

CONTENTS

Welcome Message from the President of National Central University.....	2
Welcome Message from the JCREN Organizing Committee Taiwan Chair	3
Welcome Message from the JCREN Organizing Committee Japanese Chair	4
Welcome Message from the JCREN Organizing Committee Thailand Chair	5
General Instructions to Participants.....	6
Schedule	7
Keynote Speech.....	8
Oral.....	12
Poster	46
Organizing Committee	52

Welcome Message from the President of National Central University



Message for the 14th JCREN in National Central

University, Taoyuan, Taiwan

President, National Central University

Shu-San Hsiau

Dear distinguished guests, esteemed scholars, and friends,

On behalf of National Central University (NCU), it is my great honor and pleasure to welcome you all to the 14th Joint Conference on Renewable Energy and Nanotechnology (JCREN 2025), held here in Taoyuan, Taiwan. It is truly a privilege for us to host this distinguished international gathering for the very first time on our campus and in Taiwan.

At NCU, we are deeply committed to advancing scientific research, fostering innovation, and strengthening global collaboration. As the world faces urgent challenges in energy transition and climate change, our university has taken significant steps to contribute to a sustainable future. One of these milestones was the establishment of the Hydrogen Energy Research Center (HERC) in May 2025, which aims to accelerate the development of hydrogen technologies, from production, storage to utilization and safety, while promoting the collaboration between academia, industry, and government.

This conference covers renewable energy, energy conversion and storage, nanotechnology, environmental science, system integration, and other related fields. These cross-disciplinary fields are increasingly vital to the advancement of energy systems, sustainability, and emerging applications in intelligent technologies. I believe that platforms like JCREN provide excellent opportunities for researchers from diverse backgrounds to connect their expertise and create innovative solutions to global challenges.

JCREN is more than an academic conference — it is a bridge for knowledge exchange and collaboration among researchers from across Asia and beyond, including Japan, Thailand, Malaysia, Vietnam, the Philippines, and Taiwan. Through this platform, we share cutting-edge research, discuss pressing technical issues, and explore the future directions of renewable energy and nanotechnology. In the context of achieving a net-zero future, such collaboration is not only valuable but essential.

I am confident that JCREN 2025 will serve as a catalyst for new ideas, fruitful discussions, and impactful partnerships. May this gathering inspire creative solutions and long-term collaborations that will shape the future of hydrogen energy, renewable technologies, and nanoscience.

Thank you once again for joining us. I wish you a successful conference, productive exchanges, and a memorable stay in Taiwan.

Shu-San Hsiau

A handwritten signature in black ink, appearing to read 'S-S Hsiau'.

President, National Central University, Taoyuan, Taiwan

Welcome Message from the JCREN Organizing Committee Taiwan Chair

Message for the 14th JCREN in National Central

University, Taoyuan, Taiwan



JCREN Organizing Committee Taiwan Chair
Chung-Jen Tseng

It is a great honor and pleasure for me, on behalf of the Hydrogen Energy Research Center (HERC) at National Central University (NCU), to warmly welcome all distinguished participants to the 14th Joint Conference on Renewable Energy and Nanotechnology (JCREN 2025) here in Taoyuan, Taiwan.

This year marks a particularly meaningful moment for us. As one of the major universities in Taiwan with strong research traditions in energy engineering, mechanical sciences, and materials technology, NCU took an important step forward in May 2025 by establishing the Hydrogen Energy Research Center. Our mission is to accelerate Taiwan's transition toward a net-zero future by advancing hydrogen-related technologies — including hydrogen production, storage, utilization, and safety — and by fostering interdisciplinary collaboration that bridges academia, industry, and government sectors.

We are truly delighted that this year's JCREN is being held at our university, and for the first time in Taiwan. This conference serves as a valuable platform for sharing frontier research, exchanging innovative ideas, and exploring future cooperation in renewable energy, nanotechnology, and emerging energy systems. The presence of researchers and experts from across Asia and beyond — including Japan, Thailand, the Philippines, Malaysia, Vietnam, and many other countries — reflects the global importance of our shared mission: building a sustainable, carbon-neutral society through technological innovation and international collaboration.

I sincerely hope that this gathering will not only deepen our collective knowledge but also spark new partnerships and research initiatives that will lead us closer to a cleaner and more sustainable energy future. I wish you all a fruitful and inspiring conference.

Welcome to National Central University, and enjoy your time in Taiwan.

A handwritten signature in black ink, appearing to read 'CJ Tseng', with a stylized flourish at the end.

Chung-Jen Tseng
Director, Hydrogen Energy Research Center
Distinguished Professor, Department of Mechanical Engineering
National Central University, Taiwan

Welcome Message from the JCREN Organizing Committee Japanese Chair

Words for the JCREN2025b

JCREN Organizing Committee

Japanese Chair

Yukihiko MATSUMURA



After the 13 previous Joint Conferences of Renewable Energy and Nanotechnology (JCRENs), I am really thrilled with this 14th conference because this is the first time to have this conference in Taiwan. With this historical city surrounded by beautiful nature, we are sure to enjoy the wonderful conference.

Like previous JCRENs, this conference aims at information exchange and mutual understanding among the various fields of engineering. I hope you can listen to the presentation from the fields different from your own and learn a lot. Especially, things are moving fast around renewable energy. The change is rapid, and new developments are made every day. We need to update the information.

Another important aspect of this conference is that we can join the conference cheaply. When we have to attend conferences in the United States or European countries, the travel cost is expensive, and we have to pay as much as 1,000 USD for registration. This conference is held in Asia, allowing a low travel cost, and we kept the registration fee low.

I believe that Asian countries, both developing and developed, require this kind of opportunity. We have to have more chances to talk among Asian researchers, learn from other laboratories, and develop collaborative projects. This conference can be joined cheaply, but its discussion is deep and top-level. It is good for young researchers and students, too. Because of the low cost, we can bring more youngsters here.

This wonderful opportunity was made possible thanks to Prof. Chung-Jen Tseng. I met him at a conference held in Hiroshima. Although it was the first time to meet him, he kindly accepted my request to have this JCREN in Taiwan. I cannot appreciate his kind help too much. My gratitude also goes to all the organizing committee members, especially those who worked hard in Taiwan. I also thank all the participants of this conference. Your attendance, presentation, and fruitful discussion are what make this conference precious. I believe everyone participating in this conference will be satisfied. Hope you enjoy not only this conference, but also the nature and culture of Taiwan.

A handwritten signature in black ink, appearing to read 'Y. Matsumura' with a stylized flourish at the end.

Welcome Message from the JCREN Organizing Committee Thailand Chair

Message for the 14th JCREN in National Central

University, Taoyuan, Taiwan

JCREN Organizing Committee Thai Chair

Tawatchai Charinpanitkul



2025 is a special year for our Joint Conference in Renewable Energy and Nanotechnology (JCREN) because Prof. Chung-Jen Tseng and his team in National Central University have kindly organized the 14th JCREN in the nice Taoyuan City, Taiwan. It is the 1st time for our JCREN network to share our progress and advancement in Taiwan, the ‘Waves of Wonder’.

I have no doubt why many people are interested in coming to Taiwan for various reasons and purposes. Taiwan is one of the key players providing newly emerging knowledge and technologies to our global community. As the leader of ‘Semiconductor’ producers, Taiwan has incorporated many aspects, including Renewable Energy Utilization, Nanotechnology, and certainly Generative Artificial Intelligence (GAI) in various Taiwanese Products for the benefit of people around the world. We are expecting that the incorporation of those emerging technologies will help enable our people in all sectors to suppress the emission of carbon dioxide into our atmosphere. As a continuing academic collaboration among various colleagues in many countries, our JCREN network has further expanded and gained attention from Taiwan, Japan, the Philippines, Malaysia, Thailand, Vietnam, Pakistan, Ethiopia, and other countries.

With the sunny and pleasant beginning of Autumn in Taoyuan, I am so pleased to extend my warmest wishes to all participants of the 14th JCREN, which has been organized on the beautiful campus of NCU. I am confident that all participants would appreciate the strong effort dedicated to organizing this JCREN by following the traditional objective of providing academic and cultural exchange. In addition, we are continuing to foster the young generation to pursue their studies and development in various academic aspects to contribute to our society. As recognized on the website of NCU, many academic contributions related to Renewable Energy, Chemical and Mechanical Engineering, Energy Conversion and Storage Technology, Nanotechnology, Environmental Science, Catalyst Technology, and other relevant fields would be presented and discussed in oral and poster sessions. Accordingly, I sincerely believe that the 14th JCREN would provide intimate and friendly interaction among academia, researchers, and industrial entrepreneurs to share their new progress. Also, with the continuous collaboration with the editorial board of the Journal of the Japan Institute of Energy (JJIE), a special issue of JJIE for JCREN participants to publish their emerging progress will be available.

Finally, I would like to take this opportunity to extend my sincere gratitude to the strong support of President Shu-San Hsiao, and Dean, Heng-Kwong Tsao, with the dedication of Prof. Chung-Jen Tseng and his team members, as well as all alliance institutions, to realize the successful 14th JCREN. Additionally, my sincere gratitude would be extended to all participants for their contributions. I cordially hope that the success of the 14th JCREN would help strengthen our multilateral collaboration in the field of Renewable Energy and Nanotechnology for the benefit of our global community.

A handwritten signature in dark ink, reading 'T. Charinpanitkul'.

(Prof. Dr. Tawatchai CHARINPANITKUL)

Faculty of Engineering, CHULALONGKORN University

General Instructions to Participants

1. The official language is English. Simultaneous translation is not available.
2. Presentation Duration and Slot:
 - During the oral presentation session, the Session Chair will invite presenters according to the program schedule;
 【Keynote】 : 30 minutes (oral presentation) + 5 minutes (Q&A)
 【Oral】 : 12 minutes (oral presentation) + 3 minutes (Q&A)
Please keep the presentation within the allocated time.
 - Kindly take note of the following:
 - 5 minutes before the time ends, one bell rings
 - 1 minute before the time ends, two bell rings
 - For Q&A, 1 bell ring marks the end of the session
 - **【Online Meeting】**
The conference link will be announced on the official website. Please note that there will be two conference rooms during the event. We kindly remind all presenters to carefully check and ensure that they are in the correct conference room for their presentation.
 - All presenters should be signed in to the Webex meeting platform 15 minutes before the time of the presentation as indicated in the Presentation Schedule with cameras ON.
 - During the session, please put your name in the format of “Session Number | Full Name” (ex O-01 Taro Kondo) .
3. Copying, recording, uploading and online streaming of the Conference activities are prohibited.
4. Sharing of the Conference links to non-registered persons to access the online event is prohibited.
5. The judges’ decision on the Best Oral and Best Poster Awards is final.

Schedule

2025/10/18 (Sat)

Time	Activities	Location
8:30 – 9:00	Registration & welcome coffee	Lobby, Atrium-A
9:00 – 9:20	Opening Ceremony	A102
9:20 – 9:55	Keynote Session 1	A102
9:55 – 10:30	Keynote Session 2	A102
10:30 – 10:45	Coffee Break	Atrium-A
10:45 – 12:00	Oral Presentation Session 1	A102 , B142
12:00 – 13:00	Lunch Break	Atrium-A
13:00 – 14:45	Oral Presentation Session 2	A102 , B142
14:45 – 15:00	Coffee Break	Atrium-A
15:00 – 15:45	Poster Session	Atrium-B
15:45 – 17:15	Oral Presentation Session 3	A102 , B142
17:15 – 17:30	Closing Remarks	A102
18:00 – 20:00	Banquet	Xin Tao Fang Garden

2025/10/19 (Sun) Cultural Tour

Discover the charm of Sanxia, New Taipei City, where tradition meets artistry. Experience the beauty of indigo dyeing, a centuries-old craft revived through workshops and creative products. Visit the stunning Sanxia Zushi Temple, famed as the “Palace of Eastern Art,” with its intricate carvings and masterful restoration. Finally, stroll down Sanxia Old Street, lined with red-brick arcades, Baroque façades, and bustling shops offering local treats and handmade crafts. Sanxia is a journey through heritage, craftsmanship, and vibrant local life.

【Keynote Speech】



Asst. Prof. Dr. Nataporn Sowasod ผู้ช่วยศาสตราจารย์ ดร.ณัฐพร โสวสด

PERSONAL DATA

Date of birth: July 2, 1979

Birthplace: Chanthaburi, THAILAND

Nationality: Thai

Religion: Buddhism

E-mail address: nataporn.s@eat.kmutnb.ac.th

Affiliation: Division of Chemical Process Engineering Technology, Faculty of Engineering and Technology, King Mongkut's University of Technology North Bangkok (Rayong Campus) Tambon Nonglalo, Amphur Bankhai, Rayong, 21120, THAILAND

EDUCATION

Doctor of Philosophy: Ph.D in Nanoscience and Technology, Chulalongkorn University, Bangkok Thailand

Master's degree: M.Eng. in Chemical Engineering, Chulalongkorn University, Bangkok Thailand

Bachelor's degree: B.Eng. in Chemical Engineering, Mahanakorn University of Technology, Bangkok Thailand

FILED OF INTEREST

Particle Technology and Material Processing and including Nanotechnology, Nano-Biotechnology and Drying Technology.

PUBLICATIONS

1. Sucheewa, N., Wongwiriyan, W., Klamchuen, A., Obata, M., Fujishige, M., Takeuchi, K., Lertvanithphol, T. , Wutikhun, T. , Kullyakool, S. , Auttasiri, W. , **Sowasod, N.** , Prataen, T. , Tanthapanichakoon, W. and Nukeaw, J. "Tailoring Properties of Hafnium Nitride Thin Film via Reactive Gas-Timing RF Magnetron Sputtering for Surface Enhanced-Raman Scattering Substrates." *Crystals*, 2022, 12(1), 78.
2. Wetcha, P. , Aussawasathien, D. , Srithongkam, S. , **Sowasod, N.** , Naewkanya, P. and Tanthapanichakoon, W. "Development for Preparation of Nanofibers Using Polylactic Acid and Biomass Lignin via Electrospinning Process." *AIP Conference Proceedings*, 2022, 2440, 030011.
3. Naewkanya, P. and **Sowasod, N.** "Development of packaging films based on polyvinyl alcohol and a tannic acid blend for inactivation of bacteria in tilapia (*oreochromis niloticus*) fillets" *The Journal of Industrial Technology*, 2023, volume.13, issue 3.
4. Naewkanya, P., Daothaisong, P., **Sowasod*, N.**, Loruthai, O.,* Bunwatcharaphansakun, P. and Tanthapanichakoon, W. "Development of Nanoemulsions Containing Essential Oils for Gel Formulations" *Applied Science and Engineering Progress*, Vol. 19, No. 1, 2026, 7809.

Development of Nanoparticle Coatings for Self-Cleaning Applications: Case Studies on Solar Cell Panels, Mirrors, and Concrete Surfaces of Places of Worship

Abstract

Self-cleaning coatings are very significant for specific technical applications. These coatings can be categorized into two primary types: superhydrophobic and superhydrophilic coatings. Nanoparticle coatings have the potential to prevent dust formation in solar energy systems, which increases the amount of light that is transmitted and improves the efficiency with which energy is converted. The coatings offer anti-fogging and stain-resistant features for architectural mirrors, which ensures that the mirrors will remain clear for an extended period of time and require less care. Coatings on concrete surfaces, especially those of religious or cultural importance, protect them from weathering, biological development, and pollution-induced discoloration. Furthermore, the coatings maintain the material's structural and aesthetic qualities.

Using solar cell panels, mirrors, and the concrete surfaces of places of worship as examples, this keynote presentation describes the development, and characterization of nanoparticle coatings for self-cleaning applications. This study investigated the development of superhydrophilic self-cleaning coatings for solar panels using colloidal silica nanoparticles. The coating thickness was evaluated with a nano search microscope, and the surface microstructure was examined using scanning electron microscopy. The water contact angle (WCA) was evaluated utilizing a contact angle meter. The average film thickness is 2.0 μm , and the contact angle is 13.0°. The results demonstrate that colloidal silica nanoparticle coatings significantly improve surface properties, providing advantageous self-cleaning functions suitable for solar panel use.

In this keynote, I will also introduce KMUTNB Rayong Campus and provide some basic information regarding the preparation of JCREN2026.

Acknowledgement

This work was supported by King Mongkut's University of Technology North Bangkok (Rayong Campus) and the National Nanotechnology Center (NANOTEC) for use of their lab facilities.



(Asst. Prof. Dr. Nataporn Sowasod)

Faculty of Engineering and Technology, King Mongkut's
University of Technology North Bangkok (Rayong Campus)

【Keynote Speech】

Dr. Jeng-Kuei Chang



Distinguished Professor
Department of Materials Science & Engineering
National Yang Ming Chiao Tung University
1001 University Road, Hsinchu City, Taiwan
Tel: +886-3-5712121 ext. 55320
Email: jkchang@nycu.edu.tw
Webpage: <https://sites.google.com/view/jkclab/home?authuser=0>

Education:

2001~2005, Ph.D., Materials Science & Engineering, National Cheng Kung University, Taiwan

Experience:

2004~2005 Visiting Scholar, Penn State University, US
2006~2010 Postdoc Fellow, National Cheng Kung University, Taiwan
2010.02~2013.07 Assistant Professor, National Central University, Taiwan
2013.08~2016.07 Associate Professor, National Central University, Taiwan
2016.08~2018.07 Professor, National Central University, Taiwan
2017.01~2018.07 Distinguished Professor, National Central University, Taiwan
2017.08~2018.01 Visiting Scholar, Massachusetts Institute of Technology (MIT), US
2019.08~2019.08 Visiting Professor, Helmholtz Institute Ulm, Germany
2020.01~2020.02 Visiting Professor, Kyushu University, Japan
2018.08~2020.03 Professor, National Chiao Tung University, Taiwan
2022.02~now Technical Director, Green Energy and Environmental Research Laboratories, ITRI
2020.04~now Distinguished Professor, National Yang Ming Chiao Tung University, Taiwan

Honors & Awards:

2011-2014 Outstanding Young Scientist Award, National Science Council
2014-2017 Outstanding Young Scientist Award, National Science Council
2017-2020 Outstanding Young Scientist Award, National Science Council
2020 Outstanding Research Award, National Science Council
2021 Far Eastern Y. Z. Hsu Foundation Scientific Paper Award of Technology & Innovation
2021 Outstanding Young Alumni, National Cheng Kung University
2021 2030 Cross-Generation International Outstanding Young Scholars, National Science Council
2021-2024 Top 2% Scientists (by Stanford University)

Research Areas: Energy Storage Systems; Rechargeable Batteries; Supercapacitors; Electrochemical Techniques; Hydrogen Technologies; Corrosion Prevention Technologies

Publications:

351 SCI Papers and 23 Patents
H-index (Google Scholar): 63, with a total citation number of 13,255 (@2025/09)

Garnet-Type Li⁺ Conductor for Solid-State Li-Metal Batteries

Purna Chandra Rath, Cheng-Chia Chen, Chih-Yang Huang, An-Yuan Hou, Wen-Wei Wu,

Jeng-Kuei Chang*

Department of Materials Science and Engineering, National Yang Ming Chiao Tung University,

Hsinchu, Taiwan

jkchang@nycu.edu.tw

*Corresponding Author

Abstract

The development of solid-state electrolytes (SSEs) is crucial for realizing next-generation high-energy-density and high-safety lithium-metal batteries (LMBs). The chemical composition design and synthesis route are known to be the determining factors for SSE properties. One of the most promising SSEs for LMB applications is garnet-type Li⁺-conducting oxide synthesized via a solid-state reaction. This study performs an *in situ* TEM investigation of Li_{6.25}Ga_{0.25}La₃Zr₂O₁₂ (Ga-LLZO) growth during a high-temperature calcination process. At 750 °C, an intermediate phase, La₂Zr₂O₇ (LZO), is formed through epitaxial growth along the crystallographic orientations of ($\bar{1}11$)_{LZO}//($\bar{1}11$)_{ZrO₂} and [211]_{LZO}//[101]_{ZrO₂}. The incorporation of Li and Ga into LZO is found to occur at 900 °C. The LZO transforms into Ga-LLZO via a layer-by-layer diffusion process that takes place along the [01 $\bar{1}$] direction. The Ga doping can stabilize the cubic structure of Ga-LLZO at a temperature of 900 °C (while a temperature of >1100 °C is needed to obtain cubic LLZO) and eliminate the formation of the unwanted tetragonal phase. This dynamic microstructure evolution of Ga-LLZO is examined at an atomic scale. This study opens up a new route to better characterize and understand SSE materials, providing opportunities for further tailoring SSE properties.

Keywords: operando analysis, solid-state electrolyte, calcination, phase transition

Oral

Venue : Engineering Building #5		
Oral Presentation Session 1		
10:45 12:00	A102	B143
	O-02	O-01
	O-03	O-06
	O-04	O-08
	O-05	O-09
	O-07	O-10
Oral Presentation Session 2		
13:00 14:45	A102	B143
	O-19 (online)	O-11
	O-12 (online)	O-20
	O-13	O-21
	O-14	O-22
	O-15	O-23
	O-16	O-24
	O-17	O-25
Oral Presentation Session 3		
15:45 17:15	A102	B143
	O-18	O-26
	O-27	O-32
	O-28	O-33 (online)
	O-29	O-34 (online)
	O-30	O-35
	O-31	O-36 (online)

【O-01】

NiMo-Engineered $\text{Ti}_3\text{C}_2\text{T}_x$ MXene Electrocatalyst for Hydrogen Generation from Low-Grade Water

Swapna Pahra, Pooja Devi, Hsuan Yu, Chen-Yu Chen

Email : yushuan107@gmail.com

Abstract : Hydrogen generation via wastewater splitting is a sustainable approach to producing green hydrogen fuel. Over the last few years, enormous efforts have been made to develop an efficient electrocatalyst for scalable hydrogen production. However, finding a simple and quick method to create effective catalysts with distinctive structural characteristics and ideal supports is still a significant difficulty. MXene is an emerging two-dimensional (2D) transition metal carbides, nitrides, and carbonitrides material in the field of electrocatalysis due to its superior electrical conductivity and sizable active surface area. Herein, we have investigated a novel, highly efficient $\text{Ti}_3\text{C}_2\text{T}_x$ MXene hybrid with transition metals; $\text{Ti}_3\text{C}_2/\text{NiMo}@\text{NF}$ as an HER electrocatalyst. Electrochemical deposition approach has been used to fabricate the electrode. The as-prepared catalyst was further characterized by XRD, TEM, FESEM, and XPS to study the structural, optical, and elemental composition of the material. $\text{Ti}_3\text{C}_2/\text{NiMo}@\text{NF}$ shows an overpotential of 45.8 mV at 10 mA/cm² in 1 M KOH containing 5 ppm MB dye. A 0.2 mmol/h of hydrogen production rate was estimated from textile wastewater with this catalyst. Besides, an excellent degradation of around 82% of MB dye-containing water in 90 min was achieved. The catalyst has also been explored for hydrogen production and degradation in real industrial wastewater. The promising HER catalytic activities of the $\text{Ti}_3\text{C}_2/\text{NiMo}@\text{NF}$ catalyst are attributed to its synergetic effect of MXene and NiMo. This work therefore not only contributes to developing a high-efficient electrocatalyst, but also provides a practically feasible approach for wastewater treatment.

【O-02】

Synthesis and application of conductive PAA hydrogel

Chao-Tien He, Wei-Li Yuan, Cheng-Yu Yao

Email : r47943873@gmail.com

Abstract : This research aims to develop a novel poly(acrylic acid) (PAA) cross-linked hydrogel with the goal of combining excellent electrical conductivity with high mechanical strength to meet the application requirements of flexible electronics, biosensors, and energy storage devices. To this end, we compared divinylbenzene (DVB) and N,N'-methylenebisacrylamide (MBAA) as cross-linkers to construct and optimize the hydrogel's three-dimensional network structure and investigate its impact on material properties.

【O-03】

Investigation of the heat supply performance with biofuel combustion for improving the biomass gasification system

Mayu Hamazaki, Kiyoshi Dowaki

Email : 7424531@ed.tus.ac.jp

Abstract : Currently, the Advanced Gasification Module (AGM) with a small-scale indirect biomass gasification system has been developed for green hydrogen production. One problem of AGM is tar condensation. Tar, the sticky byproduct of biomass pyrolysis, condenses on the surfaces of pipes and furnaces, causing pipe blockages and the distribution of heat supply to feedstock. Tar can be removed by thermal cracking, but it requires more than 700 °C. In the AGM process, heat transfer is controlled by heat carriers (HCs) circulation through the preheater and the pyrolyzer. In the preheater, HCs get heat from the hot gas flow. However, according to the previous study, the heat exchange performance of the preheater is approximately 35% due to more heat loss, and the minimum temperature of HCs is around 550 °C. In this study, charcoal and coffee grounds are used as additional heat resources to maintain a sufficient heat supply in the vessel. Using these resources, the improvement of heat flux and heat capacity of HCs is achieved, and operating troubles would be avoided. Here, based on the experimental data of HCs temperature trends under biofuel combustion, we investigate the changes in heat supply performance due to biofuel feeding into the preheater.

【O-04】

High-Temperature H₂S Adsorption Using Neutralized Sediment for the Mixed Gas of Biomass Origin

Shuto Kitayama, Mayu Hamazaki, Shoichi Kumon, Tetsuro Tokumoto, Kiyoshi Dowaki

Email : 7424531@ed.tus.ac.jp

Abstract : Biohydrogen, characterized by zero carbon emissions, high energy density, and carbon neutrality, has received wide attention as a potential clean energy source for Fuel Cell (FC) applications. However, hydrogen sulfide (H₂S) in biomass syngas deteriorates FC performance and shortens its lifetime. Here, we investigated the use of neutralized sediment (NS) of natural resource origin for H₂S removal. NS is a by-product of mine water neutralization and mainly contains iron, which reacts readily with H₂S, making it a low-cost adsorbent. Previous studies reported the potential of NS for H₂S removal under 250 °C using the mixed gas of H₂ and H₂S. In this study, we investigated the adsorption performance using the mixed gas of H₂, N₂, CO, and H₂S to simulate real syngas conditions better, and the temperature condition of 250–500 °C was experimentally evaluated. The results showed that NS exhibited the highest H₂S adsorption at 300 °C, while the performance gradually decreased at temperatures above 350 °C. In addition, to understand the adsorption characteristics, including the degradation, we discussed these causes based on the results of XRD and XPS.

【O-05】

Bamboo Waste Derived Porous Carbon Sulfur Composite Electrodes for Lithium Sulfur Battery

Arenst Andreas Arie

Email : arenst@unpar.ac.id

Abstract : In this work, porous carbon–sulfur composites with a sulfur content of 58.8 wt% were synthesized by the melt-diffusion method as cathode materials for Lithium–Sulfur Batteries. Initially, porous carbons were prepared by hydrothermal carbonization followed by chemical activation method. We observed an initial specific capacity of 775 mA h g⁻¹ and a reversible capacity of 515 mA h g⁻¹ after 100 cycles at a 0.2 C (1 C = 1675 mA g⁻¹) rate. Furthermore, the carbon–sulfur composite cathode can perform excellent rate capability performance from 0.1 C to 2 C.

【O-06】

Synergizing AI and chemical engineering process modeling for advanced steam boiler digital twin development

Chularak Takhonram, Weerawut Chaiwat, Prathana Nimmanterdwong

Email : weerawut.cha@mahidol.ac.th

Abstract : Steam boilers are critical components in industrial power generation, where undetected faults can cause inefficiencies, higher maintenance costs, and safety risks. Traditional threshold-based monitoring often struggles to identify subtle anomalies under normal operating conditions. This study develops a fault detection framework using Long Short-Term Memory (LSTM) neural networks trained on data collected from a pilot-scale boiler. The dataset was preprocessed and labeled according to combustion behavior, with oxygen concentration and flue gas temperature serving as key indicators to classify six operating states, including resting1, resting2, startup, combustion1, combustion2, and normal operation. Data were split into training (60%), validation (20%), and testing (20%) subsets, and hyperparameters were optimized for robust classification. The best-performing architecture, a two-layer LSTM with 85 hidden units and a sequence length of 24, achieved 89% testing accuracy. Confusion matrix analysis confirmed strong performance across all classes. These findings demonstrate the capability of AI to capture complex fault signatures, improve early detection of combustion faults, and reduce false negatives. In practice, this approach has the potential to prevent costly downtime, enhance safety, and provide a foundation for digital twin development in industrial boiler operations.

【O-07】

Improvement of Heat Transfer Performance of MH-Cartridge for the Steady Discharge of Hydrogen

Tomoya Ezawa, Shan Miao, Koki Harano, Masami Sumita, Noboru Katayama, Kiyoshi Dowaki

Email : 7425701@ed.tus.ac.jp

Abstract : The heat transfer performance of the metal hydride (MH) cartridge is examined, considering the shape of the MH-tank, in the context of the PEMFC-assisted bicycle (H-bike). The PEMFC exhaust is supplied to the self-cooling MH due to the endothermic reaction of hydrogen desorption. To provide uniform heat to the MH and prevent temperature inconsistencies, four cylindrical tanks filled with 95 g of MH are placed appropriately within the cylindrical cover, and 48 L of hydrogen is stored in. The heat of exhaust fluctuates depending on the H-bike load. Particularly during transient states when output increases in ascent, insufficient heat transfer to the cartridge causes the desorption rate to decrease. However, the heat transfer performance could be improved by optimizing the shape and the position of the MH-tank. Three types of MH-tank shapes with identical volume but differing diameters and lengths are proposed, and the heat flux of each surface and the temperature distribution of the MH are investigated using CFD simulations. Utilizing the results, a proposed shape of the MH-tank is suggested that can maintain an MH temperature of 18 °C or above and minimize temperature distribution on the MH during driving an H-bike on flat roads, stop-start, ascent, and descent.

【O-08】

Synthesis of Liquid Fuel Using Water and Carbon Dioxide as Feedstocks by in-Liquid Plasma

Ryota Shiba, Shinfuku Nomura, Junichi Nakajima

Email : k813001b@mails.cc.ehime-u.ac.jp

Abstract : This study investigates an in-liquid plasma process that converts carbon dioxide into valuable organic compounds using water and carbon dioxide as feedstocks. This method doesn't require hydrogen gas or catalysts, aligning with carbon-neutral strategies. During the plasma treatment, emission spectroscopy measurements ranging from 200 to 900 nm confirm the generation of reactive species, including CH (431, 387 nm), CO (336, 295 nm), OH (308, 283, 282 nm), O (777, 845 nm), and H radicals (656 nm [$H\alpha$], 486 nm [$H\beta$]). The electron temperature, as estimated from the [$H\alpha$]/[$H\beta$] intensity ratio of the emission spectrum (ES), exceeds 10,000 K under these plasma conditions. These species are generated through a process known as vibronic coupling, which involves the interaction between molecular vibrations and orbital electronic states in CO₂ and H₂O at these specific plasma temperatures. CH radicals, which are formed by the hetero-coupling of C and H, play a pivotal role in subsequent synthesis. Gas chromatography–mass spectrometry analysis during the quenching process reveals the presence of ethanol (2.06 min). This catalyst-free method provides an efficient and sustainable pathway for CO₂ utilization via plasma-activated carbon dioxide and water, offering a promising approach for carbon-neutral fuel production and Carbon Capture, Utilization, and Storage (CCUS) processes.

【O-09】

Electro-Fenton for Methylene Blue Degradation by Magnetite as A Heterogeneous Catalyst and Graphite Electrodes

Natchaya Atibaedya, Suwanna Kitpati Boontanon, Nawatch Surinkul, Paeka

Klaitong, Weerawut Chaiwat

Email : weerawut.cha@mahidol.ac.th

Abstract : Methylene blue (MB) dye has many potential applications in the textile, pharmaceutical, dyeing, and food industries. It is toxic, carcinogenic, and non-biodegradable, and can cause a serious threat to human health and the environment. This study focuses on approaches using the Fenton and Electro-Fenton (EF) processes. EF was combined with a cost-effective, biocompatible graphite felt cathode, graphite rod anode, and commercial magnetite (Fe_3O_4) as a heterogeneous catalyst. Fe_3O_4 exhibits inferior removal efficiency compared to metal salts (such as FeSO_4 and FeCl_3) at the same dose, but its superiority lies in producing no metal oxide sludge. The key parameters of the Fenton system include pH (3–11) and H_2O_2 concentration (0.05–0.25 M). The optimum conditions at pH 11 with 0.15 M H_2O_2 could achieve 82.98% removal efficiency of MB after 5 h. The EF process could be carried out without addition of H_2O_2 for MB removal, achieving 95.95% efficiency within 15 min. The current density was 4.8 mA/cm² at pH = 11, which yielded the highest adsorption and color removal efficiency from the Fenton reaction. The final goal of this study is to apply a conductive hydrogel, using polyacrylamide as a polymer matrix containing Fe_3O_4 , for easy retrieval after treatment as a more sustainable wastewater treatment approach.

【O-10】

Formulation of Polymer Composites with In-House Synthesized CNTs for Use as Flexible Strain-Pressure Sensors

Phitchawalai Ninthachan, Pimonpan Inthapat, Chawalkul Chotemunkongsin,

Soontorn Tuntithavornwat, Weerawut Chaiwat

Email : phitchawalai@gmail.com

Abstract : Flexible sensors represent an emerging class of electronic devices capable of detecting physical, chemical, or biological signals while undergoing mechanical deformation, such as bending, stretching, or twisting, without compromising their performance. Among various materials, carbon nanotubes (CNTs) embedded in a polydimethylsiloxane (PDMS) matrix have shown promising properties due to their high conductivity, mechanical flexibility, and ease of processing. This study aims to develop high-performance flexible strain–pressure sensors by formulating composites using in-house synthesized CNTs with controlled properties, including CNT diameter, purity, surface functionalization, and concentration, which affect performance in terms of strength, sensor sensitivity, and stability. Preliminary work on pristine CNTs showed the best dispersion in PDMS and the highest electrical conductivity. In contrast, highly functionalized CNTs tended to agglomerate and exhibited higher resistivity due to the presence of structural defects. Therefore, pristine CNTs with diameters of 30 and 70 nm and purities of 10%, 40%, and 70% were synthesized without post-acid treatment to study the strain–pressure sensitivity performance of CNT/PDMS composites. This study expects that pristine CNTs can be used directly without purification in strain and pressure sensor development. The data achieved in this study could support the design and fabrication of multifunctional flexible sensors in real applications.

Formulation of Polymer Composites with In-House Synthesized CNTs for Use as Flexible Strain-Pressure Sensors

Phitchawalai Ninthachan¹, Pimonpan Inthapat¹, Chawalkul Chotemunkongsin¹,
Soontorn Tuntithavornwat^{1,2}, Weerawut Chaiwat^{1,*}

¹ *Department of Chemical Engineering, Faculty of Engineering,
Mahidol University, Nakhon Pathom, Thailand*

² *Advanced Microfabrication and Biomaterial research unit (AMBiO),
Mahidol University, Nakhon Pathom, Thailand*

*** Corresponding author:**

Contact name: Weerawut Chaiwat

Telephone: +66845223098

E-mail: weerawut.cha@mahidol.edu

Abstract

Flexible sensors represent an emerging class of electronic devices capable of detecting physical, chemical, or biological signals while undergoing mechanical deformation, such as bending, stretching, or twisting, without compromising their performance. Among various materials, carbon nanotubes (CNTs) embedded in a polydimethylsiloxane (PDMS) matrix have shown promising properties due to their high conductivity, mechanical flexibility, and ease of processing. This study aims to develop high-performance flexible strain-pressure sensors by formulating composites using in-house synthesized CNTs with controlled properties, including CNT diameter, purity, surface functionalization, and concentration, which affect performance on strength, sensor sensitivity, and stability. Preliminary work on pristine CNTs showed the best dispersion in PDMS and the highest electrical conductivity. In contrast, highly functionalized CNTs tended to agglomerate and exhibited higher resistivity due to the presence of structural defects. Therefore, pristine CNTs with diameters of 30 and 70 nm and purities of 10, 40, and 70% were synthesized without post-acid treatment to study the strain-pressure sensitivity performance of CNT/PDMS composites. This study expects that pristine CNTs can be used directly without purification in strain and pressure sensor development. The data achieved in this study could support the design and fabrication of multifunctional flexible sensors in real applications.

Keywords: Flexible strain-pressure sensors, Polymer composites, Carbon nanotubes, Polydimethylsiloxane

Introduction

Currently, flexible strain–pressure sensors have garnered significant attention for their ability to detect human motion, physiological signals, and tactile forces without compromising performance under bending, stretching, or twisting. These advantages make them highly suitable for wearable devices, intelligent healthcare, and soft robotics, resulting in rapid market growth, particularly in Asia. Among various types, flexible strain–pressure sensors are of particular interest due to their versatility in monitoring human motion, physiological signals, and tactile sensing. Researchers have explored different materials to fabricate such sensors, including metals, conductive polymers, and carbon-based nanomaterials. However, metals often lack flexibility, while conductive polymers are costly and difficult to process. In contrast, carbon nanotubes (CNTs) exhibit high conductivity, mechanical strength, and flexibility, making them highly suitable for high-performance strain–pressure sensors. To further enhance sensor performance, CNTs are commonly combined with stretchable polymers such as polydimethylsiloxane (PDMS), which provides flexibility, chemical stability, and ease of processing. While previous studies have examined factors such as CNT content and film thickness, limited attention has been given to CNT size, purity, type, and properties that may strongly influence sensor performance. This study explores the formulation of polymer composites using in-house synthesized CNTs, allowing precise control over their structure and chemical properties. By studying different concentrations, diameter, and purity of CNTs to study the strain–pressure sensitivity performance of CNT/PDMS composites.

Methodology

2.1 In-house CNT synthesis

CNTs were synthesized using a chemical vapor deposition (CVD) method in a series of two reactors: a vaporization reaction (CVD) reactor and a CVD reactor. Initially, 1 g of catalyst (with different %metal loadings to suit the desired CNT properties) was loaded into a quartz tube at the center of the CVD reactor. Both reactors were heated, and a hydrogen and nitrogen gas mixture with a volume ratio of 1:1 (total flow rate of 200 mL/min) was flowed through them to reduce the catalyst. The temperature was controlled at 100 °C in the evaporation reactor and 800 °C in the CVD reactor. Hydrocarbon liquid mixture of benzene-toluene-xylene (BTX), as a representative of plastic waste pyrolysis products serving as a carbon source, was introduced into the reactor system via a syringe pump with a feeding flow rate of 0.5 mL/min for a specified time to obtain CNTs with varying purities. Finally, the obtained CNT products were cooled under a nitrogen flow, collected, and analyzed for their specific properties.

2.2 CNT/PDMS fabrication

Carbon nanotubes (CNTs) were mixed with isopropyl alcohol (IPA) in a 1:50 weight ratio. The mixture was dispersed using an ultrasonic bath for 30 min to ensure a uniform distribution of CNTs in IPA. The required amount of polydimethylsiloxane (PDMS) was then added, and the IPA

was removed using a hotplate and magnetic stirrer at 80 °C for 1 h to re-disperse the CNTs. The temperature then increased to 120 °C to remove the IPA completely, and the constant weight was determined after IPA removal. The CNT/PDMS was placed at ambient atmosphere for cooling down. After that, the PDMS curing agent was added to the mixture and blended thoroughly, resulting in a CNT/PDMS composite ink suitable for casting and further processing. The prepared CNT/PDMS composite ink was then poured into an acrylic mold to obtain the desired shape and structure, followed by curing in a hot air oven at 70 °C for 3 h to complete crosslinking and solidify the composite into the designed shape of the composite sheet to be ready for testing.

2.3 Characterization

For the properties of CNTs, morphology was examined using field-emission scanning electron microscopy (FE-SEM, Hitachi, SU-8010). The graphitic carbon of CNTs was analyzed using Raman spectroscopy (Horiba, XploRA PLUS), while a thermogravimetric analyzer (TGA, PerkinElmer, TGA8000, USA) was used to evaluate the purity and thermal stability of CNTs.

For the properties of CNTs/PDMS, the morphology of CNTs in PDMS was examined to determine their dispersion using field-emission scanning electron microscopy (FE-SEM, Hitachi, SU-8010). Electrical conductivity was measured using a Precision Source/Measure Unit (The Keysight B2902B precision source/measure unit (SMU)). Tensile strength was tested using a universal testing machine (UTM) (The Instron Model 4467).

Results and discussion

3.1 Physical properties of In-House CNT

Table 1 shows the different properties of in-house synthesized CNTs. Four of these CNTs were synthesized from BTX, covering the differences in CNT purity and diameter. Regarding the CNT diameter, P-CNT30-10, P-CNT30-40, P-CNT30-70 and P-CNT70-70 were confirmed by SEM analysis, as shown in **Figure 1**. The CNT diameters were 36.9 ± 5.9 nm and 76.9 ± 17.7 nm, respectively, and had similar purities of approximately 70%. Further, the purity was confirmed by TGA analysis, as shown in **Figure 2**. The purities of P-CNT30-10, P-CNT30-40, P-CNT30-70 and P-CNT70-70 had purities of 10, 40, and 70, respectively. This suggests that CNTs with different properties were synthesized.

Table 1. Physical properties of in-house synthesized CNT samples.

CNT	Purity (%)	Diameter (nm)	I_G / I_D
P-CNT30*-10**	10.01	34.5 ± 9.8	1.02 ± 2.09
P-CNT30-40	40.07	35.5 ± 1.2	1.24 ± 0.11
P-CNT30-70	74.35	36.9 ± 5.9	1.77 ± 0.17
P-CNT70-70	75.59	76.9 ± 17.7	1.28 ± 0.21

*Purity (%) of CNT ** Diameter (nm) of CNT.

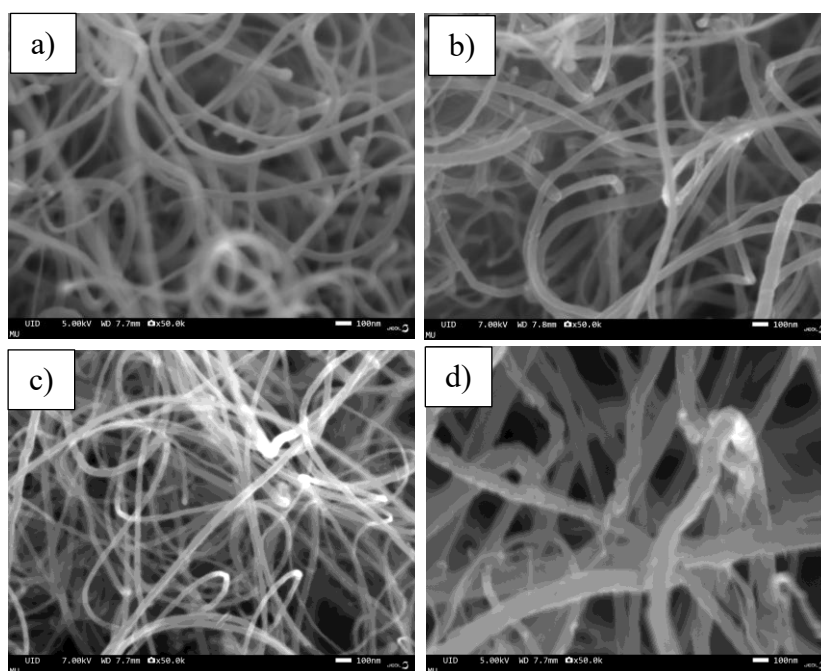


Figure 1. SEM images of pristine CNTs; (a) P-CNT30-10, (b) P-CNT30-40, (c) P-CNT30-70 and (d) P-CNT70-70

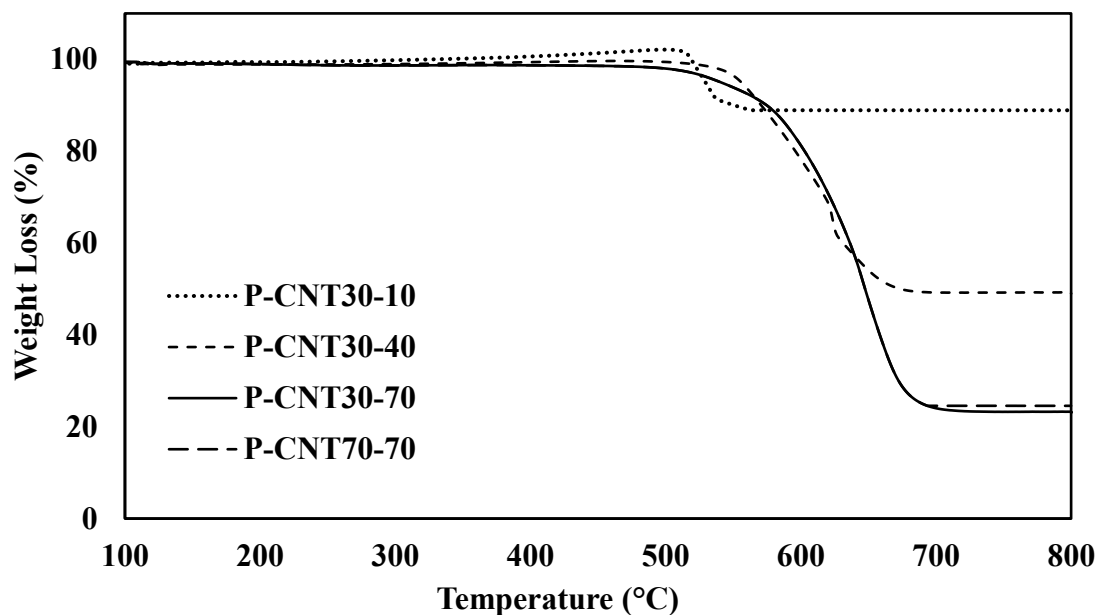


Figure 2. TGA analysis of different CNT samples.

3.2 CNT/PDMS

Initially, P-CNT30-70, which is a pristine CNT with highest purity among the in-house synthesized CNTs, was first used to fabricate CNT/PDMS sheets by measuring the CNT concentrations (wt%) at 0, 1, 2, 3, 4, and 5, respectively, as apparently shown in **Figure 3(a)**. Next, the CNT dispersion was examined by SEM analysis. The results showed that at CNT concentrations of 1 and 2 wt%, there were fewer CNTs according to the percentage added, as shown in **Figures 3(b) and 3(c)**. When the concentration was increased to 3, 4, or 5 wt%, the difference was clearly seen, as shown in **Figures 3(d), 3(e), and 3(f)**, respectively.

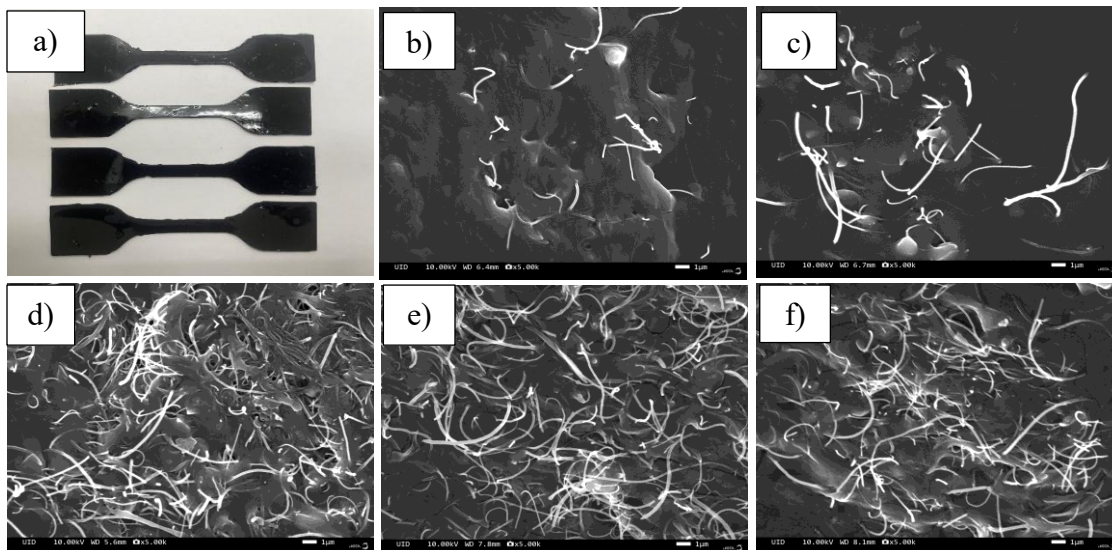


Figure 3. (a) Examples of CNT/PDMS composite testing sheets and (b)-(f) SEM images of P-CNT30-70 with various CNT concentrations (1, 2, 3, 4, 5 wt%) in PDMS.

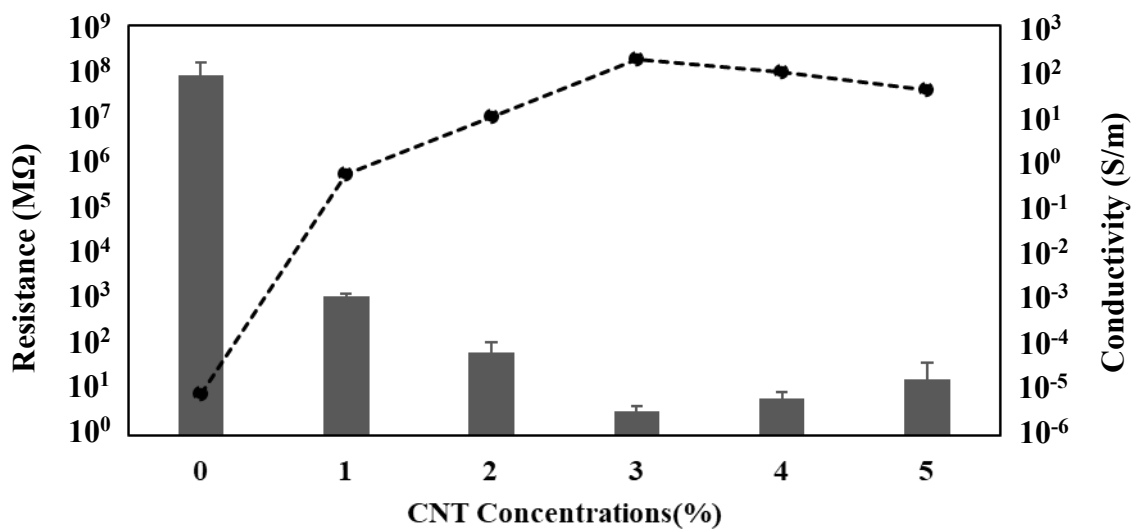


Figure 4. Resistance and Conductivity of P-CNT30-70/PDMS with various CNT concentrations (1, 2, 3, 4, 5 wt%) in PDMS.

Figure 4 shows the resistivity and conductivity of the P-CNT30-70/PDMS composite at different CNT concentrations. Pure PDMS (0wt%) has very high resistivity and very low conductivity. Upon addition of CNTs, the resistivity decreases rapidly, and the conductivity increases, indicating the formation of conductive pathways. At a CNT concentration of 3 wt%, the composite has a maximum conductivity of 3.5 K Ω . According to a study by (Lee et al., 2022), using 5% CNTs, the resistivity is 5.5 K Ω , which is like the present study. After that, additional loading does not significantly increase efficiency. This trend suggests that the permeability threshold is around 3 wt% of CNTs, which may be the optimal balance for electrical applications.

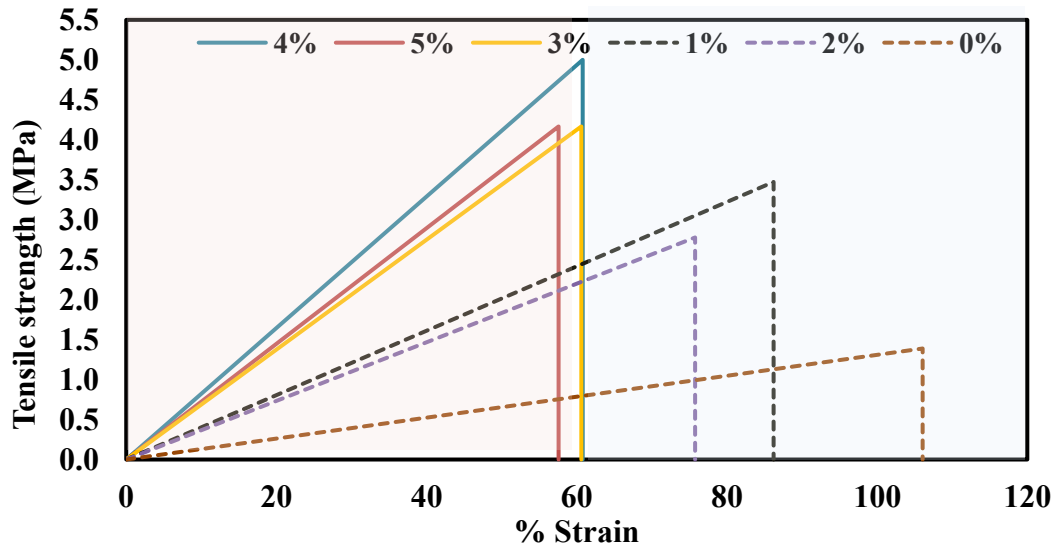


Figure 5. Tensile strength of P-CNT30-70/PDMS.

Finally, the tensile strength of P-CNT30-70/PDMS composites at different CNT concentrations (wt%) was studied, as shown in **Figure 5**. The results showed that increasing the CNT concentration increased both tensile strength and hardness compared to pure PDMS (0%). P-CNT30-70/PDMS composites at 3–5 wt% concentrations exhibited higher strength, reaching a maximum tensile strength of approximately 4–5 MPa. However, they fractured at approximately 60% lower strain. In contrast, P-CNT30-70/PDMS composites at the concentrations of 1–2 wt% exhibited lower strength but higher elongation before fracture, demonstrating good flexibility. These results indicated a balance between strength and elongation, with higher CNT concentrations increasing mechanical reinforcement but decreasing elongation. (Baloda et al., 2022)

Conclusion

This study demonstrated that in-house pristine CNTs exhibited the capability and potential for use in strain and pressure sensors. Regarding electrical conductivity, P-CNT30-70/PDMS at the 3 wt% CNT concentration revealed a maximum conductivity of 3.5 K Ω , and P-CNT30-70/PDMS at 3–5 wt% concentrations exhibited higher strength, reaching a maximum tensile strength of approximately 4–5 MPa. These experimental results will further support the design and fabrication of flexible and versatile sensors for practical applications in our upcoming studies.

Acknowledgement

We gratefully acknowledge Faculty of Graduate Studies, Mahidol University, for providing the Scholarship to Promote Master and Doctoral Students' Competency for International Academic Presentations (Fiscal Year 2026) to attend the 14th Joint Conference in Renewable Energy and Nanotechnology (JCREN). Special appreciation is also extended to Assoc. Prof. Dr. Surachoke Thanapitak, Department of Electrical Engineering, Faculty of Engineering, Mahidol University, for providing the electrical conductivity measurement facilities. This research was conducted under the Department of Chemical Engineering, Faculty of Engineering, Mahidol University, Nakhon Pathom, Thailand, in collaboration with the Advanced Microfabrication and Biomaterial Research Unit (AMBiO), Mahidol University. Finally, the authors would like to thank all members in Energy and Green Catalysis Laboratory 3 (EGCatLab3), Department of Chemical Engineering, Faculty of Engineering, Mahidol University, for their kind support and assistance.

References

- Baloda, S., Gupta, N., & Singh, S. (2022). A Flexible Pressure Sensor Based on Multiwalled Carbon Nanotubes/ Polydimethylsiloxane Composite for Wearable Electronic-Skin Application. *IEEE Transactions on Electron Devices*, 69(12), 7011-7018. <https://doi.org/10.1109/TED.2022.3216229>
- Lee, S.-J., Jung, Y.-J., Park, J., & Jang, S.-H. (2022). Temperature Detectable Surface Coating with Carbon Nanotube/Epoxy Composites. *Nanomaterials*, 12(14), 2369. <https://www.mdpi.com/2079-4991/12/14/2369>

【O-11】

Synthesis of Reduced Graphene oxide from Catalytically Graphitized Cellulose Fiber derived from Durian (*Durio zibethinus*) Rinds

Angel Gabrielle Comagon, Quennie Anne Dominique E. Delicana, Ryan D.

Timario, Mark Angelou M. Siega, Karlo Isagani A. Mosqueda

Email : msiega@umindanao.edu.ph

Abstract : This study explores the potential of durian rind, an agricultural waste material, as a sustainable precursor for the synthesis of graphite, graphene oxide (GO), and reduced graphene oxide (rGO). Durian rind biochar was catalytically graphitized using iron (III) nitrate to produce graphite-like carbon. The graphite product exhibited improved crystallinity and thermal stability, as confirmed by XRD and TGA analyses, respectively. GO was synthesized from the graphite product via the Modified Hummers' method, followed by hydrothermal reduction at 140 °C at varying times (6, 8, and 12 hours) to produce rGO. UV–Vis spectroscopy revealed that the 12-hour treatment yielded rGO with the highest degree of reduction, despite having the lowest yield, indicating more efficient oxygen removal. SEM imaging showed morphological changes from thin, wrinkled GO layers to crumpled, partially restacked rGO sheets. Elemental mapping and FTIR analyses further confirmed the reduction of oxygen-containing groups in rGO, while XRD patterns verified the successful oxidation of graphite to GO and the subsequent structural restoration in rGO. These findings demonstrate the viability of durian rind as a green, low-cost feedstock for graphene-based materials.

【O-12】 (online)

Photocatalytic Degradation of Tetracycline: Development of a Magnetic MnFe₂O₄/Biochar Photocatalyst for Sustainable Antibiotic Removal

Chai Jia Xin, and Alvin Lim Teik Zheng

Email : alvinltz@upm.edu.my

Abstract : This study presents the synthesis of manganese ferrite (MnFe₂O₄) and its composite with duckweed-derived biochar (MnFe₂O₄/BC) as photocatalysts for tetracycline (TC) degradation under low-intensity UV light. MnFe₂O₄, known for its chemical stability, magnetic properties, and UV responsiveness, was synthesized using co-precipitation and hydrothermal methods. To enhance photocatalytic efficiency, MnFe₂O₄ was integrated with BC produced from *Lemna minor*, a fast-growing aquatic plant with high surface area and adsorption capacity. The MnFe₂O₄/BC composite synergistically combines adsorption and photocatalytic degradation, promoting improved charge separation and pollutant removal. Photocatalytic experiments confirmed that MnFe₂O₄/BC demonstrated superior TC degradation efficiency compared to MnFe₂O₄ alone, under energy-efficient UV conditions. The magnetic recoverability of the catalyst and the use of renewable duckweed-based BC further support its environmental and practical viability. This work highlights a green, low-cost, and effective approach for antibiotic removal from wastewater, contributing to the development of eco-friendly and reusable materials for water purification applications.

【O-13】

Thermal Stress Analysis of Rib-Structured Solid Oxide Electrolysis Cell (SOEC) via Multiphysics Modeling

Yu-Cheng Xie, Chi-Chang Wang, Yen-Hsin Chan, Ming-Xian Lin

Email : mxlin@o365.fcu.edu.tw

Abstract : In this study, a multiphysics-coupled model of a Solid Oxide Electrolysis Cell (SOEC) was constructed using computational fluid dynamics, simultaneously taking into account flow field, heat transfer, electrochemical reactions, and solid mechanics. Under different operating parameter conditions, the effects of gas flow direction, steam fraction, and air flow rate on the thermal stress and temperature uniformity of the SOEC structure were investigated. At an operating voltage of 1.5 V, when the steam-to-hydrogen ratio was increased from 0.6:0.4 to 0.9:0.1 in the co-flow mode, the tensile stress in the electrolyte layer increased from 552.8 MPa to 558.7 MPa, and the compressive stress increased from 516.1 MPa to 521.9 MPa. The results indicate that as the reactant concentration increases, the heat generated by the electrochemical reaction also increases, leading to a rise in the internal temperature of the cell. When the air flow rate was increased from 10 sccm to 50 sccm, the tensile stress decreased from 569.7 MPa to 550.6 MPa, and the compressive stress decreased from 532.3 MPa to 514.0 MPa. The results show that increasing the air flow rate can enhance heat transfer and convection, thereby reducing the cell temperature and stress concentration.

【O-14】

Application of Mg/Al LDH-embedded sheets as a water-disinfection tool on the household scale

Erni Johan, Taufiq Ihsan, Junichi Nakajima, Shinfuku Nomura

Email : erni.johan.td@ehime-u.ac.jp

Abstract : Many people in rural areas lack access to clean drinking water due to limited infrastructure and purification technologies. Layered double hydroxides (LDHs), which are positively charged, can adsorb bacteria possessing negative charges. Mg/Al LDHs with Mg/Al ratios of 1.0, 3.0, and 6.0 were synthesized and embedded into non-woven fabric sheets for water disinfection. Each sheet (LDH mass = 0.05 g) was added to 100 mL of water containing 1,000 CFU/mL of *E. coli*, then shaken for 24 hours at 25 °C. After 3h, the viable *E. coli* counts decreased to 8.0, 30, and 40 CFU/mL for the ratios of 1.0, 3.0, and 6.0, respectively. After 24 hours, all LDH sheets achieved complete disinfection. In contrast, the control (without a sheet) remained almost constant. With an initial *E. coli* count of 5,000 CFU/mL, only the LDH with a Mg/Al ratio of 1.0 reduced the count to 0 CFU/mL after 24 hours. This suggests that the LDH with a Mg/Al ratio of 1.0 is the most effective, likely due to its higher Al content, which increases the positive charge and enhances bacterial adsorption. The sheets can be easily placed into and removed from household water containers, making them suitable for domestic water disinfection.

【O-15】

Synthesis of Fe₂O₃/Nanoporous Carbon Derived from Ion-Exchange Resin via Pyrolysis

Krit Nopparee, Kanokwan Ngaosuwan, Worapon Kiatkittipong, Doonyapong Wongsawaeng, Weerinda Mens, Santi Chuetor, Apiluck Eiad-Ua, Suttichai Assabumrungrat
Email : apiluck.ei@kmitl.ac.th

Abstract : Currently, global warming continues to have increasing impacts on the population. One of the major causes originates from the burning of waste from various sources, such as household waste, agricultural residues, and plastic wastes. Resin waste is also one of the abundant waste materials. Although there are treatment methods to recycle waste resin, the processes are generally costly. Therefore, the concept of utilizing waste resin as a precursor for nanoporous carbon has been proposed, owing to its low processing cost, highly porous structures, and large specific surface area, which make it a promising material for adsorption applications. In this study, nanoporous carbon derived from resin (RNC) was synthesized via pyrolysis at 600, 700, 800, and 900 °C for 1 hour. The optimal sample was then selected and subsequently impregnated with iron oxide (Lek Nam Phi) at loadings of 5, 10, and 15 wt% at 900 °C for 1 hour in order to impart magnetic properties to the RNC. The results revealed that increasing the pyrolysis temperature enhanced the porosity of the carbon, while higher iron oxide loadings at 900 °C promoted the formation of iron carbide phases, which will be used in future studies on glycerol acetylation into mono-, di-, and triacetin.

【O-16】

Evaluation of supported amine adsorbents in fixed-bed carbon dioxide adsorption-desorption cycles

Kazuhiro Mochidzuki, Saika Okamura, Nao Tsunoji, Horoyuki Takei, Yuichiro Ito, Takayuki Ichikawa

Email : kzmochi@hiroshima-u.ac.jp

Abstract : This study focuses on the development of an efficient carbon dioxide capture system using supported amine adsorbents, considering variations in particle size, type of supported amine, and amine molecular weight. Laboratory-scale fixed-bed adsorption–desorption experiments were conducted to evaluate the performance of these adsorbents under different conditions. Cyclic adsorption–desorption experiments were performed, using simulated flue gas for the adsorption step and steam for the desorption step, to evaluate adsorption capacity, regeneration efficiency, and stability. The results obtained were systematically compared and analyzed to clarify the effect of adsorbent properties on carbon dioxide capture performance and operability.

【O-17】

Synergistic Coagulation for Compact and Energy-Efficient Water Treatment in Rural and Emergency Applications

Jedsada Chuiprasert, Sutthichai Boonprasop, Krittawit Sopawanit, Tinn Intraluk, Natthapong Taithipmathukon, Thotsatham Takkawatakarn, Weerawut Chaiwat
Email : weerawut.cha@mahidol.ac.th

Abstract : The development of efficient water treatment systems is increasingly relevant to renewable energy, chemical–environmental engineering, and mechanical engineering, as compact and energy-efficient designs support sustainable resource management. This study investigates the optimization of a pilot-scale horizontal continuous-flow system for turbidity removal by integrating enhanced coagulation–flocculation under real raw water conditions. The effects of coagulant–flocculant dosage, aeration bubble flow rate, influent flow rate, baffle number, and inclination angle on floc formation and turbidity removal were systematically evaluated. Aeration significantly enhanced floc aggregation and mass transfer, with turbidity removal increasing from 83% without aeration to 95% at a bubble flow of 300 mL/min. Optimal chemical dosing produced dense, uniform flocs through effective charge neutralization and polymer bridging, whereas imbalanced dosages led to weak aggregation. Hydraulic and structural factors, including multiple baffle plates at an inclined angle and controlled flow rates, further enhanced settling and floc collision frequency. Statistical and regression analyses identified flow rate as the most influential factor, with baffle configuration and inclination serving as secondary optimization parameters. These findings demonstrate the synergy of chemical, hydrodynamic, and structural optimization, providing guidance for the design of compact, energy-efficient, and scalable water treatment systems suitable for rural, emergency, and resource-limited settings.

【O-18】

The Effect of Metal Composition for Direct diamond CVD on Steel

Rei Yano, Ryoya Shiraishi, Kyonosuke Harada, Yuta Egawa, Hiromichi Toyota

Email : shiraishi@yamaguchi-u.ac.jp

Abstract : Diamond deposition on steel offers advantages such as enabling low-cost production of high-performance tools, yet this has not been realized. This is due to carburization—the action of iron atoms causing carbon to form a graphite structure—and the large thermal expansion of steel. In the present study, aiming for direct diamond deposition onto steel, we investigated the effects of steel composition on diamond coverage and diamond particle size by depositing diamond onto multiple steels containing different metal-based components using the liquid-phase plasma CVD method. The results revealed that elements like V, Mo, and C, found in high-speed steels, tend to increase diamond coverage as their content rises. One possible reason is that V functions as a reducing agent, suppressing graphite formation during the CVD process and enabling stable diamond nucleation. Conversely, the presence of V and Mo was found to potentially influence diamond particle size. This provides detailed insights into the effects of metallic components on diamond CVD deposition, which are significant for both diamond CVD and tool manufacturing fields.

【O-19】 (online)

Evaluation of The Electrochemical Stability of Nickel Electrodes for Alkaline Water Electrolysis Under Fluctuated Power Supply Conditions

Yixuan Yuan, Yusuke Tama, Kazuhiro Mochizuki, Xin Zhao, Fangqin Guo, Hiroki Miyaoka, Takayuki Ichikawa

Email : yyx_ccsuer@outlook.com

Abstract : Hydrogen, as a clean energy carrier, has been widely applied across various fields. Alkaline water electrolysis (AWE) is a key hydrogen production technology, but renewable-energy-driven systems face frequent start-up/shutdown (SU/SD) cycles that induce reverse currents, accelerating electrode degradation. In this study, Raney Ni electrodes were tested under 10–10, 10–20, and 10–40 min SU/SD at 80 °C, 5 V, 30 wt% KOH. Current density declined by 9.19%, 10.81%, and 12.97%, while CV/EIS showed reduced anodic activity and higher resistance. SEM/EDS revealed anode layer delamination and Al leaching; XPS confirmed the evolution sequence $\text{Ni} \rightarrow \alpha\text{-Ni(OH)}_2 \rightarrow \text{NiOOH} \rightarrow \beta\text{-Ni(OH)}_2 \rightarrow \text{NiO}$, leading to surface passivation. Longer rest periods significantly accelerate degradation, providing insight for optimizing AWE operation.

【O-20】

Formation of SiO₂ thin films using ozone chemical vapor deposition

Daisuke Sakaitani, Kenichiro Tanoue

Email : e018vdv@yamaguchi-u.ac.jp

Abstract : In this study, the thin-film formation of SiO₂ during ozone-based chemical vapor deposition has been investigated. Hexamethyldisiloxane was used as a raw material. The experiments were conducted using a quartz-tubular reactor in an electric furnace at temperatures ranging from 300 °C to 400 °C. The growth rate of the SiO₂ film on the quartz tube increased with the axial position due to the increment of the wall temperature. When the wall temperature was almost constant along the axial position, the growth rate had a maximum value and then decreased with position. Finally, the growth rate was almost zero. The higher the setting wall temperature (T_{sw}), the shorter the axial position of the zero-growth rate. The concentration of ozone at the end of the reactor decreased with the setting wall temperature and then became zero at T_{sw} > 350 °C. The decomposition processes of ozone could consist of two steps: $\text{O}_3 \rightarrow \text{O}_2 + \text{O}$ and $\text{O}_3 + \text{O} \rightarrow 2\text{O}_2$. The activation energies were 10 kJ/mol and 77 kJ/mol. Further details on the film deposition mechanism will be reported on the day of the presentation.

【O-21】

Treatment of industrial wastewater using photosynthetic microorganisms

Ziming Zhou, Miwa Sugiura, Shinfuku Nomura, Junichi Nakajima

Email : m813001m@mails.cc.ehime-u.ac.jp

Abstract : *Thermosynechococcus elongatus* (*T. elongatus*), a photosynthetic microorganism discovered in hot springs in Japan, is believed to be one of the oldest aerobic organisms. It is thought to have originated around 3.5 billion years ago and to have introduced oxygen to the Earth. *T. elongatus* exhibits a variety of environmental response mechanisms not found in other organisms. These include its unique ability to absorb, metabolize, and accumulate environmental pollutants such as nitrite and heavy metals at high concentrations. The organism can also respond to environmental changes such as light and temperature. The cells absorb divalent heavy metal ions (M^{2+}) from solution and bind them to metallothionein, a protein that binds a variety of heavy metals. Depending on the concentration of M^{2+} in the solution, metallothionein regulates the number of molecules it synthesizes, taking up heavy metals that are undesirable for microorganisms as food. In this study, industrial wastewater was mixed with *T. elongatus* and cultured under standard conditions. After 0–24 hours, 10 mL of each sample was collected and centrifuged, and the concentrations of heavy metals in the supernatant were measured using ICP – MS. The effects of mixing ratios, the presence or absence of EDTA, and Zn were also investigated, revealing that the most advanced uptake occurred after approximately 30 minutes.

【O-22】

Continuous recovery of phosphorus assisted by calcium hydroxide in supercritical water gasification process

Zihao He, Yukihiro Matsumura

Email : mat@hiroshima-u.ac.jp

Abstract : The world is currently facing critical challenges arising from global warming and the depletion of fossil fuel reserves. In parallel, phosphorus is a non-renewable and indispensable resource. Supercritical water gasification (SCWG) offers a promising solution, as it can directly convert sewage sludge into high-value gases without the need for energy-intensive pre-dewatering, thereby enhancing overall process efficiency. This issue is particularly relevant in Japan, where phosphorus resources are absent. In this study, we propose a sustainable phosphorus recovery system integrated into SCWG. Under supercritical conditions, calcium hydroxide was employed to promote the precipitation of phosphorus in the form of solid particles, while gravity separation was investigated as a potential method for their recovery. The aim of this work was to design and construct a separation device and experimentally assess its performance. The results indicate that gasification efficiency can be enhanced by influencing the key reactions of the SCWG process. Hydrogen content in the gas phase reached 81%, while carbon was predominantly distributed in the liquid phase. The terminal velocity of particles increased notably with particle size, with higher temperatures leading to a slight additional increase. In this system, particles in the range of 10–100 μm were readily transported by the fluid, whereas larger particles ($>150 \mu\text{m}$) exhibited a stronger tendency to settle.

【O-23】

Effect of the oyster shell delivered CaO catalyst on the supercritical methanol biodiesel production

Ken Furuta, Yukihiro Matsumura

Email : mat@hiroshima-u.ac.jp

Abstract : A reaction using supercritical methanol has been proposed as a new method to overcome the problems of conventional biodiesel production. However, this approach requires high energy input and involves cost challenges. To address these issues, the use of heterogeneous catalysts has been explored, with particular focus on metal oxides such as calcium oxide. Hiroshima Prefecture, where our university is located, produces about 60% of Japan's oysters, generating a large amount of oyster shell waste that exceeds current treatment capacity. Therefore, effective utilization of oyster shells is strongly needed. In this study, oyster shells, mainly composed of calcium, were prepared as catalysts for biodiesel production, and their influence on biodiesel yield was investigated. The experiments were conducted using a mini batch reactor heated with molten salt. After reaching the target temperature, the reactor was maintained for the designated time, then removed and cooled with water. The collected samples were centrifuged, and only the biodiesel phase was analyzed by gas chromatography–mass spectrometry (GC–MS) to evaluate the FAME yield. The results demonstrated that the use of this catalyst enabled significant improvement in FAME yield, even at lower temperatures and with shorter residence times.

【O-24】

Hydrothermal carbonization of peat soil: Effect of temperature, time, and concentration on char formation

Kosuke Yamada, Obie Farobie, Novi Syaftika, Yukihiro Matsumura

Email : mat@hiroshima-u.ac.jp

Abstract : Peat soil is an organic-rich material formed in wetlands by the accumulation of partially decomposed plant matter. Its direct agricultural use is limited due to acidity, low nutrient availability, and poor drainage. Hydrothermal carbonization (HTC) is a thermochemical process that converts wet organic matter into hydrochar, a carbon-rich solid with potential applications in soil improvement and energy utilization. In this study, peat soil slurries with concentrations of 5–15 wt% were subjected to HTC at 180–220 °C for 30–90 min under autogenous pressure. The solid yield was determined, and hydrochar was evaluated in terms of mass balance, appearance, and basic properties. Results showed that the solid yield decreased with increasing temperature, reaction time, and concentration, indicating progressive decomposition of organic matter. Hydrochar also exhibited darker color and reduced moisture retention compared with raw peat soil, suggesting changes in stability and structure. These findings demonstrate that HTC can transform peat soil into a more stable solid, while reaction conditions strongly influence yield and product characteristics. Overall, this study provides fundamental insights into the transformation behavior of peat soil during HTC and supports the feasibility of applying this process for sustainable utilization.

【O-25】

Preparation of Ru/watermelon rind biochar catalyst for xylitol from xylose via hydrogenation

Raito Arakawa, Channarith Be, Krittiya Singcharoen, Wasawat Kraithong,

Tawatchai Charinpantikul, Sanchai Kuboon, Yukihiro Matsumura

Email : mat@hiroshima-u.ac.jp

Abstract : Watermelon rind (WR), which accounts for nearly one-third of the fruit's total mass, is often disposed of through landfilling or incineration, leading to hygiene concerns and environmental burdens. To address these issues, hydrothermal carbonization (HTC) provides a promising valorization pathway by converting WR into hydrochar with functional properties suitable for catalyst support. In this study, WR with a high moisture content was subjected to HTC at 200 °C for 2 h in the presence and absence of citric acid as a catalyst. The introduction of citric acid (0.05 M) decreased hydrochar yield by approximately 5%, but enhanced surface functionality, potentially facilitating metal dispersion. The obtained hydrochars were thoroughly characterized using CHNS elemental analysis, proximate analysis (TGA), XRD, FTIR, and BET surface area. Furthermore, Ru was impregnated on hydrochar (Ru/WRC) and subsequently reduced to evaluate its potential as a hydrogenation catalyst. The results demonstrate that HTC-derived hydrochars retain oxygen-containing functional groups, which promote effective metal anchoring. Overall, this work highlights the feasibility of producing sustainable biochar-based catalyst supports from agricultural residues, offering both waste valorization and environmental benefits.

【O-26】

**Investigation of the Effect of Temperature on the Properties of Diamond
Directly Deposited on Steel by In-Liquid Plasma CVD**

Kyonosuke Harada, Ryoya Shiraishi, Rei Yano, Yosuke Uchiyama, Hiromichi
Toyota

Email : shiraishi@yamaguchi-u.ac.jp

Abstract : Diamond deposition on steel is expected to enable the cost-effective fabrication of high-performance cutting tools. Nevertheless, successful realization has been hindered by several critical issues: carburization, the catalytic role of iron atoms that favor the transformation of carbon into graphite structures, and the significant thermal expansion of steel. These problems are strongly influenced by temperature, as the carbon diffusion coefficient, catalytic activity, and compressive stress all vary with thermal conditions. Therefore, we conducted direct diamond deposition experiments on stainless steel (X5CrNi18-10) at 500–700 °C, and investigated the temperature effects on grain size, surface coverage, and Raman intensity ratio. The results indicated that both the grain size and Raman intensity ratio increased with higher deposition temperatures, whereas the surface coverage decreased as temperature rose. These findings provide essential baseline data for direct diamond deposition on steel.

【O-27】

Hydrogen Production Efficiency and Carbon Properties for Decomposition of Cyclohexane/Salad Oil with Arc Plasma

Ryoya Shiraishi, Yoshifumi Go, Seinosuke Honda, Haruto Ichida, Hiromichi Toyota

Email : shiraishi@yamaguchi-u.ac.jp

Abstract : The hydrogen production energy efficiency (HPE) during arc plasma decomposition of a liquid mixture of household salad oil and cyclohexane (simulating waste oil) was investigated, focusing on the effects of various experimental factors. In addition, the properties of the by-produced solid carbon were characterized. The factors found to significantly influence HPE were the mixing ratio of salad oil to cyclohexane (weight ratio, hereafter expressed as $x : y$, where x represents cyclohexane and y represents salad oil). The HPE for a 10 : 0 mixture was threefold higher than that for a 0 : 10 mixture. However, when the ratio was adjusted to 7 : 3, the HPE increased to 1.7 times that of the 10 : 0 case. This improvement is presumed to occur because high-boiling-point salad oil molecules are transported into the plasma, entrained by the vapor of the low-boiling-point cyclohexane. The solid carbon generated exhibited various morphologies, including granular, flaky, and fibrous structures, and some carbon nanotubes were also identified.

【O-28】

Development of Heat Recovery and Preheat System for Liquid Feedstock Plasma Decomposition aiming Hydrogen Production

Ryoya Shiraishi, Seinosuke Honda, Hiromichi Toyota

Email : shiraishi@yamaguchi-u.ac.jp

Abstract : Plasma decomposition of liquid hydrocarbons is, in principle, a CO₂-free route to ultra-high-efficiency hydrogen production, yet such performance has not been realized. This shortfall has been attributed to two issues in conventional plasma-in-liquid processes: (i) most of the plasma heat is not utilized for the reaction and diffuses into the surroundings, and (ii) bubble generation and detachment around the plasma cause intermittent arcing, preventing steady-state decomposition. In this study, a system was developed in which the heat diffusing from the plasma is transferred to the feedstock (methanol was employed as a model compound for simplicity), thereby preheating and vaporizing it; the pre-vaporized feed is then supplied to the plasma in the gas phase at a constant flow rate. Through waste-heat recovery and plasma stabilization, an improvement in efficiency is expected. Using the developed system, methanol was decomposed by an arc plasma powered by a welding power supply, and the effect of the approach was evaluated. In addition, operating parameters, including the feed rate to the reactor and the discharge current, were optimized to further enhance efficiency. As a result, an efficiency improvement by up to a factor of three was achieved compared with the conventional method.

【O-29】

Ultra-low Ir Bilayer Anodes for High-Performance, Long-Life PEM Water Electrolysis

Yu Wei Hsu, Hsiang I Chang, Yung-Tin (Frank) Pan, and Apiluck Eiad-ua

Email : derrick19990423@gmail.com

Abstract : Reducing iridium usage while sustaining performance remains a central challenge for PEM water electrolysis anodes. We engineer a bilayer architecture that places an ultrathin, OER-active iridium black layer (0.03 mg cm^{-2}) directly adjacent to the porous transport layer (PTL), supported by an underlying iridium oxide (0.26 mg cm^{-2}) or platinum black scaffold. PTL-facing placement mitigates kinetic and ohmic losses, yielding $\sim 30\%$ higher current density and improved stability versus non-bilayer controls at equal total Ir loading. Notably, Ir-black(0.03)/Pt-black supports—despite Pt being OER-inactive—surpass conventional IrO_2 catalyst layers containing $\sim 10\times$ more Ir, underscoring the primacy of spatial positioning and transport management over bulk PGM content. Platinum dissolution, however, limits long-term durability for Pt-supported variants. In contrast, the Ir-black(0.03)/ IrO_2 (0.26) bilayer sustains performance with enhanced operational robustness. These results highlight a scalable pathway to efficient, economically viable PEMWE anodes that drastically reduce Ir consumption while maintaining high activity, advancing cost-effective green hydrogen production.

【O-30】

Nanoporous Carbon from Hemp Waste and Plastic Wastes via Hydrothermal-Carbonization Assisted CO₂ Activation

Korn Sukphunphoncharoen, Napat Kaewtrakulchai, Sutee Chutipaijit, Tawat Suriwong, Pramote Puengjinda, Gasidit Panomsuwan, Nuttapon Ruttanadech, Masayoshi Fuji
Email : apiluck.ei@kmitl.ac.th

Abstract : Nanoporous carbon was synthesized from composite materials of hemp waste and plastic wastes for carbon dioxide adsorption. The process involved hydrothermal carbonization at 200 °C for 12 h, ball milling at 500 rpm for 1 h, carbonization under a nitrogen atmosphere (500–1000 °C), and physical activation using carbon dioxide gas to enhance surface area and pore volume, respectively. The study evaluated various plastics (PETE, HDPE, PVC, LDPE, PP, PS, and other types), carbonization temperatures, and CO₂ flow rates (100, 200, and 300 mL/min) with activation times of 30, 60, and 120 min. Characterization was performed using TGA, CHNO, SEM, XRD, Raman, FT-IR, BET, and CO₂ adsorption analyses. The optimal conditions were hydrothermal carbonization at 200 °C for 12 h, ball milling at 500 rpm for 1 h, carbonization at 900 °C under nitrogen for 1 h, and CO₂ activation (200 mL/min) for 30 min at 900 °C. This sample exhibited the highest surface area and pore volume, demonstrating superior CO₂ adsorption potential. These findings indicate that combining hemp waste and plastic residues can produce high-performance nanoporous carbons for sustainable carbon capture applications.

【O-31】

Parametric Study on the Fabrication of CNT Paper by Vacuum Filtration for Gas Sensor Applications

Mengli Zhang, Hiroto Fujita, Haruki Matsumoto, Akihiro Hiden, Yukihiro Matsumura

Email : zml@hiroshima-u.ac.jp

Abstract : The fabrication of uniform and controllable carbon nanotube (CNT) papers is essential for their integration into next-generation gas sensors. In this study, CNT papers were prepared by vacuum filtration under systematically varied solution concentrations and volumes. The resulting papers were evaluated in terms of filtration behavior, thickness, and mass uniformity. Empirical relationships were derived to predict fabrication outcomes from input parameters, enabling reproducible control over CNT paper morphology. Future work will focus on microstructural characterization and preliminary sensing tests.

【O-32】

Hydrolysis reaction of ammonia borane with suppressing ammonia generation

Hitoshi Inokawa, and Hiroki Takata

Email : inokawa@nano.sojo-u.ac.jp

Abstract : Ammonia borane (AB; NH_3BH_3) is one of the promising hydrogen storage materials because it can generate hydrogen at room temperature via a catalytic hydrolysis reaction. However, the generation of hydrogen involves ammonia release, which can cause significant damage to polymer electrolyte fuel cells. Therefore, ISO/TS14687-2 specifies that the ammonia concentration in hydrogen must be below 0.1 ppm. In this study, pH buffer materials, such as phosphate salts, acetate salts, and citrate salts, were added into AB solution with a platinum catalyst in order to reduce ammonia release during the AB hydrolysis reaction. As a result, all pH buffers effectively decreased the ammonia concentration in the released hydrogen. The addition of phosphate salts, in particular, exhibited an excellent effect in suppressing ammonia release even at a high AB concentration of 10 mol L^{-1} , which corresponds to the saturated AB solution. Furthermore, a kinetic analysis was performed on the catalytic hydrolysis reaction of AB with the addition of pH buffer materials. It was demonstrated that the rate-determining step of AB hydrolysis with pH buffers was the dissociative adsorption of water molecules. The addition of phosphate and acetate buffers decreased both the activation energy and the frequency factor, suggesting that they can promote the hydrolysis reaction and dissociative adsorption of water, but reduce the number of active sites on the catalyst.

【O-33】 (online)

Impedance Characteristics of the $\text{La}_{0.6}\text{Sr}_{0.4}\text{Co}_{0.2}\text{Fe}_{0.8}\text{O}_{3-\delta}$ Cathode and $\text{BaCe}_{0.54}\text{Zr}_{0.36}\text{Y}_{0.1}\text{O}_{2.95}$ Electrolyte in a Symmetrical Cell at Intermediate Temperatures

Suhaida Dila Safian, Chung-Jen Tseng, Firda Aulya Syamani, Resti Marlina, Bunga Fisikanta Bukit, Abdul Mutalib Md Jani, Nafisah Osman

Email : suhaidadila@uitm.edu.my

Abstract : Lanthanum Strontium Cobalt Ferrite Oxide (LaSrCoFeO_3) is widely utilised as a cathode material for intermediate-temperature solid oxide fuel cells (SOFCs) operating at 500–800 °C. At this temperature range, the electrochemical behaviour is often analysed through complex nonlinear least-squares (CNLS) fitting. However, CNLS alone is unable to provide a detailed interpretation of the electrochemical processes occurring in SOFCs, particularly at the cathode–electrolyte interface. In this study, a comparison between the distribution of relaxation times (DRT) and CNLS analyses was carried out to extract the impedance responses of a fabricated $\text{LaSrCoFe|BCZY|LaSrCoFe}$ symmetrical cell ($\text{LaSrCoFe} = \text{La}_{0.6}\text{Sr}_{0.4}\text{Co}_{0.2}\text{Fe}_{0.8}\text{O}_{3-\delta}$, and $\text{BCZY} = \text{BaCe}_{0.54}\text{Zr}_{0.36}\text{Y}_{0.1}\text{O}_{2.95}$) at operating temperatures of 800, 750, and 700 °C. The DRT analysis clearly delineates the depressed semicircles, comprising four distinct sub-processes (illustrated by four peaks), compared to CNLS (represented by three to four impedance arcs), which indicates that several chemical reactions are involved at the interface. The extracted responses from both analyses correspond to the oxygen reduction reactions that follow the Adler–Lane–Steele model. The area-specific resistance (ASR) of the cell at 800, 750, and 700 °C is:

- (i) 0.22, 0.40, and 0.71 $\Omega\cdot\text{cm}^2$, respectively (by CNLS), and
- (ii) 0.20, 0.44, and 0.70 $\Omega\cdot\text{cm}^2$, respectively (by DRT).

【O-34】 (online)

XRD and DC Conductivity Studies of CeO-BaO Anode Catalyst for Proton Ceramic Fuel Cell Applications

Nurul Hazwani Yusof, Chung-Jen Tseng, Hanani Yazid, Abdul Mutalib Md Jani, Nafisah Osman

Email : hazwaniyusof.99@gmail.com

Abstract : Proton ceramic fuel cells (PCFCs) demand anode materials that can operate efficiently in both hydrogen and hydrocarbon fuels. Hence, an anode reforming layer (ARL) is often introduced to enhance catalytic activity, suppress carbon deposition, and improve fuel utilization during direct hydrocarbon operation. Besides these functions, the ARL must ensure adequate protonic and electronic conductivity, compatibility with the electrolyte, and stability under high temperatures. In this work, BaO and CeO powders were synthesized using a sol-gel method and mixed with three different ratios: 40 wt% CeO–60 wt% BaO (S1), 50 wt% CeO–50 wt% BaO (S2), and 60 wt% CeO–40 wt% BaO (S3). The mixed powders were processed via solid-state reaction and fabricated into 25 mm pellets using the dry-pressing technique, followed by sintering. XRD analyses revealed cubic CeO–BaO phases with space groups Fm-3m and F-23. A secondary phase of BaCO₃ was detected in all samples, but S2 exhibited the lowest intensity. The surface conductivity of the CeO–BaO pellets, measured in a hydrogen environment at 600 °C, showed S2 with the highest value (0.76 S·cm⁻¹) compared to S1 (0.58 S·cm⁻¹) and S3 (0.68 S·cm⁻¹). The analyses of structural and electrical conductivity indicate that S2 has high potential as a high-temperature catalyst for anode material in PCFC applications.

【O-35】

A Combined Coagulation-Flocculation and Heavy Metal Removal Unit in a Drinking Water Treatment System

Krittawit Sopawanit, Sutthichai Boonprasop, Jedsada Chuiprasert, Tinn Intraluk, Natthapong Taithipmathukon, Thotsatham Takkawatakarn, Weerawut Chaiwat
Email : weerawut.cha@mahidol.ac.th

Abstract : Coagulation and flocculation are widely employed as primary stages in conventional water treatment. The combination of inorganic and organic compounds as hybrid coagulants, specifically polyaluminum chloride (PAC) combined with polyacrylamide (PAM), is increasingly used to enhance performance over traditional coagulants. However, these hybrid polymers may introduce residual metals and cationic species into treated water, particularly at high dosages required for optimal removal. This study comprehensively evaluated the occurrence of residual metals and cations across a compact full-scale drinking water treatment system using inductively coupled plasma mass spectrometry (ICP–MS) for sensitive trace-level detection. Results indicated that hybrid coagulant application contributed secondary inputs of heavy metals (Fe, As, Cu, and Zn) to the treated water. Our designed treatment system, integrated with a reverse osmosis (RO) unit, removed over 99.9% of heavy metals while retaining essential minerals beneficial to human health, ensuring compliance with regulatory standards. These findings highlight the importance of identifying the sources of residual metals and emphasize that chemical additives and operational practices must be carefully managed. Precise coagulant dosing, integration of advanced technologies, and rigorous control of chemical inputs are essential to minimize residual contaminants and achieve regulatory-compliant water treatment systems.

【O-36】 (online)

Impedance Studies of Heterogeneous BSCF-Ni-based Cathode Material at Intermediate Temperatures

Nurulhuda binti Ahyad, Chung-Jen Tseng, Nafisah Osman, Abdul Mutalib Md Jani

Email : maivp@yuntech.edu.tw

Abstract : Intermediate-temperature solid oxide fuel cells (IT-SOFCs) offer a promising route towards efficient and low-emission energy conversion. However, the development of highly efficient IT-SOFCs is limited by the performance of their major components, among which the cathode is one of the most critical. Among the widely studied cathode materials is $\text{Ba}_{0.5}\text{Sr}_{0.5}\text{Co}_{0.8}\text{Fe}_{0.2}\text{O}_{3-\delta}$ (BSCF), which combines high electrochemical activity, stability, and resistance to degradation. Although BSCF exhibits high oxygen-ion and electronic conductivity, it suffers from issues such as phase instability and thermal expansion mismatch. To overcome these limitations and enhance material performance, this study focuses on incorporating nickel (Ni) into BSCF to form heterogeneous BSCF–Ni composites, combined with strategic doping and structural engineering approaches such as nanotube incorporation. Experimental studies demonstrate that a single cell using heterogeneous BSCF–Ni cathodes achieves a polarization resistance as low as $0.166 \, \Omega \cdot \text{cm}^2$ at $750 \, ^\circ\text{C}$. The impedance data are further analyzed using distribution of relaxation times (DRT) to extract the chemical reactions occurring during cell operation. DRT peaks confirm that the heterogeneous BSCF–Ni enhances the oxygen reduction reaction and reduces polarization resistance, thereby improving overall cell performance. These advancements confirm that BSCF–Ni composites, supported by doping and nanostructuring strategies, are highly promising cathode materials for advancing durable and efficient IT-SOFC systems.

Poster

Venue : Engineering Building #5		Time : 15:00 – 15:45
ID	Title	
P-01	2D nanoporous membrane optimization under the synergistic effect of space and surface charges for enhanced conversion efficiency Cong-Minh Hoang, Van-Phung Mai	
P-02	Influence of Deposition Conditions and TGA-Based Pt Loading on Catalyst Structure and Activity Yen-Ting Wei, Yu-Chen Liu, Chia-Fang Chang, Ching-Hsien Lin, Szu-yuan Chen, Chung-Jen Tseng	
P-03	A Unified Method for Accurate Online SOC Estimation in Lithium-Ion Batteries Using Uniform Puma Optimizer and Extended Kalman Filter En-Jui Liu, Qing-An Wang, Wan-Ling Lu, Rou-Wen Chen, Cai-Chun Ting, Chen-Kai Wen	
P-04	Material Surface Properties of AAO-assisted Tantalum Oxide Nanotubes Prepared by Anodization Process Yung-Huang Chang, Chen-You Cheng, Yu-chen Zheng, Chien-Sheng Huang, Yuan-Tsung Chen	
P-05	The Effects of Growth Environments on WS₂ for Electrocatalytic Hydrogen Evolution Reaction Yung-Huang Chang, Kuan-Ting Chen, Chien-Sheng Huang, Yuan-Tsung Chen	
P-06	Development of domestic vanadium flow battery energy storage system Hong-Chien Lin, Yuan-Jen Kuo, Yih-Ning Hsu	
P-07	Bottom-Up Design of Nanosphere-Supported Catalyst Layers for Proton Exchange Membrane Fuel Cells Yu-Chen Liu, Chia-Fang Chang, Ching-Hsien Lin, Szu-yuan Chen, Chung-Jen Tseng	
P-08	Durability Evaluation of the PEMFCs under Oxygen Condition Yu-Fan Lin, Kuan-Hao Lai, Chen-Yu Chen	
P-09	Investigation of the Influence of Surface Roughness on Metallic Bipolar Plates in Proton Exchange Membrane Fuel Cells Dai-Chi Yu, and Chen-Yu Chen	

P-10	Amorphous MOF-Derived Ru-Based Catalyst for Efficient Hydrogen Evolution Reaction in both Acidic and Alkaline Seawater Media Bo-Jie Wang, Chia-Yu Chang, Kuan-Wen Wang
P-11	Numerical Study on the Effect of Cooling on Reactant Concentration Distribution in PEM Fuel Cell Ming-Hui Ho, Shou-I Chen, Wei-Jen Chen
P-12	DRT-Guided Electrochemical Hydrogen Pump for H₂ Purification and Separation Cheng-Yi Lu, Sun-Tang Chang, Chen-Hao Wang
P-13	Techno-Economic Analysis of a 1 MW Proton Exchange Membrane Water Electrolyzer under Taiwans Electricity and Resource Kai-Wei Hsu, Kuan-Wen Wang
P-14	Applications of High-Entropy Catalysts to Enhance Formate Selectivity in Electrochemical CO₂ Reduction Yu-You Huang, Wei-Hsuan Hung
P-15	Zn and Sn Co-Doping Drives Covalency Modulation and Stability Enhancement in RuO₂ for Acidic OER Yu-Chen Chien, Lu-Yu Chueh, Yung-Tin Pan
P-16	Effect of metal on Nanoporous Carbon from Banana Trunk via Hydrothermal Carbonization Bussakorn Rongsawad, Damrong Mingkwankeeree, Sutee Chutipaijit, Apiluck Eiad-Ua
P-17	Effects of High-Entropy Catalysts and Flow Field Design on the Electrochemical Efficiency of AEMWE Systems Wei-Hsuan Hung, Wei Hung, Bo-Rui Huang
P-18	Optical Gas-Sensing System for Monitoring Gas Density Distribution in Semiconductor Processes Yu-Hsiang Shen, An-Chi Wei, Jyh-Rou Sze
P-19	Synergistic Effects of High-Surface-Area Nanosheet Engineering in HELDH for Enhanced Oxygen Evolution in AEM Water Electrolysis Yun Lin Li, Yu-Chi Chang, Zih-Ru Hsu, Che Cheng Lin, Wei-Hsuan Hung
P-20	Simulation of Anion Exchange Membrane Seawater Electrolyzers: Influence of Salinity on Cell Performance and Chlorine Evolution Thanh-Khiet Tran, Jenn-Kun Kuo

P-21	Optimizing Nickel Loadings for Improved Hydrogen Evolution Reaction Activity I-Ming Hung, Debabrata Mohanty, Sheng-Wei Lee, Chung-Jen Tseng, Yan-Rong Chen, Yi-Tsz Kung
P-22	LED-Controlled growth of Ag Dendrite V Particle Hybrids for SERS Yuchun Kao, Tzungta kao, HuiChen Yeh
P-23	Hydrogenation properties of Mg-based hydrogen storage materials doped with Ti and Zr catalyst by ball-milling Syuan-Yi Liao, Chia-Chieh Shen
P-24	Alkali Modified Non-metal Doped Graphitic carbon nitride for Solar-to-Fuel Conversion Yen-Po Chi, Shuo-Yun Chang, Mahmoud Kamal Hussien, Mohammad Qorbani, Chih-Yang Huang, Kuei-Hsien Chen, Li-Chyong Chen, Chen-Hao Wang
P-25	Notable Hydrogenation Behavior of Ti-V-based High Entropy Alloy under Ambient Condition Yu-Chen Kuo, Yi-Kai Lien, Bo-Yi Chen, Sammy Lap Ip Chan
P-26	Identifying Probable Oxidation Sites in Donor-Acceptor Polymer Solar Cells: A Computational Investigation Siao-Jie Ying, and Johann Lder
P-27	Development of Non-Precious Metal Catalysts for Hydrogen Evolution Electrodes in Anion Exchange Membrane Water Electrolyzers Yen-Jung Tseng, Cheng-Yuan Yu, Ching-Hsien Lin, Chung-Jen Tseng
P-28	Effect of flow channel structure on electrochemical characteristics of SOFC Runa Suzuki, Naoyasu Inagaki, Iori Shimada, Mitsumasa Osada, Nobuhide Takahashi, Hiroshi Fukunaga
P-29	Performance of Graphene-Coated Ionomer-Free Unsupported Pt Black Electrodes for PEFCs Jin Hirano, Hiroshi Fukunaga, Nobuhide Takahashi, Mitsumasa Osada, Iori Shimada
P-30	Etched ZIF-Derived Platinum-Cobalt Bimetallic Catalyst for Boosted Hydrogen Evolution Reaction in Acidic Media Ting-Yu Chang, Kuan-Wen Wang

P-31	Data Driven Simulation Framework for High-Performance BaZrS₂ Pervoskite Solar Cells Balaji Gururajan, Deveshwar Sasikumar, Venkatesh Narasihaman, Zin Thu Thu Naing, Kaviya Palanisamy, Prasanna Sankaran, Watcharapan Suansantisuk
P-32	Integration of Triple-Conducting Cathodes with Composite Functional Layers for Performance Enhancement of Protonic Ceramic Fuel Cell (PCFC) Chih-Chia Hu, Chung-Jen Tseng, Po-Chun Cheng, Po-Kai Lan, Kuan-Chieh Huang
P-33	Reduction Reactions of TiFe-based Hydrogen Storage Alloys Using Temperature Programmed Reduction Chia-Chieh Shen, Jhen-You Chen, Kuan-Wen Wang
P-34	Focused Study on Hydrogen Storage Performance of Cost-Effective TiY-based High Entropy Alloy Fang-Ti Hsu, Bo-Yi Chen, Yu-Chen Kuo, Sammy Lap Ip Chan
P-35	Numerical simulation of bubbles generated in the flow channel of AEM electrolyzer Tung-Yen Chu
P-36	Porous electrode composed of layered double hydroxide and platinum nano particles Nonoka Fukunaga, Hitoshi Inokawa
P-37	Forming CoPt alloy nanoparticles for catalytic hydrolysis reaction of sodium borohydride Hikaru Terao, Honoka Kowaki, Hitoshi Inokawa
P-38	Structural and Grain-Growth Evolution during Single-Crystal Synthesis of Ni-Rich Layered Li(Ni,Co,Mn)O₂ Yu-Hsuan Chen, Shu-Yi Tsai, Kuan-Zong Fung
P-39	Densification Enhancement of Doped BaCe_{0.4}Zr_{0.4}Y_{0.2}O_{3-δ} Proton Electrolyte for Water Electrolysis Applications Yu-Hsuan Chen, Shu-Yi Tsai, Kuan-Zong Fung, Tai-Chen Chen
P-40	Nitrate-to-Ammonia Conversion in Electrochemical Flow Cells under Practical Conditions Quoc-Nam Ha, Dong-Hau Kuo
P-41	Performance and Exergy Efficiency Analysis of Solid Oxide Power/Electrolysis Systems under Intermittent Renewable Energy Yen-Hsin Chan, Ping-Hung Chung

P-42	Electrocatalytic Performance of Ni-Doped Strontium Titanate Materials for Ammonia Cracking Yuei-Hoong Wong, Wei-Yung Chen, Yi-Horng Chang
P-43	Development of 3D Micro-Cavity mold via CNC Micro-Milling Hui-Yu Jiang, I-Tsu Chyuan, Yu-Che Cheng, Chia-Wen Tsao, You-Cheng Cai
P-44	Type-II MIL-68-NH₂/ZnIn₂S₄ Heterojunctions for Sustainable Catalyst Design in Solar Hydrogen Production: In-situ Spectroscopic Insights and Scalable Synthesis Yao-Tien Tseng, Yu-Hsuan Fan, Chih-En Chuang, Tai-Chou Lee
P-45	Study on Poly(vinylidene fluoride-co-hexafluoropropylene) - Polyvinylpyrrolidone Dual-Filler Composite Solid-State Electrolytes for Sodium-Ion Batteries Pei-Jung, Yi-Yu Chiang, Meng-Lun Lee, Torng-Jinn Lee, Yen-Shen Kuo, Yi-Hung Liu
P-46	Development of Advanced High-Entropy Electro-Catalysts for Water Treatment: Ammonia Decomposition and Hydrogen Production Neng-DI Chen, Mei-Ling Yu, Wei-Hsuan Hung, Wei-Chun Lin, Ching-Yu Chiang
P-47	Electrode Aging Effects in SOEC Performance Degradation Analysis via Multiphysics Simulation Yen-Wei Chiu, Wei-Mou Yen, Chung-jen Tseng, Bin-Hao Chen
P-48	Advanced High Entropy Carbonate Catalysts for the Applications of Seawater Splitting Hsiu-Yuan Chang, Yu-Zhe Zhang, Ching-Yu Chiang, Wei-Hsuan Hung
P-49	Study on the Application of Phase Change Materials with Different Melting Points in a Circular Pin Fin Heat Sink Jian-Sheng Huang, Han-Yu Chung, Xiang-Wei Wang, Pin-Yo Liu
P-50	CaCl₂-Modified Deep Eutectic Solvent Electrodeposition of Ni-Cu Alloy Electrodes for Water Electrolysis Meng-Chieh Liu, Yen-Shen Kuo and Yi-Hung Liu
P-51	N,F-Codoped Graphene as a Dual-Functional Anode Modifier for High-Performance Lithium Metal Batteries Pin-Ing Wang, Shih-Yu Chen, Ching-Yuan Su
P-52	Enhanced Li⁺ Transport and Cycling Stability in Solid-State Batteries Enabled by Fluorinated Layer Double Hydroxides John Peter Isaqu, Karuppiyah Pandi, Yi-Shiuan Wu, Chun-Chen Yang, Ching-Yuan Su

P-53	Microwave-Assisted ZIF-67 Synthesis Enables High-Performance OER Catalysts Through Strategic Ruthenium Incorporation and Electrochemical Activation Wei-Shiang Lin, Sheng-Wei Lee
P-54	MOF-Derived M-Doped(M=Ni, Ce, Zn) Ru-based Catalysts for Hydrogen Evolution Reaction in Both Acidic and Alkaline Media Kuan-Wen Chiu, Sheng-Wei Lee
P-55	Performance and Impedance Study of Proton-Conducting SOFCs Operated with Direct Ammonia Fuel Han-Shiang Liou, Sheng-Wei Lee
P-56	Pulsed Laser Deposition of Cathodes for Thin-Film Proton-Conducting Solid Oxide Fuel Cells Hsin-Chen Chen and Sheng-Wei Lee
P-57	High-Efficiency Solar–Hydrogen–Heat Microgrid for Sustainable Communities Yi-Jou Peng, Po-Chun Cheng, Chung-jen Tseng
P-58	TiO₂ Coating for Enhanced Durability of PEMFC Catalysts Yi-Jou Peng, Yu-Chen Liu, Chia-Fang Chang, Ching-Hsien Lin, Szu-yuan Chen, Chung-Jen Tseng

Organizing Committee

Main organizer: JCREN Organization Committee

Honorary Committee:

- President Shu-San Hsiau, National Central University, Taiwan
- Dean, Heng-Kwong Tsao, National Central University, Taiwan
- Prof. Yukihiro Matsumura, Hiroshima University, Japan
- Prof. Tawatchai Charinpanitkul, Chulalongkorn University, Thailand
- Emeritus Prof. Dr. Wiwut Tanthapanichakoon, Technology Promotion Association (Thailand-Japan), Thailand
- Assoc. Prof. Dr. Ruttikorn Varakulsiripunth, Thai-Nichi Institute of Technology, Thailand

Conference Chairs:

- Prof. Chung-Jen Tseng, National Central University, Taiwan
- Prof. Yukihiro Matsumura, Hiroshima University, Japan
- Prof. Tawatchai Charinpanitkul, Chulalongkorn University, Thailand

Organizing Committee:

- Wei-Hsuan Hung (National Central University, Taiwan)
- Sheng-Wei Lee (National Central University, Taiwan)
- Kuan-Wen Wang (National Central University, Taiwan)
- Cheng-I Chen (National Central University, Taiwan)
- Chen-Yu Chen (National Central University, Taiwan)
- Jenn-Kun Kuo (National Sun Yat-sen University, Taiwan)
- Chen-Hao Wang (National Taiwan University of Science and Technology, Taiwan)
- Yean-Der Kuan (National Chin-Yi University of Technology, Taiwan)
- Wei-Mou Yen (National Taipei University of Technology, Taiwan)
- Sea-Fue Wang (National Taipei University of Technology, Taiwan)
- Cheng-Yu Wang (National Yang Ming Chiao Tung University, Taiwan)
- Yi-Hao Pai (National Dong Hwa University, Taiwan)
- Tzu-Hsuan Chiang (National United University, Taiwan)
- Che-Ping Chou (hiPower Hydrogen Technology Co., Ltd., Taiwan)
- Wen-Sheng Chang (Industrial Technology Research Institute, Taiwan)

- Wei-Chin Chang (Southern Taiwan University of Science and Technology, Taiwan)
- Chun-Hsien Kuo (National Kaohsiung University of Science and Technology, Taiwan)
- Chih-Yuan Chen (Hephas Energy Co., Ltd., Taiwan)
- Wei-Hsin Chen (National Cheng Kung University, Taiwan)
- Yung-Sung Chen (National Chung Cheng University, Taiwan)
- Chang-Chung Yang (Walsin Lihwa Corporation, Taiwan)
- Hsi-Harn Yang (National Chung Hsing University, Taiwan)
- Fang-Bor Weng (Yuan Ze University, Taiwan)
- Yung-Chin Yang (National Taipei University of Technology, Taiwan)
- Zheng-Chao Yang (Energy Composite Technology Co., Ltd., Taiwan)
- Li-Duan Tsai (Industrial Technology Research Institute, Taiwan)
- Yi-Cheng Chen (National Central University, Taiwan)
- Yi-Hung Liu (National Central University, Taiwan)
- Chia-Hung Chen (Fucell Co., LTD., Taiwan)
- Yu-Chou Tsai (U Hydrogen Co., LTD., Taiwan)
- Wen-Inne Tsai (Delta Electronics, Inc., Taiwan)
- Feng-Hsiang Hsiao (Asia Hydrogen Energy Corp., Taiwan)
- Ching-Hsien Lin (Academia Sinica, Taiwan)

Steering Committee:

- Chen-Hao Wang (National Taiwan University of Science and Technology, Taiwan)
- Chung-Jen Tseng (National Central University, Taiwan)
- Jeng-Kuei Chang (National Yang Ming Chiao Tung University, Taiwan)
- Jenn-Kun Kuo (National Sun Yat-sen University, Taiwan)
- Sheng-Wei Lee (National Central University, Taiwan)
- Wei-Mon Yan (National Taipei University of Technology, Taiwan)
- Yean-Der Duan (National Chin-Yi University of Technology, Taiwan)
- Achariya Suriyawong (Chulalongkorn University, Thailand)
- Akihiko Horibe (Okayama University, Japan)
- Andi Erwin Eka Putra (Hasanuddin University, Indonesia)
- Anita Bt Ramli (Universiti Teknologi Petronas, Malaysia)
- Apiluck Eiad-ua (King Mongkut's Institute of Technology Ladkrabang, Thailand)

- Apinan Soottitantawat (Chulalongkorn University, Thailand)
- Arthit Neramittagapong (Khon Kaen University, Thailand)
- Chalida Klaysom (Chulalongkorn University, Thailand)
- Esmat Maleki (University of Malaya, Malaysia)
- Hiroshi Katsurayama (Yamaguchi University, Japan)
- Hiromichi Toyota (Ehime University, Japan)
- Ilyas Renreng (Hasanuddin University, Indonesia)
- Jakkrit Siririn (Technology Promotion Association (Thailand-Japan), Thailand)
- Jintawat Chaichanawong (Thai-Nichi Institute of Technology, Thailand)
- Kajornsak Faungnawakij (National Nanotechnology Center, Thailand)
- Ken-Ichiro Tanoue (Yamaguchi University, Japan)
- Kitirote Wantala (Khon Kaen University, Thailand)
- Kiyoshi Dowaki (Tokyo University of Science, Japan)
- Komkrit Suttiponparnit (PTT Research and Technology Institute, Thailand)
- Kreangkrai Maneeintr (Chulalongkorn University, Thailand)
- Lam Man Kee (Universiti Teknologi Petronas, Malaysia)
- Masato Mikami (Yamaguchi University, Japan)
- Masaya Nakahara (Ehime University, Japan)
- Minato Wakisaka (Kyushu Institute of Technology, Japan)
- Muhummad arsyad Thaha (Hasanuddin University, Indonesia)
- Nasaruddin Salan (Hasanuddin University, Indonesia)
- Nataporn Sowasod (King Mongkut's University of Technology North Bangkok, Thailand)
- Natthorn Chuayphan (Thai-Nichi Institute of Technology, Thailand)
- Nawin Vitiya-empikul (Green Technology Research Co., Ltd., Thailand)
- Nor Hisham B Hamid (Universiti Teknologi Petronas, Malaysia)
- Noriaki Sano (Kyoto University, Japan)
- Nuttapol Tanadchangsang (Rangsit University, Thailand)
- Onny Sutresman (Hasanuddin University, Indonesia)
- Palang Bumroongsakulsawat (Chulalongkorn University, Thailand)
- Paravee Vas-umnay (Chulalongkorn University, Thailand)
- Pichai Tangsathapornpanich (Technology Promotion Association (Thailand-Japan), Thailand)

- Pilasinee Limsuwan (King Mongkut's University of Technology North Bangkok, Thailand)
- Pimporn Poonpetch (Chulalongkorn University, Thailand)
- Pongsert Sriprom (King Mongkut's Institute of Technology Ladkrabang, Thailand)
- Pornnapa Kasemsiri (Khon Kaen University, Thailand)
- Pramote Puengjinda (GIZ Thailand, Japan)
- Pusanisa Patharachotesawate (Chulalongkorn University, Thailand)
- Sira Srinives (Mahidol University, Thailand)
- Shinichi Namba (Hiroshima University, Japan)
- Shinfuku Nomura (Ehime University, Japan)
- Shinobu Makasa (Ehime University, Japan)
- Shinsuke Mochizuki (Yamaguchi University, Japan)
- Shuhei Inoue (Hiroshima University, Japan)
- Supitchaya Cherdkeattikul (University of Kentucky, USA)
- Suracha Udomsak (SCG Chemicals, Thailand)
- Sutee Chutipaijit (King Mongkut's Institute of Technology Ladkrabang, Thailand)
- Suthatip Sinyoung (Mahidol University, Thailand)
- Sutasinee Neramittagapong (Khon Kaen University , Thailand)
- Suwanna Boontanon (Mahidol University, Thailand)
- Suzuna Bt Yusup (Universiti Teknologi Petronas, Malaysia)
- Takayuki Ichikawa (Hiroshima University, Japan)
- Takehiko Seo (Yamaguchi University, Japan)
- Tamio Ida (Kindai University, Japan)
- Titichaya Thanamitsomboon (Thai-Nichi Institute of Technology, Thailand)
- Titirat Vivithkeyoonvong (Thai-Nichi Institute of Technology, Thailand)
- Trakarn Prapasongsa (Mahidol University, Thailand)
- Udorn Junthorn (Thai-Nichi Institute of Technology, Thailand)
- Varong Pavarajarn (Chulalongkorn University, Thailand)
- Wahyu H. Piarah (Hasanuddin University, Indonesia)
- Watcharop Chaikittisilp (National Institute for Materials Science, Japan)
- Weerawut Chaiwat (Mahidol University, Thailand)
- Wimonmas Boonyungyuen (Mahidol University, Thailand)
- Winadda Wongwiriyan (King Mongkut's Institute of Technology Ladkrabang,

Thailand)

- Yasushi Shibuta (The University of Tokyo, Japan)
- Yoshimitsu Uemura (Universiti Teknologi Petronas)
- Yutaka Nakashimada (Hiroshima University, Japan)
- Yuushou Nakayama (Hiroshima University, Japan)
- Akihiko Horibe (Okayama University, Japan)
- Andi Erwin Eka Putra (Hasanuddin University, Indonesia)
- Anita Bt Ramli (Universiti Teknologi Petronas, Malaysia)
- Apiluck Eiad-ua (King Mongkut's Institute of Technology Ladkrabang, Thailand)
- Cattaleeya Pattamaprom (Thammasat University)
- Chalida Klaysom (Chulalongkorn University, Thailand)
- Duangkamol Na-Ranong (King Mongkut's Institute of Technology Ladkrabang, Thailand)
- Hiromichi Toyota (Ehime University, Japan)
- Hiroshi Katsurayama (Yamaguchi University, Japan)
- Ilyas Renreng (Hasanuddin University, Indonesia)
- Jintawat Chaichanawong (Thai-Nichi Institute of Technology, Thailand)
- Ken-Ichiro Tanoue (Yamaguchi University, Japan)
- Kiyoshi Dowaki (Tokyo University of Science, Japan)
- Kreangkrai Maneeintr (Chulalongkorn University, Thailand)
- Lam Man Kee (Universiti Teknologi Petronas, Malaysia)
- Mahunnop Fakkao (Thai-Nichi Institute of Technology, Thailand)
- Masato Mikami (Yamaguchi University, Japan)
- Masaya Nakahara (Ehime University, Japan)
- Minato Wakisaka (Kyushu Institute of Technology, Japan)
- Muhummad arsyad Thaha (Hasanuddin University, Indonesia)
- Nasaruddin Salan (Hasanuddin University, Indonesia)
- Nuttapol Limjeerajarus (Chulalongkorn University, Thailand)
- Nataporn Sowasod (King Mongkut's University of Technology North Bangkok, Thailand)
- Nawin Vitiya-empikul (Green Technology Research Co., Ltd., Thailand)
- Nor Hisham B Hamid (Universiti Teknologi Petronas, Malaysia)
- Noriaki Sano (Kyoto University, Japan)

- Onny Sutresman (Hasanuddin University, Indonesia)
- Patcharawat Charoen-amornkitt (King Mongkut's University of Technology Thonburi, Thailand)
- Pilasinee Limsuwan (King Mongkut's University of Technology North Bangkok, Thailand)
- Pimpet Sratong-on (Thai-Nichi Institute of Technology, Thailand)
- Pop-paul Ewphun (Argonne National Laboratory, USA)
- Ruttikorn Varakulsiripunth (Thai-Nichi Institute of Technology, Thailand)
- Shinfuku Nomura (Ehime University, Japan)
- Shinichi Namba (Hiroshima University, Japan)
- Shinobu Makasa (Ehime University, Japan)
- Shinsuke Mochizuki (Yamaguchi University, Japan)
- Shuhei Inoue (Hiroshima University, Japan)
- Supitchaya Cherdkeattikul (University of Kentucky, USA)
- Suzuna Bt Yusup (Universiti Teknologi Petronas, Malaysia)
- Takayuki Ichikawa (Hiroshima University, Japan)
- Takehiko Seo (Yamaguchi University, Japan)
- Tawatchai Charinpanitkul (Chulalongkorn University, Thailand)
- Udorn Junthorn (Thai-Nichi Institute of Technology, Thailand)
- Varong Pavarajarn (Chulalongkorn University, Thailand)
- Wahyu H. Piarah (Hasanuddin University, Indonesia)
- Weerawut Chaiwat (Mahidol University, Thailand)
- Wiwut Tanthapanichakoon (Technology Promotion Association (Thailand-Japan), Thailand)
- Yasushi Shibuta (The University of Tokyo, Japan)
- Yoshimitsu Uemura (Universiti Teknologi Petronas)
- Yukihiro Matsumura (Hiroshima University, Japan)
- Yutaka Nakashimada (Hiroshima University, Japan)
- Yuushou Nakayama (Hiroshima University, Japan)