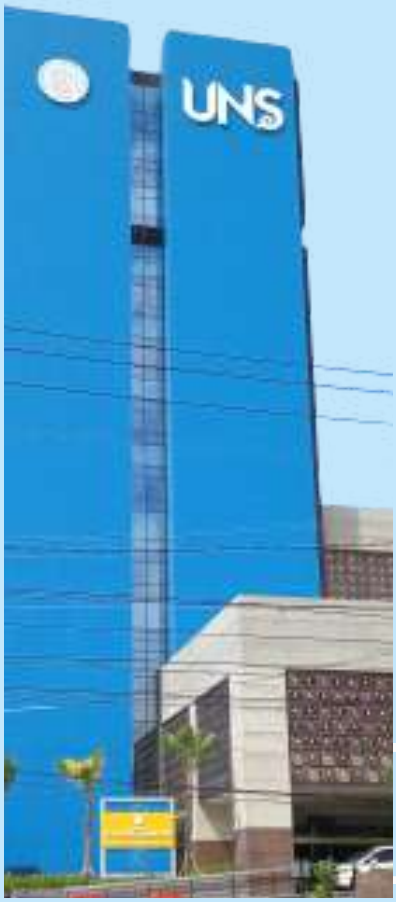
PROGRAM BOOK

ABBS 2023

THE 18th ASIAN BIOHYDROGEN AND BIOPROCESSES SYMPOSIUM

"New and Renewable Energy for Green Planet"

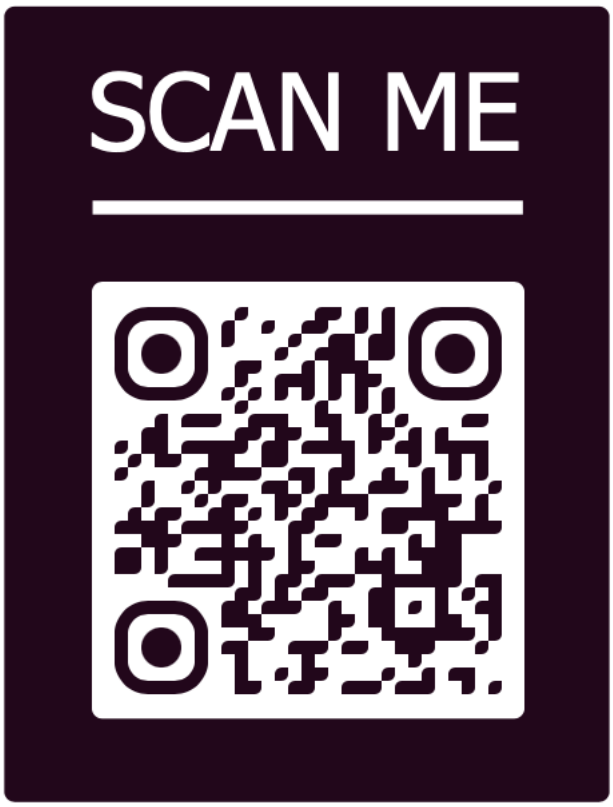


November 22–23, 2023
Solo, Central Java, Indonesia

Organized by: BRIN, Universitas Sebelas Maret, APEC Asia-Pacific Economic Cooperation (ACABT), World Bio-HyLinks

Supported by: PERTAMINA, IFHE Indonesia Fuel Cell and Hydrogen Energy

"New and Renewable Energy for Green Planet"


SCAN ME

PREFACE

Prof. Dwi Susilaningsih, M.Pharm.

Chair of ABBS 2023

Dear distinguised speakers, presentders, and partticipants,

May God bless upon us all. On Behalf the committees of the 18th ABBS symposium in 2023, the Yes Challenge Young Scientist Competition Committee, and APEC ACABT annual meeting committee, I report on the implementation of the event above which was held in two places, namely the APEC ACABT annual meeting and the ABBS Symposium in Solo City, while the final pitch of the YES Challenge 2023 was on Sukarno Campus, BRIN, Cibinong, Bogor. These activities are held jointly between BRIN, UNS Solo and APEC ACABT, and sponsored by PT Pertamina (Persero).

The Asian Biohydrogen and Bioprocesses Symposiums (ABBS) is an annual conference around Asia economies and has been successfully held for seventeen consecutive years. This event is held in turns in Asia Pacific countries and was last held in Indonesia ten years ago. In this 2023, the 18th ABBS symposium is held in hybrid format at UNS, Solo, Central Java, Indonesia from 21 to 23 November 2023, with theme "New and Renewable Energy for Green Planet". While Yes Challenge competition final pitch is held from 24 to 25 November 2023 with Theme of Reaching Net Zero by developing social solutions for the community and economy.

The annual meeting will be participated by member countries i.e. Indonesia, Malaysia, China Taipei, Korea, Japan, Vietnam and Thailand will take a place on 21th November 2023 in closed meeting. This year we received around 60 papers from Asia Pacific countries (China Taipei, Malaysia, Thailand, Japan, Philippines, Korea, Indonesia and others that will be presented at ABBS event. Whereas the finalist of "Yes Challenge" competition from Indonesia, China, Vietnam, China Taipei, Malaysia, Philippines and Turkey that will be held in Cibinong for the final judging. Of all that, the most important thing is that the holding of this event is the result of the perseverance of the committee from both BRIN and UNS.

As chairman of the committee, finally, thank you to all parties who have made this event a success. Hopefully this event will bring many of sharing knowledge, bring a lot of friends and God blessings. Thank you very much.

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AGENDA

ASIAN BIOHYDROGEN AND BIOPROCESSES SYMPOSIUMS (ABBS)
UNS TOWER, SOLO, NOVEMBER 22-23, 2023

DAY-1, 22 NOVEMBER 2023

Time	Program/Topic	Host/Speaker
08.00-08.30	Registration	Committee
08.30-08.35	Opening Ceremony	MC
08.35-08.40	Indonesia Anthem	Committee
08.40-08.50	Opening Remarks	Organizing Committee ABBS 2023 **Prof. Dr. Dwi Susilaningsih, M.Pharm**
09.00-09.10	Welcoming Speech I	Chairman of National Research and Innovation Agency, Republic of Indonesia **Dr. Laksana Tri Handoko**
09.10-09.20	Welcoming Speech II	Rector of Sebelas Maret University **Prof. Dr. Jamal Wiwoho, M. Hum.**
09.20-09.30	Welcoming Speech III	APEC - ACABT CEO **Prof. Dr. Shu-Yii Wu**
09.30-09.40	Sponsorship Talk	PERTAMINA **Dr. Oki Muraza**
09.40-09.50	Signing "Joint Declaration for Establishing the Hydrogen Eco-system"	Chairman APEC Research Center for Biohydrogen-Technology-Indonesian Chapter- President of IFHE **Prof. Dr. Eng. Eniya Listiani Dewi**
09.50-10.05	Group Photo	Committee
10.05-10.10	Coffee Break	
Plenary SESSION 1: Circular Economy (Moderator: Prof. Venty Suryanti, PhD)		
10.10-10.30	General Lecture: AI for human need and application	Osaka University, Japan **Prof. Dr. Jun Miyake**
10.30-10.50	Circular Economy on APEC Mission	APEC – ACABT CEO **Prof. Shu Yii Wu**
10.50-11.10	Energy Management	Steering Board of National Research and Innovation Agency, Republic of Indonesia **Dr. Tri Mumpuni Wiyatno**
11.10-11.20	DISCUSSION (Q & A)	
11.20-11.30	Technology Innovation PLN Indonesia	PLN (Persero) **Dr. Zainal Arifin**
11.30-11.50	Batteries in Indonesia	PUI UNS Solo **Prof. Dr. Eng. Agus Purwanto**
11.50-12.00	DISCUSSION (Q & A)	
12.00-13.00	Lunch Break/Praying	
13.00-16.00	Parallel Presentation	*Schedule are attached*
18.30-20.30	Gala Dinner	Committee

DAY-2, 23 NOVEMBER 2023

Time	Program/Topic	Host/Speaker
08.00-08.30	Registration	
Plenary Session II : Energy Management Moderator BRIN		
08.30-08.50	Standarization	National Standardization Agency **Arini Widyastuti, S.TP, M.Sc.**
08.50-09.10	Improving Material Performance for Secondary Batteries	Department of Chemistry, UNS Solo **Prof. Dr. Fitria Rahmawati**
09.30-09.50	DISCUSSION (Q & A)	
09.50-10.10	Coffee Break	
Plenary Session III: Bioenergy Application in Community Moderator: Prof. Witri W. Lestari		
10.10-10.30	Bioenergy Application	Feng Chia University, Taiwan **Prof. Chen-Yeon Chu**
10.30-10.50	Biogas Application in Manado	Head of BAPELITBANGDA Manado **Dr. Liny Tambajong**
10.50-11.10	DISCUSSION (Q&A)	
11.10-11.30	Closing Ceremony	Committee
11.30-13.00	Lunch Break/Praying	Committee

PARALLEL SESSION SCHEDULE

Time	Abstract Code	ROOM 1 (OFFLINE) (10 Presenter) Moderator : Prof Dr. Eng. Hendri Widiyandari, MSi
13.10 – 13.15		**Preparation**
13.15 – 13.35	ABBS23-BE021	Response mechanism of microalgae to sulfur during different photosynthetic carbon fixation stages and strategies for stress mitigation (Hongyan Peng, Yun Huang, Ao Xia, Xianqing Zhu, Xun Zhu and Qiang Liao, School of Energy and Power Engineering, Chongqing University)
13.35– 13.55	ABBS23-BE048	Processing POME into Biogas using cover lagoon technology for sustainable electricity production (Sri Djangkung Sumbogo Murti, Semuel Pati Senda, Dwi Husodo P, Hari Yurismono, Trisaksono Bagus Priambodo, Winda Wulandari and Hens Saputra, BRIN)
13.55 – 14.15	ABBS23-BE052	Utilization of POME for Biomethanol Production through Direct Partial Oxidation of Biomethane from Biogas (Sri Djangkung Sumbogo Murti, Fusia Mirda Yanti, Septina Is Heriyanti, Astri Pertiwi, Arfiana, Novio Valentino, Hens Saputra, Abu Bakar MIS and Muhammad Aziz, BRIN)
14.15-14.35	ABBS23-BHBP029	Start-Up Study for Biohydrogen Production in Continuous Intermittence Magnet Field Reactor (Ting-Wu Ko, Prakaidao Pomdaeng and Chen-Yeon Chu, Master's Program of Green Energy Science and Technology, Feng Chia University, Taiwan)
14.35 – 14.55	ABBS23-NRE002	Unraveling the Formation of HardCarbon/Sn Composite via Hydrothermal Carbonisation Process (Evangelin Hutamaningtyas, Hande Alptekin, Tom Headen, Ana Sobrido, Patrick Cullen, Maria-Magdalena Titirici and Alan J. Drew, Queen Mary University of London)
14.55-15.25		**Coffee break**
15.25-15.45	ABBS23-NRE056	Screen-Printed Carbon Electrode from Coconut Shell- Carbon for Cu (II) Electrochemical Sensor (Nabila Putri Aulia, Fitria Rahmawati, Abu Masykur, Research Group of Solid-State Chemistry and Catalyst, Chemistry Departement, Sebelas Maret University)
15.45-16.05	ABBS23-NRE057	Assessing the Mass-Culture System and Proximate Content of Arthrospira maxima Local for New and Renewable Energy (Dwi silaningsih, Anisa Mariah Bariz, Hilda Farida, Delicia Yunita Rahman, Hani Susanti, BRIN)
16.05-16.25	ABBS23-BHBP019	Biohydrogen production from waste polylactide (PLA) (Shu-Yii Wu, Yu-Hsuan Fang, Zi-Xian Lu, Lin-Han Li, Yu-Hao Cheng and Wei-Zhen Lee, Feng Chia University)
16.25-16.45	ABBS23-NRE061	Electricity Generation in a Microbial Fuel Cell (MFC) using Glucose from Banana (Musa balbisiana Colla) Steam as a Substrate (Venty Suryanti*, Khoirun Nisa Ashar, Abbilah Ero Mahdhani, Vicky Ahava Ferdinansyah, Husna Habib Musthofa, and Inggit Tri Cahyani)
16.45-17.05	ABBS23-BHBP053	Synthesize of Silica Membrane With High Hydrogen Permeability and Water Resistant (Hens Saputra, SD. Sumbogo Murti, Dwi Husodo, Semuel Pati Senda, Ade Andini, Arfiana, Era Restu Finalis, Septina Is Heriyanti and Fusia Mirdayanti, BRIN)
17.05		**Closing**

Time	Abstract Code	ROOM 2 (OFFLINE) (8 presenter) Moderator: Prof. Dr. Dwi Susilaningsih, M. Pharm.
13.10 – 13.15		**Preparation**
13.15 – 13.35		Sustainable Dissemination Strategies of Biogas Production for Community

	ABBS23-SEEP060	Empowerment and Energy Literacy in Rural and Small Islands Case Study Manado City, Indonesia (Alicia Amelia Elizabeth Sinsuw, Sangkertadi, Liny Anna Maria Tambajong , Hendrik Suryo Suriandjo, Chen-Yeon Chu)
13.35 – 13.55	ABBS23-BFBP023	Green-Fuel Production Through Co-processing Biomass Derived Oil with Standard Gasoil Feedstock (Rizki Ekananda, Rokhmaturrokhman, Wilda Yuni Paninduri and Zaky Al Fatony, PT Pertamina)
13.55 – 14.15	ABBS23-BHBP022	On-line observation for dynamic response process of microalgae cell's growth and division in a microfluidic biochip (Peirong Li, Yun Huang, Xun Zhu, Ao Xia, Xianqing Zhu and Qiang Liao, School of Energy and Power Engineering, Chongqing University, Chongqing, China)
14.15-14.35	ABBS23-SEEP020	A mathematical modelling biofilm development and growth for wastewater treatment through synchronous photoautotrophic-heterotrophic synthesis (Ningwei Yang, Yun Huang, Xun Zhu, Ao Xia, Xianqing Zhu and Qiang Liao, Chongqing university)
14.55-15.25		**Coffee break**
15.25-15.45	ABBS23-BFBP016	An integrated continuous process for highly efficient sugar production from wheat straw (Zhichao Deng, Ao ning, Zengzhuang Zhang, Yun Huang, Xianqing Zhu, Xun Zhu and Qiang Liao, Chongqing University)
15.45-16.05	ABBS23-BHBP030	Hydrogen Production from Terephthalic Acid-Processing Wastewater by Dark Fermentation with Mixed Culture Inoculum (Mr. Jayen Aris Kriswantoro, Ting-Wu Ko, Po-Jui Lai, Chiung-Hao Tseng and Chen-Yeon Chu, Feng Chia University, Taiwan)
16.05-16.25	ABBS23-BFBP062	Heterogeneous Catalyst based on Nickel Modified into Indonesian Natural Zeolite in Green Diesel Production from Crude Palm Oil (Fauzan Ibnu Prihadiyono, Witri Wahyu Lestari, Riandy Putra, Arifti Nur Laily Aqna, Indri Sri Cahyani, Grandprix T M Kadja)
16.25		**Closing**

Time	**Abstract Code**	**ROOM 3 (ONLINE) (12 presenter)** **Moderator: Prof. Dr. Agus Supriyanto, MSi**
13.10 –13.15		**Preparation**
13.15 – 13.30	ABBS23-BE025	Numerical Simulation of Cellulosic-Biomass Sedimentation and Mixing Mechanism in A Bionic Intestinal Segmentation Reactor (Chang Zhang, Ao Xia, Yun Huang, Xianqing Zhu, Xun Zhu and Qiang Liao, Chongqing University)
13.30 – 13.45	ABBS23-BE038	Performance of Using Lignin Pyrolysis Gas for Continuous Ethanol Production in Gas-liquid Separation Biofilm Reactor (Zhiyi Deng and Wentian Gan, ChongQing University)
13.45 – 14.00	ABBS23-NRE017	Numerical and experimental study of PEM fuel cells for application of fuel cell electric vehicle performance with different fuel flow rates (Yusuf Dewantoro Herlambang, Wahyu Sulistiyo, Margana, Nanang Apriandi, Muji Setiyo, Wawan Purwanto, Taufik and Jin-Cherng Shyu, Politeknik Negeri Semarang)
14.00 – 14.15	ABBS23-NRE024	Weibull Parameter-Based Study of Seasonal Wind Patterns and Power Potential in Java's Southern Coast (Nurry Widya Hesty, Aminuddin, Silvy Rahmah Fithri, Amiral Aziz and Toha Zaki, BRIN)
14.15 – 14.30	ABBS23-NRE035	Incorporating Solar Thermal Power Generation in Coal-Fired Power Stations: A Promising Approach (Vetri Nurliyanti, Afri Dwijatmiko, Bono Pranoto, Nurry Widya Hesty, Silvy

		Rahmah Fithri, Marlina Pandin, Dionysius Aldion Renata and Prima Tri Wijaya, Research Center for Energy Conversion and Conservation, BRIN)
14.30 – 14.45	ABBS23-NRE036	Investigation of Al-doped Materials, Methods, and Electrolytes: Towards High-Performance Rechargeable Magnesium Batteries (Ana Yuli Komariyah, Markus Diantoro, Ishmah Luthfiyah, Nasikhuddin and Worawat Meevasana, Universitas Negeri Malang)
14.45 – 15.00	ABBS23-NRE037	Magnetron sputtering-deposited MnO_2: The Impact of Oxygen Flow Addition on Structural and Electrical Properties (Tansya Trisnatika Dewi, Markus Diantoro, Goh Boon Tong and Reza Akbar Pahlevi, Universitas Negeri Malang)
15.00 – 15.30		**COFFEE BREAK**
15.30 – 15.45	ABBS23-NRE039	Effect of a 5° Angle Deflector on the Performance of Twin- Hydrokinetic Savonius Turbines with Adjacent Advancing Blades (Tsalatsatul Maulidiyah and Triyogi Yuwono, Institut Teknologi Sepuluh Nopember Surabaya)
15.45 – 16.00	ABBS23-NRE040	Deflector Effect on Side-by-Side Twin-Hydrokinetic Savonius Turbines Performance With Returning Blade Near Canal Wall (Vena Rizky Pusparani and Triyogi Yuwono, Sepuluh Nopember Institute of Technology)
16.00 – 16.15	ABBS23-SEEP011	Green Symbiosis of Kinmen Sorghum in Taiwan: Anaerobic Fermentation and the Circular Economy Development of Organic Farming (Ching-Chun Lu and Chiu-Yue Lin, Ph.D. Program for Infrastructure Planning and Engineering, Feng Chia University, Taiwan)
16.15-16.30	ABBS23-NRE047	Assessing the Wind Resource Variability for Green Hydrogen Production in Sumba Island (Nurry Widya Hesty, Aminuddin, Nina Konitat Supriatna, Wiwid Mulyadi, Agus Nurrohim and Nona Niode, BRIN)
16.30-16.45	ABBS23-NRE014	Experimental Study of The effect of Inner Side Taper Blades Ratio on The Savonius Turbine Performance (Yusuf Dewantoro Herlambang, Supriyo, Budhi Prasetiyo, Nanang Aprinadi, Marliyati, Wawan Purwanto and Fatahul Arifin, Politeknik Negeri Semarang)
17.00		**CLOSING**

Time	**Abstract Code**	**ROOM 4 (ONLINE) (11 presenter)** **Moderator: Alicia Amelia Elizabeth Sinsuw, Sangkertadi**
13.10 – 13.15		**Preparation**
13.15 – 13.30	ABBS23-BHBP005	Effects of overliming and activated carbon detoxification on inhibitor removal (Techut Promta, Rameshprabu Ramaraj, Rotjapun Nirunsin and Kittikorn Sasujit, Maejo university)
13.30 – 13.45	ABBS23-BHBP007	Biohydrogen Production from Pre-treated Rice Straw by *Clostridium acetobutylicum* YM1 (Rohindran Krisna, Hafiza Shukor, Maha Mohammad AL-Rajabi, Peer Mohamed Abdul, Ahmad Anas Nagoor Gunny, and Safa Senan Mahmod, Faculty of Chemical Engineering & Technology, Universiti Malaysia, Perlis, Malaysia)
13.45 – 14.00	ABBS23-BHBP026	Morphologies Effect of Zinc Oxide for Hydrogen Production by Photocatalytic Water-Splitting under Visible Light (Garcelina Rizky Anindika, Riki Subagyo, Hasliza Bahruji and Yuly Kusumawati, Institut Teknologi Sepuluh Nopember)
14.00 – 14.15	ABBS23-BHBP032	Potential and Prospects for Utilizing POME as a Bio-hydrogen Feedstock in Indonesia (Yusnitati, Hana Nabila Anindita, Trisaksono Bagus Priambodo, Desy Septriana, Zulaicha Dwi Hastuti and Semuel Pati Senda, BRIN)
14.15 – 14.30	ABBS23-BHBP045	Optimization of Hydrogen Production from Sea Water using the Photovoltaic-Electrolysis Tracking Method (Riski Maulana, L. Hakim, M. Daud, Muhammad, Nurdin, M. Ula and R. Sari, Universitas Malikussaleh)
14.30 – 14.45	ABBS23-	AMF and PGPR : A Promising Approach to Boosting the Growth of Biofuel-

	BFBP027	Producing Plant, *Pongamia pinnata* in the Nursery (Ragil SB Irianto, Sarah Asih Faulina, Adi Susilo, Enny Widyati and Neo Endra Lelana, BRIN)
14.45-15.00	ABBS23-BFBP028	Dynamic light transmission modeling based on microalgal growth in photobioreactors for high efficiency CO2 fixation (Shiyan Ma, Yun Huang, Xianqing Zhu, Ao Xia, Xun Zhu and Qiang Liao, Chongqing university)
15.00-15.30		**COFFEE BREAK**
15.30-15.45	ABBS23-NRE046	The Effect of Annealing: Manufactured MXene Morphology Modification on Supercapacitor Performance (Nida Usholihah, Ishmah Luthfiyah, Markus Diantoro, Nasikhuddin, Agus Purwanto and Worawat Meevasana, Universitas Negeri Malang)
15.45-16.00	ABBS23-BRBD012	Assessment on The Utilization of Cosmetic Plants : An Ethnobotanical Study in Indonesia (Peniwidiyanti, Ida Farida Hasanah and Mulyati Rahayu, BRIN)
16.00-16.15	ABBS23-NRE051	Con-Solvent Aqueous Electrolyte: Establishing the Screening Length and Enhancing CoS2/Ni(OH)2 Supercapattery Performance (Markus Diantoro, Ishmah Luthfiyah, Nando Dyas Arya, Herlin Pujiarti and Santi Maensiri, Universitas Negeri Malang)
16.15-16.30	ABBS23-BHBP033	Tracing and optimization of light transmission in microalgae photobioreactors (Kexin Ren, Jingmiao Zhang, Ao Xia, Yun Huang, Xianqing Zhu, Xun Zhu and Qiang Liao, School of Energy and Power Engineering, Chongqing University)
16.30-16.45	ABBS23-BFBP058	Production of biofuel feedstock from a mass scale photobioreactor cultivation of Navicula sp.: A case study (Rahmania Admirasari, Agus Rifai, Dian P. Dewantb, M. Hanif, Ressy Oktivia, Arif D. Santoso, Joko P. Susanto, Rudi Nugroho, Bayu Prabowo, Yana Meliana, Septhian Marno, Rizka Izdihar, Nelliza Putri, Edo R. Irawadi, Widhatul Latifah, Joko Prayitno, BRIN)
16.45-17.00		
17.00		**CLOSING**

Time	**Abstract Code**	**ROOM 5 (ONLINE) (10 presenter)** **Moderator: UNS**
13.10 – 13.15		**Preparation**
13.15 – 13.30	ABBS23-BRBD018	Simple Stage House Design Using Fast-Growing Wood Construction (Ananto Nugroho, Triastuti, Dany Perwita Sari, Agung Sumarno, Eko Widodo and Teguh Darmawan, BRIN)
13.30 – 13.45	ABBS23-BRBD031	Bioprospecting on Alginate lyase as Antibiofilm Agent from Actinomycetes Originated from North Sulawesi, Indonesia: A Preliminary Study (Rike Rachmayati, Nanik Rahmani, Siti Eka Yulianti, Nuryati, Eva Agustriana, Ade Andriani, Urip Perwitasari, Fadila Sirwati, Akhirta Atikana, Puspita Lisdiyanti and Shanti Ratnakomala, BRIN)
13.45 – 14.00	ABBS23-SEEP034	The Research of Environmental Knowledge, Consumer Attitudes and Price Sensitivity Towards Buyer Motivation of Green Skin Care Products (Chun-An Chen, Tien-Yin Chou and Mei-Ling Yeh, Ph.D. Program for Infrastructure Planning and Engineering of Feng Chia University, Taiwan)
14.00 – 14.15	ABBS23-SEEP044	Coconut Fiber Cellulose Acetate Membrane with Polyvinylpyrrolidone (PVP) Additive for Water Purifier (Endah Retno Dyartanti, Adlina Herlian Kuntari Dewi, Maysafa Agung Robani, Ameliya Maharani and Sesanti Maharani, UNS)
14.15 – 14.30	ABBS23-	Prospects for the Application of New and Renewable Energy from various

	SEEP049	aspects : Techno-Socio-Economic, Environmental and Policy (Bakti Wibawa, M. Alfan Santosa, Arif Hidayat and Ridwan Budi Prasetyo, BRIN)
14.30 – 14.45	ABBS23-SEEP004	Techno-Economics Of New Renewable Energy Development In Lombok, Indonesia (Lenggogeni, BRIN)
14.45 – 15.00	ABBS23-BHBP059	Investigating the dynamics of microbial communities in biohydrogen production from palm oil mill effluent in relation to crude palm oil production rate: a preliminary study (Sandia Primeia, Arif Darmawan, Zulaicha Dwi Hastuti, Restu Siti Nursa'adah, Era Restu Finalis, Erbert Ferdy Destian, Unggul Priyanto, Eniya Listiani Dewi, BRIN)
15.00-15.30		**COFFEE BREAK**
15.30-15.45	ABBS23-NRE041	Effect of Deflector on the Performance of Twin-Hydrokinetic Savonius Turbines with Adjancent Returning Blades in a Side-by-Side Configuration (Siti Umira and Tri Yogi Yuwono, ITS)
15.45-16.00	ABBS23-NRE042	Blockage Effect on the Performance of Twin-Hydrokinetic Savonius Turbines with Opposite Rotation in Tandem Arrangement (Hildan Fahrizal Nur Faurizki and Tri Yogi Yuwono, ITS)
16.00-16.15	ABBS23-NRE043	Blockage Ratio Effect on The Performance of Twin Hydrokinetic Savonius Turbines with Unidirectional Rotation in Tandem Configuration (Savitri Ramadhani and Tri Yogi Yuwono, ITS)
16.15-16.30	ABBS23-NRE055	Theoretical Investigation of the Full-Heusler Fe2MnSi Thermoelectric Properties (A. Nurlaela, M.A. Majidi, D. Nanto, A. Azhar, Department of Physics, Faculty of Mathematics and Natural Sciences, Universitas Indonesia.)
16.30-16.45	ABBS23-SEEP009	Reduction of Greenhouse Gas Emissions and Energy Consumption in Wastewater Treatment Plants via Engineering Strategies: A Case Study (Mei Huang Man, Feng Chia University)
16.45-17.00		
17.00		**CLOSING**


ABBS 2023
ABBS 2023 - THE 18th ASIAN BIOHYDROGEN AND BIOPROCESSES SYMPOSIUM
"New and Renewable Energy for Green Planet"
in conjunction with
International Young Entrepreneurs Competition
APEC YES Challenge 2023
and
International Annual Meeting of Members of
APEC Research Center for Advanced Biohydrogen Technology
APEC - ACABT 2023
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November 21st – 25th, 2023
Hybrid from Solo, Central Java, Indonesia
OPENING REMARKS
Gibran Rakabuming Raka
Mayor of Solo, Central Java, Indonesia
Dr. Laksana Tri Handoko
Chairman of National Research and Innovation Agency, Republic of Indonesia
Prof. Dr. Jamal Wiwoho
Rector of Sebelas Maret University, Solo, Indonesia
TOPICS
Bioenergy
New and Renewable Energy
Biohydrogen & Bioprocess
Biofuels & Bioproducts
Bioresources & Biodiversity
Socio-Economy, Env., & Policy
KEYNOTE SPEAKERS
Dr. Tri Mumpuni Wiyatno
Steering Board of National Research and Innovation Agency, Republic of Indonesia
Prof. Dr. Shu-Yii Wu
Feng Chia University, Taiwan
Dr. Oki Muraza
Senior Vice President Research & Technology Innovation, Pertamina Holding
Prof. Dr. Chen-Yeon Chu
Feng Chia University, Taiwan
Prof. Dr. Eng. Eniya L. Dewi
Chairman APEC Indonesia Chapter, President of IFHE
Prof. Dr. Eng. Agus Purwanto
Sebelas Maret University, Solo, Indonesia
Prof. Dr. Fitria Rahmawati
Sebelas Maret University, Solo, Indonesia
Arini Widyastuti, M.Sc.
National Standardization Agency, BSN Indonesia
Dr. Zainal Arifin
Executive Vice President of Renewable Energy , PT PLN Indonesia
Dr. Liny Tambajong
Head of BAPELITBANGDA, Manado, Indonesia
Prof. Dr. Jun Miyake
Graduate School of Engineering, Osaka University, Japan
IMPORTANT DATES
Abstract Submission: 15 August-28 October 2023
Abstract Acceptance: 30 October 2023
Final Registration Payment: 7 November 2023
PPT Deadline: 10 November 2023
Conference Dates: 22-24 November 2023
Deadline for Full Paper Submission: 27 February 2024
Revision Paper and Publication Target: 15 May 2024
Announcement in Proceeding or Journal: June 2024
REGISTRATION FEE
Categories | Local (IDR) | | International (USD) |
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Student | 3,800,000 | 1,000,000 | 250 | 110
Participant*** | 1,500,000 | 800,000 | | 100
*Include accommodation & meals for 3 days 2 nights
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Asia-Pacific Economic Cooperation (ACABT)
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EVENTS

01

21 NOVEMBER 2023
THE INTERNATIONAL ANNUAL MEETING OF MEMBERS OF APEC

The International Annual Meeting of Members of APEC Research Center for Advanced Biohydrogen Technology "APEC – ACABT" will promote economic growth, trade, and investment opportunities, as well as social progress and innovation capacity building, so as to build a platform for APEC economies.

02

22 –23 NOVEMBER 2023
ABBS 2023– THE 18th ASIAN BIOHYDROGEN AND BIOPROCESS SYMPOSIUM

The ABBS 2023 is aims to bring together leading academic scientists, researchers, and research scholars to exchange and share their experiences and research results on all aspects of sustainable and competitive circular bioeconomy solutions through technological innovation and creativity.

03

24–25 NOVEMBER 2023
THE INTERNATIONAL YOUNG ENTREPRENEURS COMPETITION

The International Young Entrepreneurs Competition "APEC YES Challenge" 2023 will convey creative-applicative research ideas that will be or have already been carried out by prioritizing research applications and their economic value.

SCOPES:




- Bioenergy
- New and Renewable Energy
- Biohydrogen & Bioprocess
- Biofuels & Bioproducts
- Bioresources & Biodiversity
- Socio-economy, Environment & Policy

KEYNOTE SPEAKERS

KEYNOTE SPEAKER 1

Prof., Shu-Yii Wu
APEC – ACABT CEO,
Department of Chemical Engineering,
Feng Chia University, Taiwan
Email: sywu@fcu.edu.tw

Prof. Shu-Yii Wu received a Ph.D. degree in Chemical Engineering from Katholieke Universiteit Leuven (KUL), Belgium and is currently teaching Chemical Reaction Engineering at Department of Chemical Engineering, Feng Chia University, Taiwan. He has published 100+ papers in refereed journals & international conferences, and 20+ Patents (international and domestic), with an H-index of 19. His research interests address many aspects of powder technology, fluidization, reactor design, fermentation, and bioenergy & bio-refinery. His current research work includes the production of biomaterials and biofuels from agriculture waste. He serves as Dean for College of Engineering, Feng Chia University, Taiwan. (August, 2015-) and CEO, APEC Research Center for Advanced Bio-hydrogen Technology.

Green synergy solutions for climate crisis avoidance

Climate change has appeared everywhere, such as flooding, drought, forest fires. Most people know the problem, but very few give the solution to solve this global issue. The Net Zero Emission by 2050 initiated by COP 26, most of the acting items are focused on energy issues to human activity such as manufacturing, transportation, and building. Green Synergy Solutions tries to give the total solutions to climate change that include four sectors: Human activities, Environment, Social institutions, and Personal mindset. We believe science and technology always from human beings. Thus, the solution should be back to the human being mindset. After several years of ABBS conferences, all our colleagues acknowledged that science and technology solutions are not enough to solve this big question of climate change, and now focus societal solutions in ABBS 2023. We hope all experts, scientists, business people, officers, and educators can find a better way to alleviate the problem soon and avoid the climate crisis.

KEYNOTE SPEAKER 2

Prof. Jun MIYAKE
Graduate School of Engineering,
Osaka University
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Dr. Jun Miyake is a Professor Specially Invited, Graduate School of Engineering, Osaka University. He got the degrees of BS, MS, and Ph.D. (1980) at School of Science, Osaka University. He had been a governmental officer of International Trade and Industry as an officer/scientist who chaired the Institute of Cell Engineering, AIST (2007-2009). He was appointed as a professor, School of Engineering Science, Osaka University (2009-2017). During 2017-2020 he has been a specially appointed professor, Global Center for Medical Engineering and Informatics, Osaka Univ. Invited professorships are: School of Engineering, Univ. Tokyo (2001-2010), Medical School of Osaka University (2001-2005), Institute of Fronteer Science, Kyoto University (2003-2004) and Operating Agent, IEA-HIA Annex21/34 (2005-2010). He is an Honorary Researcher of the National Institute of Advanced Industrial Science and Technology. He is professor emeritus of Cruise-Napoca University of Technology. His research has been covering from bio-energy, protein chemistry to robotics/human cognition. His is now focusing on artificial intelligence for medical applications. His achievements are: over 500 publications and 100 patents. He has been prized by Minister of Science and Technology Agency Award, Minister of International Trade and Industry Award, and Akira Mitsui-Memorial Award from International Association of Hydrogen Energy, etc. His personal Interests are bicycle and modern arts.

Artificial Intelligence for Biomolecules and Bio-Green-World

This study addresses the issue of energy conversion pathways in microbial cells, which are representative of complex systems. At least dozens of steps are involved in energy conversion in cells. It is impossible to fix any one step and study its effects. This is because all reactions are interrelated. They are, so to speak, simultaneous equations involving dozens of unknowns. The big question is how to build models and estimate protein interactions before conducting experiments. In this talk, research on pathway analysis and analysis of protein interactions will be presented, with the aim of improving the efficiency of energy conversion reactions in photosynthetic bacteria. In extension, examples of studies on the analysis of genes and their effects will also be described, using the problem of coronaviruses as an example.

AI analysis of biohydrogen generation reactions

Energy conversion in a cell has at least several dozen or more steps. It is impossible to fix any one step and study its effects. This is because all reactions are interrelated. It is, so to speak, a simultaneous equation with dozens of unknowns. Therefore, a model was developed to investigate and explain the effects of various steps of light irradiation on photosynthetic bacteria. For simplicity, the case in which the steps are divided into three parts is presented. Namely, (1) the process of forming high-energy molecules upon receiving a light quantum. (2) A process that uses the high-energy molecules to form a membrane potential and synthesize ATP. (3) Finally, an enzymatic reaction, which uses ATP to produce hydrogen. There is a time delay in hydrogen production in response to light irradiation. This delay was considered to be involved in the rate-limiting process. The internal reaction mechanism was inferred from a large amount of data. From the deduced reaction system, the rate-limiting step was deduced; the Cyt b/c1 Complex is the limiting element in hydrogen evolution.

Development of the analysis of molecule-molecule interaction

For further detailed analysis, the interactions between protein molecules are being studied. If it can be estimated which enzymes bind to which enzymes and pass electrons to which enzymes, a long series of metabolic reactions will become clear where improvements need to be made. It is hoped that this will enable new methods to replace experimental science and physical simulation. Our research is focused on the use of artificial intelligence to analyze molecular interactions.

Analysis of the variant of coronavirus gene

(1) Coronaviruses mutate rapidly and produce numerous genotypes, requiring methods suitable for understanding the population as a whole. Autoencoder meets this requirement and are suitable for understanding when and how variants emerge and disappear, using 3D plots of all 30,000+ SARS-CoV-2 ORF1ab gene sequences sampled worldwide since December 2019, provided an overview of their characteristics, showing the expansion, decline and transformation of viral types over time and geographical regions. (2) A cluster consisting only of a specific genotype with two mutations in the helicase was identified. This viral genotype was endemic only in the USA from March to July 2020. This type of virus is analyzed by a pair of mutations in the nsp13 gene, C17747T (P504L) and A17858G (Y541C). The relationship with high mortality is discussed.

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KEYNOTE SPEAKER 3

Dr. Tri Mumpuni
Streering Board National Research and Innovation Agency, Republic of Indonesia

For almost 30 years, Tri Mumpuni has consistently encouraged and campaigned for the utilization of renewable energy sources to replace the use of fossil fuels in order to support local economic growth and improve welfare for communities in rural areas in Indonesia. Her organization, Inisiatif Bisnis dan Ekonomi Kerakyatan (IBEKA), has built more than 80 micro-hydro power plants (PLTMH) and clean water facilities based on solar energy across Indonesia, from Aceh to Papua. In 2004, Tri Mumpuni pioneered a public-private partnership model to build community-owned, on-grid MHPs. The proceeds from electricity sales to PLN are then managed by local cooperatives and used to fund education, health, and micro-enterprise capital services for communities in need. The scheme has been replicated in several Asian countries with the support of UN-ESCAP. Currently, Tri Mumpuni is working independently to train and send young scholars to become facilitators of community empowerment activities in frontier, outermost, underdeveloped areas throughout Indonesia. In October 2021, Tri Mumpuni was appointed as a member of the Governing Board of the National Research and Innovation Agency.

KEYNOTE SPEAKER 4

Prof. Chen-Yeon CHU
Department of Chemical Engineering,
Feng Chia University, Taiwan

Dr. Chen-Yeon Chu is Director for Institute of Green Products and Chief of International Cooperation Division, Green Energy Development Center (GEDC), Feng Chia University (FCU). He received his Ph.D. degree in 2005 from Chemical Engineering, Tsing Hua University, Taiwan. He used to be a Principal Investigator in National Energy Phase II Project which granted by Ministry of Science and Technology. He designed and implemented two HyMeTek advanced biogas pilot plants in Manado City, Indonesia, and Khon Kaen University, Thailand. He also developed commercial large-scale (15,000 pigs) and small-scale (1,500 pigs) HyMeTek biogas plants in Central Taiwan. The shooting process was included in the "Brown is the New Green" program on National Geographic Channel. He owns some of the academic awards e.g. Best Award in The 2013 International Capstone Design Contest on Renewable Energy Technology (CORE2013), Korea (2013/01); FCU Excellent Research Awards (2010-2022); Best Paper Awards of Junior Session in International Conference of Young Scientists on Energy Issues (CYSEI-2011), Lithuania. (2011/05); Best Paper Award of Taiwan Society of Environmental Engineering in Wastewater Treatment Division (2008). He serves as the secretaries of World Bio-HyLinks since 2006, IAHE-Taiwan Chapter since 2009 and CEO for Green Chemistry Bionet Asia Pacific Association since 2016. His research interests cover fermentative biohydrogen energy technology, green hydrogen energy technology and economy, green energy demonstration system of biological technology, talent training in biomass energy technology, hydrodynamic and kinetics in a fermenter system, bioreactor design and scale up with publication of 91 refereed journal papers and 15 patens (all citation 2357; h-index 29; i10-index 51 in 2023/09). Current Fields of Research Interest: Fermentative Biohydrogen Production Technology, Hydrodynamic and Reaction Kinetics in Bioreactors, Bioreactor Design and Scale up, LCA for Environmental and Social Impacts, Bioplastic and Circular Economy, Talent Training in Biomass Energy Technology.

KEYNOTE SPEAKER 5

Prof. Agus PURWANTO
Chemical Engineering
UNIVERSITAS SEBELAS MARET
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Dr. Eng Agus Purwanto is a Professor in Chemical Engineering from Universitas Sebelas Maret (UNS). He got his BS at 1998 from Chemical Engineering, ITS Surabaya, his master degree from chemical engineering, ITS at 2002, and his doctor of engineering was from Hiroshima University, Japan at 2008. He became an assistant of his professor for Research's Project, Chemical Engineering Department, Graduate School of Engineering, Hiroshima University, Hiroshima, Japan from 2008 – 2009. Post-Doctoral Fellow, Chemical Engineering Department, Graduate School of Engineering, Hiroshima University, Hiroshima, Japan in 2010. During 2011 – 2015 he was a vice dean of student affairs of the faculty of engineering, UNS. He became a vice dean of academic affairs on 2015-2019, and became a chief of Research Centre of electrical storage technology since 2020 – now. He was a director of Innovation and Research from 2020 – 2023. At 2018 he received the Academic leader award for technology from Kemenristekdikti, and received Science and Technology Award from ITSF Indonesia Toray Science Foundation on 2020. He got funding from Pertamina to develop lithium-ion battery prototype on 2018 and continued to formulation of NMC battery on 2020. In the same year, he also got LPDP-Rispro to develop cathode materials for lithium-ion battery, and some prestigious research projects related to lithium-ion battery from Kemenristekditi.

Toward Low-Cost and Fast Charging Enable of Lithium Ion Battery

The lithium-ion battery is the most advanced battery technology widely available. Lithium-ion rechargeable batteries have recently been used in transportation (for example, electric cars) and energy storage systems that need a lot of energy and power on a large scale. Lithium-ion battery contribute of 30-40% of electric vehicles price thus a low-cost battery is highly expected. The key to reduce the price of battery is by using low-cost components without sacrificing the its performance. In here, the effort to produce low-cost battery by various methods is presented. The strategies including using low cost and simple process of cathode production. In the other hand, high performance in term of fast charging and long life is also highly demanded. The strategies such as additive addition and fabrication technique were deeply investigated. The electrochemical performances were evaluated using CV and battery analyzer. The performance of the battery was also evaluated using electric vehicle device.

Keywords: cathode, NMC, annealing

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[2] S. S. Nisa, M. Rahmawati, C. S. Yudha, H. Nilasary, H. Nursukatmo, H. S. Oktaviano, S. U. Muzayanha, A. Purw anto, A Fast Approach to Obtain Layered Transition-Metal Cathode Material for Rechargeable Batteries, 8 (1) (2022) 4

KEYNOTE SPEAKER 6

Prof. Fitria RAHMAWATI
Chemistry Department,
UNIVERSITAS SEBELAS MARET
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Dr. Fitria Rahmawati is a Professor in Chemistry from Universitas Sebelas Maret (UNS). She got her BS at 1993 from chemistry department Universitas Brawijaya (UB), her master degree from chemistry department, UGM at 2001, and her doctorate degree from ITB at 2011. She signed a contract with UNS since 1998 as a lecturer candidate, and then proceed to pursue master degree in UGM through Karyasiswa scholarship, before came back to UNS in 2001 as an active assistant professor. At 2007 she went to ITB for her doctorate degree, continued as a research student in Electroceramics Lab. at 2009 in Pohang University of Science and Technology (POSTECH). She was an editor in Chief of Alchemy: Jurnal Penelitian Kimia in a period of 2011-2019, and until now she is one of the Alchemy's editors. She was appointed as a chief of Quality Assurance in Research since 2014 until 2019, in LPPM UNS, and then became a chief of Master Degree Program in Chemistry since 2019 – 2023. She became a full professor in chemistry on July 2021. She is an adjunct professor in Department of Material Enginering and Convergence Technology, Gyeongsang National University, South Korea in the period of 2020 – 2023. She is also a research fellow of INTI International University, Malaysia from 2021- 2023. Since May 2023 she was appointed as a vice dean on academic, research and student affairs in the Faculty of Mathematics and Natural Science, UNS. She works in electroceramics for electrochemical energy conversion since her doctorate degree focusing on solid electrolyte for solid oxide fuel cell and all-solid-state batteries. She got funding from Pertamina in LLZO battery on 2020-2021, and keep doing all-solid battery in the modified LLZO for lithium battery, and sodium b-alumina for all solid-state sodium battery in collaboration with Gyeongsang National University. She also works in carbon electrode prepared from biomass for electrode material of lithium-ion battery, solid-state lithium battery, sodium ion battery, solid-state sodium battery, electrochemical sensor, and capacitors. Her personal Interests are badminton and singing.

Improving Material Performance for Secondary Batteries

Energy storage system becomes an important aspect since renewable energy is the best choice for energy harvesting in accordance with environmental issues. The ideal energy storage system or battery must have a high energy density, medium to high power density, long cycle life, low cost and safe. Improving energy storage system shall respect to material abundance, environmental safety and friendly, and promising for grid storage application. Material engineering through doping, combining, and interface engineering are some efforts to improve the performance of anode and cathode materials. The material performance as electrode or electrolyte can be analysed through electrochemical performance test. Meanwhile, material characterization including phases, crystal structure, elemental composition, particle size analysis, and conductivity support the discussion on the electrochemical performance of the materials.

KEYNOTE SPEAKER 7

Dr. Liny Anna Maria Tambajong
Head of the Regional Research and Development Planning Agency (BAPELITBANG) of Manado City
Email: linytambayong@gmail.com

Dr. Liny Anna Maria Tambajong, Head of the Regional Research and Development Planning Agency (BAPELITBANG) of Manado City. He received Doctoral degree from IPB Bogor in 2009 in the field of Development of Natural Resources and Environment. Currently, Dr. Tambajong is also a Lecturer at the Faculty of Engineering and post-graduate lecturer in Coastal Tropical City Design at Sam Ratulangi University. In 2010-2013, Dr. Tambajong was appointed as Head of the Regional Planning Division, Bappeda of North Sulawesi Province. In 2013-2016, She was a Head of Spatial Planning, North Sulawesi Province PUPR Service.

Biogas Manado (Bioman)

Biogas, containing energy-rich methane, is produced by microbial decomposition of organic material under anaerobic conditions. Under controlled conditions, this process can be used to produce energy and a nutrient-rich residue suitable for use as a fertilizing agent. Biogas can be used for production of heat, electricity, or vehicle fuel. Different substrates can be used in the process and, depending on substrate character, various reactor technologies are available. Manado city's waste production is 330,289 kg/day where 60 percent is organic waste (± 198.173 kg), which decomposes and produces CO2 (Carbon Dioxide), H2S (Hydrogen Sulfide) and CH4 (Methane) and becomes greenhouse gases that cause global warming.Traditionally, city waste is collected and delivered to city's landfill in the outskirt. Some efforts have been applied to plastic based waste which can turn the waste into more valuable forms, or to be sold for recycling. In contrast, organic waste has not been processed, thus contributing heavily to forming greenhouse gases. Manado city sees the sheer amount of organic waste as an opportunity if treated properly. In 2020 Manado city exercised a project called Bioman (Biogas Manado) which can process organic waste mainly households waste into biogas by using easily attained materials. Bioman is piloted to process organic waste into biogas in a way that is simple and easy to apply even by persons without expertise in biogas. As a result, over the two years period from 2020 until 2023, 52 Biomans have been installed and run. In a year, one Bioman could process 1.643 kg of organic waste which consecutively could also reduce GHG emissions by 3.384 CO2 equivalent. This pilot project has not only tried to reduce GHG emission but also tried to alleviate economic pressures on the underprivileged ones, by using biogas for households cooking up to 1,5 hours daily. This project demonstrates that the use of Bioman can alleviate several problems at once. Firstly, it can reduce the generation of organic waste. Secondly, it can reduce greenhouse gas emissions. Finally, it can provide added economic value by using biogas, especially for those who are less fortunate. A future challenge is a robust community involvement to ensure the sustainability of Bioman so that there can be duplication and even multiplication of Bioman.

KEYNOTE SPEAKER 8

Arini Widyastuti, M.Sc.
Head of center for standardization and conformity assessment human resource development, The National Standardization Agency of Indonesia (BSN).

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Arini Widyastuti MSc., Head of center for Standardization and Conformity Assessment Human Resource Development, The National Standardization Agency of Indonesia (BSN). As a standardization analyst, in 2017, She received a Master Degree from Wageningen University majoring Food Safety. In 2017-2019, She appointed as a Head of SubDivision for Notification TBT WTO, Center for Cooperation – BSN. In 2014-2015, Head of Subdivision for Product certification Accreditation, Center of certification body accreditation – BSN.

KEYNOTE SPEAKER 9

Dr. Oki Muraza
Senior Vice President Research &
Technology Innovation
in Pertamina Holding

Oki Muraza is the Senior Vice President Research & Technology Innovation in Pertamina holding. He is the Deputy Co-Chair in B20 India 2023 for Taskforce of Energy, Climate Change & Resource Efficiency. Previously, He was the Policy Manager in B20 Indonesia 2022 in Taskforce of Energy, Sustainability & Climate. He was co-led in the Net Zero Strategy Taskforce and Chemical Business Taskforce within Pertamina. Oki was one of the World's top 2% influential Energy scientists worldwide by Stanford University in 2020. He has more than 20 years in the energy industry. He received his PhD from TU Eindhoven, MSc from TU Delft and BSc in Chemical Engineering from the Institute of Technology Bandung (ITB).

KEYNOTE SPEAKER 10

Dr. Zainal Arifin, QCRO, IPU.
Executive Vice President of
Renewable Energy of PLN

Dr. Zainal Arifin, QCRO, IPU. is recently Executive Vice President of Renewable Energy of PLN. Previously he was Head of PLN Certification Centre, Executive Vice President of Engineering and Technology, President Commissioner of PT Indo Tenaga Hijau (a PLN Group). Zainal is Team leader of EV Infrastructure Development (2016-now) and Smart grid Implementation at PLN (2017 – now) He is also Assistant Professor at Power and Renewable Energy Graduate Program, Institut Teknologi PLN. He received a Sarjana Teknik in Mechanical Engineering from Sepuluh Nopember Institute of Technology (ITS) Indonesia in 1994. He earned his MBA in Operation Management in 2010 from University of Missouri – St Louis (UMSL), USA, and a PhD/Doctoral in Strategic Management from Universitas Indonesia by 2016 focusing on Corporate Technology Strategic Policy. Dr. Zainal is Board Member of Global Smart Energy Federation (GSEF), The Indonesian Electrical Power Society (IEPS/MKI), the Indonesian Renewable Energy Society (METI), The Institution of Engineers Indonesia (PII), IEEE Indonesia Chapter, and Indonesia Strategic Management Society (ISMS). He is Senior member of IEEE and member of IEEE Technology and Management Society (IEEE TEMS). He is Indonesia representative for The International Electricity Research Exchange (IERE).

ORAL SESSION

ABBS23-NRE002

Unraveling the formation of hard carbon/Sn composite via hydrothermal carbonisation process

Evangelin Hutamaningtyas, Hande Alptekin, Tom Headen, Ana Sobrido, Patrick Cullen, Maria-Magdalena Titirici and Alan J. Drew

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Abstract- Porous carbon prepared by hydrothermal carbonisation (HTC) has been a promising material for different applications such as gas adsorption and energy storage. Sodium batteries (NIBs), an alternative to lithium-ion batteries have advantages of Na abundance, relatively low-cost material, and potential safety benefits eliminating the dependence on fossil fuels. This work challenges to synthesize carbon/Sn composites with subsequent carbonisation from 500 to 1000C. The structure formation of carbon, including average pore size diameter and graphitic layer change of each different temperature were studied by Raman and Small Angle Neutron Scattering. TGA, SEM, and XRD were performed to understand the phase change of tin, including both SnO2 and Sn phase. The composites then being use as anode for Na-ion batteries with Na metal as counter electrode. The electrochemical results revealed the loss of capacity after the first cycle, a typical drawback with Sn based anode material.

ABBS23-SEEP004

Techno-Economics Of New Renewable Energy Development In Lombok, Indonesia

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Abstract- Presidential Regulation 112/2022 on Acceleration of Renewable Energy Development for Electricity Supply Increase investment in the Renewable Energy sector. Goal ▪ Accelerate the achievement of renewable energy mix targets in the national energy mix in accordance with the National Energy Policy; ▪ Reducing greenhouse gas emissions. Renewable Energy Development is carried out based on the RUPTL, which considers the target of the renewable energy mix, supply-demand balance, and the economic value of power plants. Implementation of procurement through direct selection (auction), and the price mechanism does not use Feed-in Tariff (FIT). The utilisation of domestic products (TKDN) is implemented under the provisions of the legislation. Therefore, researchers want to examine the techno- economics of new renewable energy development in Lombok Indonesia. Metology use qualitative research.

ABBS23-BHBP005

Effects of overliming and activated carbon detoxification on inhibitor removal

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Renewable Energy Engineering, School of Renewable Energy , Maejo University, Thailand 50290

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Abstract- Bioethanol is currently one of the most popular biofuels produced from agricultural byproducts such as sugarcane bagasse, rice chaff, cassava, etc. In this experiment sugarcane bagasse is used as biomass raw material and they will be hydrolysis by 2%v/v dilute sulfuric acid to derive hydrolysate. In hydrolysate, the acid hydrolysis of biomass has produced numerous inhibitor compounds, including furfural, 5-hydroxymethyl furfural, phenolic compound, and acetic acid. These compounds will inhibit yeast metabolism, resulting in decreased cell growth and ethanol production. This study is focused on the detoxification by activated carbon absorption and overliming to remove these inhibitory compounds and enhance ethanol fermentation by using activated carbon concentrations of 1, 3, and 5%wt. For the overliming, use $Ca(OH)_2$ to adjust the pH of the hydrolysate to 7.0, 10.0, and 12.0, and select the optimal conditions for each detoxification procedure in order to decontaminate with overliming and activated carbon. The reaction time for detoxified is 60 minutes at 30 degrees Celsius. For the study, it was determined that the maximum removal of inhibitors of activated carbon absorption at 5.0% w/v is 70.73% and 87.12% of total furan and phenolics compounds, respectively, whereas the overliming method at pH 12.0 has removal rates of 90.41% and 70.57% for total furan and phenolics compounds, respectively. The optimum conditions for detoxification include overliming with activated carbon at a concentration of 5.0%w/v at a pH of 12.0 or above. In the given conditions, the removal efficiency of total furan and phenolic compounds was found to be 96.54% and 91.26% respectively.

Keywords: Sugarcane Bagasse , Hydrolysate , Detoxification, Inhibitor compound, Activated carbon, Overliming , Ethanol

ABBS23-BHBP007

Biohydrogen Production from Pre-treated Rice Straw by *Clostridium acetobutylicum* YM1

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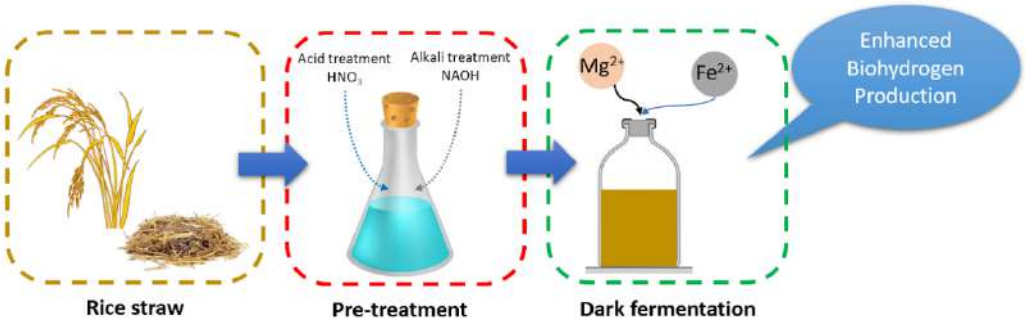

Abstract- The production of biohydrogen through dark fermentation from agricultural waste offers environmental friendliness, energy efficiency, and cost-effectiveness as key benefit. This study investigates the potential of treated rice straw to be used as an inexpensive feedstock for the production of biohydrogen. To simplify the structure of this complex material, thermochemical treatment was applied using nitric acid and sodium hydroxide at different concentrations 0.5-5 %(v/v), and the conversion of the cellulose and hemicellulose in rice straws to fermentable sugars were assessed. The highest sugar content sample obtained from pre-treatment which was 1% (v/v) nitric acid, which obtained 27.73 g/L of sugar concentration was used for dark fermentation using *Clostridium acetobutylicum* YM1 at 30 °C under anaerobic conditions to produce biohydrogen. Compared with glucose synthetic media, HNO_3-pretreated sample achieved 27% higher biohydrogen yield. Moreover, ferrous ions (Fe^{2+}) and $MgSO_4$ were added to enhance biohydrogen yield, which achieved 1.13 mol_{H2}/mol_{sugar} and 1.19 mol_{H2}/mol_{sugar}, respectively. This study demonstrated that butyric acid fermentation was the main pathway for *C. acetobutylicum* YM1 to produce biohydrogen from HNO_3-treated rice straw.

Keywords: Biohydrogen; Rice straw; *Clostridium acetobutylicum* YM1; Ferrous ion; Magnesium ion; Pre-treatment

ABBS23-SEEP009

Reduction of Greenhouse Gas Emissions and Energy Consumption in Wastewater Treatment Plants via Engineering Strategies: A Case Study

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Abstract- The energy consumption of a wastewater treatment plant is influenced by many factors, such as the wastewater flow rate, chemical oxygen demand (COD) concentration and the treatment process for the liquid and sludge. To reduce greenhouse gas emissions and energy consumption are important issues in wastewater treatment plants. In this study, a complete inventory of greenhouse gas emissions and energy consumption in the wastewater treatment plant of Chinswei Highway Rest Station was carried out. Then, four strategies were applied to reduce greenhouse gas emissions and energy consumption. For this wastewater treatment plant, the energy consumption was 1.2 kWh/m3 and the greenhouse gas emissions were 0.62 kg CO2e/m3. For this plant, when the aerobic digestion was replace by anaerobic digestion, energy consumption was reduced from 1.2 to 0.72 kWh/m3, and total CO2 equivalent (CO2e-T) was increased from 0.62 to 1.25 kg CO2e/m3. The reason was that the greenhouse gas effect of methane is 27 times of carbon dioxide. To reduce energy consumption and greenhouse gas emissions, anaerobic digesters and biogas power generation must be applied simultaneously. This process reduced energy consumption and greenhouse gas emissions by 65% and 48%, respectively. The least greenhouse gas emissions will occur in a scenario where anaerobic digesters and biogas are used to generate bio-electricity. Based on the result, greenhouse gas emissions and energy consumption in wastewater treatment plants can be reduced via an engineering method.

Keywords: Energy consumption, Greenhouse gases emission, Anaerobic digestion, Process optimization, wastewater treatment plants

ABBS23-SEEP011

Green Symbiosis of Kinmen Sorghum in Taiwan: Anaerobic Fermentation and the Circular Economy Development of Organic Farming

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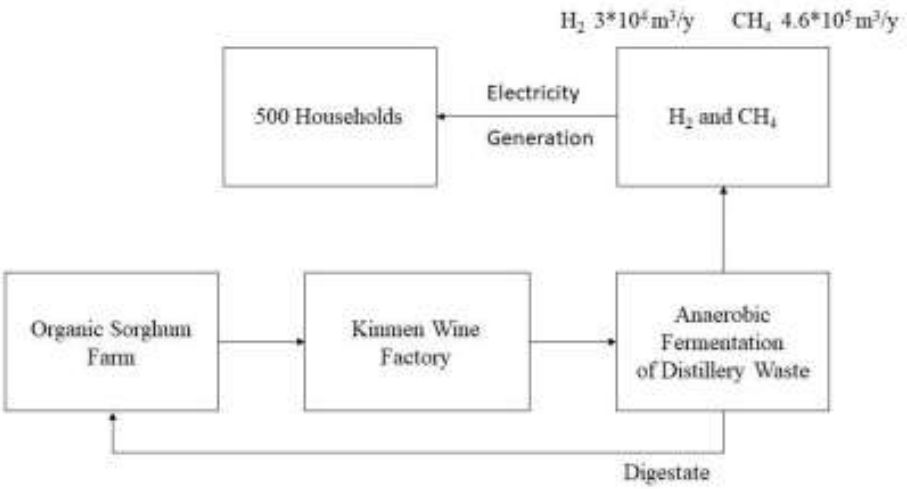

Abstract- In recent years, one of the most thought-provoking issues in the field of energy is not only the shortage of water resources but also the inadequacy of electricity supply. Rising temperatures, increasingly indistinct seasons, and the surge in remote work and learning driven by the pandemic have collectively led to a significant increase in energy consumption, resulting in extreme strain on electricity and energy supply. As the saying goes, "food is essential to life," and rural social development is the foundation of human livelihood. Agriculture and cultivation address the issue of food scarcity, but the growing population brings about concerns related to energy consumption, agricultural land area, living space, and financial expenditure. Therefore, effectively utilizing the waste of existing industries can enhance resource recycling, increase efficiency, and yield across various aspects. This article takes organic farming as a leading approach, starting from increasing high yield crops in sorghum cultivation and complementing it with the reuse of product waste such as distillery waste and household food waste. It evaluates the establishment of an organic waste treatment plant in Kinmen, maximizing resource utilization through circular economic methods. A conservative estimate suggests that this initiative can potentially double or even triple agricultural production annually. The distillery waste, which amounts to 200,000 metric tons annually, can be processed through anaerobic fermentation to produce 30,000 m3 of hydrogen gas and 460,000 m3 of methane gas. Bio-gas can be used to generate 1,602,000 kWh of electricity annually using Chen engines, which is sufficient to power approximately 500 households throughout the year. Furthermore, the fermented distillery waste can be reused as fertilizer. The green symbiotic strategy for sorghum in Kinmen not only promotes organic agriculture to reduce carbon emissions from chemical pesticides but also increases product value, addresses organic waste issues, and achieves a virtuous circular economy of coexistence between the environment and the economy.

Keywords: Sorghum; Organic waste; Anaerobic fermentation; Bio-gas; Circular economy

ABBS23-BRBD012

Assessment On The Utilization Of Cosmetic Plants : An Ethnobotanical Study In Indonesia

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Abstract- Cosmetics have evolved over time. The use of cosmetics and female beauty in Indonesia had been recorded from the time of the Hindu-Buddist Kingdom. Nowdays, various cosmetics products have been mass-produced and could slowly erode the knowledge of potential cosmetic plants from local communities in Indonesia. This study aimed to provide information on the types of potential cosmetic plants that have been used by people from several regions in Indonesia. The methods used were non-structured and "open ended" interviews and direct observation in the field. The research were conducted in five Regions and recorded 34 plant species from 24 families. Zingiberaceae family was the tribe with the highest number of species used. Fruit was the most utilized part of the plant at 35.2% followed by flowers and leaves at 17.65%. Plants were used mostly for skincare (40.38%). Various ethnobotanical information and utilization were described in detail in this manuscript.
Key Words : Conservation, *Santalum album*, Traditional knowledge, *Zingiberaceae*.

ABBS23-NRE014

Experimental study of the effect of inner side taper blades ratio on the Savonius turbine performance

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Abstract- One of the green energies of the future is wind power, which is abundantly provided by the universe. Rural areas that have low wind energy potential are suitable for using the Savonius wind rotor type which has a simple design, robust, and can capture wind from any direction. However, the Savonius rotor has several drawbacks such as high static torque fluctuations and relatively low turbine efficiency. The objective of this study is to increase the output power of a Savonius wind rotor by varying the ratio of inlet and outlet side taper blades using numerical simulations and experiments. The turbine performance investigation is based on the power coefficient (Cp), tip speed ratio (TSR), and torque coefficient (Ct). This experiment used four blade configuration models namely Savonius U-type, helical, helical taper ratio 1:1, and helical taper ratio 1:2. and blade gap width of 20 mm. The wind speeds carried out in this experiment were 3 m/s, 5 m/s, 7 m/s, and 9 m/s, which were generated from a fan blower as a wind source. The Savonius turbine with a taper ratio of 1:1 showed the best performance. The highest Cp obtained is 0.185 and the TSR value is 1.05 in Savonius double balde taper ratio 1:1 with a gap variation of 20 mm at a wind speed of 3 m/s.

ABBS23-BFBP016

An integrated continuous process for highly efficient sugar production from wheat straw

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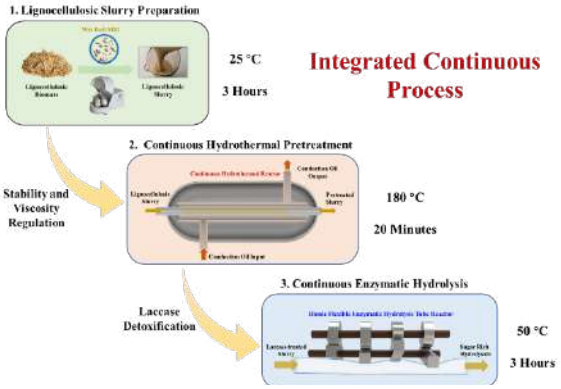

Abstract- The conversion of renewable lignocellulosic biomass into sugars via hydrothermal pretreatment and enzymatic hydrolysis is a prerequisite for biofuel production. However, further process improvements are necessary to ensure economic viability. The significantly reduced downtime and faster heat and mass transfer of a continuous flow process make it inherently more efficient than a batch process. Thus, continuous processing could be a promising solution to reduce sugar production costs. In this study, a continuous hydrothermal pretreatment process and a semi-continuous enzymatic hydrolysis process are combined to attain ceaseless and efficient sugar production. The well-dispersed and stable wheat straw slurries were prepared by the wet ball-milled method to avoid clogging issues caused by particle sedimentation. The turbiscan stability index at 24 h of wheat straw (WS) slurry ball mill for three hours is 10.3, significantly lower than WS slurry without ball mill treatment. Moreover, the average particle sedimentation velocity of WS slurry decreased from 6.48 to 0.27 mm/h. The rheology analysis showed that the apparent viscosity and yield stress of the WS slurry increased significantly with increasing solid concentration. Specifically, the apparent viscosity at 100 s^{-1} shear rate of WS slurry ball milled for 165 min increased from 0.12 to 6.26 Pa·s when the solid concentration increased from 5% (w/w) to 12.5% (w/w). Therefore, 5% (w/w) was set as the maximum solid loading of WS slurry used in continuous hydrothermal pretreatment to avoid pump plugging during continuous hydrothermal pretreatment. The maximum xylooligosaccharides and arabinooligosaccharides concentrations of 4.29 g/L and 0.55 g/L in the hydrolysate were achieved when the WS slurry was pretreated at 180 °C for 20 min. Besides, it appeared that the main inhibition product generated in the liquid phase was phenols rather than furans and acids, whose concentration reached 1.4 g/L. Therefore, a phenol-degradable enzyme named laccase was employed to enhance the subsequent enzymatic hydrolysis of hydrothermal pretreated slurry. The continuous enzymatic hydrolysis of hydrothermal pretreated slurry was carried out in a novel bio-inspired flexible tube reactor in which mass transfer enhancement was achieved by squeezing at different parts of the tube reactor. After laccase treatment and continuous enzymatic hydrolysis, the glucose and xylose concentration in the liquid phase was 10.60 g/L and 5.15 g/L, respectively. Laccase detoxification after hydrothermal pretreatment improved total sugar release by 118% compared to hydrothermal pretreatment alone.

Keywords- Biomass; Hydrothermal Pretreatment; Enzymatic Hydrolysis; Continuous Process; Sugar Production.

ABBS23-NRE017

Numerical and experimental study of PEM fuel cells for application of fuel cell electric vehicle performance with different fuel flow rates

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Abstract- The objectives of this research are to simulate fuel cell performance with utilization numerical simulation and experimentals study with testing fuel cell electric vehicle. Firstly, the continuity, momentum, species transport, and charge equations were used to represent the cell transport phenomenon in the fuel cell performance. The flow of permeable medium in the gas diffusion layer was defined by employing Brinkman equations. V-I curves were obtained using the Butler-Volmer equations. Subsequently, experiment study was performed of the PEM fuel cell engine test to determine the efficiency of using hydrogen fuel in electric cars. Testing of the PEM fuel cell engine for this power plant was carried out with a supply of hydrogen gas with varying fuel flow rates of 1 l/min, 2 l/min, 3 l/min, 4 l/min, and 5 l/min. The test results show that the highest output power of hydrogen produced by the electrolysis process is 901.58 W, and electric power is 411.32 W at a flow rate of 5 l/min and an input current of 9.1 A. This shows that the performance of the PEM fuel cell engine is optimal at the value of the output power. The optimum efficiency of testing the PEM fuel cell engine using hydrogen gas was obtained at 49.74%.

ABBS23-BRBD018

Simple Stage House Design Using Fast-Growing Wood Construction

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Abstract- Ecological and economic considerations were the reason for the development of simple stage house design using fast-growing wood materials. This article discusses the design concepts, construction phases, and thermal comfort of the stage house constructed from platinum teak and jabon wood. The objective of this study is to obtain a wooden stage house design that can be implemented on a full scale, energy-efficient, and comfortable for habitation. The study methodologies included 1) facade designs referring to traditional stage houses in Indonesia; 2) structural designs; 3) prototype construction; and 4) measurement of temperature and relative humidity inside the house. The results show that the planned design can be realized in the form of a full-scale prototype house without significant obstacles. The thermal comfort inside the house feels warm and comfortable, with temperatures between 24.12°C – 28.76°C. Meanwhile, the relative humidity is between 70.65% - 83.54%, higher than the recommended limit. The outcomes of this research are to support the development and utilization of fast-growing wood as an alternative construction material in efforts to reduce environmental damage.

Keywords- design, structure, ecohouse, thermal comfort, fast-growing wood.

ABBS23-BHBP019

Biohydrogen production from waste polylactide (PLA)

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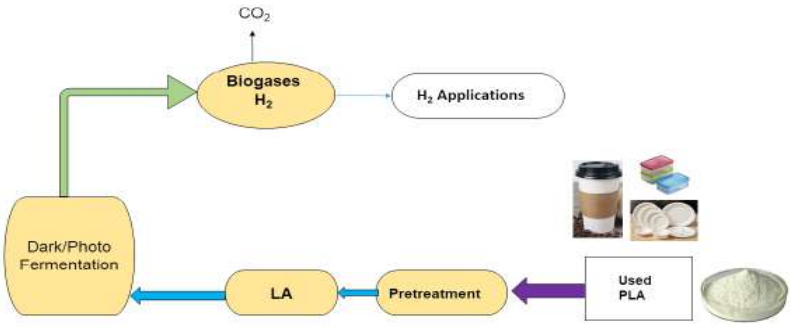

Abstract- Bioplastics are biodegradable in nature and produce organic by-products such as CO_2 and H_2O that increase the CO_2 in the atmosphere. If bioplastics can be further utilized by biological processes to produce hydrogen/methane gases that will be good with the goals of the bio-circular economy and environmental sustainability. This research aims to use waste PLA regeneration and convert waste PLA into biohydrogen. The bioprocesses include PLA hydrolysis technology to produce lactic acid (LA), bacteria selection for hydrogen production of lactic acid, and evaluation of hydrogen production conditions for better strains. In this experiment, using 10vol% photosynthetic bacteria of *Rhodopseudomonas palustris* WP3-5 as the main strain, and the *Clostridium Butyricum* immobilized cells for dark fermentation. The substrate used glucose/Lactic acid (Glu/LA) for hydrogen production.
Experimental results show that the photofermentation hydrogen yield (HY) can reach 1.495 molH_2/mol substrate, and the maximum hydrogen production rate (HPR) is 79.86 mL/h/100 mL by m-Gompertz equation at the substrate ratio of Glu/LA at 8/2. The dark hydrogen production has very low HY that needs further study. From the experiment, the results showed that the different ratios of the substrate by using Glu/LA carbon source have a better hydrogen production than using a single carbon source of lactic acid.

Keywords- Biohydrogen, Waste polylactide (PLA), Photo/Dark fermentation

ABBS23-SEEP020

A mathematical modelling biofilm development and growth for wastewater treatment through synchronous photoautotrophic-heterotrophic synthesis

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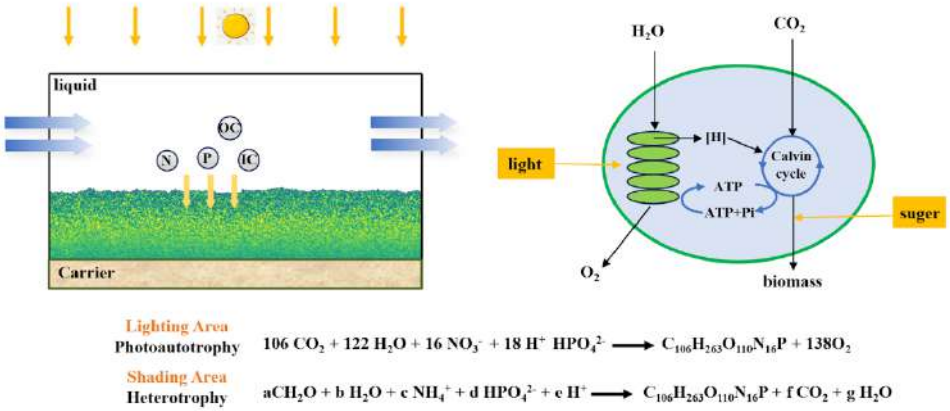

Abstract- Microalgae biofilm has great application prospect in wastewater treatment for its high pollutant removal efficiency and low biomass harvesting cost. When exposed to light, microalgae biofilm can remove nitrogen, phosphorus and inorganic carbon through photoautotrophy. After biofilm reaches a certain thickness, a dark region will be formed at the bottom due to the severe attenuation of light intensity in the biofilm, and heterotrophy begins to occur. Different substrates supply and light intensity will lead to different biofilm autotrophic heterotrophic growth rate. Besides, photoautotrophy and heterotrophy can lead to different biofilm structure, which can affect the mass transfer of substrates in the biofilm. The growth mode of biofilm and mass transfer of substrates are very complicated. It cannot be directly observed by experiment. In this study, a mathematical model for describing photoautotrophic and heterotrophic biofilm is proposed by Lattice Boltzmann method coupling cell automation probabilistic model. The simulation results show that photoautotrophy is limited by light attenuation and inorganic carbon mass transfer, mainly concentrate in the upper part of the biofilm. Heterotrophy is limited by organic carbon mass transfer, mainly concentrate in the middle of the biofilm. The bottom of the biofilm can't reach enough nutrients due to large mass transfer resistance, and almost no growth exists. When organic carbon is supplied, less inorganic carbon is needed to maintain the maximum rate of biofilm growth. The fundamental reason is that the carbon cycle in the biofilm improves the carbon utilization rate and reduces the inorganic carbon demand by the system. Maintaining mass ratio of total organic carbon to total nitrogen at 7:1 can achieve the best pollutant removal rate for sewage treatment. Adding organic carbon to wastewater with high ammonia nitrogen concentration at 340mg/L can significantly increase the removal rate of nitrogen and phosphorus, and the biomass production increase, but the removal rate of inorganic carbon and the oxygen production decrease.

Keywords- Microalgae biofilm, Synchronous photoautotrophic-heterotrophic, Wastewater treatment, Cellular automaton, Substrate transport

ABBS23-BE021

Response mechanism of microalgae to sulfur during different photosynthetic carbon fixation stages and strategies for stress mitigation

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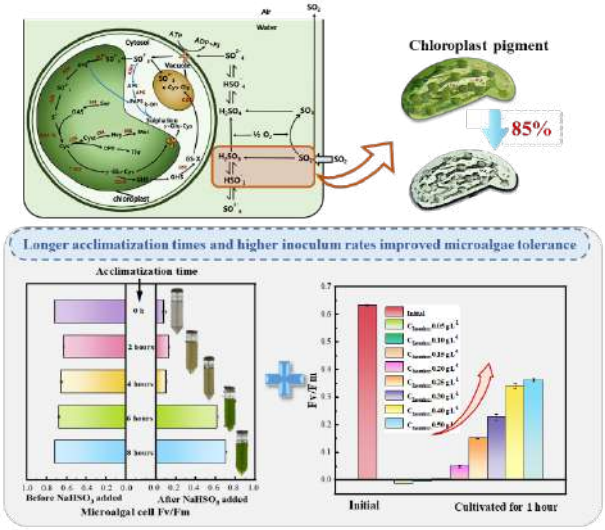

Abstract- Microalgae perform efficient photosynthesis with high yield and show a good tolerance to the environment. These characteristics render them valuable for the sequestration of CO_2 from flue gas, offering an attractive way to reduce environmental stress and achieve carbon neutrality. However, the substantial dissolution of SO_2 caused a decrease in the pH of the microalgae solution, subjecting microalgae cells to stress from sulfur-containing salts. This challenge hinders the capture of CO_2 from flue gas by microalgae. It is essential to investigate the response mechanism of microalgae to sulfur, as such, in this study, the sulfur-containing salt stress effect on microalgae *Chlorella sorokiniana* MB-1 was investigated. There were HSO_3^-, SO_3^{2-}, SO_4^{2-} exerted when SO_2 was bubbled into the microalgae suspension, and it was the state of HSO_3^- which has the most pronounced adverse effects on microalgae growth and carbon sequestration. When the concentration of $NaHSO_3$ was over 11.25 mM g^{-1}, microalgae cells microalgae cell inactivation. And pH of the microalgae solution dropped below 3, which was outside the appropriate cultivation range. Furthermore, the chlorophyll concentration in microalgae decreased by 85%, and the photosynthesis efficiency approached zero within four hours of adding 2.25 mM $NaHSO_3$. These indicated that microalgal cells unable to sequester carbon with high concentrations of $NaHSO_3$. The observation revealed that the microalgae cells' Fv/Fm increased to 0.36 when the inoculum concentration was raised to 0.5 g L^{-1}. This served as evidence that microalgae's survivability activity improved as the inoculum microalgae concentration increased. However, it's worth noting that even with the elevated inoculum concentration, the microalgae still could not grow and reproduce under the high NaHSO3 concentration (2.25 mM). After more than 6 hours of acclimatization with 2% CO_2, microalgae were able to grow up to 2.6 g $L^{-1}$with 2.25 mM $NaHSO_3$ added, and it was same as the control culture condition. A straightforward and effective approach to alleviating sulfur stress enhances the potential for microalgae to reduce carbon emissions from flue gas.

Keywords- Acclimatization period; Carbon emission reduction; microalgae survivability activity; Photosynthesis; Sulfur stress

ABBS23-BHBP022

On-line observation for dynamic response process of microalgae cell's growth and division in a microfluidic biochip

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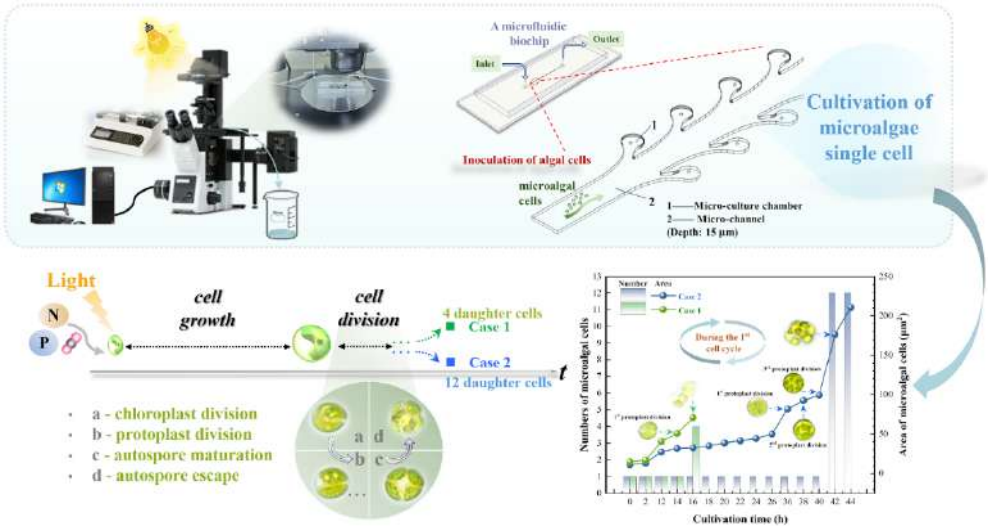

Abstract- Microalgae, a kind of single-celled organism with fast growth rate and strong environmental adaptability, can convert inorganic pollutants such as CO_2, nitrogen and phosphorus into organic matter through photoautotrophy. Removal rates of them depend on the speed of photosynthetic growth process divided into cell growth and division processes. Microalgae usually accumulate biomass during the cell growth process to ensure the normal cell division subsequently. However, traditional studies based on suspensions or biofilms can't avoid the averaging of growth parameters derived from millions of cells. But this averaging may obscure essential features of microalgal cells needed for correct understandings and interpretations of investigated processes. Therefore, it's vital to focus on growth and division processes of microalgae single cells. A microfluidic biochip that can keep a constant microenvironment (such as light intensity of 30 μmol m^{-2} s^{-1}, dissolved inorganic carbon concentration of 1.1 mM and nitrate concentration of 12 mM) for microalgae single cell was designed and applied. *Chlorella vulgaris* single cell can grow as the fastest average specific growth rate of 0.17 h^{-1}, diameter of which raised from 6.00 to 9.06 μm after 14 h. Immediately, the cell division process with little change in cell size was completed within 2 h. The cell division process can be subdivided into 4 stages: nuclear and chloroplast division, protoplast division, autospore maturation and autospore escape. Most mother cells give rise to 4 daughter cells after one cell cycle, and a few cells produced 8 or more daughter cells, depending on numbers of protoplast divisions. Daughter cells from the 1st division usually produced 8 2nd generation daughter cells after another cell cycle. Further studies into controlling factors of this phenomenon will significantly promote efficient cultivation of microalgae, greatly contributing to global carbon neutrality and water purification.

Keywords- *Chlorella vulgaris*; Single cell; Cell growth and division; Microfluidic biochip

ABBS23-BFBP023

Green-Fuel Production Through Co-processing Biomass Derived Oil with Standard Gasoil Feedstock

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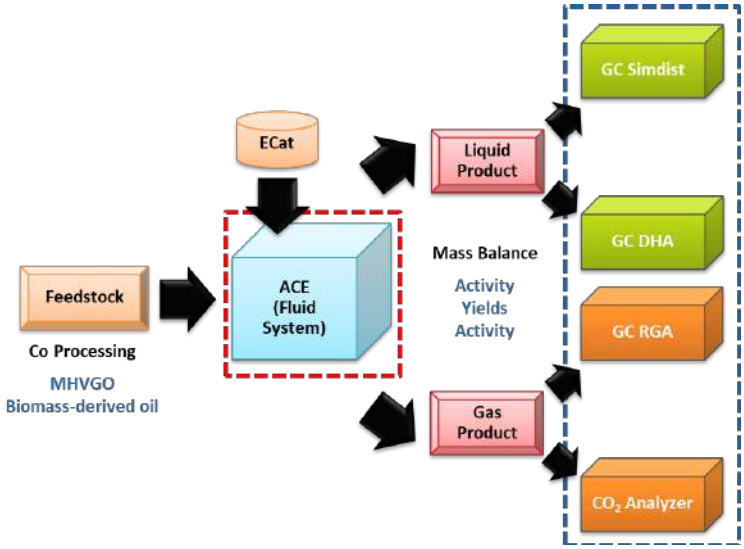

Abstract- As an effort to support our refinery revenue enhancement program through utilization of new and renewable materials, trial green-fuel production research has been carried out on lab-scale through coprocessing biomass-derived oil with a standard gasoil feedstock and existing Ecat to determine its effect on the feasibility of processing it at the commercial FCC unit. The catalytic cracking process was carried out by varying the type of feedstock biomass-derived oil (CPO and RBDPO) against standard gasoil, at general practice operating parameters such as T cracking 510 °C, C/O ratio ~6, and T regenerator 715 °C, using the ACE reactor which models one cycle of reaction and regeneration in the commercial FCC unit. Product yields were obtained by calculating the mass balance of liquid and gas products which were modeled using GC Simdist, GC RGA and CO_2 Analyzer, while gasoline octane number was modeled based on PONA composition using GC DHA. The results indicate that conversion is in the range of 85 - 86 % with RON in the range of 91.2 - 93.55 and product yields for Coke, Dry gas, Propylene, LPG, Gasoline, LCO and Bottom are respectively in the range of 6.9 - 7.1 %, 1.26 - 3 %, 6.79 - 8.5 %, 19.52 - 23.1 %, 44.8 - 51.63 %, 10.21 - 11.4 %, and 3 - 3.68 %. Although basically both CPO and RBDPO can potentially be used as coprocessing feedstock to obtain typical range conversion in FCC unit when compared to standard gasoil, it may require several adjustments in operating conditions, catalyst formulation, or optimization of subsequent unit which is the wet gas compressor as compensation for higher light fraction (Propylene and LPG) and lower gasoline production.

ABBS23-NRE024

Weibull Parameter-Based Study of Seasonal Wind Patterns and Power Potential in Java's Southern Coast

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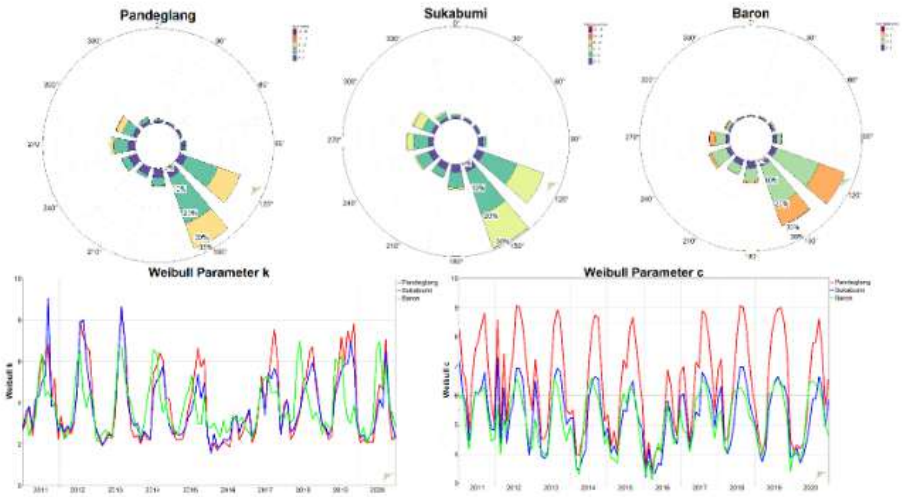

Abstract- This study presents a comprehensive analysis of wind speed characteristics using the Weibull distribution, based on wind speed data spanning the period from 2011 to 2020, collected at three distinct locations on the southern coast of Java Island, namely Pandeglang, Sukabumi, and Baron. The data were obtained from NASA's Langley Research Center (LaRC) POWER Project and processed using windographer software. The wind speed data analysis involved applying a two-parameter Weibull distribution, which was estimated utilizing the WAsP algorithm to assess the annual wind potential and frequency. The derived Weibull parameters evaluate wind Power Density (WPD) for the three locations. The results underscore the site-specific variations in the Weibull parameters and WPD. Pandeglang exhibits the highest annual average wind speed at 5.85 m/s, while Baron has the lowest at 4.69 m/s. Notably, seasonal fluctuations are observed, with the Weibull's shape parameter k reaching its minimum in February-March and its maximum in July-September. The highest WPD is recorded in Pandeglang in September, at 338.71 watt/m2, while the lowest is in Sukabumi, registering 41.6 watt/m2 in April. Furthermore, the simulation of electrical energy output, employing five different wind turbine models ranging from 50 kW to 800 kW in capacity, reveals that the optimal output for Pandeglang is a 500 kW wind turbine with a capacity factor (CF) of 30%.

Keywords- Wind energy; Weibull parameters; WPD; CF

ABBS23-BE025

Numerical simulation of cellulosic-biomass sedimentation and mixing mechanism in a bionic intestinal segmentation reactor

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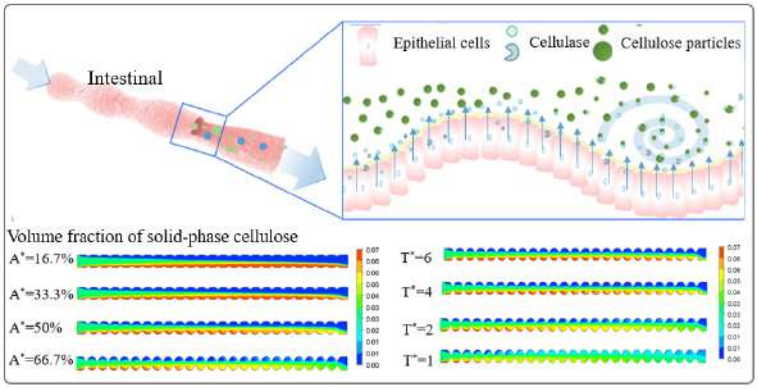

Abstract- Enzymatic hydrolysis is a promising technology for the biochemical conversion of lignocellulosic biomass. However, biomass slurries tend to settle down easily, making the contact between the substrate and the enzyme limited, which is not conducive to the bio-catalytic reaction. A bionic intestinal segmentation reactor with an enzyme secretion boundary has been proposed by our group to enhance mixing between liquid phase substrates and enzymes. However, the settling effects of solid-phase cellulose and mixing enhancement mechanism in the bionic reactor are unclear. In this study, a series of numerical simulations on solid-liquid two-phase flow in the bionic reactor based on the two-fluid model and the kinetic theory of granular flow (KTGF) was conducted. The relative standard deviation (RSD) was calculated to quantify the extent of solid suspensions. The results show that increasing the segmentation amplitude, decreasing the segmentation period, and reducing the particle size of cellulose are conducive to mixing enhancement. When dimensionless particle size, dimensionless amplitude (*A**), and dimensionless period (*T**) were set as 0.137, 66.7%, and 2, the minimum RSD value was achieved of 0.18, which was 84.0% lower than that of non-segmentation, indicating that the suspension quality of cellulose was significantly improved by the bionic intestinal segmentation reactor. Last but not least, under the condition that the *T** was higher than 1, the maximum shear rate was less than 1000 s^{-1}, which was favorable for the retention of enzyme activity. The effect of asymmetric and intermittent enzyme secretion patterns on mixing was also explored. An enzyme-cellulose mixing value of 0.54 can be found in an asymmetric and intermittent enzyme secretion system, which is 11.1% lower than symmetric and periodic enzyme secretion system. It indicates that asymmetric and intermittent enzyme secretion patterns are more conducive to the contact between enzyme and substrate. Thus, the bionic intestinal segmentation reactor can be regarded as an effective tool for lignocellulose degradation.

Keywords- Bionic intestinal reactor; Multi-phase flow; Sedimentation; Mixing enhancement, Numerical simulation; Bioenergy

ABBS23-BHBP026

Morphologies effect of zinc oxide for hydrogen production by photocatalytic water-splitting under visible light

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Abstract- Zinc oxide (ZnO) with different morphologies, including needle-like (ZnO-n), flower-like (ZnO f), and nanospheres (ZnO-s), have been synthesized by different technique. ZnO-n and ZnO-f prepared by hydrothermal process, ZnO-s was prepared using a sol-gel method. ZnO materials were used for the generation of hydrogen gas from water splitting. The photocatalysts were characterized by X-ray diffraction (XRD), UV–vis diffuse reflectance spectroscopy (DRS), and Field emission scanning electron microscopy (FESEM). Hydrogen production system was evaluated for methanol as a sacrificial agent. The photocatalytic test was implemented under irradiation of Osram Powerstar light with a UV filter providing visible light irradiation. The needle-like morphology was identified as the best photocatalyst. Achieving a maximum hydrogen production of about 51.72 μmol.g^{-1}after 4 hour of irradiation.

Keyword- ZnO, hydrogen production, water splitting, photocatalyst

ABBS23-BFBP027

AMF and PGPR : A Promising Approach to Boosting the Growth of Biofuel-Producing Plant, *Pongamia pinnata* in the Nursery

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Abstract- Since 2004, Indonesia has become a net oil importer due to the need for a larger domestic supply to meet domestic demand. In 2021, Indonesia consumed 430 million barrels of fuel while only producing 240.37 million barrels. Therefore, the government has four long-term strategies to combat the fuel shortage: (1) fuel efficiency, (2) exploration for new sources, (3) utilization of biofuels, and (4) utilization of solar energy. Pomangia pinnata is a plant commonly used as a biofuel source for relatively high oil output (10-47%). This research aimed to determine the effect of inoculation of Arbuscular Mycorrhizal Fungi (AMF) and Plant Growth Promoting Rhizobacteria (PGPR) on the growth of 4-month-old P. pinnata seedlings in the nursery. The treatments were Entrophospora sp. (A), Glomus clarum (B), Entrophospora sp. + PGPR (C), G. clarum + PGPR (D), Entrophospora sp. + PGPR* (E, PGPR inoculation three times with two-week intervals), G. clarum + PGPR* (F, PGPR inoculation three times with two-week intervals) and control (G). The results showed that the consortium inoculation treatment between Entrophospora sp. + PGPR (C); G. clarum + PGPR (D); Entrophospora sp. + PGPR* (E); and G. clarum + PGPR* (F) can increase the height growth and dry weight of seedlings by 27, 29, 45, 33, and 5, 7, 29, 23% compared to the control (G). Meanwhile, all single inoculation treatments of AMF and the consortium between AMF and PGPR increase the uptake of N, P and K elements in seedling leaf tissue ranging from 11-52, 32-76 and 8-61% compared to the control (G). This high uptake of N, P and K elements can increase the growth of P pinnata seedlings with better vigor in the nursery. Seedlings with high vigor thrive in the field and produce many seeds with high oil yields.

Keywords- Entrophospora, Glomus clarum, biofuel, inoculation

ABBS23-BFBP028

Dynamic light transmission modeling based on microalgal growth in photobioreactors for high efficiency CO_2 fixation

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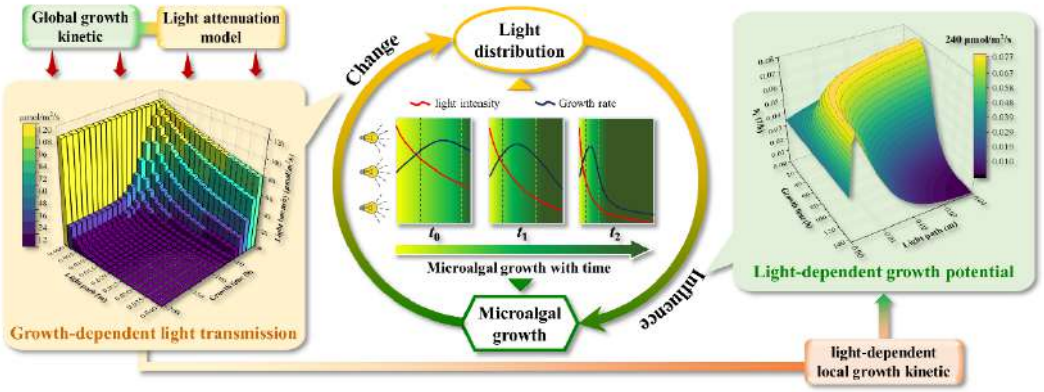

Abstract- In recent decades, the utilization of microalgae-based biorefinery processes has emerged as a vital biotechnological tool due to their potential for producing high-quality biomass energy feedstock and sequestering carbon. Light, as the fundamental driving force of photosynthesis, significantly impacts microalgal photosynthetic carbon fixation and biomass production. However, the constantly changing light transmission during microalgal growth presents a significant challenge when aiming to optimize their performance in terms of light utilization. In this study, the growth-dependent light transmission characteristics in microalgal suspensions were investigated. Although biomass accumulation was relatively slow during the early growth stage with biomass concentrations below 0.5 g/L, rapid changes in light attenuation were observed. A light-dependent local growth kinetic model was developed to predict microalgal growth and CO_2 fixation potential during their growth. The optimal saturation light intensity for microalgal growth was 83 μmol/m^2/s, which is smaller than the one determined by the kinetics describing the overall growth of microalgae in the flat plate reactor. The prediction showed that the initially expanding light saturation regions within the suspension eventually contracted, while the light inhibition expanded and the light limitation regions continuously decreased in size with microalgal growth. And a contraction of the local microalgal CO_2 fixation and specific growth rate distribution curve towards the incident light source occurred. In conclusion, the continuous accumulation of biomass during microalgal growth exacerbates the light attenuation within the reactor. Simply increasing light intensity has a limited mitigating effect on light attenuation, and alternative measures that can modify light transmission behavior may serve as better optimization strategies.

Keywords- Microalgal suspensions; CO_2 fixation; Growth-dependent Light transmission; Photobioreactors

ABBS23-BHBP029

Start-Up Study for Biohydrogen Production in Continuous Intermittence Magnet Field Reactor

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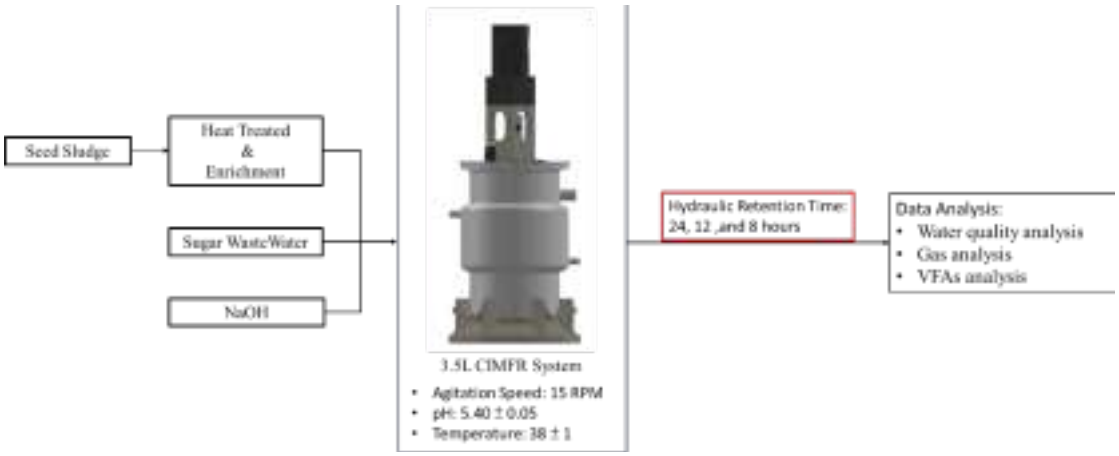

Abstract- Biomass has emerged as a critical player in climate change mitigation due to its significant energy potential, which produces less pollution than fossil fuels. The static magnet fields (SMF) enhance the performance of the dark fermentation process and the hydrogen-producing bacteria richness in the sludge. Experts are currently focusing on improving biogas production performance by employing SMF in the dark fermentation batch system. This study organized the data during the start-up process before applying a Continuous Intermittence Magnet Field Reactor (CIMFR) fed with sugary wastewater. The hydrogen seed sludge was heat treated under 90 ± 2 °C for 1 hour and enriched with 40 g/L glucose, 5 mL/L nutrient solution in 38 ± 1 °C incubator for 36 hours. The 350 mL of seed sludge was added into the CSTR with a working capacity of 3.5 L. During the biogas production process, the temperature was regulated at 38 ± 0.5°C, agitation speed was controlled at 15 rpm and the pH was maintained at 5.40 ± 0.05 by adding 1M NaOH. The hydraulic retention times (HRT) varied from 24, 12, to 8 hours sequentially after reaching a steady state. During the experiment, the gas produced and VFAs concentrations were examined using GC-FID and GC-TCD. The sample was collected at the end of each step for analysis and discussion. The results showed, the average gas production rate was 5.55, 6.48, and 16.01 L/L/day and the average hydrogen production rate was 1.96, 3.20, and 7.19 L/L/day under HRT 24, 12, and 8 hours, respectively, after maintaining in steady state.

Keywords- Continuous Intermittence Magnet Field Reactor; Hydrogen Production; Biogas Production; Hydraulic Retention Time

ABBS23-BHBP030

Hydrogen Production from Terephthalic Acid-Processing Wastewater by Dark Fermentation with Mixed Culture Inoculum

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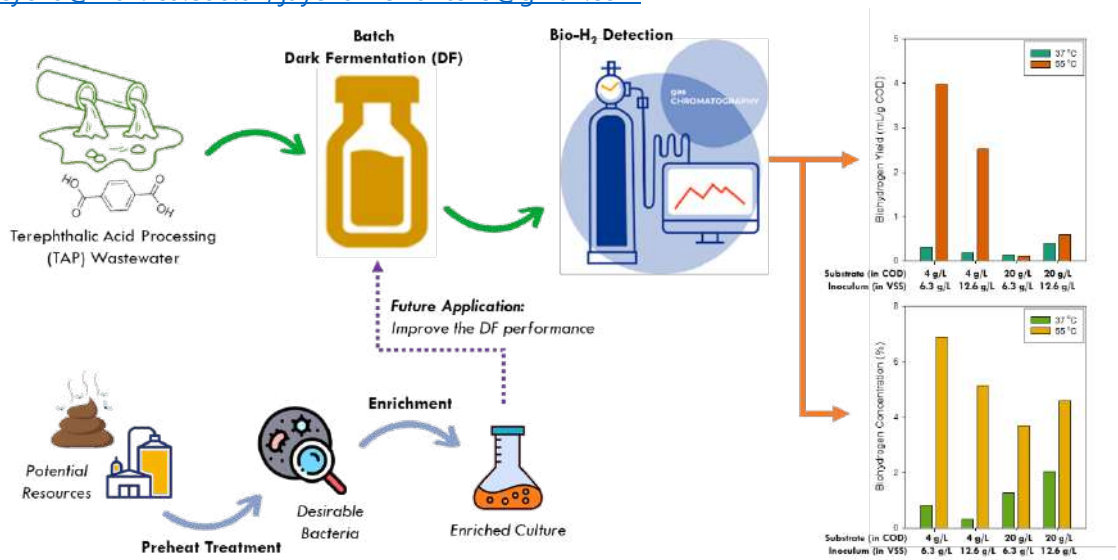

Abstract- Terephthalic acid processing (TAP) wastewater is one of the most challenging to treat due to its low biodegradability, containing cyclic structure compounds with high toxicity levels. Many technologies have been reported for treating TAP wastewater, including conversion to methane using anaerobic digestion (AD). In contrast, the use of dark fermentation (DF) for biohydrogen production using TAP wastewater as the main substrate has been less explored. In this study, the effect of initial concentration (4 and 20 g COD/L), incubation temperature (mesophilic and thermophilic), and mixed culture inoculum concentrations of 6.3 and 12.6 g VSS/L on biohydrogen production in a batch reactor were investigated. The different inoculum sources from pig manure and different sludges were investigated in this study with preheating treatment by oven drying at 105 °C for 3 h using enrichment media containing glucose as a carbon source. The result shows that the highest biohydrogen yield, with a value of 3.98 mL/g COD, was obtained under thermophilic conditions (55 °C), lower substrate and inoculum concentrations of 4 g COD/L and 6.3 g VSS/L, respectively, after 47 days. This condition also produced the highest biohydrogen concentration by 6.87% after 17 days of incubation. In the preheat treatment followed by enrichment of hydrogen-producing bacteria, the inoculum from pulp and paper wastewater treatment sludge reached the biohydrogen concentration and yield at the value of 42.2% and 5,195 mL/L, respectively, after 56 hours. The volatile suspended solids (VSS) using this inoculum source increased by 37.7% after approximately 7 days of enrichment. This study demonstrated that thermophilic dark fermentation is capable of converting TAP wastewater to a valuable product, biohydrogen. Preheat treatment and bacterial enrichment potentially increase the density of hydrogen-producing bacteria in the inoculum to improve the DF production performance.

Keywords- Dark fermentation; Hydrogen; Inoculum; Preheat treatment; Terephthalic acid

ABBS23-BRBD031

Bioprospecting on Alginate lyase as Antibiofilm Agent from Actinomycetes Originated from North Sulawesi, Indonesia: A Preliminary Study

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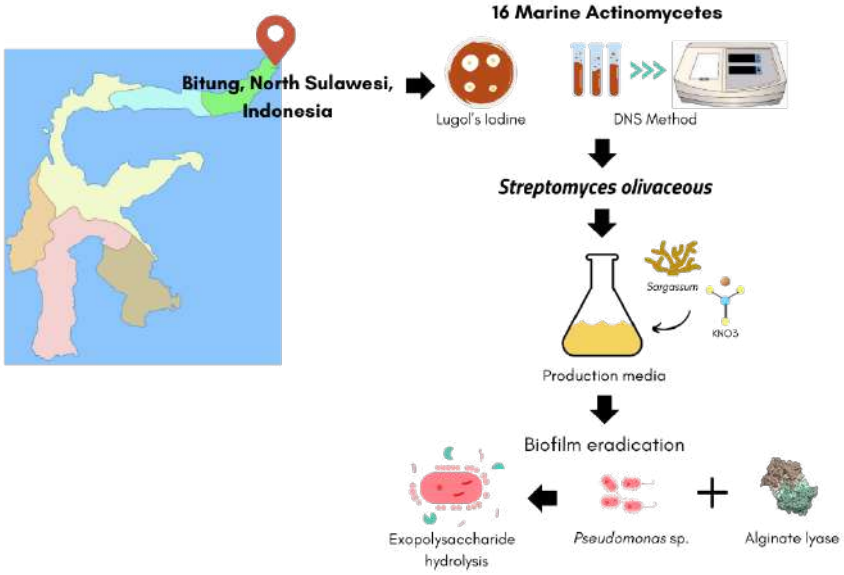

Abstract- Actinomycetes is well-known as a resource for a number of clinically used drugs, including antibiotics, enzymes, antitumors, and antifungals. Within the reported actinomycetes, it was primarily isolated from terrestrial habitats and only 1 % was explored from marine environments. The exploration of distinguished habitats may raise the opportunity to obtain rare actinomycetes with unique metabolic pathways and genetic properties, thus promising to discover a novel natural product. Screening of 16 actinomycetes strains was conducted using the Lugol's Iodine staining followed by the DNS method. BLH 5–36 was chosen as a prominent candidate for producing alginate lyase which showed outstanding activity ($P < 0.05$). Regarding the 16S rRNA gene, the strain was identified as *Streptomyces olivaceous*. Further analysis was subjected to select carbon and nitrogen sources for production media. We found that inoculating *S. olivaceous* in a media containing 0.5 % (w/v) *Sargassum* and 0.5 % (w/v) KNO_3 were capable to generate the highest enzyme activity ($P < 0.05$). Furthermore, the optimized enzyme was produced and evaluated to determine its effect to disrupt *Pseudomonas* sp. biofilms. Several crude alginate lyase concentration were tested, including 0 %, 20 %, 40 %, 60 %, 80 %, and 100 % (v/v). Based on the MBEC method, 40 % (v/v) of crude alginate lyase was effective to degrade more than 50 % biofilm ($P < 0.05$).

Keywords- Bioprospecting, Actinomycetes, Alginate Lyase, Antibiofilm

ABBS23-BHBP032

Potential and Prospects for Utilizing POME as a Bio-hydrogen Feedstock in Indonesia

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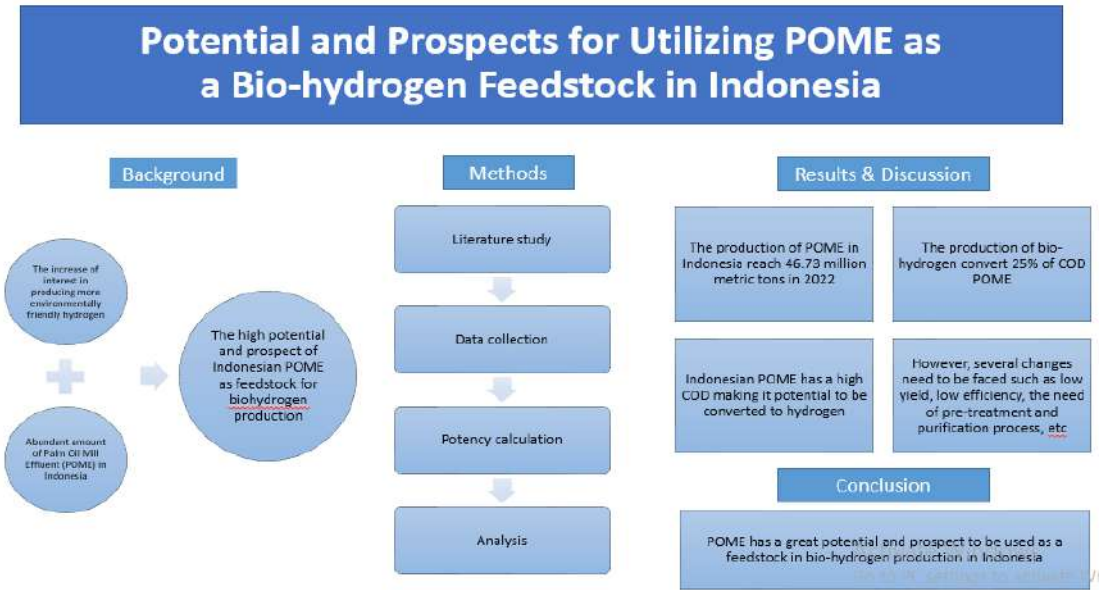

Abstract- The interest in utilizing hydrogen from as a future energy source is increasing nowadays because of its high potential and cleanliness. Currently, the main feedstock for hydrogen production comes from the fossil fuel through reforming or gasification processes. On the other side, hydrogen can also be produced in a more environmentally friendly way by using biomass waste as feedstock through the fermentation process integrated with the pre-treatment of feed and purification of the gas product. One of the biomass waste that is potential to be used in Indonesia, as the biggest palm oil producer in the world, is Palm Oil Mill Effluent (POME). In 2022, with the large production of crude palm oil, 46.73 million metric tons of POME was obtained. POME contains complex carbohydrate polymers material which results in high COD value (15,000-100,000 mg/L) making it potential to be converted into bio-hydrogen and bio-methane as well. Even though many studies and/or research have been conducted to produce hydrogen from POME, however no application has been found on commercial scale. Based on these fact then this study was directed to present and discuss the technology development, potential, prospect, and challenge in utilizing POME as feedstock for bio-hydrogen production in Indonesia which not only can support the acceleration of net zero emission program but also circular economy movements.

Keywords- bio-hydrogen, POME, potential, prospect, Indonesia

ABBS23-BHBP033

Tracing and optimization of light transmission in microalgae photobioreactors

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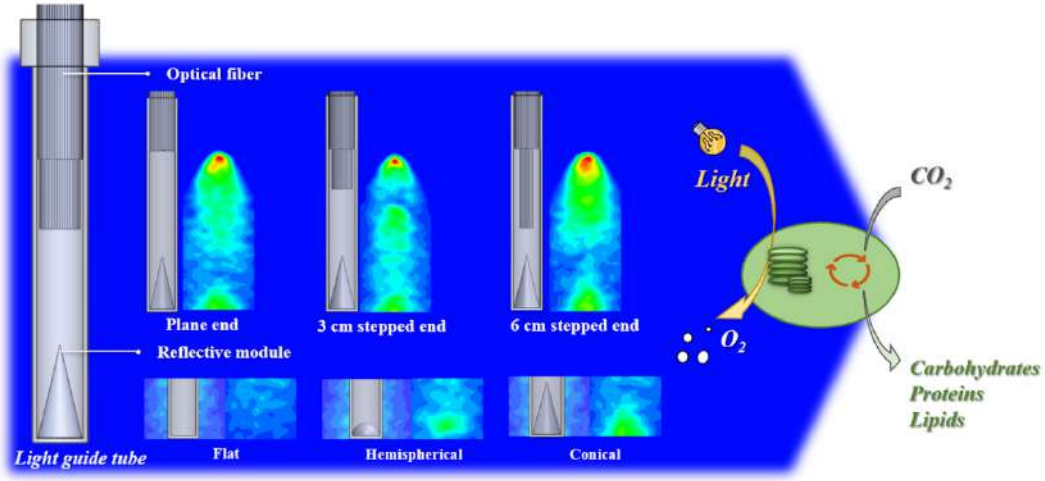

Abstract- The absorption and mutual shading among microalgal cells led to a decline in light intensity as light traveled through the microalgae suspension, making it difficult for internal microalgal cells to acquire the necessary light energy for efficient photosynthesis. This study designed a stepped optical fiber photobioreactor to efficiently transmit light over long distances into the microalgae suspension. We added reflective modules (flat, hemispherical, conical) at the bottom of the light guide tubes. The steeper the reflective surface on the module, the larger the incidence angle of light, and the more light was reflected toward the outside of the tube, which affected the length of the light emission of the tube. Then, the light from the light source was divided into two parts by changing the optical fiber structure into two stepped end planes. The luminous length of the light guide tube became longer, achieving lateral luminescence of the tube without additional energy consumption. Compared to the light guide tube with flat-bottom fiber, the light intensity on the tube with stepped fiber was higher than 80 μmol m^{-2} s^{-1}, increased by two times, and the light intensity was more uniform. The results showed that, with the same incident light energy, the highest microalgal biomass concentration of 1.60 g/L was obtained in the photobioreactor (PBR) with light guide tube featuring a stepped shape at the end of the optical fiber, which was 15% and 36% higher than the PBR with flat-bottom fiber (1.39 g/L) and the PBR without optical fiber (1.18 g/L), respectively. It was beneficial for the growth and carbon fixation of microalgae to use optical fiber as the built-in light source of the photobioreactor. During cultivation, changing the geometric shape of optical fibers could change the light transmission inside the microalgae suspension.

Keywords- Microalgae; Photobioreactor; Carbon fixation; Light distribution; Optical fiber

ABBS23-SEEP034

The Research of Environmental Knowledge, Consumer Attitudes and Price Sensitivity Towards Buyer Motivation of Green Skin Care Products

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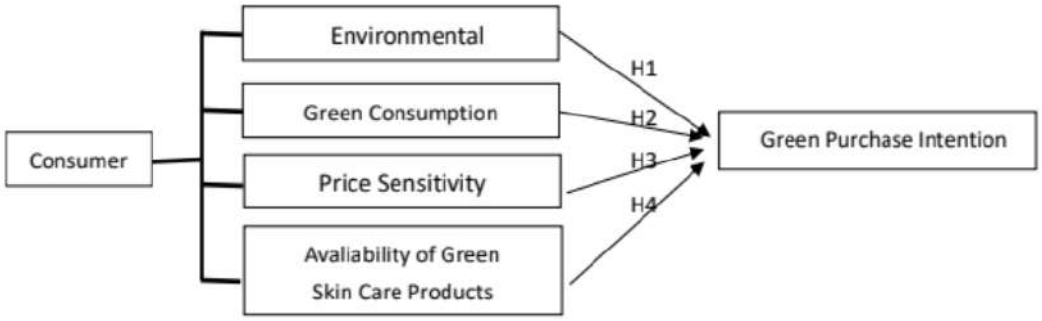

Abstract- The United Nations has ratified the 2030 Sustainable Development Goals (SDGs) in 2015. Consumers paid more attention and concern to the environment where they live, therefore green consumption is not only the slogan anymore, the communities start take actions since then. Due to the life style change of consumers, and rising consensus of environmental sustainability, topics like sustainable environmental knowledge, green consumption behavior and the concept of circular economy have gained more attention. The beauty & skincare product markets have witnessed substantial growth, leading to the demand of green skincare products. However, research in this field such as environmental knowledge, green consumption behaviors & attitudes and buyer motivation are still limited. Therefore, this study aims fill the gap by evaluating the influence of environmental knowledge, consumer attitudes, and price sensitivity on buyer motivation for green skin care products. The study delves into five key dimensions: environmental knowledge, the usability of green skincare products, price sensitivity, consumer attitudes, and buyer motivation of green products. The study adopts statistics software SPSS 22.0 to conduct descriptive statistics, T-test, reliability analysis, factor analysis, independent sample T-test, one-way ANOVA, Pearson's correlation analysis, regression analysis and hierarchical regression analysis. The research result shows buyer motivation is significant in independent sample T-test and consumer attitudes are significant in one-way ANOVA and all dimensions are positive related and significant in Pearson's correlation analysis and regression analysis.

Keywords- Environmental Knowledge; Consumer Attitudes; Price Sensitivity; Buyer Motivation of Green Products.

ABBS23-NRE035

Incorporating Solar Thermal Power Generation in Coal-Fired Power Stations: A Promising Approach

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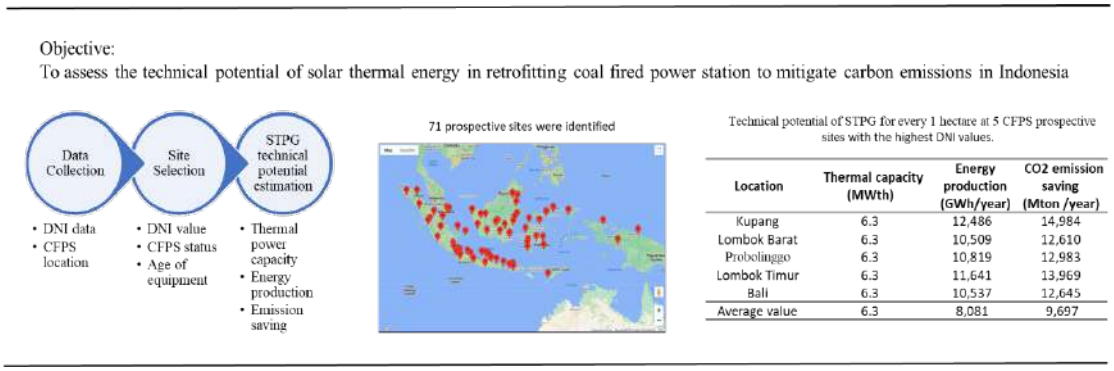

Location	Thermal capacity (MWth)	Energy production (GWh/year)	CO2 emission saving (Mton /year)
Kupang	6.3	12,486	14,984
Lombok Barat	6.3	10,509	12,610
Probolinggo	6.3	10,819	12,983
Lombok Timur	6.3	11,641	13,969
Bali	6.3	10,537	12,645
Average value	6.3	8,081	9,697

Abstract- Within the framework of global efforts to combat climate change, the energy sector is faced with the challenge of transitioning away from fossil fuel dependency towards more ecologically sustainable alternatives. However, phasing out fossil fuel power plants can be a lengthy and difficult process that may meet political hurdles and have a wide range of consequences for communities, electricity pricing, security of supply, and other factors. This research aims to evaluate the potential of incorporating Solar Thermal Power Generation (STPG) technology into Coal-Fired Power Stations (CFPS) as an alternative solution to mitigate carbon emissions in Indonesia. An innovative approach has been developed to assess the technical viability of solar thermal energy implementation in CFPS locations by facilitating site selection, making predictions about system capacity and production, and estimating the potential savings in emissions. This study employs spatial Direct Normal Irradiation (DNI) data to address the major scarcity of precise DNI data specifically designed for STPG systems within the Indonesian climate. As a result, a total of 71 prospective sites have been identified, among which the five locations exhibiting the highest Direct Normal Irradiation (DNI) values are Kupang City, East Lombok, Probolinggo, Bali, and West Lombok. Specifically, the DNI values for these sites are recorded as 1982, 1848, 1717, 1673, and 1634 kWh/m2.year, respectively. Hence, the average annual solar thermal energy potential per hectare of usable land in each CFPS location is 6.3 kWth in terms of thermal power capacity, 8081 GWh/year in energy production, and 9697 Mton CO2 saved. This finding demonstrates that retrofitting CFPS with solar thermal energy technology emerges as a promising solution in the energy transition, bringing Indonesia closer to its renewable energy targets and global climate commitments. The integration of STPG with hydrogen production, biomass combustion, and other renewable energy sources in the retrofit of coal-fired power plants could also be further studied to maximize the benefits of this promising approach.

Keywords- Solar thermal power generation; Direct Normal Irradiation (DNI); coal-fired power station; carbon emission; retrofitting; technical potential

ABBS23-NRE036

Investigation of Al-doped Materials, Methods, and Electrolytes: Towards High-Performance Rechargeable Magnesium Batteries

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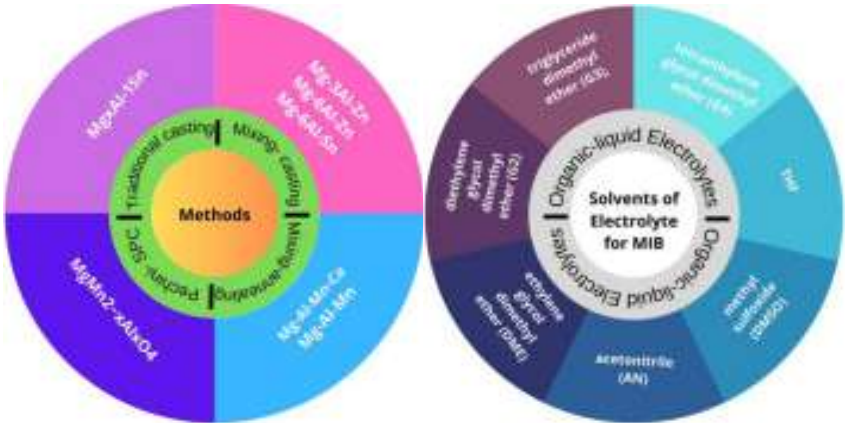

Fig 1. Materials and Methods for MIB **Fig 2**. Types Solvent of Electrolyte for MIB

Abstract- Aluminum-doped magnesium ion batteries (MIB) are considered a promising alternative to lithium batteries because of their advantages, namely abundant in nature, low cost, high stability in the atmosphere, high theoretical specific capacity, and environmental friendliness. However, in its development, it is necessary to pay attention to the selection of active electrode materials, appropriate methods, and electrolytes to improve battery performance. The purpose of this review article is to identify methods, types of electrolytes, and active electrode materials that are effective in magnesium-ion batteries. There are various methods for synthesizing MIB electrodes, including the Pechini method, traditional casting method, self-propagating combustion (SPC) method, casting, mixing, and annealing. The active electrode materials used include $MgMn_{2-x}Al_xO_4$, Mg-xAl-1Sn, Mg-xAl-Zn, Al-xMg, Mg-Al-Mn-Ca, and Mg-Al-Mn. The electrolyte also plays an important role in determining battery performance because it acts as a charge-carrying medium and underlies the redox reactions of the electrolyte/electrode interface. The electrolyte commonly used in MIB consists of salt and solvent. Organic–liquid electrolytes are widely used because of their relatively high conductivity and ionic stability. Types of solvents for MIB electrolytes include diethylene glycol dimethyl ether (G2), triglyceride dimethyl ether (G3), tetraethylene glycol dimethyl ether (G4), THF, methyl sulfoxide (DMSO), acetonitrile (AN), and ethylene glycol dimethyl ether (DME). Comparison of the results of using methods, electrolytes, and active electrode materials that have the potential to improve battery performance is a benchmark in the application of magnesium-ion batteries. Based on a literature review, the specific capacity produced from Mg-xAl-Sn through the mixing and annealing process is 1800 mAh g^{-1}, and the electrolyte with THF solvent shows better performance in batteries.

Keywords- Magnesium ion battery, aluminum, annealing, electrolyte, electrode.

ABBS23-NRE037

Magnetron sputtering-deposited MnO2: The Impact of Oxygen Flow Addition on Structural and Electrical Properties

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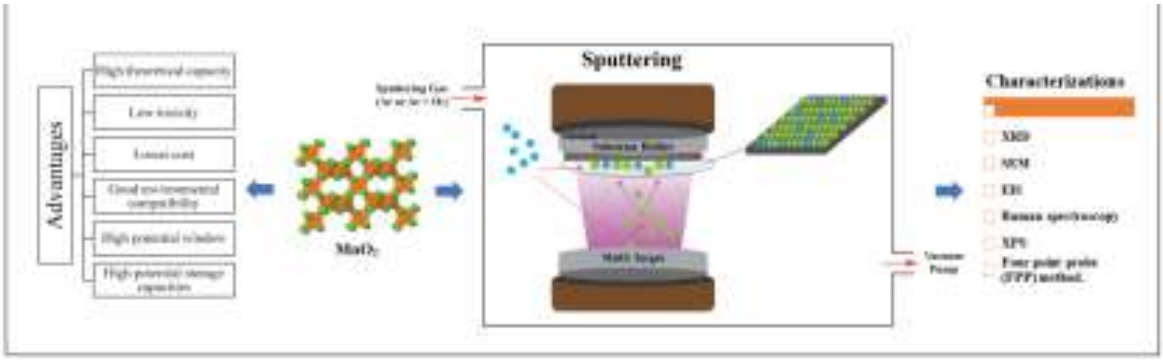

Abstract- Manganese dioxide (MnO_2), which is composed of one manganese (Mn) atom and six oxygen (O) atoms has received significant attention as a suitable material of electrode supercapacitors due to its low toxicity, lower cost, good environmental compatibility, and high theoretical capacity (1370 F g^{-1}). In various methods, MnO_2 synthesis for supercapacitor applications has been widely explored, and one of them is the sputtering method. This research reports the effect of variations in process parameters during magnetron sputter deposition of MnO_2. Here, MnO_2 was deposited directly onto a Si wafer substrate at a temperature of 200°C for 2 hours and 65 W sputtering power with a total pressure was 0.5 Pa. Sputtering of MnO2 was performed under two different gas flow conditions, using argon (Ar, 30 sccm) gas alone and a mixture of argon (Ar, 30 sccm) and oxygen (O_2, 35 sccm) gasses. MnO_2 was characterized using X-ray diffraction (XRD) to determine the crystallographic information, the morphological properties were examined using scanning electron microscopy (SEM), and the efficiency of the charge transfer was evaluated by electrochemical impedance spectroscopy (EIS) measurements. Additionally, further characterizations were conducted through Raman spectroscopy and X-ray photoelectron spectroscopy (XPS). Electrical conductivity measurements were carried out by a four-point probe (FPP) method. The substrate material was also investigated. XRD analysis results reveal that MnO_2 with added oxygen gas flow exhibits an amorphous structure. No sharp peak has been found in the spectra, while MnO_2 with only argon gas showed a crystalline structure. The other results of the addition of oxygen gas flow have an effect on structural characteristics, surface morphology, the effective active site, electrical conductivity, and resistivity. Moreover, MnO_2 has good specific capacitance values, showing its potential for sustainable applications in energy storage.

Keywords- MnO2; Magentron sputtering; Supercapacitor, Sputtering

ABBS23-BE038

Performance of Using Lignin Pyrolysis Gas for Continuous Ethanol Production in Gas-liquid Separation Biofilm Reactor

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Abstract- With the rapid development of industry, fossil energy has been rapidly consumed, so it is urgent to seek an alternative energy source. Bacteria use pyrolysis gas to produce ethanol, which is a way to generate clean energy. However, pyrolysis gas (CO, CO_2, H_2) is difficult to dissolve in liquids, limiting gas-liquid mass transfer and bioconversion. In this study, a gas-liquid separation type biofilm reactor was designed using the NIPAAm-PVDF hollow fiber membrane to enhance gas-liquid mass transfer. Under 17% CO+30% CO_2+53% H_2 gas composition, the total organic carbon (TOC) is finally about 6.2g L^{-1}, and the highest ethanol concentration can reach 10.499g L^{-1}. Under 23.55% CO+21.15% CO_2+55.3% H_2, the maximum concentration of TOC reached 4.48g L^{-1}, and the maximum concentration of ethanol reached 8.497g L^{-1}. In summary, the PVDF hollow fiber membrane modified with N-polyacrylamide is suitable for bacterial biofilm formation and enhancing gas-liquid mass transfer.

Keywords- PVDF hollow fiber membrane; N-polyacrylamide; gas-liquid separation; lignin pyrolysis gas.

ABBS23-NRE039

Effect of a 5° Angle Deflector on the Performance of Twin- Hydrokinetic Savonius Turbines with Adjacent Advancing Blades

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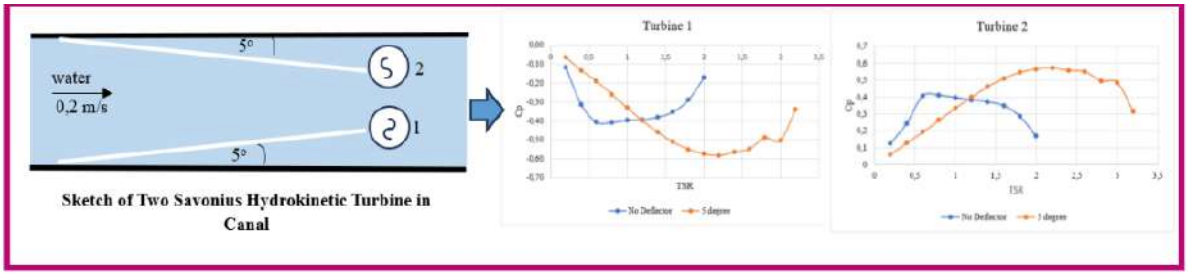

Sketch of Two Savonius Hydrokinetic Turbine in Canal

Abstract- To reduce the dependency of fossil fuels, water is a new and renewable energy that is clean and efficient. The hydrokinetic Savonius turbine is an alternative for generating electricity using new and renewable energy. The turbine that utilizes the drag force has a simple shape and can work at low speeds. However, its efficiency is the lowest compared to other turbines. Placing twin-hydrokinetic Savonius turbines side-by-side configuration with adjacent advancing blades can increase the power produced. The addition of deflectors is expected to reduce the pressure drag on the returning blade so that it can increase the power of the turbine. So, this research was carried out by placing a deflector to determine its effect on the performance of twin-hydrokinetic Savonius turbines in a canal. A 2-D numerical study will be carried out using CFD software Ansys Fluent R2 2023 in unsteady conditions and a realizable k-ε turbulent model. The turbine diameter is 60 mm, the shaft diameter of 10 mm, and a characteristic length (L) of 110 mm while the canal size is 35L x 3.63L. Both turbines are separated by a distance of 134 mm. This simulation uses the sliding mesh method so that the domain is divided into 2 (two) subdomains, namely the rotating domain for the hydrokinetic Savonius turbines and the stationary domain for the canal. The density of the water is 997.05 kg/m3 and the water velocity is 0.2 m/s. The deflector is placed at an angle of 5° with a deflector width of 133 mm. The simulation results show that a deflector at an angle of 5° can improve the performance of the hydrokinetic Savonius turbine by 29.75% for turbine 1 and 28.30% for turbine 2 compared to the turbines without deflector in a side-by-side configuration.

Keywords- Savonius; Side-by-side; Deflector; Coefficient of Power.

ABBS23-NRE040

Deflector Effect on Side-by-Side Twin-Hydrokinetic Savonius Turbines Performance With Returning Blade Near Canal Wall

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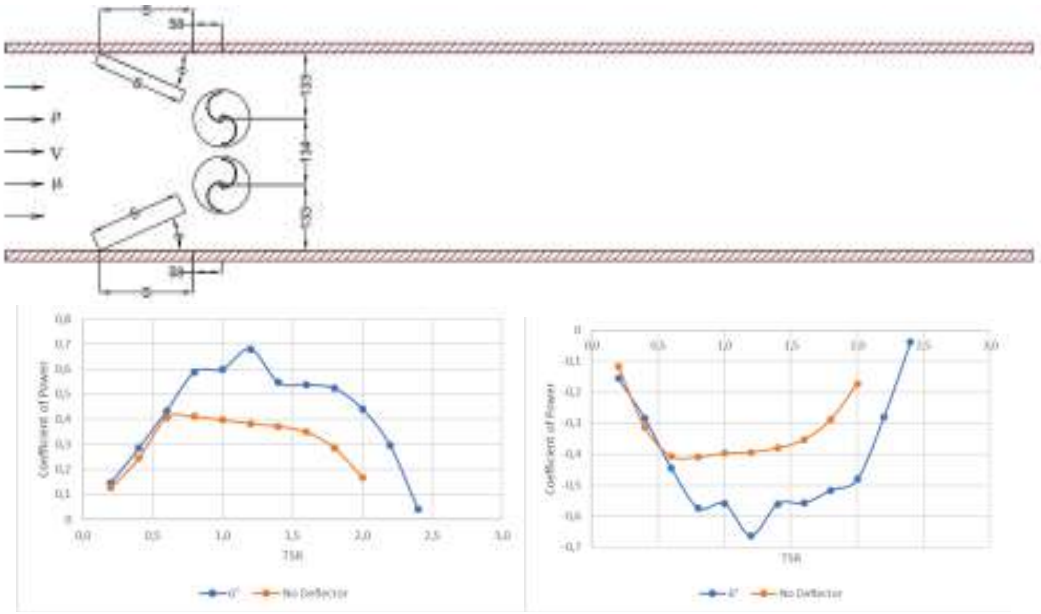

Coefficient of Power of upper turbine Coefficient of Power of lower turbine

Abstract- Water energy is a renewable energy source that can be used as a source of electrical energy through hydroelectric power plants. One type of turbine that can be used to harness energy is the Savonius turbine. This research was carried out by adding a plate as a deflector in front of the returning blade in Dual Savonius Turbines arranged side-by-side for the Returning Blade near the Canal Walls to direct the water flow in the advancing blade. Adding a deflector plate to the returning blade will direct the water flow toward the advancing blade, and the drag force on the advancing blade increases. So the positive torque of the turbine increases and causes the turbine performance to increase. This research used a 2D numerical method using the ANSYS FLUENT R1 2023 software with meshes selected from the grid independence test process. The simulation uses a k-ε Realizable model with a velocity inlet of 0,2 m/s. According to the independency test, the present study applied 66000 elements and validated with previous research authors by Patel et al (2016) with 3,65% average error. In this research, a deflector plate with a 6° angle with a flow velocity is 0,2 m/s and a length of the plate is 190,5 mm. The maximum performance upper turbine can increase about 65,8% and the lower turbine performance can increase about 61,7% higher than side-by-side dual Savonius Turbines without a deflector.

Keywords- Savonius Turbine; Side-by-side; Numerical Simulation; Turbine Performance; Deflector.

ABBS23-NRE041

Effect of Deflector on the Performance of Twin-Hydrokinetic Savonius Turbines with Adjancent Returning Blades in a Side-by Side Configuration

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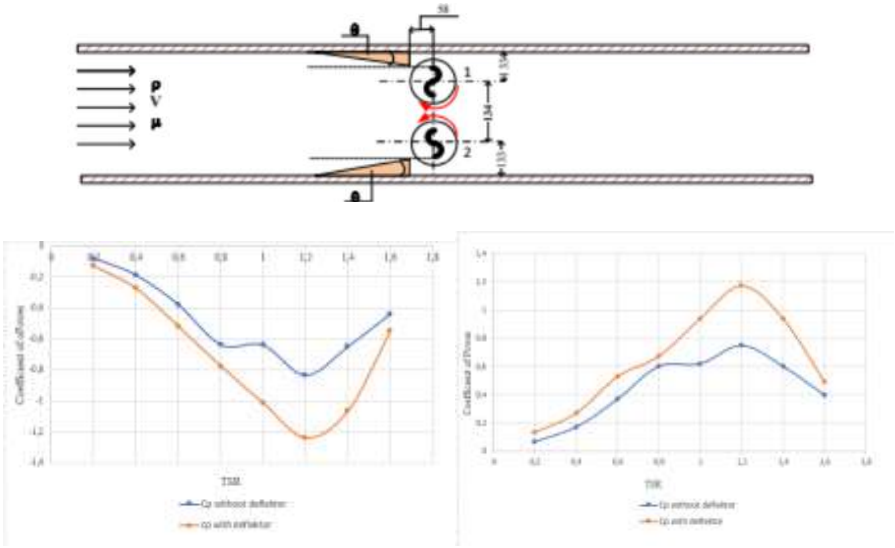

Coefficient of Power of upstream turbine Coefficient of Power of downstream turbine

Abstract- Water energy is one of the most important renewable energy sources in an effort to reduce dependence on fossil fuels and mitigate the effects of climate change. The final energy consumption during 2020-2015 increased relatively limited at around 1.3%. Renewable energy is an energy source that is available by nature and can be used continuously, one of which is water, and can be utilised by using water turbines. A water turbine suitable for low flow speeds is the Savonius water turbine. Savonius turbines, a type of vertical turbine, have been the focus of significant research in water energy utilisation. Savonius turbines have a simple design and have the ability to receive water from any direction. The drawback of the Savonius turbine is its low performance. These shortcomings prompted research to improve the performance of the Savonius turbine. This study was conducted by increasing the number of turbines to two Savonius turbines with the addition of a deflector on the advancing blade near the canal wall arranged in a Side-by-Side manner with a deflector tilt angle to obtain optimum turbine performance. The method used is a numerical approach, namely Computational Fluid Dynamics using ANSYS FLUENT R1 2023 software. In this study, the angle of inclination used is 5^0at $3.6x10^4$ with the velocity of the water fluid used is 0.3 m/s. The turbulence model used in this study is k-ε realisable. The research was conducted by analysing the coefficient of coefficient of power (CoP). Based on the grid independency test (GIT) in this study using 66000 elements and has been validated using previous research conducted by Patel et al (2016) with an average error obtained of 3.65%. In this study, a numerical study was conducted and the results were compared with simulations without the use of a plate deflector. The results show that at the upstream position using the deflector plate, the maximum performance increases at TSR 1.2, which is 1.23, while at the downstream position, the maximum performance at TSR 1.2 is 1.17. Respectively 33% and 36% at a deflector angle of 6^0.

Keywords- Savonius turbine, Side-by-Side, deflector, tilt angle, numerical simulation, turbine performance

ABBS23-NRE042

Blockage Effect on the Performance of Twin-Hydrokinetic Savonius Turbines with Opposite Rotation in Tandem Arrangement

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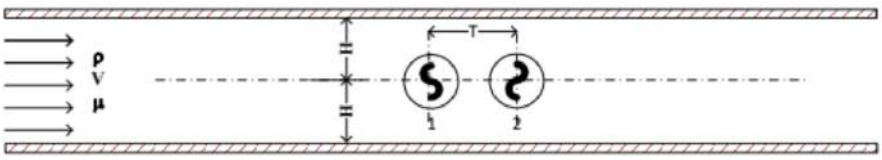
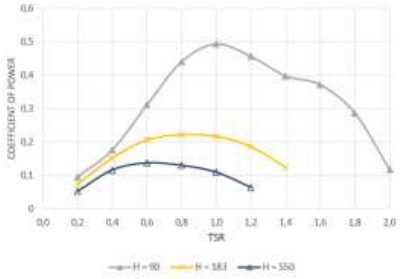
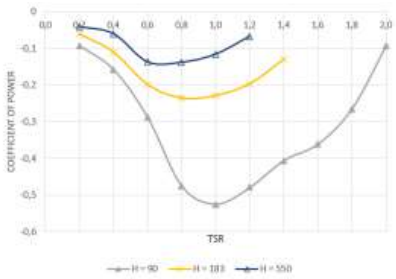


Fig 1. Schematic of Present Study



Coefficient of Power of Upstream Turbine



Coefficient of Power of Downstream Turbine

Abstract- Energy transition is an urgency focused by all countries. Application of green energy in purpose for renewable energy transition has been chosen, e.g. water flow. As one of the renewable energy sources, water is abundant and clean. Many research has been conducted to extract water flow in order to produce electricity for human necessity using hydrokinetic turbine with many innovations such as installed addition turbine in side-by-side, tandem or staggered arrangement and mounted in narrow channel or river. Recent data shows that Indonesia has 95 GW hydro energy and utilized only 6,69 GW. In order to maximize the potential of hydro energy in Indonesia, it is required to apply hydrokinetic turbine widely. One of hydrokinetic turbines that can put into practice easily is Savonius turbine. While it is simple to design and construct a Savonius turbine, its performance is rather low. This disadvantage leadsthe research to improve Savonius turbine performance. In the present study, a 2D numerical approach has been conducted to increase two hydrokinetic Savonius turbines performance installed in narrow channel with tandem arrangement. The result is compared with Savonius turbine installation in open channel to obtain performance enhancement. Distance between both turbines (T/D) is fixed at 60, in which both turbines are independent and width of channel relative to the turbine center axis (H) is vary at 90, 183, and 550mm. Turbulence model used in this study is k-ε realizable with velocity-inlet 0,3m/s and no-slip wall condition. According to the independency test, this present study has applied 66000 elements and has been validate with previous research with 3,65% average error. The results of this study show an increase in both coefficient of moment and coefficient of power for upstream and downstream turbine in higher blockage ratio (BR). Blockage ratios used in this study corresponded to the distance between wall channel and turbine center axis (H) are 0,61, 0,3, and 0,1, respectively. BR 0,61 has maximum performance at TSR 1 and reach maximum TSR at TSR 2. BR 0,61 produced significant increase in coefficient of power of upstream turbine at TSR 0,8 with 50% and 78% enhancement from BR 0,3 and 0,1, respectively. While downstream turbine is 50% and 79% from BR 0,3 and 0,1 at TSR 0,8, respectively.

Keywords- Savonius Hydrokinetic Turbine; Blockage Ratio; Twin Turbines; Tandem; Numerical Study

ABBS23-NRE043

Blockage Ratio Effect on The Performance of Twin Hydrokinetic Savonius Turbines with Unidirectional Rotation in Tandem Configuration

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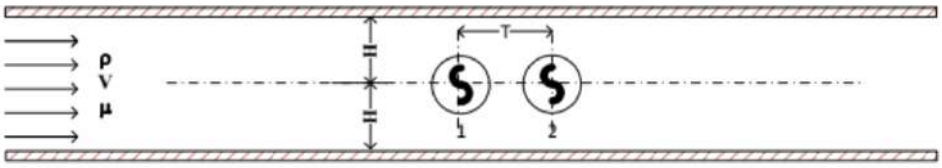

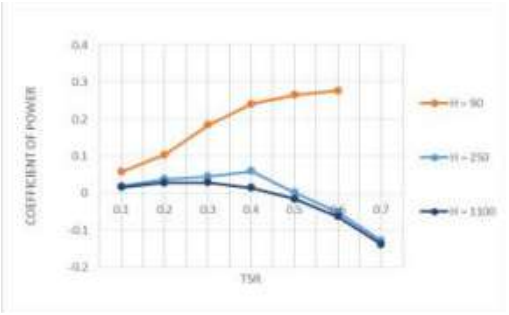

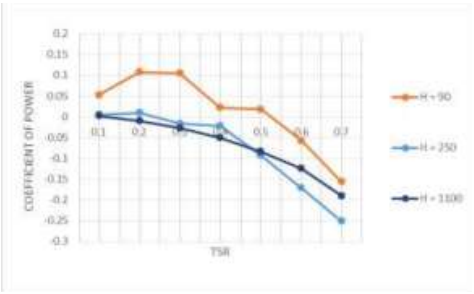

Coefficient of Power of Upstream Turbine Coefficient of Power of Downstream Turbine

Abstract- The increase of population, technology and economy causing the increase of energy consumption per year. The main source of energy in Indonesia is fossil fuels that can caused energy crisis. Alternative source of energy to solve this problem is renewable energy through flow utilization. Savonius hydrokimetic turbine convert the kinetic energy into electricity installed in narrow river or channel. The advantages of this turbine are simple design and ability to self starting, although it has a low performance. Because of this disadvantages many research has done to improve the Savonius turbine performance. This study investigates the performances of Savonius water turbine arranged in tandem with numerical approach using the ANSYS FLUENT R1 2023 software. The turbine installed in a narrow water channel arranged in tandem and the result is compared with the installation in a open channel. The analysis performed for distance between both turbines are considered (T/D) fixed at 2,667 and the width of the water channel to the turbine center axis (H) are 90, 250, and 1100 mm. Numerical approach in this study using turbulence models k-ε realizable, velocity inlet 0,3 m/s, and no-slip wall condition. The independency test has done in this present study which applied 66000 elements and validated according to previous research by Patel et al (2016) with 3,65% average error. The results of this present study show an increment in both coefficient of moment (Cm) and coefficient of power (CoP) of upstream and downstream turbine as the blockage ratio (BR) increase. Blockage ratios in this study according to the distance between wall channel and turbine axis are 0,63, 0,23, and 0,05, respectively. The maximum performance is BR of 0.63 at TSR 0,6. It is observed that BR 0.63 increase in coefficient of power of upstream turbine at TSR 0,3 with 75% and 84% increment from BR 0,23 and 0,05, respectively. The downstream turbine at TSR 0,1 with 88% and 94% increment from from BR 0,23 and 0,05, respectively. Moreover, it is also found that the increase of blockage ratio, increase the in Savonius hydrokinetic turbine performance.

Keywords- Savonius Hydrokinetic Turbine; Tandem; Blockage Ratio; Twin Turbine; Turbine Performance; Numerical Study

ABBS23-SEEP044

Coconut Fiber Cellulose Acetate Membrane with Polyvinylpyrrolidone (PVP) Additive for Water Purifier

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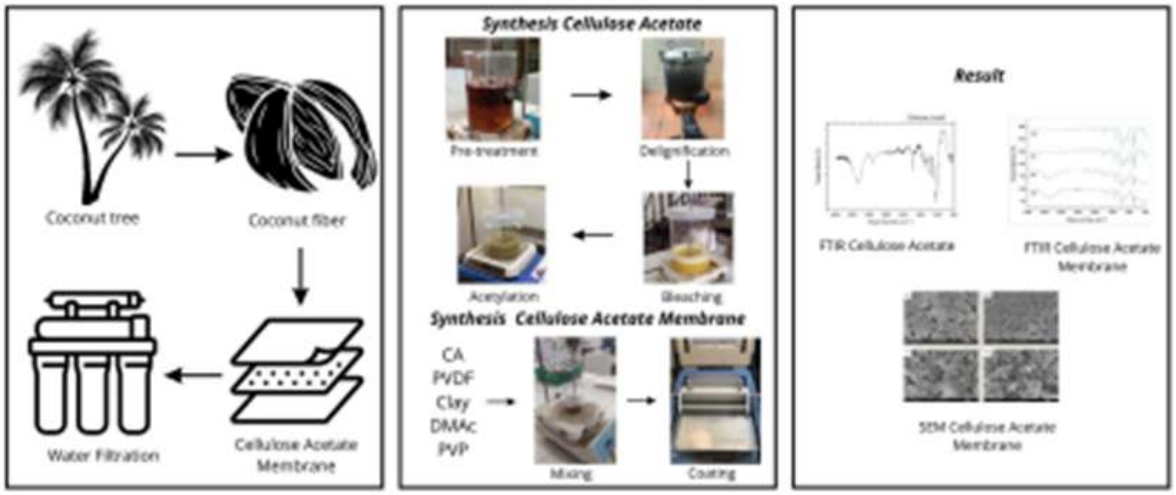

Abstract- Coconut fiber is a part of the coconut which causes waste problems. Processing coconut fiber to extract its cellulose and use it as a cellulose acetate membrane is one of the solutions to reduce waste. In this study, cellulose acetate membranes for water purification were synthesized from coconut fiber with variations in the addition of polyvinylpyrrolidone (PVP) additives using the phase inversion method. Variations in the addition of PVP additives are 0.02;0,03;0,04; and 0,05 grams of PVP. Delignification cellulose is determined by its yield and α-cellulose content, while acetylated cellulose acetate is determined by percentages of acetyl, degree of substitution, and characterized by FTIR. Cellulose acetate membranes were tested with various parameters, such as SEM, FTIR, and porosity. The delignification yield of coconut fiber was obtained at 69,44% while the α-cellulose content was obtained at 60%. The percentage of acetyl is 22,30% and the degree of substitution is 1,07. The SEM results show that the greater the addition of PVP additives, the larger the pore diameter. The results of the FTIR characterization showed that acetylation had occurred in cellulose. The porosity test result was obtained consecutively 27,47;30,45;37,04; and 48,15%. The addition of PVP additive as a pore-forming agent shows that the greater the addition of PVP, the better the pore size distribution, which indicates the better the performance of the membrane.

Keywords- *Cellulose Acetate Membrane; Coconut Fiber; Phase Inversion; Polivinilpirolidone Additive; Water Filtration*

ABBS23-BHBP045

Optimization of Hydrogen Production from Sea Water using the Photovoltaic-Electrolysis Tracking Method

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Abstract- Hydrogen is the energy with the most potential to be developed as both a fuel and clean energy. Photovoltaic-Electrolysis seawater is a hydrogen producer with a clean and free source. The electrolysis method in this research uses direct electric current (DC) from solar panels (photovoltaics) with 5000 ml of seawater electrolyte solution. The duration of electrolysis is 7 hours starting from 10.00 am to 16.00 pm. Titanium plates with a thickness of 1 mm are used for both electrodes with a 5 cell design. The voltage varies from 12, 18, 24 and 30 volts for the operating process. Electrolysis is carried out without the addition of a catalyst, using only the natural electrolyte sea water. The electrolysis reactor is rectangular in shape, the operating process is at atmospheric temperature conditions and 1 atm. The research results show that voltage has a greater influence on the electrolysis process compared to time. However, temperature also plays an important role in production and it is proven that when the temperature reaches above 60°C the H_2 gas flow rate begins to decrease even though the operating voltage is greater. From the research results, the highest hydrogen gas flow rate was obtained with increased the hydrogen generation efficiency to 10.4% (21.13ml/s) with an average operating temperature of 43.31°C.

Keywords- hydrogen, energy, electrolysis, seawater, photovoltaic, solar tracker

ABBS23-NRE046

The Effect of Annealing: Manufactured MXene Morphology Modification on Supercapacitor Performance

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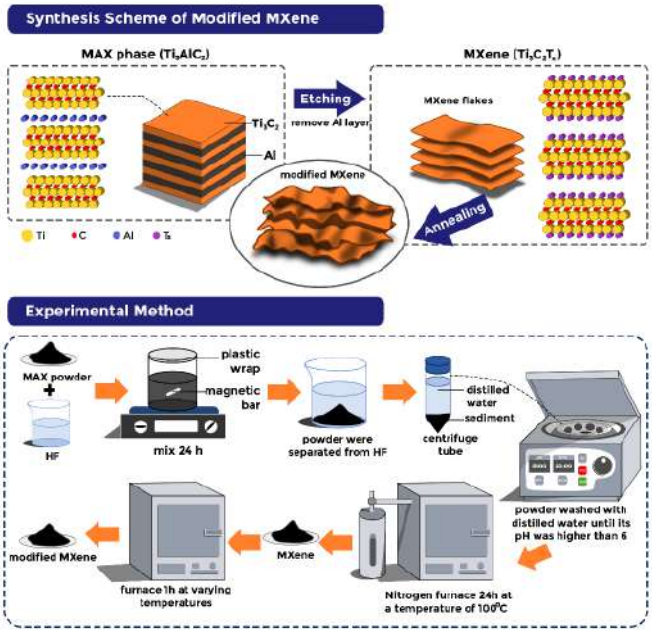

Abstract - Supercapacitors are expected to be the promising energy storage devices for future generations. Supercapacitor has higher power density and faster charge-discharge cycles than batteries and greater energy density than dielectric capacitors. MXene material is a good candidate for supercapacitor electrodes because it has excellent electrochemical properties, high electrical conductivity, and high hydrophilicity. However, 2D MXene flakes can reduce active site contact and hinder electrolyte ion transport, which affects electrochemical performance. MXene flakes can be removed in an advanced method with an annealing process. The annealing temperature is a key factor to influences the morphology, structure, components, and mass changes of the electrode material, which has been shown to increase the electrochemical performance. In the previous studies, the MXene surface could be modified by an annealing treatment. The annealing treatment aims to remove a part of the surface groups and expose more Ti elements in the MXene surface, providing the larger active sites to contact the electrolyte. Zhou et al (2020) research show that MXene film upon annealing treatment at 650°C for 1 h using an Ar furnace has a higher specific capacity than pure MXene (442 Fg-1) and excellent cycling stability with capacity retention of 95,4% after 5000 cycles. Therefore, this research will focus on obtaining how the annealing treatment affects the performance of modified MXene using different temperature furnaces. This research has synthesized MXene (Ti3C2Tx) material from MAX phase (Ti3AlC2) using the etching method with an HF solution. The powder MXene was then annealed for 1 hour at varying temperatures ranging from 350°C, 450°C, 550°C, and 650°C using a furnace. The samples were then characterized using XRD, SEM, BET, GCD, CV, and EIS. X-ray diffraction (XRD) was used to confirm that the Al atomic layer of Ti3AlC2 was successfully removed by hydrofluoric acid (HF) treatment and effect temperature. Galvanostatic charge-discharge (GCD), CV, and EIS were used to obtain the modified MXene's electrochemical performance. The ideal annealing temperature will provide more active sites without titanium oxide formation due to oxidation and maintain its structural integrity.

Keywords: Annealing, Modification structure, Etching, MXene, Supercapacitor

ABBS23-NRE047

Assessing the Wind Resource Variability for Green Hydrogen Production in Sumba Island

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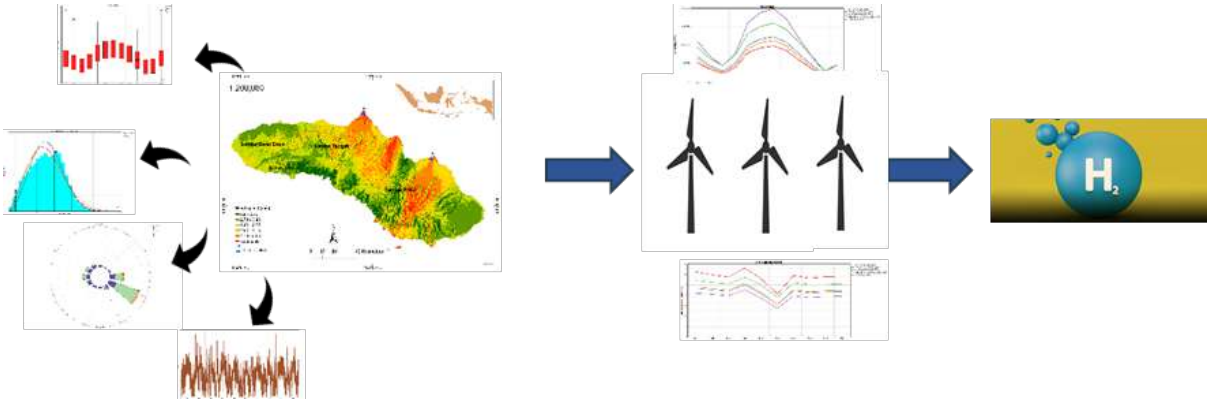

Abstract - Generating hydrogen from renewable energy sources is widely recognized as an effective strategy for addressing critical challenges in the energy sector while simultaneously contributing to the vital reduction of greenhouse gas emissions. This study aims to assess the wind energy potential for electricity and hydrogen production in five locations on Sumba Island, namely Haharu, Laepori, Kahaungu Eti, Waingapu, and Karera, using 10 years (2011-2020) data from NASA's Langley Research Center (LaRC) POWER Project. The assessment involves various aspects such as average wind speed, wind direction, Weibull distribution parameters, wind power density (WPD), annual power output, and annual hydrogen output, performed by five wind turbines with capacities ranging from 500 kW to 1.5 MW. The results reveal that Sumba Island, particularly the regions of Haharu and Waingapu, possesses substantial wind energy potential that can be harnessed for both wind power generation and hydrogen production. The feasibility analysis of hydrogen production from wind energy demonstrates that Sumba Island produces hydrogen at an estimated rate of 18.99 to 42.65 tons per year. This finding underscores the promising potential of Sumba Island as a hub for sustainable energy production, contributing to the growing demand for clean and renewable energy sources.

Keywords: Wind energy; hydrogen production; WPD, Weibull parameters; CF

ABBS23-BE048

Processing POME into Biogas using cover lagoon technology for sustainable electricity production.

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Abstract - The development of palm oil processing encourages the palm oil industry to enhance industrial sustainability and creates chances to lower greenhouse gas emissions through waste processing, particularly the processing of liquid waste in the form of POME. This paper describes the POME processing using cover lagoon technology, from initial treatment to electricity. There are four steps involved in producing continuous, effective, and efficient biogas from POME: hydrolysis, acidogenesis, acetogenesis, and metanogenesis. What effects do temperature, pH, residence time, and POME content and quality have on the production of biogas? What initiatives are in place to improve the production of biogas, purify it, and turn it into electricity? What is gained from POME processing in terms of contributing to improving the environment and reducing greenhouse gas emissions, is discussed in more depth in this paper.

Key words: POME, pre-treatment, Biogas, purification, greenhouse gas emissions, electricity

ABBS23-SEEP049

Prospects for the Application of New and Renewable Energy from various aspects : Techno-Socio-Economic, Environmental and Policy

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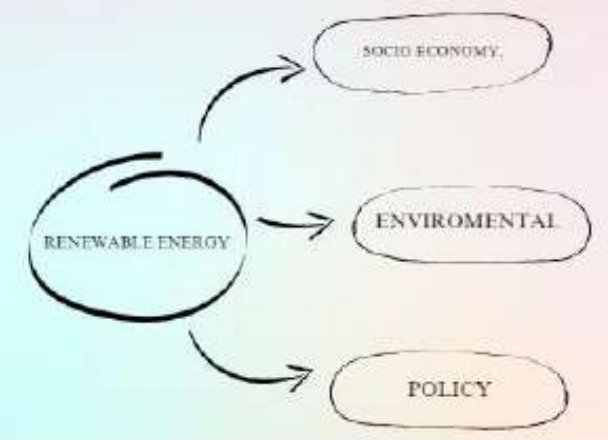
Abstract - Currently, the government has tried to reduce fossil energy drastically and continuously, while also trying to maintain and restore the remaining natural ecosystems which play a major role in absorbing greenhouse gas emissions from the atmosphere at the same time. This is all done because it is known that in the process of extracting fossil fuels from the bowels of the earth and burning them, emissions are produced which have serious impacts because they cause various damages to the environment. Therefore, the application of the renewable energy is a necessity so that environmental damage is replaced by environmental improvement. Renewable energy is an energy source that comes from natural resources and will not run out because it is formed from sustainable natural processes. The potential for new and renewable energy in Indonesia that comes from nature is very abundant. If managed and utilized properly, it is believed that renewable energy can replace conventional fossil-based energy. Various new and renewable energy sources in Indonesia that can be utilized include: biofuel, biomass, geo-thermal, water (streams and waterfalls), wind, hydrogen, tidal waves and the sun. Unfortunately, these renewable energy sources have not been utilized optimally and optimally.



The results of this multidisciplinary research were written to find out how conventional energy based on fossil fuels must be immediately replaced with renewable energy. The focus in this writing is the very high potential for solar energy in Indonesia. Effective energy planning can maximize the realization of solar energy utilization. Currently, more and more people want to combine conventional electrical energy such as PT PLN with alternative solar energy. Apart from being popular on a residential scale, in the future solar energy power plants will be in great demand on an industrial or factory scale. It is predicted that in the future elec-tricity costs will continue to increase so that bills will continue to increase. To save costs and energy, solar energy power plants will be widely applied for industrial or factory needs. The aim of this research is to find out more about: how solar energy technology is mastered and ready to be implemented by the community, what the planning and direction of government policy is in utilizing solar energy in Indonesia. The technology used in utilizing solar energy in Solar Energy Power Plants is photovoltaics and concentrating solar energy. The data used is secondary data obtained through intensive literature study. This research uses a qualitative de-scriptive method and a quantitative normative method by utilizing secondary data sources as fully and optimally as possible based on valid numeration from valid sources

Keyword : new and renewable energy, environmentally, policy, social , economics

ABBS23-NRE051

Con-Solvent Aqueous Electrolyte: Establishing the Screening Length and Enhancing CoS2/Ni(OH)2 Supercapattery Performance

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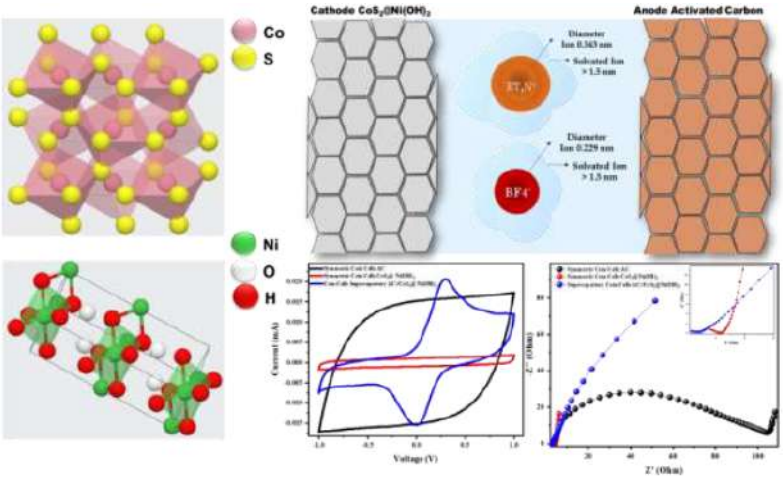

Abstract - Electrolytes are one of the most influential aspects determining the performance of electrochemical supercapattery. The Debye screening length is the characteristic length scale for interactions in aqueous electrolytes (low ion density), which decrease exponentially with distance, according to classical electrolyte theory. The decrease in length is linearly decreasing with increasing concentration of ions because of short-range effective charge screening. Therefore, no long-range forces are anticipated in the concentrated electrolyte according to the Debye model. Here, we demonstrate that the screening length grows with increasing concentration beyond the dilute (Debye-Hückel). The purpose of this research is to investigate the variations in concentrationsolvent (con-solvent) that could have an impact on the Debye screening length. The results show that in aqueous electrolytes sampled C1 (1 M), C2 (2M), C3 (3M), and C4 (4 M) the Debye-Hückel screening length gets variation. Electrolyte ET4NBF4 consolvents in acetonitrile (ACN) as electrolyte for supercapatterry improves conductivity, electrochemical properties, and stability, allowing greater energy storage capacity and increased device durability. In addition, variations in solvent concentration affect the electrochemical properties of the electrode interface, which contributes to the performance of the supercapattery. These findings provide significant insight into how controlling solvent concentration can be used to improve the performance supercapattery. This research has an important emphasis on developing more efficient and sustainable energy storage technologies. The synergistic effect of CoS2 and Ni(OH)2 increased the storage capacity and energy density of the supercapattery. Multivalent ion storage in CoS2@Ni(OH)2 enables the storage of a number of ions. The supercapattery was designed with CoS2@Ni(OH)2 and activated carbon (AC) achieved a high energy density of 79 Wh/kg in addition to its high power density of 420 W/kg. The supercapattery (CoS2@Ni(OH)2 //AC) was subjected to 3000 cycles.

Keywords: Screening Debye Length, Organic Electrolyte ET4NBF4, Supercapattery

ABBS23-BE052

Utilization of POME for Biomethanol Production through Direct Partial Oxidation of Biomethane from Biogas

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Abstract - Palm oil mill waste (POME) is the term used to describe the liquid waste produced by palm oil mills (PKS). The Fresh Fruit Bunches (FFB) boiling process produces boiled condensate, hydrocyclone water, and sludge separator, which are the three forms of POME. Through the fermentation of microorganisms in a cover lagoon anaerobic reactor, POME processing generates biogas, which is typically composed of 35–40% carbon dioxide (CO2), 55–60% biomethane (CH4), and other gases. Methane is a greenhouse gas that is 21 times more potent than CO2 in terms of its 100- year global warming potential.This is why research has been done on changing methane into molecules that can be transported more readily, such methanol. A partial oxidation reaction using ZSM-5, a heterogeneous catalyst based on zeolites, was used to produce methanol from methane. ZSM-5 catalyst was syntesized from coal fly ash and rice husk ash. The assynthesized ZSM-5 were characterized by X-Ray Diffraction, Scanning Electron Microscope, and Surface Area Analyzer. The catalytic activity of assynthesized ZSM-5 zeolites as heterogeneous catalysts in partial oxidation of methane to methanol were evaluated and compared with that of the commercial one. The result showed the as-synthesized ZSM-5 has percentage yield of methanol is 10.04 % and the ZSM-5 commercial has percentage yield of methanol is 2.60 %, they were potential to be used as catalyst in the partial oxidation of methane to methanol. Optimization of the catalytic activity test process for the reaction of methanol from methane was conducted through increasing the selectivity of methanol by modifying the catalyst, and identifying the effect of operating conditions on the production of methanol.

Keywords : POME, Biogas, Methane, ZSM-5, Methanol

ABBS23-BHBP053

Synthesize of Silica Membrane With High Hydrogen Permeability and Water Resistant

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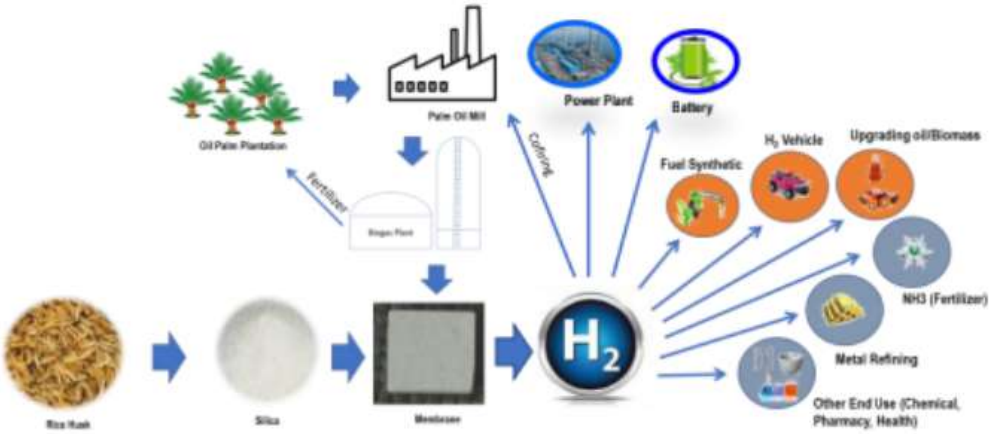

Abstract- Hydrogen is an environmentally friendly and attractive fuel that has great potential for use in the future in order to reduce emissions and achieve net zero emissions. Biohydrogen can be produced from liquid waste from palm oil mills. To improve the quality of produced biohydrogen, it is necessary to purify and separate the biohydrogen from other impurities such as CO2, oxygen, water, etc. Silica membrane was an inorganic membrane that has high thermal stability and potential for hydrogen purification. High purity of silica was obtained from rice husk, then used to synthesize inorganic membrane by hydrothermal process on alumina substrate. The trimethyl chlorosilane was used to change the hydrophilic nature to hydrophobic using vapor infiltration process at 120 ºC. The obtained membrane has a good thermal stability, high permeability for hydrogen and strong resistance to water. Structure identification was carried out using X-ray diffraction. After the calcination process at a temperature of 700 ºC, the structure was still confirmed, which is an indication that the membrane has good thermal stability. The pore size distribution was analyzed using adsorption desorption isothermal method at -229 ºC. In order to study the permeation properties of hydrogen gas on membranes, pure gas permeation tests were carried out at room temperature and various pressures. The permeability of hydrogen gas through the synthesized membrane was around 3 x 10^{-7} mol.m ^{2}.S^{-1}.pa^{-1}. Hydrophobic properties are analyzed by measuring the contact angle of water on the membrane surface. The water permeation test on the hydrophobic membrane at 3 bar showed that no water could pass through the membrane. The results of this research open up opportunities to be implemented in biohydrogen production from pome.

Keywords- inorganic membrane; hydrogen; pore size distribution; thermal stability; water resistant.

ABBS23-NRE055

Theoretical Investigation of the Full-Heusler Fe_2MnSi Thermoelectric Properties

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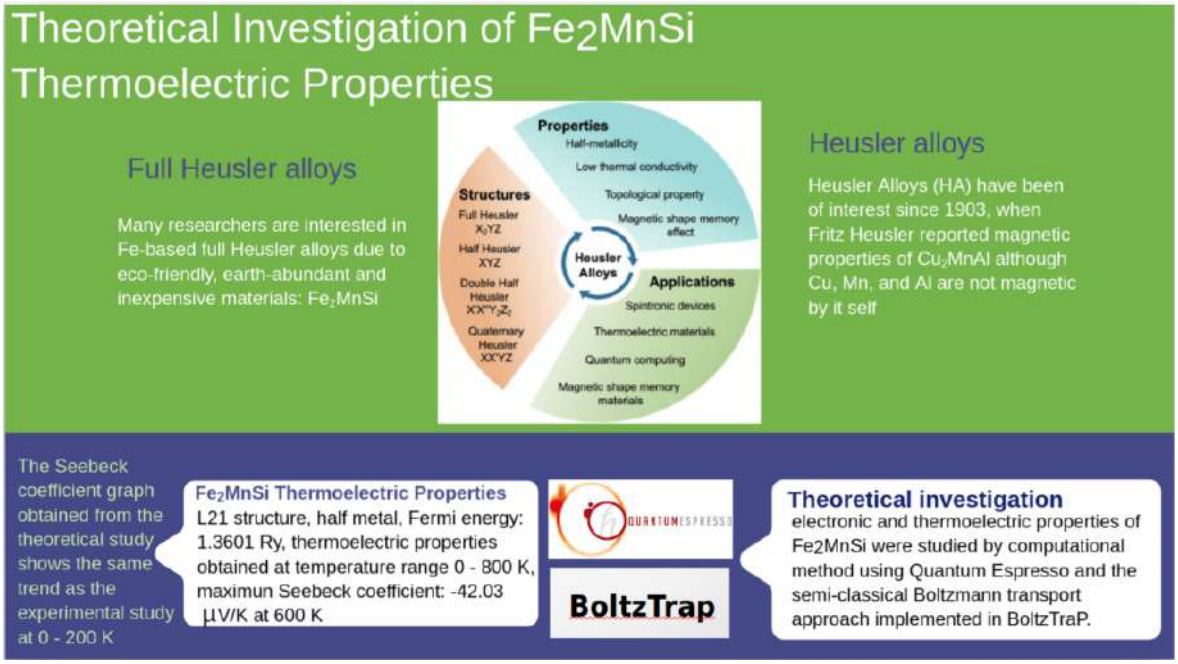

Abstract- Theoretical investigation has been carried out on the thermoelectric properties of full-Heusler Fe_2MnSi through DFT calculations using the Quantum Espresso package. An energy band gap of 0.36 eV was obtained with half-metal properties. In this study, the positions of the Fe, Mn, and Si atoms correspond to the positions of the Cu, Mn, and Al atoms for the Cu_2MnAl structure. The crystal structure of Fe_2MnSi is an *L21* crystal with a lattice constant of 5.591Å. A semi-empirical Boltzmann transport model solved via BoltzTraP software, we calculate the electrical properties, including electronic thermal conductivity, electrical conductivity, and Seebeck coefficient over the temperature range 0 - 800 K. A linear dependence of thermal conductivity and electrical conductivity on temperature due to the metallic nature of the alloy. The value of the Seebeck coefficient decreases from 0 K, forming a maximum value of -42.03 μVK^{-1} at 600 K and then increasing until 800 K. We compare the obtained Seebeck coefficient graph with the experimental Seebeck coefficient obtained from the previous researcher; both charts show the same trend in the temperature interval 0 - 200 K.

Keywords- Thermoelectric, density functional theory (DFT), Seebeck coefficient, electrical conductivity, thermal conductivity

ABBS23-NRE056

Screen-Printed Carbon Electrode from Coconut Shell- Carbon for Cu (II) Electrochemical Sensor

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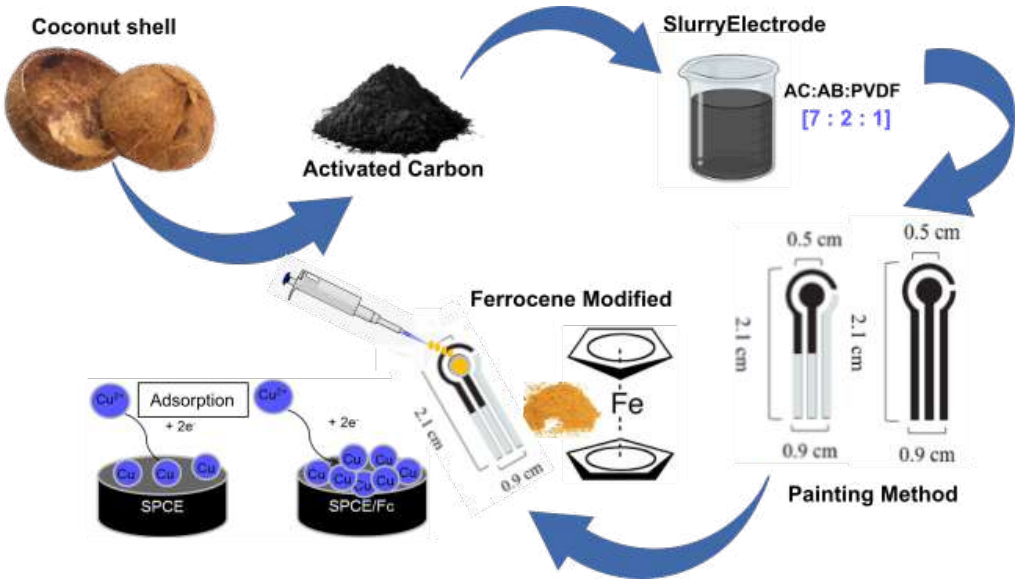

Abstract- Screen-printed carbon electrode (SPCE) was prepared from coconut shell-carbon (CSC). The CSC was chemically activated with NaOH. The working electrode part of the SPCE was then modified by adding ferrocene to form SPCE-Fc, and the SPCE was used as electrochemical sensor for Cu (II) detection. Activated carbon was characterized by X-ray diffraction (XRD), Fourier Transform Infrared (FTIR), Scanning Electron Microscopy-Energy Dispersive X-Ray (SEM-EDX), Surface Area Analyzer (SAA), and conductivity for a single material. The result shows that the CSC is amorphous contains of 52.89% Carbon, 19.65% Nitrogen, and 23.12% Oxygen. FTIR analysis shows vibrations of C=O, C=C, C-H, C-O, O-H, N-H, and C-S. Conductivity of the activated-CSC is 25.6418 S/cm. A carbon ink prepared from the activated-CSC was made by mix the activated-CSC with acetylene black, and polyvinylidene fluoride (at a 7:2:1 w/w ratio). The carbon ink was applied to the printed – PVC paper. The silver (Ag) ink was applied to the reference electrode part. The SPCE-CSC was modified by applying a drop of ferrocene solution on the working electrode part at a various percentage of 10%, 20%, and 30% weight according to the SPCE-CSC mass. Cyclic voltammetry analysis found that the SPCE-CSC-Fc10% provides a highest current density. Therefore, the SPCE-CSC-Fc10% was used further for limit of detection (LoD), interference, the pH and scan rate effect, the repeatability, and the reproducibility tests. A commercial SPCE was also measured for comparison. The LoD is 0.055 mM, the repeatability coefficient (Rc) is 0.306, and provide good reproducibility proven by similar CV curves for replications. Interference test shows that the SPCE-CSC-Fc10% is selectively detect Cu(II) with the presence of Pb(II) and Co(II).

Keywords- Coconut shell carbon, screen printed carbon electrode, electrochemical sensor, Cu(II) detection.

ABBS23-NRE057

Assessing the Mass-Culture System and Proximate Content of *Arthrospira maxima* Local for New and Renewable Energy

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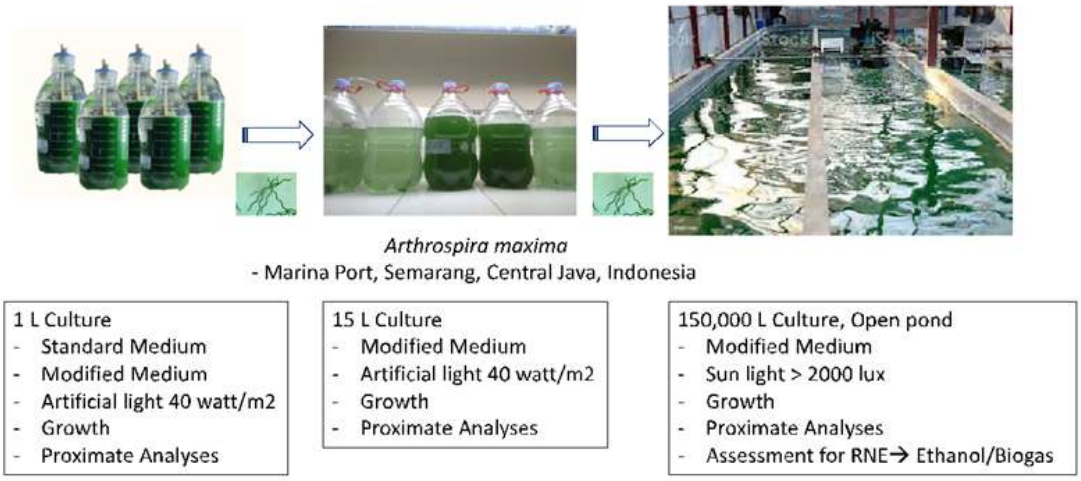

Abstract- *Arthrospira maxima* is a local cyanobacteria isolated from Marina beach, Semarang. This microalga can be grown in sea water and fresh water, and is not toxic. *A.maxima* has been used for feed supplements, food, bioaugmentation and biostimulation of marginal soils and biomass production. This research is aimed at looking at the resilience and ability to grow in outdoor conditions using cheap media and following environmental patterns in terms of temperature, sunlight and aeration. Observation results show that at the scaling up process from laboratorial to outdoor condition the biomass ratio has decreased by 2-10%, whereas protein has decreased from 73% to 68.3%, in contrast starch tends to increase from 10% to 17%. Cultivation time outdoors turns out to be faster growth when compared to controlled conditions indoors. Biomass analyses results shows composition proximate contents were dominated by protein then following by starch and lipid. Biomass analysis results show that the largest content is protein, followed by carbohydrates and fat. This shows that this microalgae biomass tends to be used for biogas conversion rather than alcohol. However, it should be remembered that this strain is still original or wild type, and can still be developed using both environmental and molecular manipulation approaches. Survival rate from laboratory scale to field scale shows that the microalgae is strong and worthy of consideration for industrial applications. Apart from that, high pH culture conditions are very good for removing contaminants. Also changing the media from good grade chemicals to commercial chemicals grade only reduces the biomass composition by 2-5% so it is worth considering for commercial applications. Testing various reactors to make biomass as needed with high productivity will be a challenge in the future.

Keywords- *Arthrospira maxima*; Assessment of Biomasses; Proximate Content, Survival Rate, Scaling Up, Media Adaptation

ABBS23-BFBP058

Production of biofuel feedstock from a mass scale photobioreactor cultivation of *Navicula* sp.: A case study

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Abstract- Environmental pollution issues and shortage supply of fossil fuel is spurring innovation in the use of biofuels. Compared to other groups of microalgae, diatoms (including *Navicula*), is recognized as one of high lipid producers. Nevertheless, biofuel production from microalgae faces various challenges, one of which is an insufficiency of feedstock. In this study, a mass cultivation of *Navicula* sp. in an enclosed 5000 L photobioreactor system was conducted. Three batch cultivation periods were executed sequentially in f2 medium. At the end of experiment, the highest biomass production of 0,31 g L^{-1} DW was achieved during the second cultivation period, in which temperature condition was between 32 – 35^{0}C. However, the highest oil production of 8,3% DW was observed from the first cultivation period, where the highest biomass production was only 85% from that of the second cultivation period. Although various factors still need to be improved, this first *Navicula* mass scale production system in an enclosed photobioreactor is one solution to meet the need of biofuel feedstock from microalgae.

Keywords- *Navicula*, biofuel feedstock, mass scale cultivation

ABBS23-BHBP059

Investigating the dynamics of microbial communities in biohydrogen production from palm oil mill effluent in relation to crude palm oil production rate: a preliminary study

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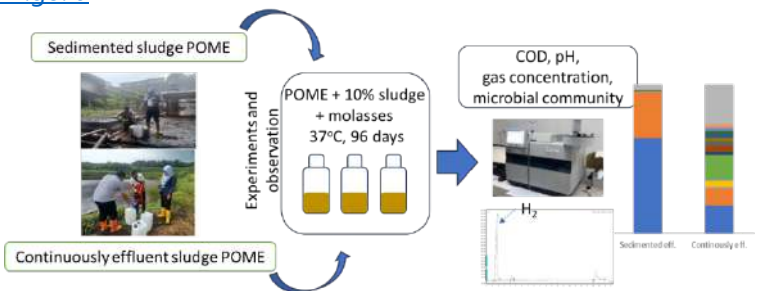

Abstract- The demand for hydrogen as a renewable energy carrier has recently increased globally. Hydrogen from biological processes (biohydrogen) takes attention regarding the environmentally friendly and economic aspects because it can be produced from waste, such as palm oil mill effluent (POME). Indonesia, as the largest palm oil industry in the world, has the potential to utilize POME as media fermentation for biohydrogen production. In this study, the crude palm oil (CPO) production rate influences the effluent of POME was observed. The microbial community inside POME and its sludge were examined to enhance their ability. The experiment was conducted in a 250 mL vial glass as an anaerobic batch fermenter which was filled with raw POME, 2.5% molasses as optimum concentration, and pH 7. The sealed vial glass was then incubated at 37°C for 96 hours. Sampling was taken every 24 hours for gas and liquid analysis. The gas volume was measured and the concentration of hydrogen was analyzed with Gas Chromatograph TCD detector. The physicochemical property of POME was measured for pH and COD. And the microbial community was examined and identified through 16S rRNA extraction and next-generation sequencing. As a result, different conditions of CPO production rate showed the distinct potential of POME as media fermentation to be converted to biohydrogen. The sedimented sludge POME exhibited predominant bacteria from the family *Leuconostocaceae* and *Lactobacillaceae* as lactic acid bacteria (LAB) up to 63.86% and 30.66%, respectively, then the number was naturally decreased after 96 hours. The bacteria shifting occurred as *Clostridiaceae* grew up to 35.17%, with the escalation of total biohydrogen production up to 20,08% after 72 hours. Besides, the continuously effluent sludge POME showed the existence of *Thermoanaerobacteraceae* up to 16.17% and a lower number of LAB in the beginning. It shifted to *Prevotellaceae* and *Veillonellaceae* up to 31.93% and 26.05%, respectively. Those bacteria were known for potential biohydrogen production.

Keywords- *biohydrogen; microbial community; POME; next-generation sequencing; dark fermentation*

ABBS23-SEEP060

Sustainable Dissemination Strategies of Biogas Production for Community Empowerment and Energy Literacy in Rural and Small Islands Case Study Manado City, Indonesia

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Abstract- The Symbiosis Energy Biogas production model has been implemented in Manado City, Indonesia, with the aim of harnessing the potential of biogas production to benefit rural communities. A comprehensive life cycle assessment was conducted to evaluate the model's environmental impact, confirming its positive outcomes. Subsequently, the Manado city government disseminated and expanded the two-stage biogas production system to rural areas and small islands surrounding the city. To assess the sustainability of the biogas technology implementation, a system dynamics approach was employed. A purposive sampling technique was used to select 30 respondents from the community of biogas technology users. The sustainability status was evaluated based on four factors: knowledge, skills, trust, and government involvement. The baseline scenario, known as Baseline As Usual (BAU), was established through interviews with the community. Using a Stock Flow Diagram (SFD) scenario, simulations were conducted for a ten-year period from 2023 to 2033. Various interventions and controlled inputs were applied to enhance the sustainability status, aiming for a minimum average of 90%. Three scenarios were compiled: BAU, Moderate, and Optimistic. The study's results indicate that without sustained efforts, the long-term sustainability of the biogas production system would be relatively low, with a simulation value of 28.61 by 2033. However, by increasing knowledge, skills, trust, and government involvement to 90% of normal levels, the sustainable coexistence of the biogas production system can be significantly improved to 78.90 by 2033, classified as sustainable. These findings will inform the policy strategies and programs of the Manado City Government, supporting their efforts to sustain the Symbiosis Energy Biogas production system and empower rural communities and small islands.

Keywords: *Symbiosis Energy Model; System Dynamics; Biogas Production; Strategy; Rural and Small Islands Communities.*

ABBS23-NRE061

Electricity Generation in a Microbial Fuel Cell (MFC) using Glucose from Banana (*Musa balbisiana Colla*) Steam as a Substrate

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Abstract- Microbial fuel cell (MFC) is a bio-electrochemical technique based on bacteria's metabolic activity, which converts organic substrates into energy. In MFC, substrate, the liquid solution inside the anodic chamber, is considered one of the main factors that affect electricity generation. Various substrates can be used in MFC for electricity production, ranging from pure compounds (such as glucose, acetate, propionate, and butyrate) to complex mixtures of organic matter in wastewater. The characteristics of the cathode can also substantially affect electricity production. Cathode used for MFCs is often Pt-coated carbon electrodes immersed in water that use dissolved oxygen as the electron acceptor. This paper investigates the MFC performances using glucose from banana (*Musa balbisiana Colla*) steam as an organic substrate for microbe growth of *Escherichia coli* and metal ions from Lapindo mud as a cathode material. Banana steam contains 86.25% of cellulose. Bioconversion of banana steam cellulose into glucose was performed by cellulase. Lapindo mud contains heavy metals of Pb and Cu, which can be used as a cathode material. The volume of solution in the anode and cathode chambers affected the electrical voltage produced, where a volume of 220 mL had the highest voltage of 1.672 V after running for 17.5 hours.

Keywords- *banana steam, glucose, Microbial Fuel Cell, Musa balbisiana Colla, substrate*

ABBS23-BFBP062

Heterogeneous Catalyst based on Nickel Modified into Indonesian Natural Zeolite in Green Diesel Production from Crude Palm Oil

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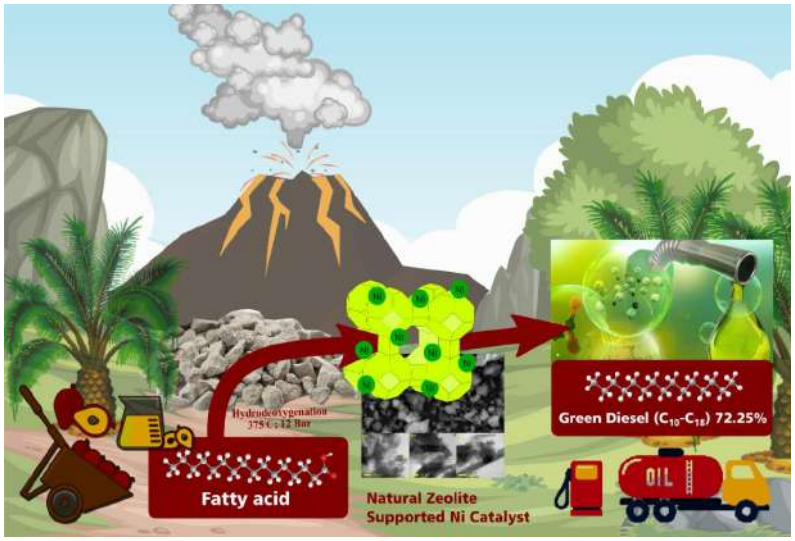

Abstract- Green diesel is an alternative renewable and environmentally friendly fuel in the transportation sector. This study aimed to modify Indonesian natural zeolite (NZ) with nickel and apply it as a catalyst in green diesel production from crude palm oil (CPO). The materials were prepared with different Ni content of 3, 5, and 10 wt.% and characterized in detail using X-Ray Diffraction (XRD), Scanning Electron Microscope (SEM), Transmission Electron Microscope (TEM), Fourier Transform infra-red Spectroscopy (FTIR), and Surface Area Analyzer (SAA). Catalytic tests were performed in a batch reactor at a temperature of 375 °C and a pressure of 12 bar for 2 hours. Gas Chromatography-Mass Spectrometry (GC–MS) analysis was used to determine the liquid product. Based on XRD analysis, the crystallinity of materials tends to decrease after being modified with Ni. Concomitantly, the presence of Ni was indicated by new peaks with increasing intensity at 2? = 44°, 55°, and 76°. SEM analysis shows morphological changes in materials with decreasing particle sizes. The presence of Ni is also known by the presence of small spheres scattered in the material and black shades observed in TEM analysis. Based on IUPAC, the resulting isotherm graph is categorized as type I with type IV loop hysteresis and classified as micropore with an average pore size is <2 nm. The highest activity and selectivity on C15 were achieved up to 77.34% and 53.11% when 3% of Ni modified NZ was applied as Catalyst compared to NZ, and other Ni modified NZ.

Keywords- Crude Palm Oil; Green Diesel; Hydrodeoxygenation; Natural zeolite; Nickel

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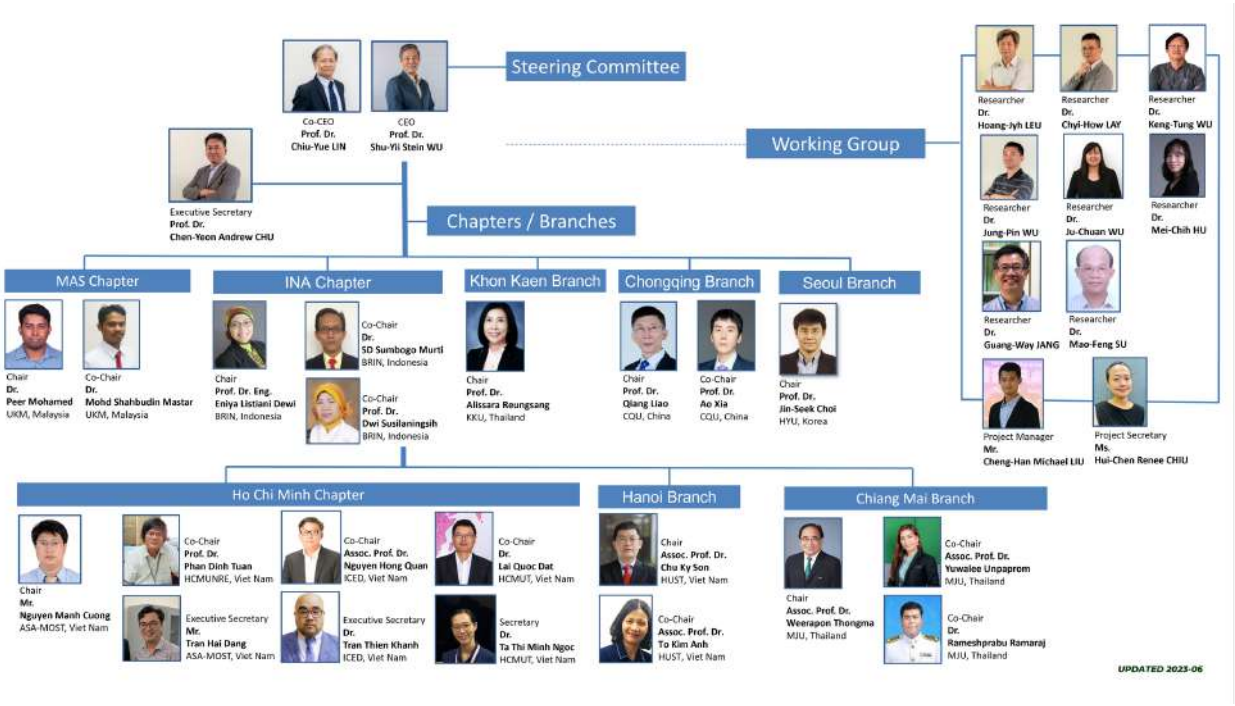

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