



# PROGRAMME BOOK

9-10 SEPTEMBER 2024  
HOTEL SERI MALAYSIA MELAKA

## 1<sup>ST</sup> INTERNATIONAL SYMPOSIUM ON SOLAR HYDROGEN 2024

*Towards Green and Sustainable Hydrogen Future*

### ORGANIZERS:



### COLLABORATOR:



### SPONSORS:



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# WELCOME MESSAGE



## **Assoc. Prof. Dr. Lorna Jeffery Minggu**

Chairman

1<sup>st</sup> International Symposium on Solar Hydrogen (SSH2024)

Fuel Cell Institute, Universiti Kebangsaan Malaysia

## MESSAGE FROM SSH2024 CHAIRMAN

Greetings! Dear colleagues and friends,

We warmly welcome you to the 1<sup>st</sup> International Symposium on Solar Hydrogen (SSH2024). We extend our deepest gratitude to all the speakers and participants who have come together to make this event a success. Your presence reflects a shared commitment to advancing solar hydrogen energy research.

This symposium is a unique opportunity to exchange ideas, showcase innovative products and technologies, and explore applied research and case studies in the field of hydrogen energy. We hope that these discussions will not only elevate interest in this critical area within Malaysia but also foster meaningful collaborations on an international scale.

Organizing this event has been highly rewarding, enriched by the valuable insights and support from all involved. We are honored by your contributions and look forward to the fruitful exchanges and collaborations that will emerge from this gathering.

Thank you for being a part of SSH2024!

# WELCOME MESSAGE



**Prof. Ir. Dr. Siti Kartom Kamarudin**

Director of Fuel Cell Institute Universiti Kebangsaan Malaysia

## MESSAGE FROM THE DIRECTOR OF SELFUEL

Assalamualaikum wbt. and Greetings to all,

Congratulation to the organizing committee and a warm welcome to all the speakers and participants to the 1<sup>st</sup> International Symposium on Solar Hydrogen (SSH2024). This symposium is organized to increase the recognition and exposure of hydrogen application in Malaysia to the international level. It also aims to serve as a platform for researchers to exchange views and research experience.

SELFUEL aspires to be the leading and renowned regional reference higher learning institution in Malaysia for experts and practitioner to exchange experience, views and latest finding on hydrogen energy. The institute is constantly seeking opportunities to secure research grants and expanding its industry collaboration to grow its strength in research and development as well in improving the research labs and facilities for product innovations.

Finally, a big applaud to my fellow teams of the SSH2024 committee for making the symposium a success and well done to each of you. Thank you.

# WELCOME MESSAGE



**Prof. Dato' Ir. Dr. Wan Ramli Wan Daud**

President of the Malaysian Association of Hydrogen Energy (MAHE)

## MESSAGE FROM PRESIDENT OF MAHE

Assalamualaikum w.b.t and Greetings,

I would like to express my heartfelt appreciation to the Solar Hydrogen Group from Fuel Cell Institute (SELFUEL) and Faculty of Science and Technology for successfully organizing the 1<sup>st</sup> International Symposium on Solar Hydrogen (SSH2024). This event provides a platform for academic-industrial professionals to build networking and collaborations in the field of hydrogen energy and its sub-field. This time, we're continuing our efforts to drive and promote the local research and industry growth in the hydrogen technology. Our goal is to make progress towards sustainable energy by reducing our impact on the environment.

The SSH2024 is underway with the theme "Towards Green and Sustainable Hydrogen Future". The theme is timely as it aligns with the effort to enhance energy security and reduce the impact on the environment, in pursuit of the Sustainable Development Goals 2030 (SDG 2030). Finally, I hope that the findings and discussions of this event will be able to provide a solution to the environmental challenges that we are facing today.

# WELCOME MESSAGE



**Prof. Dato' ChM. Dr. Mohammad B. Kassim**  
Head of Solar Hydrogen Research Group,  
Universiti Kebangsaan Malaysia

## MESSAGE FROM HEAD OF SOLAR HYDROGEN RESEARCH GROUP

Assalamualaikum w.b.t and Greetings,

Welcome to the 1<sup>st</sup> International Symposium on Solar Hydrogen (SSH2024). We are delighted to have a gathering of distinguished experts, researchers, and enthusiasts, all united by our vision for a sustainable future powered by hydrogen. As we embraced the potential of hydrogen energy - a clean, renewable, and versatile zero-emission fuel; we are set to revolutionise the global energy landscape and strive towards a sustainable future.

Hydrogen, produced using renewable energy sources, is essential to contend with climate change and has vast applications in transportation, electricity generation, industrial processes, and green chemicals production. Finally, I would like to express my sincere thanks to fellow SSH2024 committee who have worked tirelessly in making this symposium a success.

Wishing you all for a happy and fruitful symposium. Thank you.

# ORGANIZING COMMITTEE



Advisor	: Prof. Dato' ChM. Dr. Mohammad B. Kassim
Chairperson	: Assoc. Prof. Dr. Lorna Jeffery Minggu
Deputy Chairperson	: Assoc. Prof. Dr. Rozan Mohamad Yunus
Secretariat	: Dr. Nabila A. Karim (Leader) : Cik. Nowilin James Rubinsin : Cik. Siti Nurul Falaein Moridon : Pn. Nur Azlina Adris : Pn. Nurul Nabila Rosman : Pn. Hafizatul Izzati Badrul Zaman
Treasurer	: Dr. Sharifah Najiha Timmiati (Leader) : Dr. Fazilah Farhana : Pn. Nora Azlina Asikin Harun
Promotion & Sponsorship	: En. Mohd Faizal Md. Nasir (Leader) : Dr. Khuzaimah Arifin : Assoc. Prof. Dr. Norasikin Ahmad Ludin : Cik. Nur Rabiatal Adawiyah Mohd Shah : En. Mohammad Fadzlee Ngatiman : Dr. Juliana Jumadi
Program & Publication	: ChM. Dr. Mohamad Azuwa Mohamed (Leader) : Dr. Khairul Naim Bin Ahmad : Pn. Nur Shamimie Nadzwin Hasnan : Cik. Nurul Atikah Nordin : Cik. Nur Nabihah Sazali : Pn. Wan Emilin Suliza Bt Wan Abdul Rashid
Technical & Logistic	: Assoc. Prof. Ts. Dr. Lim Kean Long (Leader) : Dr. Azim Fitri Zainul Abidin : En. Azman Md Nor : Cik. Nisa Afiqah Rusdan : Cik. Afifah Kamal : En. Mohd Asri Yusof : En. Mohd Azahar Azahari

# SCIENTIFIC COMMITTEE



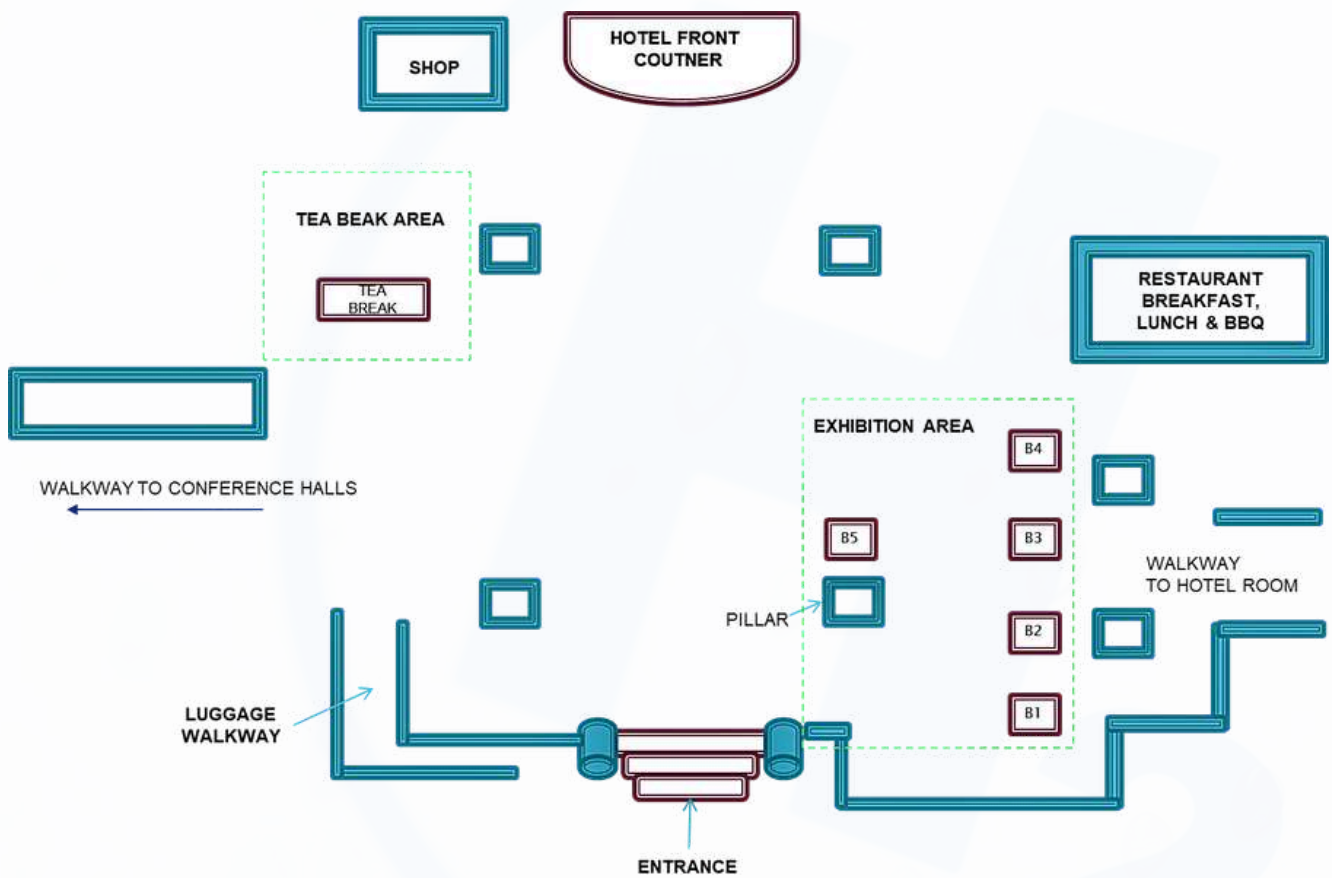
<b>Professor Dr. Kenji Miyatake, FRSC</b>	Clean Energy Research Center University of Yamanashi, Japan
<b>Prof. Dr. Lam Hon Loong</b>	University of Nottingham, Malaysia
<b>Dr. Khuzaimah Arifin</b>	Pusat Riset Material Maju, Badan Riset dan Inovasi Nasional (BRIN), Indonesia
<b>Dr. Chua Yong Shen</b>	Universiti Sains Malaysia (USM), Malaysia
<b>Dr. Mohammed Ismail</b>	School of Engineering, University of Hull, England



# VENUE FLOOR PLAN



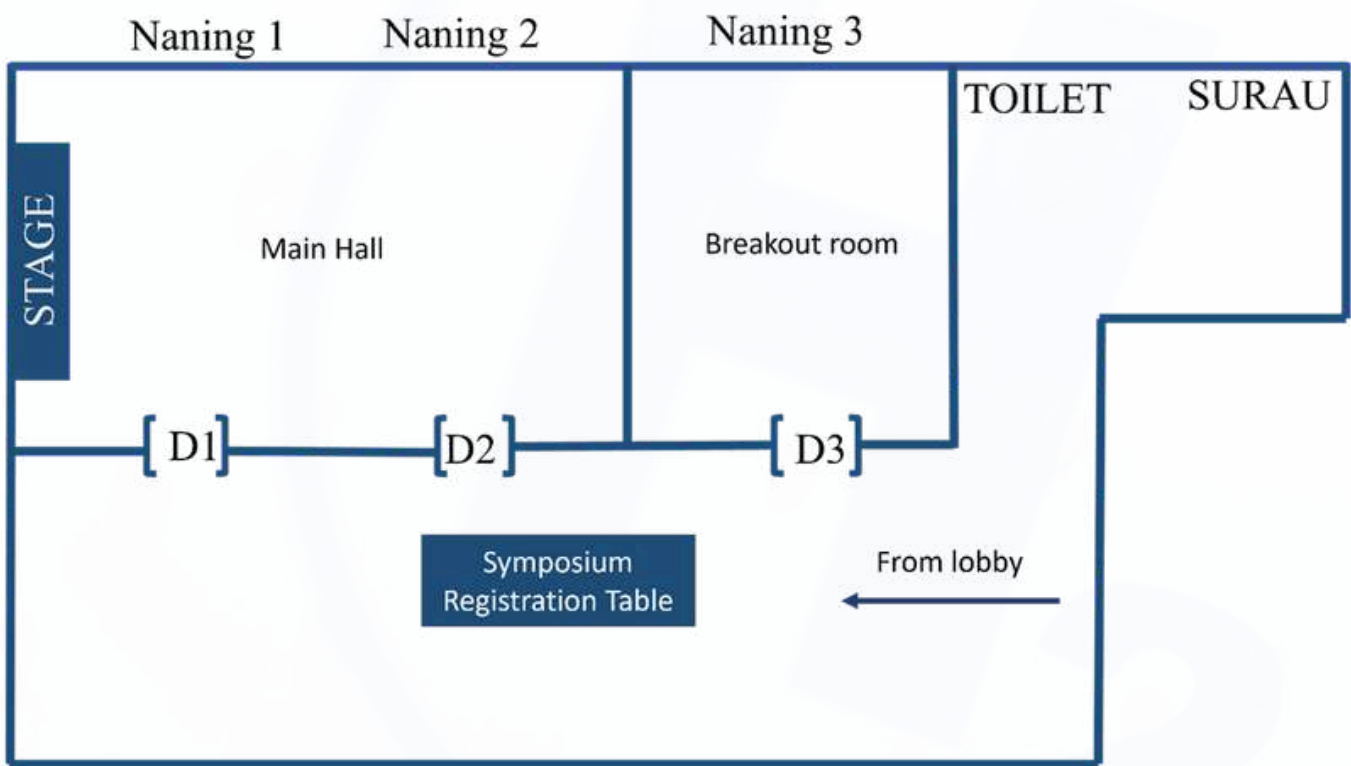
## Floor Plan Lobby Area 🔍



# VENUE FLOOR PLAN



## Hall Floor Plan



# PROGRAMME OF SSH2024



## 09 SEPTEMBER 2024 (MONDAY)

8:00 am	Registration	
<b>Opening Ceremony</b>		
9:00 am	National Anthem (Negaraku)	
9:10 am	Opening Ceremony <b>YBhg. Prof. Dato' Ir. Dr. Wan Ramli Wan Daud</b> <i>President of the Malaysian Association of Hydrogen Energy (MAHE)</i> Video Montage Presentation	
9:45 am	Photo Session	
<b>Plenary Session</b>		
10:00 am	Plenary Talk 1 : <b>YBhg. Prof. Dato' ChM. Dr. Mohammad B. Kassim</b> <i>Professor, Faculty of Science and Technology, Universiti Kebangsaan Malaysia (UKM), Malaysia</i> Chairperson: Assoc. Prof. Dr. Mohd Shahbudin Mastar @ Masdar	
10:45 am	Coffee Break	
<b>Parallel Session 1</b>		
Theme	<b>Solar and Photoelectrochemical Systems</b>	<b>Sustainable Hydrogen Production, Storage, and Advanced Materials</b>
Venue	Dewan Naning 1&2	Dewan Naning 3
Chairperson	Dr. Noor Shahirah Shamsul	Dr. Khuzaimah Arifin
11:00 am	Keynote Speaker: <b>Dr. Viet Huong Nguyen</b>	Keynote Speaker: <b>Assoc. Prof. Dr. Lim Kean Long</b>
11:30 am	SPO1 (INV)	11:30 am      HPO2 (INV)
11:50 am	SPO2 (INV)	11:50 am      HPO3
12:10 pm	SP05	12:05 pm      HPO4
12:25 pm	SP06	12:20 pm      HPO5
12:40 pm	Lunch	

# PROGRAMME OF SSH2024



**09 SEPTEMBER 2024 (MONDAY)**

## Parallel Session 2

Theme	Solar and Photoelectrochemical Systems	Sustainable Hydrogen Production, Storage, and Advanced Materials
Venue	Dewan Naning 1&2	Dewan Naning 3
Chairperson	Dr. Muhammed Ali. S.A.	Dr. Lim Swee Su
2:30 pm	SP03 (INV)	HP01 (INV)
2:50 pm	SP04 (INV)	HP06 (INV)
3:10 pm	SP07	HP07
3:25 pm	SP08	HP08
3:40 pm	Break	
3:55 pm	SP09	HP09
4:10 pm	SP10	HP10
4:25 pm	SP11	HP11
4:40 pm	Break	
<b>Barbecue Dinner</b>		
7:30 pm	Barbeque Dinner and Networking Session Dress Code: Casual	
<b>10.30 pm</b>	<b>END OF DAY 1</b>	

*Time is GMT +8hrs*

# PROGRAMME OF SSH2024



## 10 SEPTEMBER 2024 (TUESDAY)

8:00 am	Registration		
<b>Plenary Session</b>			
9:00 am	Plenary Talk 2: <b>Dr. Eng. Deni Shidqi Khaerudini</b> <i>Research Professor of Research Center for Advanced Materials, Badan Riset dan Inovasi Nasional (BRIN), Indonesia</i> Chairperson: Assoc. Prof. Dr. Rafiziana Binti Md Kasmani		
9:45 am	Coffee Break		
<b>Parallel Session 3</b>			
Theme	<b>Photocatalysis and Fuel Processing</b>	<b>Hydrogen Utilization, Safety, Battery Technology &amp; Others</b>	
Venue	Dewan Naning 1&2	Dewan Naning 3	
Chairperson	Assoc. Prof. Dr. Loh Kee Shyuan	Dr. Azran Mohd Zainoodin	
10:00 am	Keynote Speaker: <b>Prof. Ir. Dr. Chong Meng Nan</b>	Keynote Speaker: <b>Assoc. Prof. Dr. Rafiziana Md. Kasmani</b>	
10:30 am	PF01 (INV)	10:30 am	HS01 (INV)
10:50 am	PF03 (INV)	10:50 am	HS03
11:10 am	PF05	11:05 am	HS04
11:25 am	PF06	11:20 am	HS05
11:40 am	PF07	11:35am	HS06
11:55 am	PF08	11:50 am	HS07
12:10 pm	Lunch		

Time is GMT +8hrs

# PROGRAMME OF SSH2024



**10 SEPTEMBER 2024 (TUESDAY)**

## Parallel Session 4

Theme	Photocatalysis and Fuel Processing	Hydrogen Utilization, Safety, Battery Technology & Others	
Venue	Dewan Naning 1&2	Dewan Naning 3	
Chairperson	Dr. Azim Fitri Zainul Abidin	Dr. Sahriah Basri	
2:00 pm	PF02 (INV)	2:00 pm	HS02 (INV)
2:20 pm	PF04 (INV)	2:20 pm	HS09
2:40 pm	PF09	2:35 pm	HS10
2:55 pm	PF10	2:50 pm	HS11
3:10 pm	PF11	3:05 pm	HS12
3:25 pm	Break		

## Closing Ceremony

3:45 pm	Closing Speech: <b>YBhg. Assoc. Prof. Dr. Lorna Jeffery Minggu</b> <i>Chairperson of SSH2024</i>
4:00 pm	Announcement of Best Oral Presenter Award
4:15 pm	Photo Session
<b>4.30 pm</b>	<b>END OF PROGRAM</b>

Time is GMT +8hrs



## PLENARY SPEAKER 1

**Prof. Dato' ChM. Dr. Mohammad B. Kassim**  
Head of Solar Hydrogen Research Group,  
Universiti Kebangsaan Malaysia

**Biography:** Mohammad B. Kassim, graduated with a B. Sc. (Hons.) in Chemistry with Energy & Fuel Science in 1992 from Lakehead University, Thunder Bay, Ontario, Canada and Master of Science (Chemistry) in 1996 from Universiti Kebangsaan Malaysia. He was conferred a PhD (Inorganic & Coordination Chemistry) by University of Bristol, United Kingdom in 2004. Currently, he serves as Professor of Inorganic Chemistry at the Department of Chemical Sciences, UKM. He was appointed as the Deputy Vice-Chancellor (Academic & International Affairs) from the 3rd of May 2021 to 2nd of May 2024. He was also appointed as the Chair for the Malaysia public university's Deputy Vice-Chancellor/Reactor for Academic Committee for (2024-2024). Previously, he served as the Dean for the Faculty of Science and Technology (2018 – 2021), Deputy Executive Director (Academic & Research) (2014 – 2017), Strategic Centre UKM. He has also been appointed as a Visiting Professor at University of Tsukuba (2019), Specially Appointed Professor at Osaka University (2018), Visiting Professor at Gifu University (2017), and Visiting Researcher at the University of Sheffield (2011). He specialised in coordination chemistry, molecular electronics, photo-electrochemistry, and conversion & utilization of CO<sub>2</sub>. Currently, he is the founder and leader for Solar Hydrogen Research Group.

### **Title: Solar Hydrogen: Current Status, Challenges, Opportunities and Future Direction for Green Hydrogen Production**

**Abstract:** The work of Brattain and Garrett (Bell Telephone Laboratories) and Gerischer (Max Planck Institute, Stuttgart) defined the fundamentals for modern photoelectrochemistry. In fact, the terms photoelectrochemistry and photoelectrochemical cells that we use today originated from their publications. The study of photoelectrochemical cells attained tremendous interest after Fujishima and Honda and later, O'Regan and Grätzel published their work. The explosive interest may be associated with the energy crisis of the seventies when the World for the first time realised that the supply of fossil fuels cannot last forever and consequently, faces the climate change crisis due to the accumulation of greenhouse gases that originated from burning fossil fuels. The world needs to find a substitute that is clean and sustainable. Solar hydrogen emerges as a promising avenue for leveraging solar energy that in turn contributes to mitigating climate change and restricting fossil fuel combustion. This article focuses on photoelectrochemical (PEC) cells and accounts for the current development status, challenges and opportunities as well as future directions of PEC systems for sustainable hydrogen production. It presents different methods for converting abundant solar energy into hydrogen, and in turn, attaining the solar hydrogen fuel. The highlight on photoelectrochemical water splitting (PEC-WS) reveals the importance of PEC-WS for a green hydrogen production. Further discussion will emphasise the achievements of PEC-WS especially, in terms of materials used for the fabrication of photoanodes, photocathodes and tandem cells. The article also presents motivations for PEC-WS research in the near future specifically for green hydrogen contribution to the hydrogen economy. It is intended to be a manual for researchers new to the field and at the same time a useful reference for experienced researchers.



## PLENARY SPEAKER 2

### Dr. Eng. Deni Shidqi Khaerudini

Deputy II of Indonesia Fuel Cell and Hydrogen Energy (IFHE),  
Center for Advanced Materials and Research Professor of  
Research Center for Advanced Materials,  
Badan Riset dan Inovasi Nasional (BRIN), Indonesia.

**Biography:** Deni Shidqi Khaerudini, a Research Professor at the Research Centre for Advanced Materials, earned his PhD (Dr Eng.) from Hirotsuki University, Japan, specializing in high-temperature fuel cell (SOFC) cathode materials. Following his graduation in 2016, he served as a Postdoctoral Fellow at the National Institute of Advanced Industrial Science and Technology (AIST), focusing on similar area of SOFCs cathode, specifically on nano manufacturing of vertically alignment cathode based on PLD. His research spans advanced material development for eco-friendly energy conversion, storage, low-carbon technologies, and management. He has authored over 200 papers in indexed journals, accumulating over 1012 citations and an h-index of 16.

### **Title: Ferrites in Energy Conversion Innovations: Breakthrough in Fuel Cells and PEC Water Splitting**

**Abstract:** For many years, ferrites, including iron oxalate, have been mentioned as one of the most important materials in widely used applications. This work endeavors to illuminate the applications of ferrites in energy conversion technologies, focusing in solid oxide fuel cells (SOFCs) and photoelectrochemical (PEC) water splitting. Iron oxalate, a precursor for iron-based nanomaterials, potentially reduces costs and increases efficiency. In SOFCs, ferrites enhance performance by improving conductivity and serving as electrocatalysts in solid ceramic cathode. In PEC water splitting, ferrites and iron oxalate (embedded with ZnO) function as photoanodes, improving sunlight absorption and facilitating efficient water splitting reactions for sustainable hydrogen generation. This study also explores future directions, highlighting research into environmentally friendly methods of synthesizing iron oxalate from steel industry waste. This not only leverages waste materials but also advances the application of ferrites in energy conversion technologies, combining environmental sustainability with technological progress. The potential of ferrites, especially iron oxalate, in revolutionizing energy systems is profound, pointing towards a greener and more efficient future.





## KEYNOTE SPEAKER 1

**Dr. Viet Huong Nguyen**

Faculty of Materials Science and Engineering,  
Phenikaa University, Hanoi, Vietnam.

**Biography:** Viet Huong Nguyen earned a B.S. in Materials Science from the National Institute of Applied Science of Lyon, France, in 2013, and a Ph.D. in Materials Science & Engineering from the University Grenoble Alpes, France, in 2018 (awarded the Best Ph.D. Thesis Prize by the French Chemical Society, Solid State Chemistry Division). Following this, he conducted postdoctoral research at the Laboratory of Materials Science and Physical Engineering (LMGP, CNRS) in Grenoble, France. Since August 2019, he has been a member of the Faculty of Materials Science and Engineering at Phenikaa University, where he currently serves as Vice Dean. His research focuses on the synthesis, surface engineering, and processing of nanostructured materials using Atomic Layer Deposition, with applications in flexible electronics, energy conversion, and storage.

### **Title: Potential of Atomic Layer Deposition in Improving Photoelectrochemical Water Splitting**

**Abstract:** Efficient solar hydrogen ( $H_2$ ) production, particularly using the photoelectrochemical (PEC) water splitting approach, faces significant challenges due to energy losses during light harvesting, recombination of photogenerated charge carriers, and electrode degradation. The stability and charge-transfer efficiency are critically dependent on the interfacial interactions between the electrode and electrolyte. Atomic Layer Deposition (ALD) is a key technology that addresses these challenges by enabling precise nanostructure development at the atomic scale. ALD facilitates bandgap engineering, surface passivation, catalyst improvement, and enhanced light-harvesting properties. In this talk, I will highlight ALD's pivotal role in improving the structural and surface properties of PEC electrodes and discuss their effects on PEC efficiency. Future research and innovation in ALD are essential for overcoming current limitations and achieving low-cost, large-scale, practical applications in sustainable hydrogen production.



## KEYNOTE SPEAKER 2

**Assoc. Prof. Ts. Dr. Lim Kean Long**  
Fuel Cell Institute, Universiti Kebangsaan  
Malaysia.

**Biography:** Kean Long Lim is a Senior Research Fellow and Associate Professor at the Fuel Cell Institute, Universiti Kebangsaan Malaysia (UKM). He is a registered Professional Technologist with the Malaysia Board of Technologists. Dr. Lim's academic journey began at the UKM, where he received his Bachelor of Chemical Engineering (Hons) in 2007 and Master of Chemical Engineering in 2008. He continued his studies and earned his Ph.D. in Materials Science and Engineering from the University of New South Wales in Australia in 2015. His research focuses on developing electrocatalysts, hydrogen storage materials, fuel cell membranes, and process modeling for renewable energy systems. He has collaborated with researchers from Australia, Japan, China, Taiwan, the United Kingdom, and domestically, leading numerous national and university research projects and participating in several international research projects related to hydrogen energy. He has also published his research in international peer-reviewed journals and has been involved in drafting technical codes for hydrogen storage and safety under the Malaysian Communications and Multimedia Commission. Dr. Lim has been recognized with awards such as the MEXT Nuclear Researchers Exchange Program Fellowship from Japan, where he explored the application of radiation technology in materials development. Recently, he has also received the UAiTED Faculty Exchange Scholarship from Taiwan. In recognition of his expertise and achievements, Dr. Lim was appointed as a Subject Matter Expert for the Task Force of the Preliminary Study MyNet Zero Emission Roadmap 2050 (Transportation and Mobility group) by the Academy of Sciences Malaysia. Internationally, Dr. Lim has served as a seasonal international grant evaluator for EPSRC in the UK. With his deep expertise spanning chemical engineering and materials science, coupled with extensive national and international contributions, Dr. Lim is well-positioned to drive impactful research advancing Malaysia's transition towards a sustainable hydrogen economy.

### **Title: From Storage to Catalysis: The Versatility of Metal Hydrides in a Hydrogen Economy**

**Abstract:** Hydrogen, a clean energy carrier, holds immense potential for decarbonization. However, storing hydrogen at high pressures (e.g., 700 bar) or cryogenic temperatures (-253°C) poses significant challenges for transportation and safety, particularly in remote areas. Metal hydrides offer a promising alternative by storing hydrogen in a solid-state form. This keynote will explore the fundamental principles of hydrogen storage in metal hydrides, discussing their advantages, limitations, and exceptional suitability for remote applications due to their high volumetric capacity and safe operation under practical conditions. To further enhance performance and address specific needs in remote areas, the use of composite materials will be discussed. Building on the understanding of metal hydrides as hydrogen storage materials, the presentation will explore their potential as catalysts in Liquid Organic Hydrogen Carriers (LOHCs). By examining how metal hydrides can accelerate hydrogen loading and unloading while addressing challenges such as high dehydrogenation temperatures and catalyst deactivation, their potential to improve LOHC efficiency will be explored. The presentation will conclude by emphasizing the crucial role of ongoing research in optimizing metal hydride performance to accelerate their widespread adoption in a hydrogen economy.



## KEYNOTE SPEAKER 3

### Assoc. Prof. Dr. Rafiziana Md. Kasmani

Fakulti Kejuruteraan Kimia dan Kejuruteraan Tenaga,  
Universiti Teknologi Malaysia.

**Biography:** Rafiziana is a senior lecturer at the Department of Energy Engineering, Faculty of Chemical and Energy Engineering, Universiti Teknologi Malaysia (UTM). Completed her PhD in 2009 at University of Leeds, UK, specializing in vented explosions. The main research focus is on fire engineering, gas and dust explosion by studying a series of methodologies for classifying flame acceleration and potential detonation hazard in chemical process industrial, including mixtures of different sensitivity. She managed to secure research grant with a total of more than RM2 million to date and published over 100 papers at the international and national levels in refereed journals and proceedings. For supervision, 5 PhD and more than 10 Masters has successfully graduated under her supervision with total current students of 2 PhD and 1 Masters. She also secured AUN-SEED Short-term Research Program in Japan (SRJP) JFY 2015 in University of Tokyo and a recipient of Fulbright Malaysian Scholar Program for 2017/2018 in University of Maryland, USA for six (6) month and selected as one of the recipients of Erasmus+ Mobility Staff Program in 2017 in Universidad Politécnica de Madrid (UPM). Through her experiences and expertise in Fire and Explosion engineering, Rafiziana has the opportunity to participate as a speaker in a variety of related courses, conferences and workshops and was invited as a keynote speaker at several international conference platforms. She also frequently served as technical reviewer to prestige international journals that has allowed for a broad resource base on which to build her career as educator and researcher.

### **Title: Research and development of hydrogen energy safety**

**Abstract:** The increasing adoption of fuel cell vehicles (FCVs) and hydrogen refueling stations (HRSs) has heightened concerns about hydrogen leakage safety as recent fatal accidents underscore the potential risks of explosions, involving hydrogen jets and diffusion when hydrogen leaks from FCVs or HRSs. These accidents demonstrated intricate characteristics and posing significant technical challenges to make hydrogen powered vehicles as a game changer in transportation. Previous researchers have developed various theoretical models to understand the underlying mechanisms and introduced a range of monitoring and diagnostic approaches to detect and mitigate these hazards. This work delves into the safety implications of hydrogen leakage, examining different types of hydrogen jets, covering (1) subsonic jets, (2) under expanded jets, their diffusion patterns in various environments, and strategies to mitigate hazards in both confined and open spaces. Additionally, it explores advanced hydrogen detection technologies. The ultimate goal is to identify research gaps and technological barriers hindering the development of robust safety standards, thereby facilitating the wider acceptance and utilization of hydrogen fuel cell technology in the transportation sector.



## KEYNOTE SPEAKER 4

**Prof. Ir. Dr. Chong Meng Nan**

School of Engineering, Monash University Malaysia (MUM).

**Biography:** Professor Ir. Dr. Chong has more than 18 years of experience in academic, research, consultancy and editorial works. He began his Ph.D. research by working in an ARC Linkage project (partners: AWQC, SA Water, Uni of Adelaide, Uni of South Australia) that investigated the feasibility of solar photocatalysis as an AOP for reusing the treated sewage effluents from Bolivar WWTP in South Australia. Shortly before the submission of his Ph.D. thesis, he was employed as a Research Scientist at CSIRO and worked on a number of urban water projects in Southeast Queensland that were funded by the UWSRA. He was a key researcher in the urban water team by leading on a range of urban water research activities, and later becoming a project leader for two CSIRO capability theme projects. After CSIRO, he joined Monash University Malaysia (MUM) as Senior Lecturer and later being promoted to Associate Professor and Professor. Currently, he is the Director of Centre for Net-Zero Technology at MUM. He has attracted more than RM 20 million in competitive research funding as both PI and CI from his research career to date. His academic and research portfolio are accoladed with various prizes, awards and fellowships from national and international learned bodies and societies, such as being awarded the prestigious Royal Society of UK Newton Advanced Fellowship, Green Talents Award, Top Research Scientist Malaysia and others. In a recent ranking study by Stanford University, he is ranked among the World's Top 2% Scientists in his fields of research for 2020, 2021, 2022 and 2023 (i.e., both in career-long and single-year categories). Professor Chong is always open to new research ideas and collaborations, as he believes that these are the key drivers for the creation of new innovations in this modern era.

### **Title: From Sunlight to Hydrogen: State-of-the-Art Advances in Photoelectrochemical Water Splitting for Sustainable Green Hydrogen Production**

**Abstract:** The global transition to sustainable energy has intensified research into hydrogen ( $H_2$ ) as a clean fuel. Among the various methods of  $H_2$  production, photoelectrochemical (PEC) water splitting stands out for its potential to directly convert solar energy into  $H_2$  fuel with minimal environmental impact. This technology harnesses the unique properties of semiconductors to absorb sunlight, generating the charge carriers needed to split water molecules into  $H_2$  and oxygen ( $O_2$ ). Despite significant advancements in this field, challenges remain in improving the efficiency, stability, and scalability of PEC systems. In this keynote presentation, the current landscape and state-of-the-art developments in PEC water splitting will be discussed, with a focus on innovative material designs and system architectures that enhance solar absorption, charge separation, and (photo)electrocatalytic activity. At present, our research group is at the forefront of advancing PEC technology through significant advancements in semiconductor-based photoelectrode materials, surface modifications and configuration of proof-of-concept PEC reactor systems. These developments have shown great promise in addressing critical challenges such as recombination losses and system durability. This keynote will highlight the latest research progress on prominent n-type and p-type semiconductor materials, such as  $BiVO_4$  and  $CuO$ , for constructing high-performance photoelectrodes. The presentation will discuss the implementation of specific nano-architectural strategies, including surface facet manipulation, incorporation of polymeric layers and the formation of heterojunction structures. These strategies will be explored in terms of how they enhance overall charge transfer kinetics and charge separation efficiency in photoelectrodes. This keynote will also explore the potential of constructing a photoanode-photocathode PEC tandem cell for low-bias solar  $H_2$  generation. The integration of PEC systems with renewable energy sources, coupled with cutting-edge advancements in materials design, is anticipated to play a crucial role in accelerating the national and global transition toward a low-carbon green  $H_2$  economy.

# PRESENTATION LIST



## PARALLEL SESSION

SESSION THEME	<b>SP</b>	Solar and Photoelectrochemical Systems
	<b>HP</b>	Sustainable Hydrogen Production, Storage, and Advanced Materials
	<b>PF</b>	Photocatalysis and Fuel Processing
	<b>HS</b>	Hydrogen Utilization, Safety, Battery Technology & Others

## Presentation ID Reference (based on Abstract ID)

Abstract ID	Presentation ID	Abstract ID	Presentation ID
OP-002	HP03	OP-030	HS02
OP-004	SP05	OP-031	HS11
OP-005	PF05	OP-032	HS04
OP-006	PF06	OP-033	HP08
OP-007	HS03	OP-034	HS09
OP-008	PF07	OP-035	PF10
OP-009	SP06	OP-036	HS05
OP-012	SP07	OP-037	HP10
OP-013	SP11	OP-039	HP06
OP-015	SP08	OP-040	SP04
OP-017	PF08	OP-041	HP05
OP-018	SP01	OP-042	HP11
OP-019	HS06	OP-043	HS07
OP-020	SP02	OP-046	HS10
OP-022	PF01	OP-047	HS12
OP-023	SP09	OP-050	HP07
OP-024	HP04	OP-051	HP02
OP-025	PF09	OP-052	PF03
OP-026	HP01	OP-053	PF11
OP-027	SP10	OP-058	PF04
OP-028	SP03	OP-059	HS01
OP-029	PF02	OP-060	HP09

# PRESENTATION LIST



## PARALLEL SESSION 1

9<sup>th</sup> September 2024, Day 1

Session: 11:00 am - 12:40 pm (MY T)

**Theme** : Solar and Photoelectrochemical Systems  
**Venue** : Dewan Naning 1&2  
**Chairperson** : Dr. Noor Shahirah Shamsul (Universiti Kebangsaan Malaysia)

Time	Presentation ID	Presentation Detail
11:00 AM	Keynote-1	<b>Potential of Atomic Layer Deposition in Improving Photoelectrochemical Water Splitting</b> <i>Dr. Viet Huong Nguyen Phenikaa University, Hanoi, Vietnam</i>
11:30 AM	SP01 (INV)	<b>Hydrogen Production Using 1D Modified TiO<sub>2</sub>-Based Photocatalysts</b> <i>Assoc. Prof. Ir. Ts. Dr. Lai Chin Wei (University Malaya, Malaysia)</i>
11:50 AM	SP02 (INV)	<b>Effect of Electrodeposited Cu<sub>2</sub>O on Copper Foam Photoelectrodes for Enhanced Photoelectrochemical Water Splitting</b> <i>Assoc. Prof. Dr. Lorna Jeffery Minggu (Universiti Kebangsaan Malaysia)</i>
12:10 PM	SP05	<b>Hybrid Perovskite Solar Cells: Properties, Fabrication Techniques, and Commercialization Challenges</b> <i>Dr. Muhammed Ali. S.A. (Universiti Kebangsaan Malaysia)</i>
12:25 PM	SP06	<b>Synthesis and Characterization of Ni-doped Natural Zeolite Catalyst by Wet Impregnation Method</b> <i>Saddam Husin (Badan Riset dan Inovasi Nasional (BRIN), Indonesia)</i>

**Theme** : Sustainable Hydrogen Production, Storage, and Advanced Materials  
**Venue** : Dewan Naning 3  
**Chairperson** : Dr. Khuzaimah Arifin (Badan Riset dan Inovasi Nasional (BRIN), Indonesia)

Time	Presentation ID	Presentation Detail
11:00 AM	Keynote-2	<b>From Storage to Catalysis: The Versatility of Metal Hydrides in a Hydrogen Economy</b> <i>Assoc. Prof. Dr. Lim Kean Long (Universiti Kebangsaan Malaysia)</i>
11:30 AM	HP02 (INV)	<b>Hybrid Organic-Inorganic Hydrides for Reversible Hydrogen Storage</b> <i>Dr. Chua Yong Shen (Universiti Sains Malaysia)</i>
11:50 AM	HP03	<b>Maximizing Hydrogen Recovery: Integrating Dark Fermentation with Solar-Powered Microbial Electrolysis Cell System</b> <i>Dr. Lim Swee Su (Universiti Kebangsaan Malaysia)</i>
12:05 PM	HP04	<b>Review on Membrane Electrode Assembly (MEA) Fabrication for Anion Exchange Membrane Water Electrolysis (AEMWE): From Catalyst Ink Preparation to Membrane Electrode Assembly</b> <i>Ng Wei Shi (Universiti Kebangsaan Malaysia)</i>
12:20 PM	HP05	<b>Performance Evaluation of a Lab-Scaled Anion Exchange Membrane Water Electrolyzer Under Varying Operating Parameters</b> <i>Muhammad Asyraf Bin Abdullah (Universiti Kebangsaan Malaysia)</i>

# PRESENTATION LIST



## PARALLEL SESSION 2

9<sup>th</sup> September 2024, Day 1

Session: 2:30 pm - 4:40 pm (MY T)

**Theme** : Solar and Photoelectrochemical Systems  
**Venue** : Dewan Naning 1&2  
**Chairperson** : Dr. Muhammed Ali. S.A. (Universiti Kebangsaan Malaysia)

Time	Presentation ID	Presentation Detail
2:30 PM	SP03 (INV)	<b>Levelized Cost Analysis of Solar Hydrogen Production</b> <i>Assoc. Prof. Dr. Norasikin Ahmad Ludin (Universiti Kebangsaan Malaysia)</i>
2:50 PM	SP04 (INV)	<b>Exploring Bismuth Ferrite Nanostructures for Effective Photocatalytic and Adsorptive Dye Degradation</b> <i>Assoc. Prof. Chm. Dr. Siti Fairus Mohd Yusoff (Universiti Kebangsaan Malaysia)</i>
3:10 PM	SP07	<b>Fabrication of Cu<sub>2</sub>O/CuO/Pt Nanowire-Based Photocathodes for Photoelectrochemical cells</b> <i>Dr. Nurhaswani Binti Alias (Universiti Kebangsaan Malaysia)</i>
3:25 PM	SP08	<b>Study of the Potential Use of Plastic Waste as a Bipolar Plate Material in PEMFC Applications Through Fluid-Structure Interaction Analysis</b> <i>Galih Taqwatomo (Badan Riset dan Inovasi Nasional (BRIN), Indonesia)</i>
3:40 PM	<i>Break</i>	
3:55 PM	SP09	<b>Enhanced Hydrogen Production using Co, Cu, and Ni-doped TiO<sub>2</sub> photoanodes in Photoelectrochemical Cells</b> <i>Nur Ain Atiqah Mohd Amin (Universiti Teknologi PETRONAS, Malaysia)</i>
4:10 PM	SP10	<b>Impact of oxide growth of TiO<sub>2</sub> on Different Annealing Temperature in Hydrogen Generation on Photoelectrochemical Cells</b> <i>Siti Nur Asmah Binti Md Shuhimi (Universiti Sains Malaysia)</i>
4:25 PM	SP11	<b>Sustainable Direct Recycling of Spent Lithium-ion Batteries Using Green Organic Acid and Flame-Assisted Spray Pyrolysis</b> <i>Dr. Sri Rahayu (Badan Riset dan Inovasi Nasional (BRIN), Indonesia)</i>

# PRESENTATION LIST



## PARALLEL SESSION 2

9<sup>th</sup> September 2024, Day 1

Session: 2:30 pm - 4:40 pm (MY T)

**Theme** : Sustainable Hydrogen Production, Storage, and Advanced Materials  
**Venue** : Dewan Naning 3  
**Chairperson** : Dr. Lim Swee Su (Universiti Kebangsaan Malaysia)

Time	Presentation ID	Presentation Detail
2:30 PM	HP01 (INV)	<b>Physicochemical and Electrocatalytic Properties of NiMoO<sub>4</sub>/Ni in AEM Water Electrolysis</b> <i>Assoc. Prof. Dr. Rozan Mohamad Yunus (Universiti Kebangsaan Malaysia)</i>
2:50 PM	HP06 (INV)	<b>Inorganic Modulation of g-C<sub>3</sub>N<sub>4</sub> Photocatalysts for Enhanced Solar Fuel Generation</b> <i>Chm. Dr. Mohamad Azuwa Mohamed (Universiti Kebangsaan Malaysia)</i>
3:10 PM	HP07	<b>Crystal Structure, Hirshfeld Surface Analysis and Energy Framework Calculations of N-(1,3-benzothiazol-2-yl)-R-benzamide (R-BZBA)</b> <i>Mohammad Fadzlee Bin Ngatiman (Universiti Kebangsaan Malaysia)</i>
3:25 PM	HP08	<b>Metal hydride-based catalyst for dehydrogenation of Methylcyclohexane (MCH)</b> <i>'Afifah Binti Kamal (Universiti Kebangsaan Malaysia)</i>
3:40 PM	<i>Break</i>	
3:55 PM	HP09	<b>Development of Efficient Z-Scheme Water Splitting Using (W<sub>2,β</sub>Y<sub>1,β</sub>)<sub>2</sub>AlC as H<sub>2</sub> Evolution Photocatalyst and Pt-BiVO<sub>4</sub></b> <i>Dr. Nurul Asikin Mijan (Universiti Kebangsaan Malaysia)</i>
4:10 PM	HP10	<b>Investigation of Binding Materials for Detaching TiO<sub>2</sub> Nanotubes for Enhanced Photoelectrochemical Applications</b> <i>Siti Nurul Falaein Binti Moridon (Universiti Kebangsaan Malaysia)</i>
4:25 PM	HP11	<b>Enhanced Hydrogen Generation via Photoelectrochemical Water Splitting Using Kenaf-based Carbon Quantum Dots Modified BiVO<sub>4</sub></b> <i>Poh Ching Hong (Universiti Teknologi PETRONAS, Malaysia)</i>



# PRESENTATION LIST



## PARALLEL SESSION 3

10<sup>th</sup> September 2024, Day 2

Session: 10:00 am - 12:25 pm (MY T)

**Theme** : Photocatalysis and Fuel Processing  
**Venue** : Dewan Naning 1&2  
**Chairperson** : Assoc. Prof. Dr. Loh Kee Shyuan (Universiti Kebangsaan Malaysia)

Time	Presentation ID	Presentation Detail
10:00 AM	Keynote-3	<b>From Sunlight to Hydrogen: State-of-the-Art Advances in Photoelectrochemical Water Splitting for Sustainable Green Hydrogen Production</b> <i>Prof. Ir. Dr. Chong Meng Nan (Monash University, Malaysia)</i>
10:30 AM	PF01 (INV)	<b>Heterogeneous Catalysis for CO<sub>2</sub> conversion into Chemicals and Fuels</b> <i>Dr. Sharifah Najiha Timmiati (Universiti Kebangsaan Malaysia)</i>
10:50 AM	<del>PF03 (INV)</del> Withdrawn	<del><b>Towards large area Cu<sub>2</sub>SnS<sub>3</sub> thin film by Cost effective and solution-based technique for water treatment and hydrogen production</b></del> <del><i>Prof. Dr. Fawzy AbdelHamid Mahmoud Hassan (National Research Centre, Egypt)</i></del>
11:10 AM	PF05	<b>Bi<sub>2</sub>O<sub>3</sub> particles decorated on porous g-C<sub>3</sub>N<sub>4</sub> sheets: Enhanced photocatalytic activity through a direct Z-scheme mechanism for degradation of Reactive Black 5 under UV-vis light</b> <i>Dr. Anis Natasha Binti Shafawi (Universiti Sains Malaysia)</i>
11:25 AM	PF06	<b>ZnO with engineered surface defects as a competent photocatalyst for CO<sub>2</sub> photoreduction into valuable fuels under simulated solar light irradiation</b> <i>Rabiatul Aliah Binti Mahmud (Universiti Sains Malaysia)</i>
11:40 AM	PF07	<b>Temperature-Tuned Hydrothermal Synthesis on Porous Substrate: Boosting PEC Efficiency of ZnO/Graphene/Nickel foam</b> <i>Nur Rabiatul Adawiyah Mohd Shah (Universiti Kebangsaan Malaysia)</i>
11:55 AM	PF08	<b>Catalytic pyrolysis reaction on Ni-CeO<sub>2</sub> (111) for hydrogen-rich gas: DFT study</b> <i>Nowilin James Rubinsin (Universiti Kebangsaan Malaysia)</i>

# PRESENTATION LIST



## PARALLEL SESSION 3

10<sup>th</sup> September 2024, Day 2

Session: 10:00 am - 12:25 pm (MY T)

**Theme** : Hydrogen Utilization, Safety, Battery Technology & Others  
**Venue** : Dewan Naning 3  
**Chairperson** : Dr. Azran Mohd Zainoodin (Universiti Kebangsaan Malaysia)

Time	Presentation ID	Presentation Detail
10:00 AM	Keynote-4	<b>Research and Development of Hydrogen Energy Safety</b> <i>Assoc. Prof. Dr. Rafiziana Md. Kasmani (Universiti Teknologi Malaysia)</i>
10:30 AM	HS01 (INV)	<b>Accident and Consequences Modelling for Stationary and Mobile Hydrogen Storage</b> <i>Dr. Norafneeza Binti Norazhar (Universiti Teknologi Malaysia)</i>
10:50 AM	HS03	<b>Oxygen Reduction Reaction on Single-Atom Catalyst from Density Functional Theory Combined with an Implicit Solvation Model</b> <i>Dr. Azim Fitri Zainul Abidin (Universiti Kebangsaan Malaysia)</i>
11:05 AM	HS04	<b>Enhanced Performance of Magnesium-Air Fuel Cells with MnO<sub>2</sub>/3D Graphene Composite</b> <i>Dr. Sahriah Basri (Universiti Kebangsaan Malaysia)</i>
11:20 AM	HS05	<b>Performance Evaluation of P-Block Metal in ORR Applications</b> <i>Siti Haziyah Binti Mohd Chachuli (Universiti Kebangsaan Malaysia)</i>
11:35 AM	HS06	<b>Advancing PEC Water Splitting Performance with Nickel-Based Protective Coating (NiO) and Co-Catalyst Layer (NiFe-LDH) on Cu<sub>2</sub>O/CuO Photoelectrodes</b> <i>Nur Azlina Adris (Universiti Kebangsaan Malaysia)</i>
11:50 AM	HS07	<b>Correlating Chemical Degradation and Ageing Phenomenon in Polymer Electrolyte Membrane (PEM) Water Electrolysis: A Bayesian Modelling Approach</b> <i>Nurul Amelia Binti Mustaffa (Universiti Teknologi Malaysia)</i>

# PRESENTATION LIST



## PARALLEL SESSION 4

10<sup>th</sup> September 2024, Day 2

Session: 2:00 pm - 3:25 pm (MY T)

**Theme** : Photocatalysis and Fuel Processing  
**Venue** : Dewan Naning 1&2  
**Chairperson** : Dr. Azim Fitri Zainul Abidin (Universiti Kebangsaan Malaysia)

Time	Presentation ID	Presentation Detail
2:00 PM	PF02 (INV)	<b>Enhanced Bimetallic Alloy Catalysts: A DFT Study on Structural, Electronic, and Adsorption Properties</b> <i>Dr. Nabila A. Karim (Universiti Kebangsaan Malaysia)</i>
2:20 PM	PF04 (INV)	<b>Advanced Ternary Photocatalyst: Ce-Doped Bi<sub>2</sub>O<sub>3</sub> Integrated with Biochar for Enhanced Tetracycline Degradation</b> <i>Assoc. Prof. Dr. Noor Haida Mohd Kaus (Universiti Sains Malaysia)</i>
2:40 PM	PF09	<b>Recent progress and new perspective of Borophene-based catalyst for energy application: A Review</b> <i>Nurulfasihah Binti Azhar (Universiti Kebangsaan Malaysia)</i>
2:55 PM	PF10	<b>Revealing the impact of different precursors and solvents for supramolecular complex formation and in-situ C-doping in g-C<sub>3</sub>N<sub>4</sub> with enhanced photocatalytic H<sub>2</sub>O<sub>2</sub> production</b> <i>Nurul Atikah Binti Nordin (Universiti Kebangsaan Malaysia)</i>
3:10 PM	PF11	<b>One-pot synthesis of MoS<sub>2</sub>/Ni<sub>3</sub>S<sub>2</sub>/Ni Foam for Photoelectrochemical Hydrogen Production</b> <i>Wiwit Widayanti (UIN Sultan Maulana Hasanuddin Banten, Indonesia)</i>

**Theme** : Hydrogen Utilization, Safety, Battery Technology & Others  
**Venue** : Dewan Naning 3  
**Chairperson** : Dr. Sahriah Basri (Universiti Kebangsaan Malaysia)

Time	Presentation ID	Presentation Detail
2:00 PM	HS02 (INV)	<b>Formic Acid Decomposition into Hydrogen Using Graphitic Carbon Nitride Supported Palladium Catalyst</b> <i>Dr. Khairul Naim Ahmad (Universiti Kebangsaan Malaysia)</i>
2:20 PM	HS09	<b>Boosted Performance of CO<sub>2</sub>-to-Methanol by Controlled Synthesis of Cu@Al<sub>2</sub>O<sub>3</sub> Core-Shell Nanostructured Catalyst</b> <i>Nisa Afiqah Binti Rusdan (Universiti Kebangsaan Malaysia)</i>
2:35 PM	HS10	<b>Preparation of a Carbon Nanofiber Layer for Electrode Support in Direct Methanol Fuel Cell with Taguchi Method</b> <i>Dr. Azran Mohd Zainoodin (Universiti Kebangsaan Malaysia)</i>
2:50 PM	HS11	<b>Corrosion On Stainless Steel 316L using Green Inhibitor Garlic Extract (Allium Sativum) With NaCl Media</b> <i>Dr. Igusti Ayu Arwati (Univercity Mercubuana Jakarta, Indonesia)</i>
3:05 PM	HS12	<b>Influence of Ni Loading on H<sub>2</sub> Selectivity and Production in the Dry Reforming of Methane Using Ultrasound-Assisted Ni/CeO<sub>2</sub> Catalysts</b> <i>Wan Nabilah Binti Manan (Universiti Kebangsaan Malaysia)</i>



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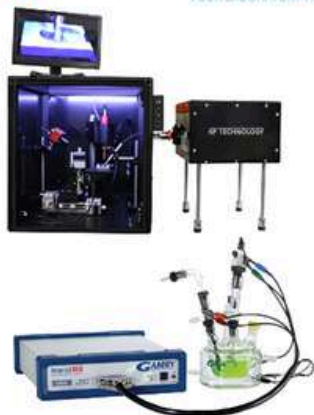
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