

*Final*

# ABSTRACT BOOK

# MLC 2022

**MATERIALS LECTURE COMPETITION**

**07 JULY 2022**



**I·M3**

Institute of Materials,  
Minerals & Mining

**HOSTED BY**

XIAMEN UNIVERSITY MALAYSIA  
SCHOOL OF ENERGY AND  
CHEMICAL ENGINEERING



XIAMEN UNIVERSITY MALAYSIA  
廈門大學馬來西亞分校



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## Materials Lecture Competition 2022 (MLC 2022)

### Final Programme

| Time            | Agenda                                                                                                                  |
|-----------------|-------------------------------------------------------------------------------------------------------------------------|
| <b>9.00 am</b>  | National Anthem<br>Opening speech by Dean of School of Energy and Chemical Engineering of XMUM (Prof. Dr. Chen Binghui) |
| <b>9.15 am</b>  | Photo session<br>Rules briefing by Master of Ceremony                                                                   |
| <b>9.30 am</b>  | Presentation session (5 participants):<br>15 minutes lecture + 5 minutes Q&A                                            |
| <b>11.15 pm</b> | End of presentation<br>Judges' deliberation + Videos                                                                    |
| <b>11.45 pm</b> | Closing remarks by Ts. Dr. Chew Khoo Hee (Deputy President of Institute of Materials, Malaysia, IMM)                    |
| <b>11.55 am</b> | Announcement of the MLC 2022 winners<br>Photo session of winners                                                        |
| <b>12.00 pm</b> | End of MLC 2022 Final                                                                                                   |

## Foreword

Dr. Andrew Ng Kay Lup



**Chairperson of MLC 2022 Organizing Committee**

On behalf of the organizing committee, we are pleased to welcome all of you to attend the virtual Materials Lecture Competition 2022 (MLC 2022) final round hosted by Xiamen University Malaysia (XMUM) and co-organized by the Institute of Materials Malaysia (IMM) and the Institute of Materials, Minerals & Mining, UK (IOM3 UK). This is the first time XMUM has participated in the MLC and has received full support from the management, and it is indeed an honour for XMUM to host the MLC 2022.

I have always believed in the importance of materials engineering in opening the door to new technologies in every research field; materials scientists and engineers continue to be at the forefront of all areas of science. MLC will serve as an effective platform to stimulate the passion and research interest of young materials scientists and engineering in this research area.

For this year's MLC 2022 final round, we have 5 finalists from Universiti Teknologi Petronas, Universiti Teknologi Malaysia, Universiti Malaya, Taylor's University Malaysia and Universiti Tenaga Nasional.

Thanks again to all participants, university representatives and everyone joining us today. Let's together make this event a successful one, and I wish all the finalists the best and a successful presentation!

Thank you.

With best wishes,

Dr. Andrew Ng Kay Lup and on behalf of all the organizing committees.

## Foreword

Dr. Nor Akmal Fadil

**Chairperson, Materials Lecture Competition Committee  
Institute of Materials Malaysia (IMM)**



First of all, I would like to welcome all our guests and competitors of the Materials Lecture Competition 2022 (MLC 2022). As the Chairperson of the IMM-Materials Lecture Competition Committee, my main role is to guide and assist the organising committee to host the event and ensure that the competition runs in accordance with the rules set by IMM.

The annual MLC competition often receives an overwhelming response from the private and public universities in Malaysia with more than 10 institutions competing in the MLC events. This event has been hosted successfully annually since its inception in 2012. While initially, for the first two years it was hosted by IMM, the subsequent years saw both the public and private universities playing a key role in taking turns to host the event.

Since 2013, the winner of the competition has been sponsored by IMM to participate in the annual YPWLC competition hosted by the UK Institute of Materials, Minerals and Mining (IOM3) and held in different countries, usually in the month of October or November of the same year. The Malaysian representatives have done the country proud as they were placed within the top 3 on a few occasions and these were in 2014, 2017, 2018, 2019, and 2021. Since the year 2020, the national and international competitions were held online and is in the virtual mode due to the continued Covid-19 pandemic situation.

I would like to thank and congratulate the Xiamen University Malaysia MLC 2022 Organising Committee for their hard work and successfully organising the Materials Lecture Competition this year, the 11th event in this annual series. My appreciation also goes to the competition judges for their commitment and support towards the event.

I would like to take this opportunity to thank the IMM Management for the full support and trust on me to lead the MLC Committee for the term 2022-2024, and not forgetting my fellow IMM MLC Committee members for the cooperation and teamwork.

Finally, my best wishes to all five finalists (from Taylor's University, Universiti Malaya, Universiti Teknologi Malaysia, Universiti Teknologi Petronas, and Universiti Tenaga Nasional) in this MLC 2022 Final and I offer my advance congratulations to the winners. May the first-prize winner representing our country do well to secure one of the top places in YPWLC 2022 and on behalf of the IMM MLC team, I wish him/her well and the best of luck.

Thank you.

Dr. Nor Akmal Fadil,  
Chairperson, Materials Lecture Competition Committee  
Institute of Materials Malaysia (IMM)

## Foreword

Dato' Dr. Ir. Ts. Haji Mohd Abdul Karim Abdullah

President, Institute of Materials, Malaysia (IMM)



It gives me great pleasure, on behalf of IMM, to greet and welcome all guests, judges, participants and competitors of the Materials Lecture Competition 2022 (MLC 2022). The MLC competition is the brainchild of IMM to give an opportunity to our young students and researchers (below the age of 28 years old), particularly in the area of materials science, technology and engineering to showcase their capabilities and share their knowledge on issues pertaining to materials and their roles in society. It is an honour and privilege for the Institute of Materials, Malaysia (IMM), Institute of Materials, Minerals and Mining (IOM3), UK and Xiamen University Malaysia (XMUM) to organise a competition that has become an important and trademark annual event in the calendar of IMM.

In addition to providing career advancement opportunities for non-professional members through technical competency certification and educational training courses for skills, IMM also aims to help empower and reach out to young materials scientists and engineers and foster long-lasting relationships. As the President of IMM, I encourage all members of the academia, industries and students to play an active role in promoting the importance of materials in Malaysia by joining IMM and be at the forefront of its activities and to contribute positively to the community it represents, our society and nation. Engineers, academicians, technologists and technicians, skilled workers and other professionals are amongst its members and number more than 6000.

I would like to thank IOM3 for the support and XMUM for successfully hosting and co-organising this year's event on a virtual platform. My heartiest appreciation and congratulations goes to the XMUM-MLC 2022 organizing committee, ably led by the Organising Chairperson, Dr. Andrew Ng Kay Lup, and to all those involved in making this online lecture competition a successful event at both the semi-final and final rounds.

I also would like to record my appreciation and thank all competition judges who have graciously accepted our invitation despite their busy schedule, the Chairperson of the IMM MLC Committee Dr Nor Akmal Fadil of UTM, the IMM MLC committee members and university representatives for their dedication and commitment in organizing not only this Final but also the internal competitions in their respective institutions in order to select the winners to participate in the MLC2022 Semi Finals held on 16th June 2022.

My congratulations to all MLC2022 Semi-Final participants from 12 public and private universities in Malaysia for their commitment towards the competition and to the top five contestants who qualified for the MLC 2022 Final today. I wish all the best to the first placed Winner of the MLC2022 Final who will represent Malaysia at the Young Persons' World Lecture Competition 2022 (YPWLC 2022) to be held in November 2022 in Hong Kong and organised by IOM3, UK. IMM is proud of the achievements of past MLC winners who had represented Malaysia and were placed amongst the top three at the YPWLC international competition on a number of occasions.

Once again, I would like to express my gratitude to all those who were involved in successfully organizing the MLC 2022 nationwide competition including the Final today. I wish you all a great event.

Thank you.

Dato' Dr. Ir. Ts. Haji Mohd Abdul Karim Abdullah  
President, Institute of Materials, Malaysia (IMM)

## IMM-MLC 2022 Organizing Committees

|                               |                                                                     |
|-------------------------------|---------------------------------------------------------------------|
| <b>IMM-MLC Chairperson</b>    | Dr. Nor Akmal Binti Fadil                                           |
| <b>Organizing Chairperson</b> | Dr. Andrew Ng Kay Lup                                               |
| <b>Committee</b>              | Dr. Wong Xin Yi<br>Dr. Thien Yun Yee<br>Mr. Yeong Kar Fai           |
| <b>Secretariat</b>            | Dr. Ban Zhen Hong<br>Dr. Yvonne Choo Shuen Lann<br>Ms. Olvianie Pan |

## MLC 2022 University Representatives

|                                       |                                                                                        |
|---------------------------------------|----------------------------------------------------------------------------------------|
| Universiti Teknologi Malaysia         | Dr. Nor Akmal Binti Fadil<br>Dr. Abdillah Sani Bin Mohd Najib                          |
| Universiti Malaysia Kelantan          | Ts. Dr. Teo Pao Ter                                                                    |
| Universiti Malaysia Perlis            | Assoc Prof. Dr. Rozyanty Rahman                                                        |
| Universiti Selangor                   | Ts. Dr. Norazean Binti Shaari @ Md Noh                                                 |
| Universiti Sains Malaysia             | Assoc. Prof. Dr. Nurulakmal Mohd Sharif<br>Ts. Dr. Yanny Marlina binti Baba Ismail     |
| Taylor's University                   | Dr. Choo Hui Leng<br>Dr. Chou Pui May                                                  |
| Multimedia University                 | Assoc. Prof. Ts. Dr. Ervina Efzan Mhd Noor                                             |
| Universiti Teknikal Malaysia Melaka   | Dr. Mohd Edeerozey Abd Manaf<br>Dr. Hairul Effendy Bin Ab Maulod                       |
| Universiti Teknologi MARA             | Ts. Dr. Nik Roselina Binti Nik Roseley                                                 |
| Universiti Malaysia Sabah             | Assoc. Prof. Ts. Dr. Sazmal Effendi Bin Arshad                                         |
| University Of Nottingham Malaysia     | Ir. Dr. Chai Ai Bao<br>Assoc. Prof. Ir. Dr. How Ho Cheng                               |
| Universiti Kebangsaan Malaysia        | Dr. Nashrah Hani Jamadon                                                               |
| Curtin University Malaysia            | Ir. Dr. Christine Yeo Wan Sieng                                                        |
| Xiamen University Malaysia            | Dr. Andrew Ng Kay Lup                                                                  |
| Universiti Tun Hussein Onn Malaysia   | Assoc. Prof. Ts. Dr. Hamimah Binti Abd.Rahman                                          |
| Tunku Abdul Rahman University College | Ts. Ong Thai Kiat                                                                      |
| Universiti Malaya                     | Dr. Muhammad Khairi Faiz bin Ahmad Hairuddin<br>Dr. Nazatul Liana Sukiman              |
| Universiti Tenaga Nasional            | Ts. Dr. Pua Fei Ling @ Grace Pua<br>Nurfanizan Binti Mohd Afandi                       |
| Universiti Putra Malaysia             | Assoc. Prof. Dr. Norkhairunnisa binti Mazlan<br>Ts. Dr. Mohd Salahuddin bin Mohd Basri |

## Past Events

### Materials Lecture Competition (MLC) and Young Person's World Lecture Competition (YPWLC)

| Year | MLC Host & Co-host                                                                                    | MLC First Winner / Malaysia Finalist in YPWLC                                                                                                              | YPWLC organized by IOM3-UK & Prize won by Malaysia               |
|------|-------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------|
| 2012 | IMM<br>(Participating Universities: 3)                                                                | Undergraduate:<br>Mr. Mohd Danial Shafiq<br>Universiti Sains Malaysia (USM)<br>Postgraduate:<br>Mr. M. Ghaddafy Affendy<br>Universiti Sains Malaysia (USM) | No participation from MLC2012 first winner.                      |
| 2013 | IMM<br>(Participating Universities: 10)                                                               | Miss Farahani Irna Nazari (UTeM)                                                                                                                           | Hong Kong                                                        |
| 2014 | Semi-final: Universiti Teknologi MARA (UiTM)<br>Final: IMM<br>(Participating Universities: 13)        | Losini A/P Amarasan (MMU)                                                                                                                                  | University of California, Riverside, USA (3 <sup>rd</sup> Place) |
| 2015 | IMM & Universiti Kebangsaan Malaysia (UKM)<br>(Participating Universities: 15)                        | Hana Atiqah Abdul Karim (UM)                                                                                                                               | Dublin, Ireland                                                  |
| 2016 | IMM & Universiti Malaya (UM)<br>(Participating Universities: 12)                                      | Hoy Chun Wai (APU)                                                                                                                                         | Araxa, Brazil                                                    |
| 2017 | IMM & Asian Pacific University of Technology and Innovation (APU)<br>(Participating Universities: 12) | Ng Zheng Yu (Nottingham University Malaysia)                                                                                                               | Perth, Australia (3 <sup>rd</sup> Place)                         |
| 2018 | IMM & Universiti Teknologi Malaysia (UTM)<br>(Participating Universities: 11)                         | Andrew Ng Kay Lup (UM)                                                                                                                                     | Port Elizabeth, South Africa (3 <sup>rd</sup> Place)             |
| 2019 | IMM & Universiti Teknikal Malaysia Melaka (UTeM)<br>(Participating Universities: 20)                  | Lam Jia Yong (UPM)                                                                                                                                         | London (2 <sup>nd</sup> Place)                                   |
| 2020 | IMM & Universiti Putra Malaysia, UPM (virtual competition)<br>(Participating Universities: 16)        | Kai Xin Tan (UniMAP)                                                                                                                                       | Online                                                           |
| 2021 | IMM & Universiti Sains Malaysia, USM (virtual competition)<br>(Participating Universities: 18)        | Farah Hannan Abd Nasir (UM)                                                                                                                                | Online (2 <sup>nd</sup> Place)                                   |

## MLC 2022 Panel of Judges

### JUDGE 1 AND MODERATOR

#### PROF. TS. CHM. DR. CHAN CHIN HAN



Chin Han CHAN is a professor at the Faculty of Applied Sciences of Universiti Teknologi MARA, Malaysia. Her research interest is devoted to the physical properties of macromolecules and polymer blends, polymer characterization, solid polymer electrolytes, FTIR fingerprinting on polymeric products etc. She was appointed as Visiting Scientist at the China University of Petroleum, Beijing, China (2011 – 2012), as Chair Professor at Mahatma Gandhi University, Kottayam, India (2014) and International Members of the Core Advisory Committee, School of Nanoscience and Nanotechnology, Mahatma Gandhi University, Kottayam, India (2011). She has published more than 150 papers in international and national refereed journals and more than 50 plenary, keynote & invited lectures for international conferences/workshops. She has been leading more than 30 industry grants, consultancy projects and research grants. She has been one of the editors of the Malaysian Journal of Chemistry and Materials Mind of the Institute of Materials, Malaysia. She is one of the editors of books published by Royal Society of Chemistry (2013) entitled “Natural Rubber Materials” (2 Volumes), and Apple Academic Press (2014 & 2017) (distributed by CRC Press) entitled “Physical Chemistry of Macromolecules - Macro to Nanoscales” and “Functional Polymeric Composites”, respectively. She was appointed as Editorial Advisory Board Member of the Journal of Macromolecular Science, Part A: Pure and Applied Chemistry (Taylor & Francis Group) since 2017, Polymers (MPDI) since 2018 and Polymer International (Wiley) since 2020. She peer-reviews many international journals on polymer sciences. She has been a committee member of the International Union of Pure and Applied Chemistry (IUPAC) Subcommittees on Polymer Terminology since 2016 and Secretary of Polymer Education since 2019 and Associate member (2018-2019) & Titular member (2020-2023) of IUPAC Polymer Division. Since 2016, she has been elected as Honorary Secretary of the Institute of Materials, Malaysia, she is the Fellow & Council member of the Malaysian Institute of Chemistry and Fellow of Academy Professor Malaysia.

## JUGDE 2

### IR. DR. AZMI BIN MOHAMMED NOR



Ir Dr Azmi Mohammed Nor first earned his Associate in Applied Science from State University of New York at Buffalo. Then, he received his first degree in mechanical engineering from the University of Tulsa, Oklahoma, USA and subsequently obtained his MPhil in Corrosion and Corrosion Control from the University of Manchester, Institute of Science and Technology (UMIST) with a dissertation entitled The Influences of Near Surface Environment on The Polarisation Behaviour of Cathodically Protected Buried Steel Pipelines under the supervision of Emeritus Prof. Dr Robert A Cottis. He then earned his PhD in chemical engineering from Ohio University, Athens, USA with a dissertation on The Effect of Flow on the Corrosion Behaviour of Carbon Steel in High CO<sub>2</sub> Environments under the supervision of Prof. Dr. Srdjan Nesic. Currently, he is a Principal Researcher at PETRONAS Research Sdn Bhd. He is also a professional engineer with a practising certificate and a Fellow at Institute of Materials Malaysia. He was awarded Industrial and Engineering Chemistry International Fellowship (class 2021) by American Chemical Society. He has also served SIRIM as a technical committee for Pipeline Transportation and a working group on the development of Malaysian Standard on “Pipeline Repair and Rehabilitation” (2021) “Pipeline Life Extension” (on-going). He has been appointed thrice as a judge for Materials Lecture Competition held at a national level. He is also a PhD co-supervisor at UM and UKM as well as a PhD external examiner at UTM. Since joining PETRONAS, he has been involved in various projects that include gas-absorption chiller, corrosion resistant coatings, plant asset maintenance management study, cathodic protection audits, failure analyses, the corrosion behaviour of carbon steel in high CO<sub>2</sub> environments, running ductile fracture of dense-phase CO<sub>2</sub> transport pipelines, and graphene barrier coatings.

### JUDGE 3

#### IR. TS. NOOR HISHAM YAHAYA



Ir. Ts. Noor Hisham Yahaya is a Managing Director of Safe Asbestos Solutions Sdn Bhd, a mechanical engineer by qualification from UB-CT, USA. He is a licensed Professional Engineer with the BEM and also a registered Professional Technologist with MBOT. He is a certified Green Project Manager with GPM Global-USA. Ir. Hisham has more than 35-years work experiences; 5-years in power-station with LLN, 10-years in oil refinery with Shell and the remaining 20-years in managing his companies; contracting, consulting and training. He is an active member of IEM and MOGSC. Ir. Ts. Hisham Yahaya started his OGE working experiences in 1985 with LLN in Pasir Gudang Power Station and later in Perai Power Station for a total of 5-years. Later, he worked with Shell Refinery in Port Dickson in various capacities and having extensive experiences in plant maintenance management, major project construction and turnaround management for 10-years. Then, he started his own contracting and consulting companies for the remaining of his 35-years in OGE industries. During in tenure in Shell Port Dickson, he was involved in maintaining and project construction works in rotating equipment, static equipment, piping and other inter-disciplinary works. He was the Head of Project Engineering for 2-years, managing the design office and project construction works and later he was the Head of Maintenance Engineering for 2-years, managing maintenance and turnaround works. During his days in Shell Port Dickson, he was involved in managing some of the major projects in the refinery such as Multi-Product Pipelines project (facilities in the refinery), LPG inter-connecting pipelines between Shell and Esso refineries, facilities preparation for LRCC project and many other turnaround projects. He started his own business in 2001 as contractor for OGE industries, undertaking project construction, maintenance and turnaround works. During his days as a contractor, he had experiences in undertaking minor EPCC projects such as Bio-Diesel Project in Esso Port Dickson refinery, ASSAR Kuching terminal metering skids and many other small design projects. He also owned a consulting business in 2008, undertaking Shell Hijau Project for their imported UPV design approval from DOSH and issuance of the Certificate of Completion and Compliance (CCC); for EPCC Fluor Daniel International. He was also the consultant for Arkema CJ Plant project for their imported UPV design approval from DOSH; for EPCC Foster Wheeler UK. Ir. Ts. Hisham Yahaya is a certified NOSS DESCUM facilitator by Department of Skills Development (under the Ministry of Human Resources) with

experiences in developing Technical & Vocational Education and Training (TVET) occupational competencies in NOSS Rotating Equipment as well as Static Equipment for Oil & Gas industries. He was engaged as mechanical rotating and static equipment auditor by DNV.GL to undertake independent construction audit for RAPID-Pengerang Refinery and Cracker Complex; Jul till Dec 2019. He was also engaged as Subject Matter Expert (SME) in mechanical by DNV.GL to undertake Root Cause Failure Analysis (RCFA) in RAPID-Pengerang Diesel Hydro-Treater (DHT) fire/explosion incident from Apr till Jun 2020. In early 2020, he received his certification as a Green Project Manager (GPM-bTM) as well as a Registered Consultant & Assessor (RCA) in Green Project Management by GPM Global, USA.

#### JUDGE 4

#### PROF. DR. MARIYAM JAMEELAH GHAZALI



Mariyam Jameelah obtained her B.Eng.(Hons), Mat. Eng from University Sains Malaysia in 1999. This was followed by her M.Sc. in Materials Engineering from the same university and Ph.D. from University of Sheffield, UK in 2000 and 2005 respectively. On completion of her PhD, she was appointed as a tutor in 2002 at UKM. She is currently appointed as a full Professor in Mechanical & Manufacturing Engineering Department, UKM and recently was a Visiting Professor at Nagaoka University of

Technology, Japan. Administratively, she was appointed as Chief Editor of Journal Kejuruteraan UKM, and currently holding a post as an Assistant Dean for Entrepreneur and Creativity of Engineering & Built Environment Faculty. She sat on many committees at International, National and University levels. She was the co-founder of the Malaysian Tribology Society (MYTRIBOS) and served as the secretary of Malaysia Tribology Society from 2007 until 2019. Currently she has been appointed as the Vice President (Academics) for Mytribos and also the Vice President for Asia Tribology Council (ATC). She has received numerous research grants and awarded outstanding academic achievements as well as members of many international and national professional organizations. She has successfully supervised many local and foreign Master and PhD students. She enjoys cycling and reviewing papers, and still being invited to review many journal articles by renowned publishers.

## Materials Lecture Competition 2022 (MLC 2022)

### Top 5 Finalist

| No. | Name                        | Title                                                                                                        | University                    |
|-----|-----------------------------|--------------------------------------------------------------------------------------------------------------|-------------------------------|
| 1.  | Nithyalakshmi A/P Ravindran | High Performance Supercapacitors with Hybrid MoS <sub>2</sub> /MXene Electrodes                              | Universiti Malaya             |
| 2.  | Ng Yong Pong                | Radiation Shielding Material – An overview and manufacturing of radiation shielding composite                | Taylor's University Malaysia  |
| 3.  | Natasha Voznyuk Jeevan      | Potato plastic - A solution to single-use plastics                                                           | Universiti Teknologi Petronas |
| 4.  | Ammar Zoheir                | Graphene: The Wonder Material in the Electronics Industry                                                    | Universiti Tenaga Nasional    |
| 5.  | Rathosivan Gopal            | Immobilisation of Factor VII through Polydopamine Grafting on Polycaprolactone Membrane for Cardiac Bleeding | Universiti Teknologi Malaysia |

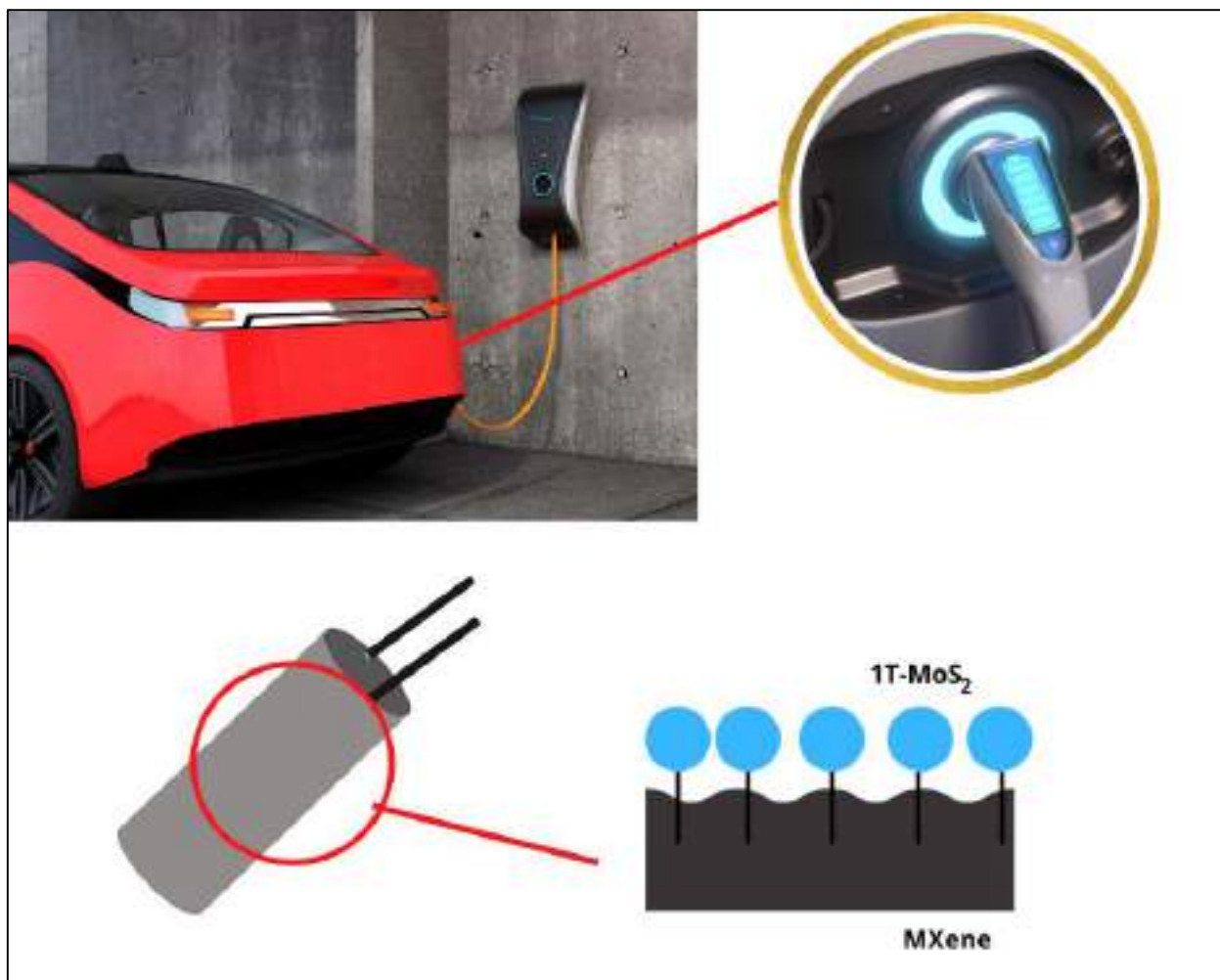
|                       |                                                                                 |
|-----------------------|---------------------------------------------------------------------------------|
| Name                  | Nithyalakshmi A/P Ravindran                                                     |
| University            | Universiti Malaya                                                               |
| Status                | Postgraduate                                                                    |
| Title of Presentation | High performance supercapacitors with hybrid MoS <sub>2</sub> /MXene electrodes |



## Biography

Nithya graduated from Universiti Putra Malaysia with a Bachelor of Science (Hons) in Petroleum Chemistry in 2021. She is pursuing her master's degree in Physics at the Low Dimensional Materials Research Centre, Faculty of Sciences, Universiti Malaya. During her undergraduate study, Nithya developed a profound interest in the field of renewable energy that prodded her to do research in energy storage devices. Her research interests include catalysis, material science, electrochemistry, and renewable energy. She is also looking to incorporate machine learning and artificial intelligence to design efficient energy storage devices to power up the planet and reduce the effect of climate change. Nithya is very passionate about volunteering. She founded The Intern Project UPM, an organization that preps final-year students with the necessary skills to progress in their internship and work life. She has also held leadership positions and spearheaded projects with various nation-building NGOs. This year, she will be representing Malaysia as a delegate for Hitachi Young Leader's Initiative 2022 while working on her startup, Urban Leaves. Nithya enjoys binge-watching dramas, learning to code, and reading novels during her free time. As a researcher, she believes that science communication is a vital skill to address the public and industry on the scientific discoveries, thus bridging the gap between the research community and the general public.

## Graphical Abstract



## Abstract

Climate change is already upon us, and the transportation sector has emerged as one of the most significant contributors to greenhouse gas emissions. To reduce emissions and limit warming, reducing fossil fuel consumption and electrification of the transportation sector could buy us time to undo the damage done to the planet. One way would be to embrace electric vehicles as a mode of transportation. Battery-powered vehicles take a longer time to charge despite covering longer driving ranges. Supercapacitors complement batteries by inducing fast charging. Supercapacitors can readily replace batteries in the future by improving their storage capacity. Fabricating high-performance supercapacitors requires electrodes with high surface area, and high electrical conductivity - the 1T-MoS<sub>2</sub>/MXene hybrid material could satisfy these criteria due to its sizeable lateral size and metallic nature. The hybrid material gives a synergistic effect by combining the high electrical conductivity of the 1T-MoS<sub>2</sub> and the large surface area of the MXenes. The hybrid material has a pseudocapacitive ability that increases the storage capacity of the supercapacitors. Integrating 1T-MoS<sub>2</sub> onto MXenes also prevents the aggregation of 1T-MoS<sub>2</sub> and extends the supercapacitors' lifetime for long-time use as an energy storage device.

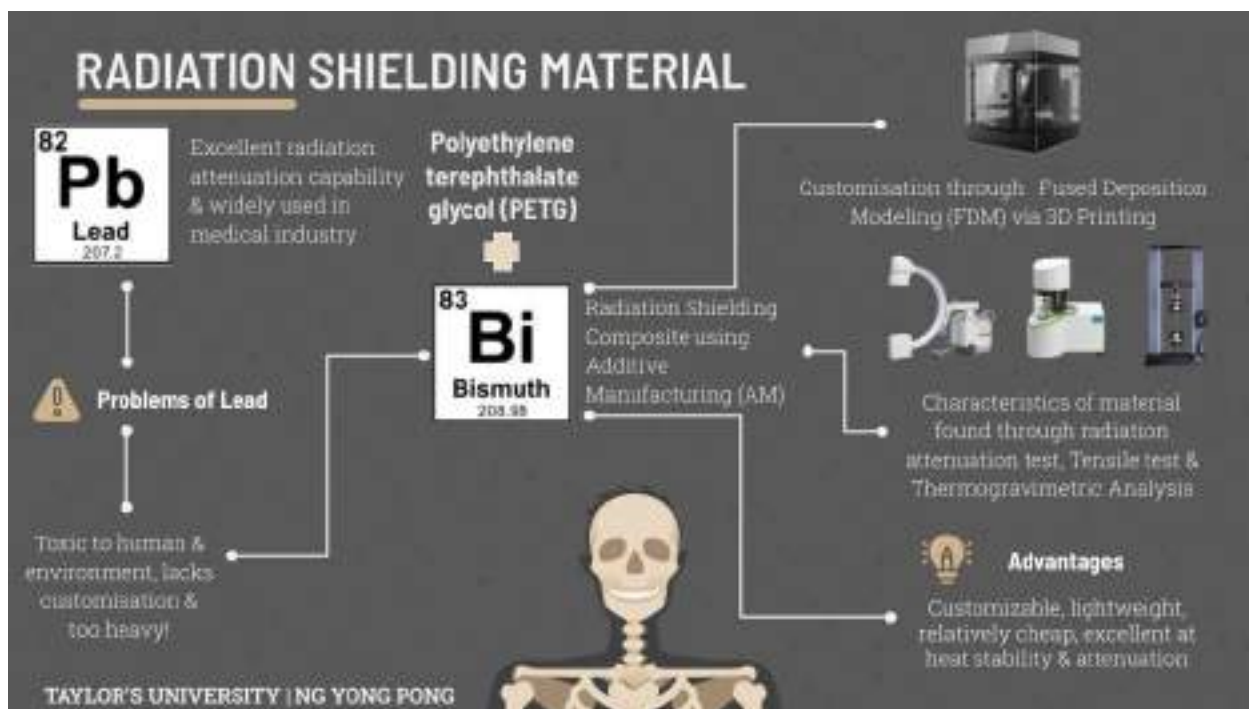
|                                                                                               |                              |
|-----------------------------------------------------------------------------------------------|------------------------------|
| Name                                                                                          | Ng Yong Pong                 |
| University                                                                                    | Taylor's University Malaysia |
| Status                                                                                        | Undergraduate                |
| Title of Presentation                                                                         |                              |
| Radiation shielding material – An overview and manufacturing of radiation shielding composite |                              |



## Biography

Born and raised in Sabah, Malaysia, the dream to be a professional engineer kick-started from the 12th MICSS Nationals Science Camp 2016. Pong was able to return in the 13th MICSS Nationals Science Camp in the year 2017, and was victorious and hence selected as Malaysian representative to attend 2017 WCS World Science Camp in Taiwan. Being an engineering minded person, during his gap year in 2018, Pong managed to solve water filtration issue in Kota Kinabalu and curated a unique water for his coffee, bagging home first runner up of Borneo Brewers Cup 2018. Since enrolling into the Foundation in Engineering program in Taylors University in 2020, Pong competed in EIC hosted by IES in 2021 and IBCEX Nationals in 2022, bagging home champion and first runner up, respectively.

## Graphical Abstract



## Abstract

Radiation shields are essential tools in radiological departments to protect healthcare workers (HCWs) from excessive exposure to ionizing radiation, and lead-based radiation shield is the mainstream choice for the industry. However, lead is toxic and not environmentally friendly. Besides, due to the weight of lead-based products, musculoskeletal pain is very common among HCWs who use medical garments incorporating lead. Lastly, commercial lead shields lack customisation and have relatively high cost to manufacture. Hence, this project aims to fabricate a lead-free radiation shielding material using bismuth (Bi) and polyethylene terephthalate glycol (PETG). The composite is made into a suitable filament so that it can be used for fused deposition modelling (FDM). Besides, characteristics of the material is determined after undergoing a couple of tests, which includes Radiation Attenuation Test, Tensile Test and lastly Thermogravimetric Analysis (TGA). Bi-PETG is customisable, lightweight, excellent at radiation shielding, able to perform at high temperature and relatively cheap as compared to lead-based products.

|                       |                                                   |
|-----------------------|---------------------------------------------------|
| Name                  | Natasha Voznyuk Jeevan                            |
| University            | Universiti Teknologi PETRONAS                     |
| Status                | Undergraduate                                     |
| Title of Presentation | Potato Plastic -A solution to single-use plastics |

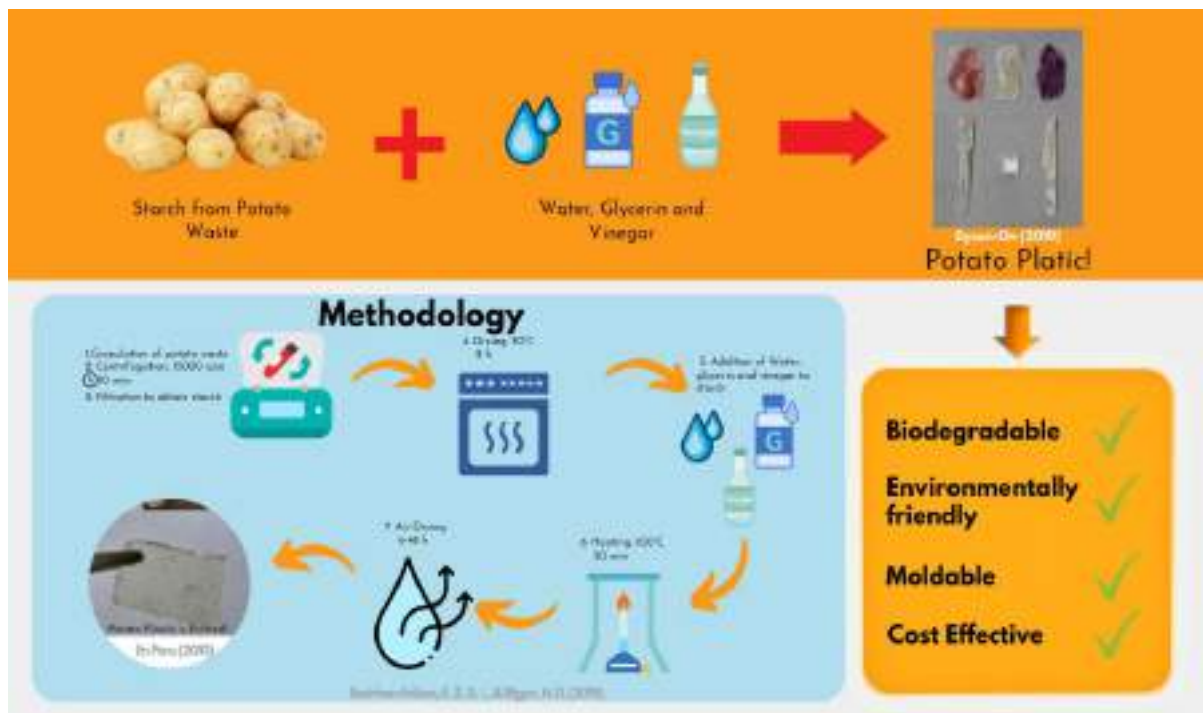


## Biography

Ms Natasha Voznyuk Jeevan is a student at Universiti Teknologi PETRONAS pursuing her Bachelor of Mechanical Engineering with Honours. Natasha was the cofounder and president of the Institution of Engineers, Malaysia, UTP Student Chapter (21/22), project director of IEM-UTP-SC Women's Leadership Summit 2021 and supervisor of IEM-UTP-SC Expo 2022. She is also the current assistant project director of Science and Engineering Design Exhibition (SEDEX) 48, UTP.

Coming from a cross cultural background, Natasha hopes to inspire and empower others through leading by example. Upon graduation, she hopes to be a part of a diverse team that will allow her to pursue her passion for energy and sustainability, to bring sustainable and positive energy solutions to the community.

## Graphical Abstract



## Abstract

Potatoes produced worldwide amounts to a total of 359 million metric tons per year. Nevertheless, one out of ten potatoes go to waste during production due to partial damages incurred during the process of harvest, storage, and transport. From the market to the home, more potatoes are thrown out because of their unappealing appearance or food preparation waste. The waste from potatoes can be turned into potato plastic via granulation, centrifugation and drying. Potato plastic can replace conventional plastic where it is designed for a single usage, such as plastic bags, straws, and plastic cutlery. Plastics come from non-renewable sources and generate a high amount of non-biodegradable waste, whereas potato plastic is a biodegradable and compostable plastic produced from starch. Potato plastic has a Tension Fracture of 1.04-1.43 MPa, percent elongation of 17.6-36.7 %, a transparent visual appearance and is produced at a thickness of 0.31-0.42 mm. These material properties are suitable for single-use plastics as a Tension Fracture of less than 0.01MPa and a thickness of less than 0.35mm is required. By manufacturing potato plastic, the food waste can be significantly reduced, and the use of single-use plastic can be eliminated, thus reducing environmental concerns caused by single-use plastics.

|                       |                                                           |
|-----------------------|-----------------------------------------------------------|
| Name                  | Ammar Bin Zoheir                                          |
| University            | Universiti Tenaga Nasional                                |
| Status                | Undergraduate                                             |
| Title of Presentation | Graphene: The wonder material in the electronics industry |

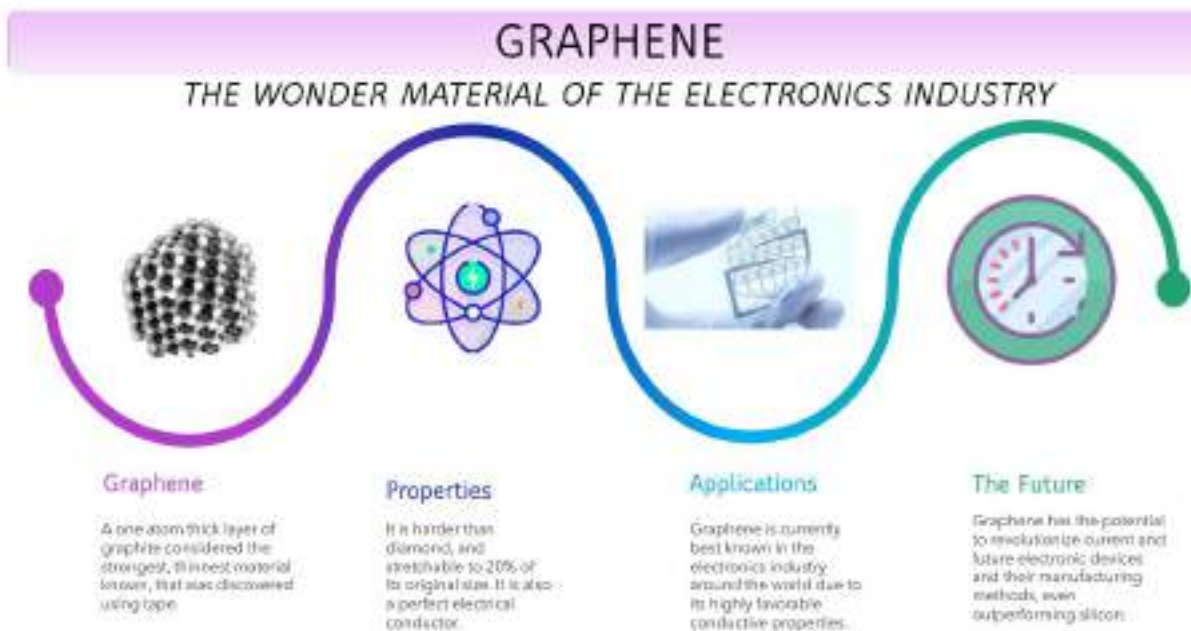


## Biography

Ammar is an undergraduate student of Universiti Tenaga Nasional (UNITEN), studying Bachelor of Electrical and Electronics Engineering. Coming from a family of engineers, he is passionate about upcoming advancements in the form of automation and AI development. This passion is demonstrated through active involvement in clubs and societies, as well as programs advocating for, or pursuing advancements in the aforementioned fields.

Ammar has been active in the world of public speaking since his time in high school, participating in both impromptu and storytelling competitions. In university, he successfully represented UNITEN in the South East Asia Region Speak Out for Engineering Competition in 2020 and 2021. He also won the Material Lecture Competition 2019 Internal Heat, and is an active debater with numerous achievements at a national stage.

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## Abstract

Graphene is a revolutionary material made up of a single layer of graphite atoms arranged as a single sheet. It is known as the strongest, lightest, thinnest, and hardest material on the planet. It is also one of the most readily available materials in the world, as it is comprised of carbon, the fourth most known element. It was initially discovered by separating sheets of graphite on tape, and today, it is created through a variety of ways. Some of these range from running graphite in a blender at home, to using chemical reactions to separate the layers of graphene. Graphene has hundreds of practical applications in many fields, and in computing and electronics in general. As a result, graphene manufacturers are currently working on developing manufacturing methods that will enable the rapid implementation of this material. Graphene is currently best known in the electronics industry due to its highly favourable conductive properties. Graphene's strength, high thermal conductivity, and high electron mobility have the potential to revolutionize electronic devices, occasionally outperforming silicon. In applications such as batteries, it theoretically succeeds in bridging the gap between lithium batteries and supercapacitors. Applications for the generation and storage of electrochemical energy have been reported to benefit from graphene. It operates through quick surface reactions in both electrodes, which results in an incredibly high power output. In summary, graphene is a material that surpasses the capability of the most common materials in electronics, and its applications have the potential to revolutionise technology.

|                       |                                                                                                              |
|-----------------------|--------------------------------------------------------------------------------------------------------------|
| Name                  | Rathosivan Gopal                                                                                             |
| University            | Universiti Teknologi Malaysia                                                                                |
| Status                | Postgraduate                                                                                                 |
| Title of Presentation | Immobilisation of Factor VII through Polydopamine Grafting of Polycaprolactone Membrane for Cardiac Bleeding |



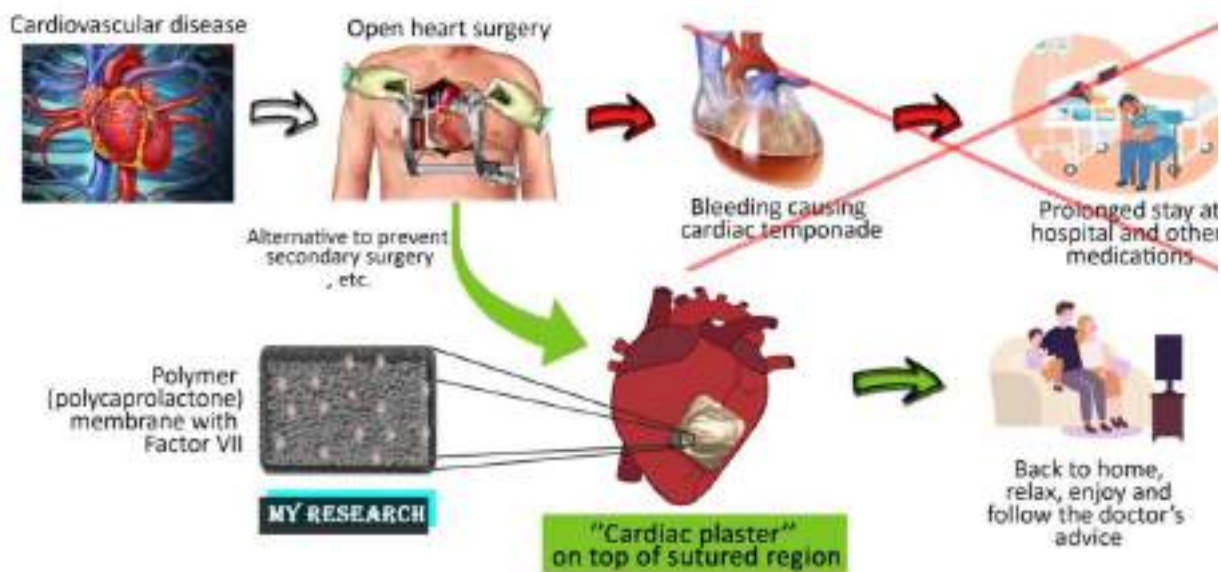
## Biography

Rathosivan graduated in Bachelor of Engineering (Bio-Medical) from Universiti Teknologi Malaysia (UTM) with first class distinction in the year 2019. He was then offered to pursue fast-track doctorate programme in School of Biomedical Engineering and Health Sciences and managed to secure financial aid from student excellence program by Malaysia public service department (PPC-JPA) to further his studies. His research focuses on utilisation of biomaterials especially polymers and hydrogels as an implant material and has skilled in operating several high-end analysis instruments as well as performing in-vitro analyses.

Rathosivan is currently completing his six months training attachment at Laval University, Canada funded by the Canadian government. Ratho has presented his preliminary research work in Quebec, Canada at the QCAM student symposium 2022 and virtually at Japan in the 8th ICCME 2021 conference in the field of biomaterials, polymer and mechanics. Recently, he won the 3 Minute Thesis competition in UTM and represented the university to the national level. He also has been the organising committee for 8th and 9th IGCESH (2020, 2022) conference and gained valuable experiences in managing hybrid big-scaled events.

Apart from academic relations, Ratho has led several student associations during his doctorate study such as postgraduate student society (PGSS 2019/2020) and residential college student committee (JKM 2020/2021). Together with his team members, Ratho has organised variety of programs to engage students actively participate in activities outside their academic field and cope with the pandemic while excelling in their studies and research. As a graduate engineer and a researcher, he is keen in giving back to the community to raise awareness and help young students and kids to engage in STEM programs. He enjoys participating in charity programs and always willing to lend a helping hand to develop the community.

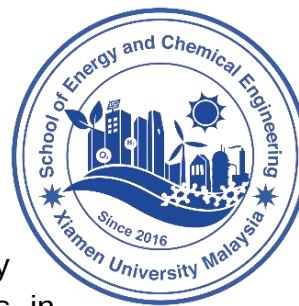
## Graphical Abstract



## Abstract

The repair of cardiac bleeding is one of the processes in the treatment of cardiovascular diseases. Nevertheless, postoperative bleeding is still an issue following the implementation which derange the resources and cost. Oral administration of blood coagulation protein called Factor VII (FVII) has been effective to stop the bleeding. However, the short half-life may loss its effectiveness and frequent intake may distress the patient. Alternatively, synthetic polymers such as polycaprolactone (PCL) is used in drug delivery and wound dressing applications due to its favorable properties. Therefore, this study immobilises FVII on PCL membrane through polydopamine grafting using dropcasting technique to seal the bleeding at its maximum region and accelerate blood coagulation. The PCL membrane was used to graft a thin polydopamine film as the intermediate layer to enhance the surface compatibility and provide a platform for immobilisation of Factor VII afterwards. The physio-chemical properties of the thin PCL membranes were characterized using several analyses. While the cytocompatibility of the membranes was evaluated with fibroblast and blood cells. Initial characterisation studies showed the success of FVII immobilisation through polydopamine grafting and the presence of FVII molecules on the PCL membrane with enhanced surface roughness and hydrophilicity. While the biocompatibility tests showed increased cell viability and coagulation and the lowest haemolysis ratio on FVII immobilised PCL membrane. This validates the biocompatibility of the membrane and its ability to accelerate blood coagulation and potential application as cardiac bleeding sealant. Future works will focus on the mechanical strength and incorporation of adhesive component to the membrane.

## School of Energy and Chemical Engineering (SECE), Xiamen University Malaysia



Xiamen University Malaysia (XMUM) is the first overseas Chinese university branch campus in Malaysia. XMUM was founded after Malaysian Minister of Higher Education officially invited Xiamen University, China (XMU) to set up a campus in Malaysia. Located in the vicinity of Bandar Sunsuria, Kota Warisan, Sepang, Selangor. XMUM aspires to become a university with a distinct global outlook, which features first-class teaching and research and embraces cultural diversity. It mirrors the best practices of XMU in every aspect of academic excellence, governance and infrastructure, as well as providing the best conducive environment for teaching and learning and promoting research, development and innovation. Holding the vision and mission of XMU, XMUM additionally advances its vision and mission to establish a multi-cultural university encompassing both teaching and research excellence. Our ultimate aim is to cultivate young talents who will contribute to the welfare improvement of people and society progress as regional citizens with dignity and intelligence. Leaning into the glorious existence of XMU, past and present, XMUM is set to move forward in tandem with XMU into the future. Holding onto the privilege of being the only Chinese university outside of China; and the first Chinese university branch campus in the world, it opens up a gateway to China, to people of the world through educational pursuit. Leveraging on teaching excellence and research reputation at XMU and local demand in the energy and chemical engineering industry, the School of Energy and Chemical Engineering was established in April 2016 and provides science and engineering courses related to Energy and Chemical Engineering at XMUM. There are six academic programmes offered in this school:

Undergraduate programmes:

- (1) *Bachelor of Engineering in New Energy Science and Engineering with Honours*
- (2) *Bachelor of Chemical Engineering with Honours*

Postgraduate programmes:

- (3) *Master in New Energy Science and Engineering*
- (4) *Master of Science in Chemical Engineering*
- (5) *PhD in New Energy Science and Engineering*
- (6) *PhD in Chemical Engineering*

## Institute of Materials, Malaysia (IMM)

### About IMM



The Institute of Materials, Malaysia (IMM) is a professional society and certification body that promotes the honourable practice, professional ethics and encourages education and skills in materials science, technology and engineering. Engineers, academicians, technologists and technicians, skilled workers and other professionals are among its members and number more than 6000.

Registered with the Registrar of Societies in 1987 as the Malaysia Materials Science & Technology Society (MMS), IMM changed to its current name in 1997. IMM is administered by a council of 30 members with volunteers who are experts in various fields leading 8 specialised materials science and technology committees, complemented by 15 other professional working committees and 4 regional chapters, supported by a secretariat.

One of the key objectives of IMM includes the training and development of individuals in Malaysia to attain certification and professional recognition in materials science, technology and engineering. IMM also promotes research and development in these fields in addition to facilitating and encouraging collaboration between the industrial sectors, research institutes and universities.

IMM's certification courses are well recognized and endorsed in the oil and gas, shipbuilding, construction and transport industries. Over the years, personnel from these industries have been trained and certified. They include, amongst others, blasters and painters, coating inspectors, welding engineers, welding inspectors, corrosion technicians, cathodic protection technologists, vibration practitioners and coating fingerprint quality controllers. These certification programmes are organised by Authorised Training Bodies and provide high employability with a pathway for increased remuneration and career advancement for certified technicians and professionals. Our programs have been developed together with the industry, academia and relevant stakeholders to ensure that

the technical training and certification provided meet the relevant industry standards and requirements.

IMM also organises numerous conferences, workshops, seminars, technical visits, educational and materials awareness programmes. Notably, IMM has organised the International Materials Technology Conference (IMTCE) on a biennial basis.

IMM has cemented its place and is recognised in Malaysia as the authority in Materials Science and Technology through the various certification courses and related programmes. Collaborations with industries including PETRONAS and with overseas professional organisations such as the Asian Welding Federation, Japan Welding Engineering Society and others continue to be part of IMM's vision to be internationally recognised.

IMM continuously endeavours to try to fulfil its mission to be the technical authority on material science and technology, to expand its scope to cover more categories for competency and skills training in material science and engineering, to be an internationally recognised certifying body with accreditation to MS ISO/IEC 17024, to be the forum for industry and academia collaboration while not forgetting to contribute positively to society and quality of life.

## General Information on IMM Membership

The IMM membership is opened to all individuals and companies in developing the contribution of Materials science, technology and engineering towards industrial growth in Malaysia. The technology of materials is advancing day-to-day throughout the world. Membership to IMM will enable networking and exchange of knowledge from a very wide variety of specialised areas of expertise. Please feel free to download or print a copy of the application form together with the IMM regulations. If you have any doubt, do not hesitate to contact our secretariat through the phone; +603 7661 1591 or +6018 911 3480 or email to [secretariat@iommm.org.my](mailto:secretariat@iommm.org.my).

Annual subscriptions shall be payable in advance by 1st January of each year. Those admitted into IMM between 1st July and 31st December in any year shall pay only half the annual subscription. Seniors (above 55 years old) get 50% discount off their annual subscriptions.

We have an online application for selected grades which can be accessed from [https://docs.google.com/forms/d/e/1FAIpQLSeZtdYFI1osWHCPVzaUeamheSunYCPNy-vsN16nBAg\\_yID3CA/viewform](https://docs.google.com/forms/d/e/1FAIpQLSeZtdYFI1osWHCPVzaUeamheSunYCPNy-vsN16nBAg_yID3CA/viewform)

Also, Membership application forms in document format can be accessed from <https://www.iomm.org.my/membership-grade-requirement/>

Kindly fill out the form and email it to [secretariat@iommm.org.my](mailto:secretariat@iommm.org.my) or send it to:

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Institute of Materials Malaysia



\*As updated on 13<sup>th</sup> May 2022



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