic features, which comprise of high quantum yields, high molar extinction coefficients, large effective Stokes shifts, broad excitation and narrow emission profiles, high resistance to reactive oxygen-mediated photo-bleaching, and are against metabolic degradation. These significant properties are due to quantum mechanical principle of three-dimensional confinement of the charge carriers (electrons, holes) that determine novel quantum phenomena which allows the tune of optical properties, which are sensitive to the size, shape, and material composition of the QDs. The intrinsic II-VI are reported to be adapted to a several surface enhancement approach such as surface capping, doping and introduction of heterostructure (core/shell) that will lead to the confining of electrons and holes into the core region which will enhanced photoluminescence quantum yield (PLQY) and photo-/chemical-stability. This will be beneficial to the luminescent.

Invited Speaker 19
Dr. Nurul Ezaila Alias

Reliability of Graphene Floating Gate Flash Memory Cell with High-k/Low-k Tunnel Barrier

The aim of the study was to investigate the memory performances of graphene as a charge storage layer in the floating gate with different type of high-k materials such as silicon nitride (Si3N4), aluminium oxide (Al2O3), hafnium dioxide (HfO2) and zirconium oxide (ZrO2) using Silvaco ATLAS TCAD Tools. Initially, the work is to validate the experimental work by other researchers with the simulation data and then determine the

performance of flash memory cell with the different type of high-k materials in term of memory window, program and erase characteristics and data retention. The memory window for flash memory cell without high-k material was 15.4V while for the memory window of 1/7nm of silicon dioxide (SiO2)/high-k material of four high -k materials for SiO2/Si3N4, SiO2/ Al2O3, SiO2/HfO2 and SiO2/ZrO2 tunnel barrier were 23.0V, 20.0V, 25.4V and 26.0 respectively at the same P/E voltage of ±20V programming and erasing voltage. The data retention of SiO2/Al2O3 tunnel barrier with thickness 1/7nm obtained an excellent result among others with 83% (16.60V) data are retained after 10 years of extrapolation compared to other high-k materials of SiO2/Si3N4, SiO2/HfO2 and SiO2/ZrO2 tunnel barrier which are retained by 56% (12.88V), 47% (11.94V) and 33% (8.58V) of -1/1V gate stress. The best high-k materials SiO2/Al2O3 and SiO2/HfO2 were tested for endurance which manifest the endurance are retain 82% and 75% of charges respectively for 104 of P/E cycles.

Invited Speaker 20
Dr. Yasmin Ab Wahab

Optimization of cobalt nanoparticles for biogas enhancement from green algae using response sureface methodology

Biofuels can be produced by utilizing locally available organic feedstock. Various methods are available for organic matter to energy conversion, but anaerobic digestion (AD) is among the most preferable specifically for biogas production. It is one of the most widely used methods in the field of sustainable bioenergy production from various feedstock. One such feedstock is algae waste which has become an increasingly serious environmental problem. In order to improve the energy productivity of green algae, this study is focused on the introduction of cobalt (Co) nanoparticles (NPs) in AD process. The concentration of Co NPs was optimized using response surface methodology (RSM). Mesophilic temperature range (25-45oC), initial pH (5-9) and Co NPs dosage (0.5-2 mg/L) were selected as the independent variables for RSM. The results indicated that at optimized values (Co NPs concentration = 1mg/L, initial pH=7 and digestion temperature = 35oC) produced highest biogas yield of 298 ml. AD performance was further evaluated by modified Gompertz model. Different kinetic parameters were calculated. The values of the performance indicators confirmed that mathematical model fitted well with experimental data.

Invited Speaker 22
Dr. Hwei Voon Lee

Efficient deoxygenation of biomass to hydrocarbon-based biochemicals over mesoporous catalyst

An efficient valorisation process of biomass to high-value products and fuels has received significant research attention. This is because biomass shows various unique characteristics, such as high abundance, superior renewability, and remarkable sustainability, thus its effectiveness in biomass upgrading could provide potential solutions to overcome the negative impacts of the fossil fuels. However, the bio oil derived from biomass are comprised of various oxygenated molecules that come from cellulose, hemicellulose and lignin, which limit the desired physicochemical that further apply as fuel and chemicals. It has been demonstrated that the hydrodeoxygenation (HDO) process using mesoporous-based catalyst systems (e.g. SBA-15 and MCM-41) can efficiently remove the chemically bonded oxygen from biomass-derived bio oil. In order to get a better understanding of catalytic reaction pathway for HDO of crude bio oil, the performance of catalysts needs to be assessed for biomass model compounds before their final application to crude bio-oil. Therefore, the present study investigates the conversion of bio oil technology by using bimetallic catalyst. The work focused on the HDO of dibenzofuran into bicyclic hydrocarbons; and HDO of guaiacol into cyclohexane, where the physicochemical properties of prepared bimetallic catalysts, catalyst reusability, effect of reaction condition and reaction pathways of bio oil conversion are discussed.

Invited Speaker 16
Dr. Lina Adnan Fadhel Al-Ani

Green nanomedicine formulation: Hybrid curcumin - capped gold nanoparticles - reduced graphene oxide as potential anti - oxidant and colon cancer cytotoxic agent

Development of selective advanced therapeutic modalities has been an urgent need and a vital research focus recently, to face the ever-increasing mortality rates imposed by cancer disease. Among these, colon cancer remains a leading cause of death and the third most common type encountered globally, which declares conventional treatments currently in use as deficient and incompetent. Consequently, there is a modern shift from mono-targeted drugs to multi-targeted hybridization concept which is thought to bring enormous advancements and surpasses individual pitfalls. Herein, nanotechnology and natural plant-derived agents have both emerged as revolutionary, multi-targeted, next generation treatments with promising advantages. The Noble-award winning nanomaterial graphene (GN) and polyphenolic extract curcumin (CR) are major representatives of these categories, with accumulative anti-oxidant and anti-cancer efficiency evidence. Nevertheless, the previous trials of merging GN-based composites and natural plant-derived agents suffered from indeterminate conclusions and study models, thus resulted in various concerns regarding toxicity, along with scarce clinical translation and progress. Herein, we present a novel green integrated hybrid nanocomposite of CR - capped gold nanoparticles - reduced graphene oxide (CAG), based on rational design for a prominent anti-oxidant and anti-cancer activities. Distinctly, the conventional trial-and-error method was replaced with a modern qualitative rational design in compliance with recent up-to-date nano-toxicology r ecommendations, where CR served dual roles as anti-cancer and reducing agent during synthesis.

Invited Speaker 21
Dr. Muhammad Nihal Naseer

Statistical modelling and performance optimization of a two -chamber microbial fuel cell by response surface methodology

Microbial fuel cell as a promising technology for simultaneous power production and waste treatment has got much attention in the recent years but relatively low power density is main limitation in its commercial applications. This study contributes to optimization of power density of microbial fuel cell by employing response surface methodology coupled with central composite design. For this optimization study, the interactive effect of three independent parameters, (i) acetate concentration in influent of anodic chamber (ii) fuel feed flow rate in anodic chamber (iii) oxygen concentration in influent of cathodic chamber, is analyzed for a two-chamber microbial fuel cell and optimum conditions are identified. The optimum value of power density is observed at acetate concentration, fuel feed flow rate and oxygen concentration of 2.60 mol m-3 , 0.0 m3 , 1.00 mol m-3 , respectively. The results shows that a power density of 3.425 W m-2 is achieved which is significant as compare to the available literature. Additionally, a statistical model is also developed that correlates the three independent factors to the power density. For this model, R2, adjusted R2 and predicted R2 are 0.839, 0.807 and 0.703 respectively. The fact that there is only 3.8% error in the actual and adjusted R2 testify that proposed model is statistically significant.

Keynote Session 5
Prof. Dr. Abdul Rohman

Analysis of porcine gelatin in food and pharmaceutical products for Halal authentication

Gelatine is one of the components commonly used in food, cosmetics and pharmaceutical products due to its gelling properties. The most commonly used gelatines in those products are porcine and bovine gelatines. Unclear labelling and information regarding the actual sources of gelatines in products have become the main concern among societies in terms of religion and health aspects. Porcine gelatine (PG) is prohibited to be consumed by Muslim and

Jewish and considered non-halal (and non-kosher) following some scholars of thought. Therefore, reliable methods for identifying gelatine sources in the products must be developed. Some analytical methods including physico-chemical methods as well as biological methods along with advantage and disadvantage for differentiation of PG intended to halal authentication studies. Some analytical methods are used for rapid identification of raw materials of PG. FTIR spectroscopy in combination with chemometrics of pattern recognition either supervised and unsupervised is used for identification and differentiation of PG by investigating the specific functional groups and peak intensities related to PG. HPLC using certain detector is also successful for identification of gelatine sources by analysing amino acid composition. Liquid chromatography hyphenated with mass spectrometer (LC-MS/MS) is candidate to be used as standard method for identification of PG in food and pharmaceutical products by investigating the peptide markers which are specific to PG. Finally, our laboratory has accredited real-time polymerase chain reaction according to ISO 17025: 2017 for identification of porcine gelatine in capsule shells.

Keynote Session 5

Prof. Dr. Karen Wilson

Sustainable catalytic bio-refining - Challenges and opportunities for catalyst design

Concerns over dwindling oil reserves, carbon dioxide emissions from fossil fuel sources and associated climate change is driving the need for clean, renewable energy supplies. If average global temperature rises induced by greenhouse gases are not to exceed 1.5 °C, then estimates indicate that a large proportion of crude oil, gas and coal reserves must remain untouched.[1] Biomass, derived from agricultural and forestry residues, or non-food sources of triglycerides are a sustainable source of carbon that can provide low cost solutions for transportation fuels and organic chemicals. Akin to petroleum refining, biorefining will integrate biomass conversion processes to produce fuels, power, and chemicals, thereby increasing the economic viability of bio-derived processes. Indeed, the US DoE identified a range of sugar derived 'Platform Chemicals' produced via chemical or biochemical transformation of lignocellulosic biomass as potential targets for manufacture in biorefineries.[2] Catalytic technologies played a critical role in the economic development of both the petrochemical industry and modern society, underpinning 90 % of chemical processes and contributing to over 20% of all industrial products. In a post-petroleum era, catalysis will underpin biorefinery technology, and researchers will need to rise to the challenge of synthesising chemical intermediates and advanced functional materials and fuels from such non-petroleum based feedstocks.[3]

This presentation will discuss the challenges faced in catalytic biomass processing, and highlight recent successes in catalyst design facilitated by advances in nanotechnology and careful tuning of catalyst formulation. Specific case studies will explore *(i)* how the effects of pore architecture and acid strength can impact upon process efficiency in biodiesel synthesis (Figure 1);[4,5] *(ii)* how catalytic pre-treatments improve transportation fuel production from pyrolysis oil,[6] and *(iii)* the role of bifunctional catalysts in the hydrodeoxygenation of phenolic components in bio-oils,[7] and the aqueous phase processing of sugars to important platform chemicals and fuel precursors such as 5-HMF derivatives.[8]

Keynote Session 5

Prof. Dr. Norhayati Soin

Printed Flexible and Stretchable Electronics for wearable health care

The demand for printed, flexible and stretchable electronics is growing fast. The rapid expansion in smart wearable and integrated electronic devices has stimulated demand for advanced smart systems with high performance, micro size, high reliability, mechanical flexibility, and high-temperature stability for application as flexible and stretchable displays, personal health monitoring, human motion capturing, smart textiles, electronic skins, flexible energy source and others. The main requirement for .

these applications is flexibility and stretchability, as these devices are subject to various mechanical deformations including twisting, bending, folding, and stretching during operation. The development of printed, flexible and stretchable conductors over the last decade has resulted in commercialization of flexible and stretchable sensors for various applications, circuits, displays, and energy harvesters for next-generation wearables and soft robotics. These systems must be able to conform to the shape of and survive the environment in which they must operate. They are typically fabricated on flexible plastic substrates or are printed/ woven into fabrics. This presentation will cover the development of current printable, flexible and stretchable devices using advanced materials.The research activities at Center of Printable Electronics. Universiti Malaya will also be highlighted.

Mr. Wong Zheng Wei

A Label-free Optical Nanobiosensor for the Sensitive Detection of miRNA in Breast Cancer

Breast cancer accounts for 30% of all female cancers and 15% of all cancer-related mortalities. Early detection is known to improve the prognosis and overall survival-rate of breast cancer. Hence, extensive research has been focused on microRNAs (miRNAs) as diagnostic and prognostic biomarkers, for their regulatory role in post-transcriptional gene expression. In breast cancer patients, the expression of miRNA-155 is commonly upregulated as compared to healthy individuals. Herein, we present a nanobiosensor to detect miRNA-155, comprising hybridization chain reaction (HCR) and DNA-stabilized silver nanoclusters (AgNCs), that serve as an enzyme-free amplification strategy and label-free fluorescent detection probes, respectively. Under constant mild conditions, DNA hairpin probes were mixed with miRNA-155 to initiate HCR. Reduced silver salt was subsequently added to form fluorescent AgNCs. The performance of HCR was validated through gel electrophoresis. The fluorescence emission from AgNCs was analysed qualitatively and quantitatively with UV-transilluminator and spectrofluorometer, respectively. The HCR-AgNCs nanobiosensor exhibited dual-emissive fluorescence species, and a ratiometric analysis led to a highly accurate and sensitive nanobiosensor, without any system leakage and false-positive occurrence. The detection of miR-155 could be completed in just 2 hours under constant 32 oC HCR incubation, and showed high-selectivity towards miRNA-155, with capabilities of discriminating single-base mismatch. Furthermore, the HCR-AgNCs nanobiosensor displayed high sensitivity with a wide linear range between 100 fM and 10 nM, and a LOD of 7 fM. In real sample analysis, the nanobiosensor exhibited exceptional reproducibility and stability when tested with diluted human serum samples. In lieu of current breast cancer and miRNA detectors, the HCR-AgNCs nanobiosensor displayed relatively better performance at a miniscule fraction of cost, effort and time required. Furthermore, the direct and highly-responsive HCR-AgNCs nanobiosensor potentially offers a non-invasive and safe approach towards the clinical detection miRNA-155 and point-of-care early diagnosis of breast cancer.

Prof. Dr. Ong Keat Khim

Methylphosphonic Acid Detection using DNA Aptamer-Citrate Capped Gold Nanoparticles

A portable aptasensor was developed using DNA aptamer-citrate capped gold nanoparticles to detect methylphosphonic acid (MPA), a metabolite of several organophosphorus (OP) nerve agents. A three-factor faced centred central composite design (FCCCD) coupled with response surface methodology (RSM) was applied to design the experiment and to optimise the independent variables including concentration of citrate capped gold nanoparticles (cit-AuNPs) (A), concentration of DNA aptamer (B) and incubation period (C) for MPA detection. Good agreement between the experimental and predicted data was found using a second order polynomial model which demonstrated the adequacy of the model for the prediction of the response (ΔRGB values).

ANOVA results showed a high coefficient of determination value (R2 = 0.9944) and A, B, C, A2, B2, C2, AC and BC were the significant factors affecting ΔRGB values at 95% confidence level. The optimum conditions suggested by second order polynomial model for obtaining maximum aptasensor sensitivity were 0.34 nM of cit-AuNPs, 3.9 μM of DNA aptamer and 18 min of incubation period.

Mr. Muhamad Isyraf Bin Aznam

Effect of mixing time of precursor powders on the structural properties of ni-cu-mn spinel produced via glycine nitrate process

Spinel structured catalyst is known for its durability and stability during hydrocarbon reforming. The catalytic activity of spinel catalyst is strongly influenced by the structural properties of the catalyst, in particular, inversed spinel. This study aims to elucidate the influence of mixing time of precursor powders on the structural properties of Ni-Cu-Mn spinel catalyst. The catalyst powders were produced via glycine nitrate process. The structural properties of the catalyst powders were examined via x-ray diffraction, field emission scanning electron microscope and light scattering technique. Findings indicate all the samples produced exhibit dual spinel phase namely Ni0.4Cu0.6Mn2.0O4 and (Cu, Mn) 3O4 with cubic crystal system and space group of Fd-3m (227). The (Cu, Mn)3O4 phase was determined to be either in normal and inversed structure, where the latter was the highest in the sample produced with mixing time of 24 h. The crystallite size of the samples were in nano-size scale, where sample with mixing time of 1 h was the smallest (41.43 nm). The sample produced by 24 h of mixing time displayed the smallest particle size (200-400 nm) and homogeneous compared to others. Samples with mixing time of 24 and 36 h showed high formation of Ni0.4Cu0.6Mn2.0O4¬¬ phase indicating less unreacted Ni existence. The results shows mixing time critically influences the structural properties of Ni-Cu-Mn spinel catalyst, thereby directly influence the catalytic activity.

Mr. Abdul Rahman Bin Abdul Rahim

Removal of heavy metal by emulsion liquid membrane

Emulsion liquid membrane (ELM) has been used to extract heavy metals such as zinc (Zn) and lead (Pb) from electroplating wastewater due to its high selectivity, simple process and low operating cost, hence it has a high potential for the use to be expanded compared to other current conventional treatment processes. However, its major concern is the emulsion instability which may decrease the extraction inefficiency. In ELM, a membrane phase is made of carrier, surfactant and diluent which is mixed with internal phase to form a primary emulsion. It is then dispersed into the external phase to form a secondary emulsion. The targeted solutes diffuse into the membrane due to concentration gradient. Chemicals involved to form membrane phase were Di-(2 ethyl hexyl) phosphate (D2EHPA) as a carrier, vegetable oils used as diluents are corn, palm and olive oil meanwhile sorbitan monooleate (Span80) as a surfactant, meanwhile stripping agent was nitric acid (HNO3). Synthetic zinc nitrate and lead nitrate aqueous solution which served as the external phases were contacted with the emulsion membrane and extraction and stripping of Zn2+ and Pb2+ ions took place. In this work, the incorporation of green diluents was explored, and corn oil was proven to be the best green diluent. The influence of carrier concentrations on zinc and lead extraction was also observed from 1 vol% to 6 vol%. Optimum carrier concentration was found to be 3 vol% for zinc extraction and 4 vol% for lead extraction. The highest removal of zinc and lead was obtained at treat ratio of 1:2; membrane: internal phase of 1:1, emulsification time of 45 min, extraction time of 20 min and agitation speed of 600 rpm. 80.33% of zinc and 77.44% of lead were successfully removed.

ABSTRACT

Ms. Nur Irdina Syahirah Binti Abdul Ghani

Various Synthesis Methods of Sulfonated SnO2 Catalysts for Esterification of PFAD Feedstock into Biodiesel

The usage in excessive of non-renewable fuel by transportation and industries sectors leads to the crises of fossil fuel depletion and environmental pollution. With the limited sources of fossil fuels, with millions of years to be produced, its availability is prolonged and may decrease overall consumption. Thus, various renewable energy sources have successfully been tested to overcome the aforementioned problems. In this study, biodiesel as a renewable fuel was produced by catalytic esterification of palm fatty acid distillate (PFAD) as a feedstock using sulfonated tin oxide (HSO3-/SnO2), as a superacid solid catalyst. The SnO2 catalysts were synthesized from various methods such as solid-state method (SS), sol-gel method (SG) and self-propagating combustion method (SPC). The SnO2 catalysts were sulfonated with HSO3- ions from chlorosulfonic acid to enhance their acidic properties. For a comparison, the commercial SnO2 was also sulfonated. The SnO2 based catalysts (sulfonated and non-sulfonated) were preliminarily screened for the esterification of PFAD feedstocks. The results showed that the sulfonated SnO2 catalyst that was synthesized using the SPC method had re-converting free fatty acid (FFA) of the PFAD into fatty acid methyl ester (FAME). It indicated that the SPC method can produce nano-sized catalyst with homogenous in size and shape that anchored by many HSO3- ions boosting its acidity, which is beneficial to esterification reaction. Overall, the SPC method is a simple and friendly technique to produced nano catalysts and the production of FAME helps to reduce the cost of biodiesel production as the non-edible feedstock is obtained from low value, cheaper, abundance with the choice of active catalysts from non-transition metal oxide.

Ms. Sharifah Sarah Shazwani Binti S.Shahrulidzafa

Development and Characterization of Nanostructured Lipid Carrier Loaded Flavonoid-Enriched Zingiber Officinale Extract for Topical Application

Topical drug delivery dates to ancient times and has had a long history of continued development and use and is now mainstream in modern medicine, especially as over-the-counter formulations. However, several problems have been reported with the conventional topical preparations and for this reason, the scientific literature has now begun to address other alternative and novel drug delivery system such as nanostructured lipid carrier (NLC), of which is beneficial in enhancing the bioavailability and bio efficacy of active ingredients such asflavonoids by elevating the solubilization potential, refining the absorption pathways, obviating the rate of degradation, increasing the occlusive effect on skin and improving water solubility. In present study, gel incorporated with NLC loaded Zingiber officinale extract; eriched with biological flavonoid compound were developed and characterized by means of particle size, polydispersity index, zeta potential, morphology and encapsulation efficiency, and drug release. The formulation of NLCs were developed using stearic acid, a mixture of MCT and isopropyl myristate, tween 20 and span 20 through hot-homogenization method. Using Box-Behnken Design, an optimized formulation; SR8 was chosen for further physicochemical characterization among 15 randomly formulated NLCs.

Ms. Obaid Asma Omar

Gold nanoparticles with L-cysteine as chiral recognition sensor for ketoprofen enantiomers

Using gold nanoparticles with L-cysteine (Au-L-Cys) as colorimetric sensors, a simple, affordable but efficient method for ketoprofen enantiomers was developed. As the R-ketoprofen was added to Au-L-Cys, the solution color converted from light red to light purple. However, there was no color adjustment to the presence of S-ketoprofen. UV-Vis, FESEM, FT-IR, SERS and zeta potential analysis were used for

characterization. The recognition process is easily done with the naked eyes or a UV-spectrometer. The SERS analysis shows distinct differences between R- and S-ketoprofen. The results reveal R-ketoprofen spatial orientation is a more suitable direction than S-ketoprofen. The proposed interactions of L-Cys with R-ketoprofen represent the three-point contact model for chiral recognition in a bimolecular system.

Dr. Susmita Pramanik

Flexible polymeric electrode imbedded with nano-structured sensing material for simultaneous detection of Adenine (AD) Guanine (GU) Thymine (TY) Cytosine (CY) for medical diagnosis

Detection of diseases and their status during treatment through the analysis of biomolecules present in bio-fluids are very relevant to medical science. Some of those molecules are adenine (AD), guanine (GU), cytosine (CY),thymine(TH) , uric acid (UA) , xanthine (X) ,hypoxanthine (HX) ,tryptophan (Tr),serotonin (Sr),dopamine(DA) , levodopamine(L-DA) ,ascorbic acid(AA). Only a few authenticated methods for analysis of such molecules are widely used such as HPLC and Mass-spectra. A large number of electrochemical methods have been developed using electrodes of various nano-structured materials. These nano-materials are chemically stable, easily synthesized and at a very low cost. Detection of Adenine (AD), Guanine (GU), Thymine (TY) , Cytosine(CY) are very relevant for diagnosis of various important diseases where detection range is more important than the detection limit . Most of the detection ranges of these synthesized electrodes lie between 0.1 μM to 5μM which is also necessary for clinical use. The medium and structuring of these electrodes were made keeping one time use or disposability in mind.

Ms. Afrin Jahan

Adsorptive Nanocomposite of 2-D Carbon and Amorphous Carbon Derived from Indigenous Lignocellulosic Residue: Present Status and Future Perspective

Till date activated carbon from lignocellulosic biomass has been used as the most competent adsorbent due to its high capacity of adsorption. Graphene has joined the race recently. Pure graphene, Graphene oxide, reduced Graphene oxide and graphene composites with polymers/ nano metal oxides have been promising candidates for removal of organic/ inorganic pollutants from wastewater. However, most applications are in laboratory stages and not yet ready for the market because of technical challenges (e.g., scale production, structural instability), environmental toxicity and cost-effectiveness, and thus only a few nanoscale commercial products are available in the market. (Li et al., 2019). In this regard, nanocomposites with activated carbon and Graphene are introduced in this study which constitutes a promising category of adsorbent because of their high porosity and surface area. They can adsorb and decompose pollutants because of strong binding affinity, chemical, and thermal stability. These materials are destined to grab attention from researchers due to their super stability and low toxicity to make carbon nanocomposites. This presentation aims at investigating the Current research status of Graphene- carbon composite and depicts the future prospective too.

Mr. Lim Hong Hua

Synthesis of carbide lime waste derived base catalyst, KF/CLW-Fe3O4 for methyl ester production: An optimization study

In this paper, solid base catalyst, KF/CLW-Fe3O4 was prepared from waste carbide lime waste – a by-product of acetylene production, which composed mainly of calcium hydroxide with minor parts of carbonate. The new strong base catalyst was synthesized by chemical impregnation. This catalyst had strong base strength as characterized by Hammet□indicator anlaysis, scanning electron microscope (SEM), energy-dispersive x-ray spectrometry (EDX) and Brunauer, Emmett, and Teller (BET) method analyses. The catalyst was further used to catalysed the transesterification reaction to produce methyl ester feedstock for biolubricant

production. Taguchi method was used to evaluate the effect of catalyst at different interval of reaction parameters including reaction time, catalyst loading and methanol to oil ratio were being studied. Mixed level of orthogonal array design with L9, signal to noise ratio and analysis of variance (ANOVA) were used to determine the parameters that have the major impact on the transesterification reaction of the palm oil. High methyl ester conversion was achieved and the catalyst can be easily separated for reuse purpose. KF/CLW-Fe3O4 have great potential to be used in the production of methyl ester due to its high catalytic activity and environment friendly properties.

Invited Speaker 23
Dr. Md. Ibrahim Khalil

Dual Platform Based Surface Enhanced Raman Scattering DNA Biosensor – A Sensitive Detection Approach For Species Authentication

Surface enhanced Raman scattering (SERS) DNA biosensors have been getting substantial acceptance as a fast, and ultrasensitive sensing technique by the virtue of its ability to producing molecule specific fingerprint spectra. It succeeds the DNA based molecular detection techniques such as polymerase chain reaction (PCR), DNA sequencing, as well as nanoparticle based electrochemical and other optical DNA biosensing strategies. However, the performance of the biosensor relies on the sensor platform composition, Raman tag and its position in probe DNA sequences, DNA probe length, and the chosen sensing strategy. Herein, we report SERS active dual platforms and split-probe DNA sequence based two different DNA biosensing strategies for the efficient detection two different species. In the first biosensing approach, capture probe (CP) functionalized graphene oxide-gold nanoparticles (GO-AuNPs) and signal probe (SP) along with Raman tag (Cy3) co-adsorbed AuNPs were used. In second approach, CP functionalized graphene oxide-gold nanorod (GO-AuNR) and a uniquely designed Raman tag (ATTO Rho6G) intercalated short-length SP sequences were employed. The detection principle involves the covalent linking of the two platforms via hybridization of the probe sequences with the corresponding target DNA. Hybridization mediated linking of the two platforms therefore generates huge SERS signal enhancement by both electromagnetic hot spots generated at the junctions or interstices of the two platforms and the chemical enhancement between the AuNPs with the adsorbed or intercalated Raman tag. GO-AuNR and the Raman tag intercalated probe DNA sequence based SERS DNA sensing technique showed greater sensitivity with a limit of detection (LOD) of 10-16 M than the GO-AuNP and Raman tag co-adsorbed based sensing strategy (LOD - 10-14). In addition, both the sensing strategies showed sensitivity even for single nucleotide base-mismatch .

Mr. Abu Hashem

The Development of an oligonucleotide-based electrochemical biosensor for the detection of Sus scrofa using graphene-gold nanoparticles modified screen printed carbon electrode

An oligonucleotide based electrochemical biosensor was developed for the detection of the Sus scrofa mitochondrial cytochrome b (cytb) gene based on an insilico designed probe using bioinformatics tools and was validated in wet-lab experiments. Screen-printed carbon electrodes (SPCE) modified with graphene (Gr) and gold nanoparticles (AuNPs) composite were used as a detection platform. The modified electrodes were analysed by different methods, including electrochemical characterisation such as cyclic voltammetry (CV), differential pulse voltammetry (DPV) and electrochemical impedance spectroscopy (EIS). The modified SPCE showed better conductance due to the synergistic effects of the composite, giving it a better detection range. The thiol modified synthetic oligonucleotide probe was immobilized on modified SPCE to facilitate hybridization with reverse complementary (RC) oligonucleotides. The Sus scrofa oligonucleotide was distinguished based on hybridization induced electrochemical change in the presence of methylene blue (MB) compared to their mismatches and noncomplementary animal species

oligonucleotides measured by DPV. The result demonstrated that Gr and AuNPs were successfully fabricated on the SPCE surface, which was indicated by different characteristics such as effective surface area and electrochemical properties. The developed biosensor exhibited a selective response towards RC oligonucleotides and could discriminate against mismatches and non-complementary DNA of other species. The modified electrode displayed good linearity for RC oligonucleotides in the range of 1×10-11 M to 5×10-6 M (R2 = 0.9856) with a limit of detection of 0.98×10-12 M. This indicates that the proposed biosensor has the potential to be applied for real pork sample detection.

Dr. Hoda M. Elnawawy

A Systematic Review and Meta Analysis on The Properties of Nano-Calcium Silicate-Based Cements

This systematic review studied the effects of nano-sized cement particles on the physiochemical, mechanical and biological properties of calcium silicate-based cements (CSCs). Using definite keywords, a literature search was done in PubMed and Scopus database until 22nd January 2021 to identify related studies. This systematic review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines (PRISMA). After removing duplicates, studies were retrieved and screened by two independent reviewers. Reviewers' agreement was calculated using Kappa analysis. Retrieved articles were then read in full text and categorized into three categories based on properties; physicochemical, mechanical and biological properties. The data were extracted from figures using WebPlotDigitizer* software, and meta-analysis was performed with level of significance at 0.05 (P=0.05). Results: After removing duplicates, 1174 studies were checked and a total of 15 studies fulfilled the inclusion criteria. Kappa analysis showed perfect agreement between reviewers (0.912). Results indicated that Nano-CSC (NCSC) formulations have favourable physical (setting time, pH and solubility), mechanical (push out bond strength, compressive strength and microhardness) and biological (bone regeneration and foreign body reaction) properties compared with commonly used CSCs, such as mineral trioxide aggregate (MTA). Meta-analysis showed that Nano-MTA had significantly higher push out bond strength compared with White MTA (P<0.05). However, there was a marginal heterogeneity in the results. Despite these favourable properties, the characterization and verification for the nano-particle size of NCSCs were deficient in the majority of studies. Furthermore, the nano sizing was not limited to the cement particles only and a number of additives were present.

Invited Speaker 27
Dr. Adeola Akeem Akinpelu

Adsorptive removal of polycyclic aromatic hydrocarbons from contaminated water by biomass from dead leaves of halodule uninervis: Kinetic and thermodynamic studies

Polycyclic aromatic hydrocarbons are carcinogenic organic pollutants that are produced primarily by daily industrial and personal activities. This work studies the use of an abundant seagrass powder (SG) as an adsorbent to remove Acenaphthylene (Ace), Phenanthrene (Phen), and Flouranthene (Flu) from contaminated water. At an optimum dose of 2 g/L, Flu was found to have the highest removal efficiency of 90.54%, followed by Phen with a removal efficiency of 87.89% and Ace with an efficiency of 61.11%. Flu had a maximum adsorption capacity of 2.25 mg/g at an equilibrium time of 6 hours, followed by Phen with qe of 2.12 mg/g at an equilibrium time of 24 hours, and finally Ace with qe of 1.13 mg/g at an equilibrium time of 120 hours. Linear and non-linear Isotherm Langnuir, Freundlich and Temkin models fit largely well with adsorption data for Flu, Phen and Ace. This suggests that coexistence of heterogeneous adsorption mechanism. The kinetic data of all 3 PAHs were best described by the pseudo-second-order model. The adsorption of both Flu and Phen by SG was observed to be spontaneous with

negative ΔG values. On the other hand, the adsorption of Ace was spontaneous only at a low temperature. The change of enthalpy (ΔH) for all the studied compounds was negative; therefore, their adsorption was found to be exothermic. Physisorption appeared to dominate the adsorption mechanism of Flu and Phen, with ΔH values of -36.03 kJ/mol and -36.65 kJ/mol respectively. However, Ace adsorption showed some presence of chemisorption, with ΔH values of -114.43 kJ/mol.

Invited Speaker 29
Dr. Mohd Hafiz Ahmad

Synthesis of butylated hydroxytoluene-ligands conjugated with gold nanoparticles: Antioxidant activity and cytotoxic effect against cancer cells

Butylated hydroxytoluene (BHT) is one of phenolic compounds which commonly used in pharmaceutical, food, petroleum and cosmetics industries. BHT has therapeutic ability as a drugs to treat cancer, cataract formation, reduce oxidative carcinogenic and neurotoxicity. Its antioxidant property as radical scavenging helps to prevent cancer through antioxidant action or modulation of several protein functions. Unfortunately, the consumption of BHT causes the adverse effect to human health. It has been approved by FDA to be used at low concentration normally ranges from 0.01 to 01%. Nanoparticle antioxidants constitute a new wave of antioxidant activities in the field of oxidative stress. Due to its low toxicity, gold nanoparticles (AuNPs) have been used as the platform material in medical application. The ability to obtain extremely stable gold nanoparticles also in aqueous solution has led to a renaissance in the use of gold for life science applications. In this research, our strategy is to functionalize the antioxidant ligands onto the surface of antioxidant nanoparticles, AuNPs could provide the possibility of increasing antioxidant and cytotoxicity activities by the functionalization of BHT-ligands with AuNPs (Au-BHTLs) as novel nanoantioxidant. Then, we found that the functionalization of BHT-Ligands (BHTLs) with gold nanoparticles increased the selectivity of nanocomposites and enhanced the antioxidant potential and their ability as useful and promising anticancer agents.

Invited Speaker 24
Dr. Leo Bey Fen

Nanotechnology-based Electrochemical Biosensor for the Rapid and Sensitive Detection of Foodborne Pathogens

Foodborne outbreak is a major threat to global public health despite stringent food safety guidelines and regulations. The burden of foodborne diseases worldwide is substantial with approximately 1 in 10 people falling ill yearly and 33 million healthy life years lost. The continued rise in incidences of foodborne illness necessitates the development of sensitive and rapid foodborne pathogen detection methods. Over the years, researchers have invented automated and new molecular-based and immune-based methods for rapid microbial identification and characterization such as pulse-field gel electrophoresis, polymerase chain reaction (PCR) and loop-mediated isothermal amplification (LAMP), which also corresponds with the gold standards of traditional microbial analysis for a faster and more reliable diagnosis. However, on-site testing of foodborne bacteria is still not possible as these methods require expensive, bulky instrumentations and trained technicians. To overcome these drawbacks, a facile, cost-effective, highly selective, and sensitive electrochemical-based foodborne bacteria detection device have been developed. The developed prototype not only has a superior LOD at 10 CFU/ml compared to the conventional PCR-based method, but it also requires lesser reagents and analytes reducing the cost of detection. Furthermore, this biosensor can detect bacteria in spiked food samples within 10 minute which is much faster than the conventional methods that require few hours to complete. Our developed handheld biosensor device enables on-site food sample testing which supports fast decision making by law enforcement officers and mitigates food poisoning outbreaks.

Invited Speaker 25
Dr. Mohammad Aminul Islam

Synthesis of Lead Sulfide Nanoparticles by Modified Chemical Precipitation Method for Perovskite Solar Cell Application

Lead sulfide (PbS) nanoparticles were synthesized by chemical precipitation method using Alovera extract with PbCl2 and Thiourea (H2N-CS-NH2). The synthesized nanoparticles have been investigated using X-ray diffraction (XRD), UV-Vis, scanning electron microscopy (SEM), Energy-dispersive X-ray spectroscopy (EDX), and transmission electron microscopy (TEM). XRD and TEM results confirm that the films are in the cubic phase. To investigate the quality of prepared nanoparticles, the crystallite size, lattice constant, micro-strain, dislocation density, and optical bandgap, etc. have been determined using XRD and UV-Vis. The possible application

Invited Speaker 26
Dr. Mohd Shahadan Bin Mohd Suan

Synthesis and characterizations of black phosphorus via ball-milling technique: Effects of the milling materials

Black phosphorus (BP), named for its distinctive colour, has been successfully synthesized from the red phosphorus by using the ball-milling technique. Compare to the complex synthesis method which combining high temperature and high pressure, the ball-milling technique is much simple and convenient way. In this work, we investigated and compared the effects of using various types of pots and grinding balls towards the physical and structural properties of BP. Herein, rather than using the hazardous white phosphorus, the pure red phosphorus powder is used as the raw material. The alumina, stainless steel, and agate pots containing the calculated number of respective grinding balls have been employed to mill the red phosphorus. The ball-milling process which took place at 50 rpm for 2 h has transformed the coarse red powder into a dark black colour fine powder. The XRD analysis on the as-prepared powder revealed that the high purity and crystallinity of phosphorus with the crystal size around 50 nm. While the Raman analysis indicated the obvious existence of black phosphorus structure in the sample synthesized from the alumina milling set. The SEM images of this sample also showed nanosized and uniform particles of BP compared to the other milling sets. The intriguing results shown by the sample synthesized using alumina milling set can be attrib uted to the high thermal and mechanical resistance properties of alumina which suffice the transformation of the red phosphorus into BP. The results presented here can initiate the employment of BP in different applications.

Invited Speaker 28
Dr. Zaira Zaman Chowdhury

Environmental Perspective and Toxicity Profile of Potential Surface Engineered Carbon and Its Derivatives

In recent years, the application of nanoporous carbon in the environmental purification and biomedical field has grown rapidly. These materials have exhibited remarkable developments in the domains of wound dressing, cancer therapy, water treatment as well as sensor development which may offer the opening of new avenues for fascinating possibilities for the wellbeing of humans. This is owing to its' large surface area, which leads towards the considerable loading capacity of drugs. It has been proven that carbon nanotubes, graphene (gr), GO and rGO can increase the effectiveness of drugs without enhancing the chemotherapeutic agent dosage for the treatment of cancer. Notwithstanding these beneficial features of surface engineered carbon and its' derivatives, this paper aims to focus on the recent breakthroughs achieved for membrane separation, water treatment, drug and gene delivery systems utilizing the structured carbon. Different techniques for minimizing the cytotoxic effects of nano-porous carbon and its' derivatives will be discussed. The strategies for developing biocompatible, eco-friendly carbon platforms will also be addressed.

ABSTRACT

Invited Speaker 30
Assoc. Prof. Dr. Suresh Sagadevan

Enhanced photocatalytic activity under visible light of g-C3N4@ZnO composites

Photocatalysis technology offers excellent potentials for the complete removal of organic and other biochemical pollutants in an environmentally friendly and sustainable means where the final outcome is without the involvement of greenhouse gas emissions. It has been found that under UV-Visible light irradiation, the nanostructured semiconductor metal oxide photocatalysts can easily degrade many different organic and biochemical pollutants. The present study deals with the synthesis, characterization and photocatalytic activity of g-C3N4/ZnO composite towards the degradation of significant dyes such as Malachite green (MG), Rhodamine-B (Rh-B), Congo red (Con-R), and Red ink (RI) solution. For the synthesis of the g-C3N4/ZnO composite, we have adopted the chemical precipitation method where the composite was thorougnly analyzed for the crystallinity, optical performance, and morphology by making use of the instrumental methods like powdered X-ray diffraction (PXRD), Fourier transforms–infrared spectroscopy (FTIR), UV-Vis diffuse reflection spectroscopy (UV-Vis), Transmission electron microscopy (TEM), Atomic force microscopy (AFM), and thermogravimetric (TGA) analysis. It was found from the PXRD and TEM analysis that the composite maintains hexagonal wurtzite phases for the ZnO and g-C3N4 compounds, while the UV-Vis spectrum confirmed that the composite's absorption edge is getting shifted to the lower energy and wavelength region as compared to ZnO. On testing the photocatalytic activity under the UV light towards the dye degredation, the g-C3N4/ZnO composite is indicated to have much higher performance as against the single-phase g-C3N4 and thereby supporting the synergistic impact among ZnO and g-C3N4. The observation of such activity in the g-C3N4/ZnO composite can be investigated to be due to the composite's enhanced stability in the aqueous solution in addition to the improved electron-hole separations and synergistic photocatalytic mechanism between ZnO and g-C3N4.

Keynote Session 6
Prof. Dr. Azhar Ariffin

Carbazole-Based Dendrimers in Organic Light Emitting Diodes, OLED, Applications

Organic light-emitting diode (OLEDs) has been attracting much attention recently for their promising applications in energy-efficient flat-panel displays and for the next generation solid state lighting [1]. Our present lighting system such as tungsten filament bulbs and fluorescent lamp consume more power, harmful, non-disposable and have short lifetime. The development in OLEDs could solve this problem because it is self-illuminating, eco-friendly and power saving technology. Furthermore, OLEDs are thin and light, flexible, varying in shapes, colours and sizes and some are even transparent. Currently, the design of suitable materials for the efficient and stable blue OLEDs still remains a challenge due to the requirement of high triplet energy. In order to achieve that, carbazole moiety was chosen in our study because carbazole-based materials have high triplet energy and excellent hole-transporting properties for blue OLEDs. To serves as good materials for OLEDs, the materials should fulfil some requirements: suitable ionization potentials, high electron mobility, permit formulation of uniform films without pinholes, morphologically stable and thermally stable. Therefore, we have synthesized several novel dendritic carbazole-based molecules with high molecular weight (more than 1700 g mol-1). These dendrimer molecules have the ability to form good quality film, well-defined structure, high level of purity and good solubility in common solvents.

Ms. Mizan Izzati Binti Mat Zin

Chitin nanopaper from mushroom: Effect of pretreatment process on its mechanical properties

Chitin nanofibre from mushroom is covalently linked with glucan

which can contribute to higher mechanical properties compared to conventional animal-based chitin. This study aimed to evaluate the effect of the pre-treatment process (freezing and drying) of different mushroom on the mechanical properties (tensile stress and tensile strain) of chitin nanopaper. The chitin nanofibre was extracted from three commercial mushroom species available in the Malaysian market: oyster mushroom (P. ostreatus), enoki mushroom (F. velutipes) and shiitake mushroom (L. edodes) without acidic extraction step and further fabricated as chitin nanopaper. With freezing pretreatment, nanopaper produced from enoki mushroom exhibits the highest mechanical properties, ($E=4.85$ GPa, $\sigma=80$ MPa) compared to oyster ($E=2.58$ GPa, $\sigma=49.11$ MPa) and shiitake ($E=3.32$ GPa, $\sigma=51.19$ MPa). Similiar trend also observed when fresh (no pre-treatment) and dried mushroom were used as nanofibre source for chitin nanopaper fabrication. With regards to drying pre-treatment, all chitin nanopapers show reduced performance as a result of fibre hornification effect. For example, chitin nanopaper produced from dried enoki shows 24.36% reduction in modulus compared to frozen sample. This study suggested that enoki mushroom which has long-structure chitin nanofibre promotes tensile stress enhancement and has potential to be used as a good reinforcing element in biobased composite manufacturing process.

Ms. Chiam Sin Ling

Facile One Step Synthesis of MnO2 Nanostructure Using Rapid Heating Method for Rhodamine B Dye Removal

A rapid one-step heating method for the synthesis of MnO2 nanostructures was demonstrated. The heat was transfer directly from the power source towards the heating coil and precursor solution hence minimize the heat loss to the surrounding. As a result, the nutrient solution was heated up rapidly and MnO2 nanostructures with different morphologies was successfully synthesized in the duration of 5 to 15 min. These MnO2 nanostructures were used as catalyst in the degradation of Rhodamine B (RhB) organic dye. Particularly MnO2 nanostructure with synthesis duration of 10 min possessed outstanding catalytic activity by able to degrade 99% of RhB dye in 10 min of reaction time. This was greatly contributed by its 3D nanoflowers morphology that provided more active sites for catalytic activity to occur. The promising catalytic activity with affordable synthesis method could provide an alternative in the development of MnO2 catalyst for organic dye removal.

Mr. Jonathan Ting Yik Chang

Characterising Metallic Nanoparticle Surfaces Using Unsupervised Machine Learning

A data-driven approach to materials design can accelerate the discovery and development of heterogeneous catalysts, using hypothetical databases of potential catalysts characterised using different features (structural and processing) and some performance indicators for different reactions. Surface features are particularly important, but the surfaces of metallic nanocatalysts include a variety of atomic configurations. One of the greatest challenges in this process is to identify surface structures relevant to catalysis that can be targeted for synthesis. Previous research has used surface coordination number to describe the surface structures. While this is an intuitive assumption, it fails to capture the role of surface reconstructions and lattice variations. In this presentation, we will describe a data-driven approach to find intrinsic patterns surfaces of metallic nanoparticles. The method utilizes iterative label spreading, an unsupervised machine learning method especially suited for clustering of small data sets with high dimensionality, which are common in materials science. Given various structural features of a nanoparticle, the model returns classes of atoms that are different from typical groupings based on

ABSTRACT

domain knowledge. The method manages to distinguish edges, corners, sub-surfaces and sub-edges, revealing hidden patterns that could potentially relate to specific chemical reactions. We have demonstrated the application of the method on ideal and thermally relaxed palladium zonohedrons, an important electrocatalyst with significant potential for chemical engineering.

Assoc. Prof. Dr. Norli Binti Abdullah

MWCNT dispersed conducting polymer (MWCNT/P3HT) nanocomposites: structural and morphological studies

Carbon nanotubes (CNT) have been demonstrated as excellent sensing material for chemiresistive gas detection due to its high surface area to volume ratio as well as their unique electrical and mechanical properties. Yet, CNTs tend to agglomerate to each other, thus, hard to disperse in solvent or functionalized with the polymer matrix uniformly. In this study, the effect of stirring speed non-covalent functionalization on the textural, structural and morphological analysis for the regioregular poly (3-hexylthiophene-2,5-diyl) (P3HT) wrapped hydroxylated multi-walled carbon nanotubes (MWCNT-OH) nanocomposites has been reported. The stirring speed was varied at 250 rpm, 500 rpm, 650 rpm and 800 rpm. The morphological analysis for the obtained nanocomposites was carried using optical microscope, field emission scanning electron microscopic (FESEM) and high resolution of transmission electron microscope (HRTEM). While, the structural analysis was conducted using fourier transform infrared spectroscopy (FTIR) and Raman spectroscopy. The morphological analysis shows the P3HT was successfully wrapped the MWCNT -OH side wall evidence from the changes in mean diameter size of nanocomposites and influenced by the different stirring speed. Whereas, results indicate the intensity ratio; ID/IG of the nanocomposites increases as the stirring speed increased.

Mrs. Suzaimi Binti Johari

Recent Advances in the Base-Catalytic Knoevenagel Condensation

α, β-Unsaturated acids are well-known and useful reagents, and they have been applied in different fields due to their fascinating properties. The catalytic Knoevenagel condensation reaction is one of the most remarkable methods for the formation of C=C bonds. The multi -substituted alkenes can be obtained from the reaction of carbonyl and active methylene compounds in the presence of base catalysts, Bronsted catalysts, Lewis acid catalysts, or ionic liquids. In terms of providing both desirable structural diversity and compound libraries, Doebner-Knoevenagel condensation is the most efficient strategy. There is a high demand for an efficient, rapid, environment-friendly, and sustainable catalytic protocol under milder conditions for the stereoselective synthesis of Knoevenagel products, which can tolerate a wide variety of functional groups. Carrying out the transformations through alternative reagents, catalysts, or methods provides a valuable and broad space for selectivity. Herein, the recent advances in the synthesis of structurally diversified Knoevenagel products using base-catalysts are reviewed.

Dr. Florentinus Dika Octa Riswanto

FTIR Spectroscopy Combined with Multivariate Calibration Techniques for Determining Content of Three Isoflavone Aglycones in Soybean Milk

Soybean products are currently attracting much attention and becoming popular research object. The growing interest for studying soybean products was related to their benefits towards human health as well as their main function as daily food. Soymilk, one of the beverage products made from soybeans, is widely consumed in Indonesia and reported as one of isoflavone aglycones source namely genistein, daidzein, and glycitein. Hence, it was important to develop effective and efficient method to analyze the content of genistein, daidzein, and glycitein in soymilk product. Quantitative

analytical method using FTIR spectroscopy combined with multivariate calibration techniques were developed in this study. It was found that multivariate calibration techniques of partial least square (PLS) resulted better predictive model compared to the principal component regression (PCR) in order to determine content of genistein, daidzein, and glycitein in soymilk product. Selected calibration models for genistein, daidzein, and glycitein resulted Rcal2 of 0.977, 0.991, and 0.999 with the RMSEC values of 1.020, 0.708, and 0.063, respectively. These models was successfully applied for content prediction and resulted RMSEP values of 3.290, 3.310, and 1.180, rescpectively

Ms. Nur Farhana Binti Shahrul Azhar

Temperature dependent photoluminescence of core CdSe quantum dots

A comprehensive study of the photoluminescence (PL) properties of core Cadmium Selenide (CdSe) quantum dots (QDs) is reported in the temperature range from 80 K to 300 K. The PL are found to display bimodal distribution of Gauss behaviour with homogeneous broadening. With respect of temperature changes, the behaviour of PL found to be blueshift as temperature is reduced for the 1st peak while the 2nd peak remains unchanged. Full width half maximum (FWHM) for the 1st peak found to decrease as the temperature reduces from 300 K to 80 K. For the 2nd peak, the same FWHM saw across the temperature. As for PL intensity, it is recorded that the intensity increase as temperature decreasing for the 1st peak while 2nd peak shows inconsistent PL intensity increase. It is estimated that based on the PL properties, the origin of 2nd peak is a trap state at the surface of CdSe QDs. This trap state may lead into two PL conditions; 1st condition at high temperature (200K to 300K) non-radiative process become dominant than radiative process yet vise versa for 2nd condition at low temperature (80K to 180K).

Mr. Ibrahim Abdulrauf Onimisi

Thermodynamic study of Methane and Water adsorption on Ir(111), Pd(111), Pt(111) and Ni(111) surfaces

Periodic density functional theory (DFT) has been used to study the surface Gibbs free energy of methane and water adsorption on Ir(1 1 1), Pd(1 1 1), Pt(1 1 1) and Ni(1 1 1) metal surfaces. DFT was used to investigate the adsorption of methane at different coverage as well as the H2O aggregation over the clean metal surfaces. The adsorption configuration was compared with experimental data to assess the validity of our calculation methods. The calculated adsorption energies of methane on the different surfaces ranked in decreasing order, are as follows; Pt(1 1 1) > Ir(1 1 1) > Pd (1 1 1). For water aggregation over the metal surfaces, increase in the number of water molecules on the metal surface, the weaker the interaction between the water molecules and the metal surfaces. The thermodynamic diagram was established for methane and water adsorption on the different metal surfaces. Pt(111) surface had the thermodynamically most stable coverage for water and methane adsorption.

Mr. Mohammed Bashir Abdullahi

Experimental investigation of silica nanoparticle on bentonite types for CMC polymer treated water based mud in shale formation

Nano-drilling fluid is an innovative and cost effective method of controlling wellbore instability cause by reactive shale. Shale is about 75% of all formations drilled and 90 % of all the wellbore instability problems occur in the shale, thereby, increases the drilling cost. New environmental regulations enforce using WBM because of pollution challenges cause by OBM. Nano-mud is needed because of nanosized pores, since; the additives used in conventional WBM have micro size to plug Nano-pores in shale formations. Nano mud can physically plug the nanosized pores and reduce the permeability, thus, improving wellbore stability. It has low filtration loss in the shale because of a very thin and low permeability filter cake. This study focus on formulation of SiO2-nano mud with sodium bentonite and

calcium clay at several SiO2 concentrations of 0.05 wt%, 0.1 wt% and 0.15 wt%. The adsorption of silica NP onto clay particles surfaces and swelling rate were evaluated. Results shows that SiO2 NP added to the sodium bentonite improved its rheological and filtration loss properties of WBM at room temperature, while for calcium clay loss its rheological performance at 0.05 wt% SiO2, due to low swelling in water, but at 0.1 wt% and 0.15 wt% SiO2 started increasing due to binding occurs more readily at lower NP concentration and becomes increasingly difficult at higher concentrations. However, its filtration properties were improved regardless of SiO2 NP concentrations to the base mud. SiO2 NP significantly inhibits calcium clay swelling greater than sodium bentonite.

Mr. Muhammad Nur Iman Amir

Gold Nanoparticles Supported on Reduced Graphene Oxide as Green Catalyst for Solventless System of Hydrosilylation Process

The commonly used metal oxides and few studies made to find the high conversion reaction rates and including with high yield of product by using the efficient and effective catalyst for hydrosilylation reaction. In this research study, the focus is to synthesize and characterize gold (Au)-based catalyst because the electrochemical stability in strong acid conditions and remarkable selectivity for oxygen reduction reaction (ORR). Where, the gold nanoparticles (AuNPs) were used to support on reduce graphene oxide (rGO). Next, the produced gold nanoparticles/reduce graphene oxide (AuNPs/rGO) was test and run in hydrosilylation application by dehydrogenative silicon-heteroatom coupling reaction. Before that, the catalyst of AuNPs/rGO has been synthesized with different molarity of Au solution by using trisodium citrate ($Na_3C_6H_5O_7$) as reducing and capping agent. The synthesis process has been done with one pot synthesis method. Furthermore, the synthesized catalyst was further solidifying using freeze drier process. For the application part, the overall reaction has been yielding a yellowish transparent liquid of organosiloxane product that is simplifying name as disiloxane. As a result, AuNPs/rGO catalyst has been successfully synthesized and yields the product from the substrate or reactant of dimethylphenylsilane. Initially, the characterizations study of AuNPs/rGO catalyst was identified through XRD (that combine with FESEM image of different molar parameter catalyst used) and FTIR only. To further confirm its catalytic performances and identification of the product obtained, the analysis was further by using GC-FID and GC-MS, respectively. Interestingly, the dehydrogenative coupling of hydrosilane into disiloxane product has been generated the reaction by solventless and analyzed with several parameters. As a result, the most optimised catalysts used which is 0.4 mM of AuNPs/rGO was determined for hydrosilylation reaction due to its highest conversion rate among other. The experiment study has been established the heterogeneous AuNPs/rGO-catalyzed with dehydrogenative coupling of hydrosilane that generate the reaction under solventless to give the corresponding disiloxane that yield purely product 100% within 3 hours period. Where, the present methods are expected to contribute to various research fields.

Invited Speaker 31

Dr. M. A. Motalib Hossain

Innovative approaches of nanotechnology in food authentication

Food authentication is a rapidly growing field because of its direct relevance to public health, biodiversity perspectives as well as people's religious and cultural traditions. Authentication of animal materials limits the spread of zoonotic threats, prevents unfair competition in business settings, boosts up consumer confidence and product sales, and brings long-term benefits in public health, social harmony, economic growth and biological conservation of endangered species. Unfortunately, despite having national and international rules and regulations in most of the countries, adulteration of meat and meat products is going on rampant; this is just to make extra profit and outweigh the

honest companies in the competitive markets. Mainly molecular-based technique, polymerase chain reaction (PCR), is widely used to authenticate the food products as protein-based biomarkers are not suitable to analyze the highly processed food products since it is denatured easily. However, the PCR-based techniques are expensive, time-consuming and required sophisticated instruments as well as trained personnel. The rapid advancement of nanotechnology has provided opportunities to overcome the limitation of the existing methods by improving their efficiency and developing new techniques. Nanotechnology has the potential to advance molecular-based methods through various approaches involving the development of DNA biosensors, increase the PCR assay efficiency, colorimetric detection of DNA etc. Here, we summarized recent studies on the use of nanomaterials in the development of I nnovative approaches for the reliable and rapid authentication of food products. In addition, Potential future technologies are predicted and probable challenges are summarized.

Invited Speaker 33
Dr. Siti Mariah Mohd Yasin

Strength of kenaf/glass fibre reinforced epoxy (GRE) composite lap joint

The tensile properties of single lap joints of kenaf fibre (KF) and glass fibre reinforced epoxy (GFRE) omposite were studied. The vacuum infusion technique was implemented in preparing samples with parameters of i) different stacking sequence among KF and GFRE and ii) different type of sequences: symmetry, anti-symmetry and unindirectional sequences. The stress-strain of the composite joint materials was investigated by using a mechanical instrument, Shidmadzu Universal Testing Machine at room temperature. The hybrid joining failure mode was investigated by employing both epoxy adhesive and Huck bolt onto single lap joint of composite materials. The experimental results show that the hybrid joint of KF/GFRE with the unidirectional stacking exhibits highest, with predominantly bearing mode failure. Different types of stacking and sequences were observed to be an important role for mechanical performance of hybrid composite, natural and synthetic materials.

Mr. Poonanulkarage Ruwan Dinesh Weerasooriya

Evaluating the performance of bismuth ferrite incorporated regenerated cellulose nanocomposites as a potential photocatalyst

Industrial waste water is a highly prevailing environmental concern at present. Waste water consists of numerous harmful substances and organic dyes are one of significant elements. Organic dyes can be identified as cationic and anionic based on their ionic charge of organic portion. Methylene Blue (MB) is a cationic dye used for silk, paper, wood and leather products while Methyl Orange (MO) is an anionic dye utilized in textile, printing, food and pharmaceutical industries. The presence of these dyes even at very low concentrations may severely affect on the ecological system. Therefore, neutralization of these contaminants is a mandatory requirement of industries prior to discharge. In this research, degradation of methyl orange (MO) was evaluated with the aid of bismuth ferrite (BiFeO3) impregnated regenerated cellulose (RC) nanocomposite films as a photocatalyst. Microcrystalline cellulose (MCC) was used as the cellulose source to obtain RC films using solution casting method and (0-5) wt% of BiFeO3 with respect to MCC weight was added into the MCC dissolution ionic liquid 1-butyl,3-methylimidazolium chloride [BMIM]Cl system. MCC weight was 6.5 wt% of the total weight of MCC and ionic liquid. Morphology of raw materials and products were observed using scanning electron microscopy (SEM). Light absorption capability of prepared photocatalysts were measured by UV visible diffuse reflectance spectroscopy (DRS). The photocatalytic performance of the film was evaluated by treating the catalyst dye mixture under direct sunlight until observe a significant colour removal of the dye. The concentration of the dye at each time interval was determined with the aid of UV

SEM, BiFeO3 shows a good compatibility with RC and particle agglomeration is taken place when BiFeO3 loading is above 3 wt%. Therefore, it is affected on light absorption of films and DRS analysis was further discussed with the calculation of optical energy gap (Eg). The photocatalyst shows 90% degradation of 10 ppm MO as maximum with 3 wt% of BiFeO3 loading at pH 2 and the catalytic performance was stabled for 4 cycles. Thus 3 wt% of BiFeO3 was identified as the best loading to accomplish the degradation of MO at pH2.

Dr. Tuan Sheikh Ahmad Izaddin Sheikh Mohd Ghazali

Calcium-Aluminium Hydrotalcite-Like Compounds: A Review of Synthesis and Applications

Layered inorganic structure such as the Layered Double Hydroxide (LDH) and Calcium Aluminum Layered Double Hydroxide (Ca-Al LDH), in nano-size, had been used widely in the nanotechnology areas. They are well known as a problem-solving materials. The Ca -Al LDH can be synthesis using various method such as co-precipitation, ion exchange, hydrothermal, sol-gel or induced hydrolysis method. The LDH has an ability to encapsulate the organic anions that provide great benefits in the nanotechnology, were explained more details in this review. The application of these layered structure that had been widely used as, target based drugs field and it controlled release properties in the drug delivery system were also describes in detail.

Ms. Shamala Gowri Krishnan

Synthesis of magnetic base catalyst from industrial waste for transesterification of palm oil

Industrial waste is continually produced in vast quantities; without adequate planning, the waste might pose a significant threat to the environment. Hence, an industrial waste based heterogeneous magnetic catalyst was synthesised using carbide lime waste (CLW) as raw material for biodiesel production from transesterification of palm oil. The catalyst successfully synthesised by the one-step impregnation method and calcination at 600oC. The synthesised catalyst, C-CLW/γ -Fe2O3, was characterised by temperature-programmed desorption of carbon dioxide (CO2-TPD), scanning electron microscopy (SEM), electron dispersive X-ray spectroscopy (EDX), X-ray Diffraction (XRD), Brunauer-Emmett -Teller (BET), vibrating sample magnetometer (VSM), and Fourier transform infrared spectroscopy (FT-IR). The catalyst has high surface area (18.54 m2 /g) and high basicity (3,637.20 μmol/g). The catalytic performance shows that the optimum reaction conditions are 6 wt.% catalyst loading, 12:1 methanol to oil molar ratio with 3 hours reaction time at 60oC to produce 90.5% biodiesel yield. The catalyst exhibits good catalytic activity, and magnetism which indicates that the CLW can be a potential raw material for catalyst preparation and its application in biodiesel industry.

Invited Speaker 32
Dr. Nina Naquiah Ahmad Nizar

The Different Approaches in Non-Halal Food Detection Technologies

In the era of food advancement, various food processing ingredients have been introduced. Technological progression in this field made food adulteration and food fraud become common due to financial benefits. Besides, there is also an increase of concern in food ingredients among public. All these are the main impetus of traceability and authenticity of food products. In recent years, halal food detection methods have been widely established. It is challenging to determine which products are permitted or not under the Islamic law if not for the halal certificates which is in place. Numerous types of foods are available, and in case of detection methods, there is hardly one detection method that can fit all. Thus, it is imperative to highlight the different approaches in non-halal food detection methods according to different food types, for example, oil, fats and meat. Due to the physical and chemical attributes, adulteration of oils and fats are commonly detected by physico-chemical approach such

as DSC, FTIR and GCMS whereby meat detection by DNA based approach such as conventional PCR and qPCR.

Invited Speaker 34
Dr. Lee Kian Mun

A statistical modeling-optimization approach for photocatalytic degradation of organic pollutants using ZnO based photocatalysts

A wide variety of organic pollutants have been introduced into our water streams from various industrial sources. Most of these pollutants are highly toxic and pose a health threat to the living organism, mainly aquatic life. Therefore, the removal of these recalcitrant contaminants from the water sources is essential to avoid further pollution. Heterogeneous photocatalysis employing ZnO photocatalysts have attracted great attention owing to their extraordinary characteristics. Various process parameters that affect the photodegradation efficiency of ZnO-based photocatalysts such as the amount of catalyst loaded, substrate concentration, light intensity, solution pH etc. have been examined. However, those studies only dealing with one-factor-at-a-time (OFAT) while keeping other parameters constant and the interaction effects between the studied parameter are rarely determined. Hence, a statistical approach modelling is very crucial in obtaining the optimum conditions of the photocatalytic reactions, with a small number of experiments and can optimize the process more accurately.

Invited Speaker 35
Dr. Yusliza Yusof

Electromagnetic behavior carbon based polymer nanocomposites

During this 20th century, polymer-based nanocomposites are reliable as lightweight, low cost, and easy shaping property for specific designs in electromagnetic (EM) shielding applications. A greater change in electromagnetic properties is expected as particle sizes of the fillers decreased to the nanoscale due to relatively low density and high specific surface area. The electromagnetic behavior of polymer based nanocomposites can be tailored by their reflectivity and absorption characteristics as compared to conventional metal meshes that provide a total EM reflection at material surfaces like a Faraday cage effect. In this study, the integration of carbon nanotubes (CNT) with noble metallic materials such as silver nanoparticles (AgNP) have shown a tremendous effect as EM wave absorbing materials. The combination of CNT -AgNP filled polyvinyl alcohol (PVA) nanocomposites exhibit a great potential as thin and lightweight dielectric-absorbing materials at high frequency up to 12 GHz. This is due to their tunable dielectric permittivity and electrical conductivity, wherein the dielectric loss is attenuated as heat dissipation. Electromagnetic measurements were carried out by using a rectangular waveguide equipped with Vector Network Analyzer. The optimum properties were obtained at 1.0 wt% of AgNP with the particles size of 40 nm which resulted in a higher EM absorption than the reflection behavior. The structural and morphology properties of the polymer nanocomposites were characterized by X-ray diffraction (XRD), Fourier transforms infrared (FTIR), Raman spectra, and Field emission scanning electron microscopy (FESEM), respectively.

Invited Speaker 36
Dr. Syazwan Hanani Meriam Suhaimy

Current doped TiO_2 studies

In nanotechnology field, the invention of nanotubes is significant to most industries for its wide capabilities and functions. Nanotubes are cylindrical molecules with ~1nm in diameter or less. Nanotubes are often doped or associated with other elements to alleviate its efficiency and functions in research. In recent researches, nanotubes are known for their efficienct in wastewater treatment as they are proven to have the ability to degrade pollutants in wastewater in the presence of light due to their photocatalytic properties. This review highlights methods to synthesize nanotubes, their applications, properties and future prospects that associate with their abilities and unique characteristics.

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NANOCAT (Nanotechnology and Catalysis Research centre) is a pTJ incorporated by UM in 2012, a UMCoE. Its mission is to be a world leader in "catalysis and nanotechnology" coining sustainability and green technology. NANOCAT research thrust is deploying catalysis to support energy, chemical synthesis, environment pollution and global warming mitigation as well as designing smart materials as catalyst, sensor, nanocoating, and nanocomposite.

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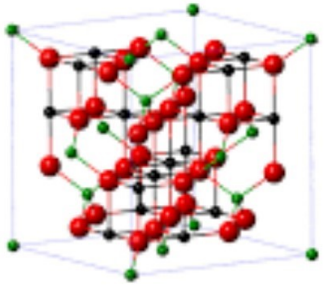

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