

## Hydrogen Power Theoretical & Engineering Solutions International Symposium

# HYPOTHESIS XIX Hiroshima 2024

Venue: International conference center Hiroshima  
1-5, Nakajima-cho, Naka-ku, Hiroshima (in the Peace Memorial Park)

Date: July 14-18, 2024



## Program

### Organizer

HYPOTHESIS XIX Hiroshima 2024 executive committee

### Co-organizers

Hydrogen Energy Systems Society of Japan (HESS)  
Fuel Cell Development Information Center (FCDIC)



### Sponsor



HIROSHIMA UNIVERSITY



Hiroshima University  
A-ESG Science and Technology  
Research Center

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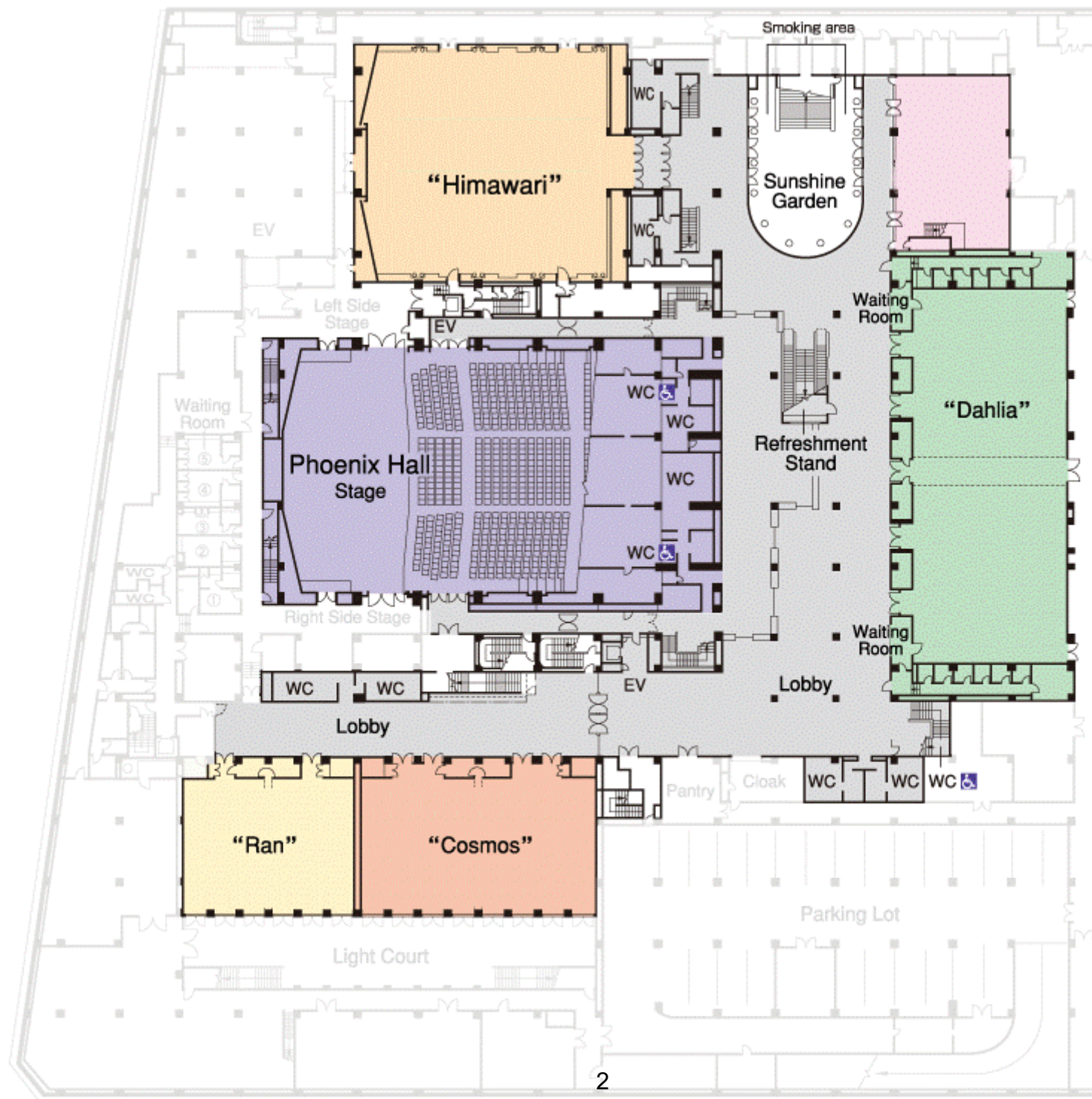
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HYPOTHESIS 2024	
Sunday 2024-07-14	
15:00	Registration @Reception Desk in front of Dahlia
18:00-20:00	Welcome Party @ room of "Dahlia"
Monday 2024-07-15	
8:30	Registration @Reception Desk in front of Dahlia
Plenary Session @ Himawari Hall Chair: Prof.Ichikawa Takayuki	
8:40-9:00	Opening Ceremony Professor Giuseppe Spazzafumo, University of Cassino and Southern Lazio, Italy Professor Shigenori Mitsushima, Yokohama National University, Japan
9:00-9:40	Plenary Speech 1 Development of Stationary Fuel Cell Systems in Toshiba Energy Systems & Solutions Corporation Shoichi Hidaï, Toshiba Energy Systems & Solutions Corporation, Japan
9:40-10:20	Plenary Speech 2 Development of a CVD derived hydrogen permselective silica membrane and its application to the thermochemical water splitting method Mikihiro Nomura
10:20-10:40	Coffee break @room of "Sakura"
Plenary Session @ Himawari Hall Chair: Prof.Yukihiko Matsumura	
10:40-11:20	Plenary Speech 3 India's stride towards Sustainable Energy: Overview of Green Hydrogen Mission Ankur Jain, Suresh Gyan Vihar University, India
11:20-12:00	Plenary Speech 4 Metal hydrides for catalysis Jie Zheng, Peking University
12:00-13:00	Lunch @ room of "Dahlia"
13:00-14:40	Poster Session 1 @ room of "Dahlia"
518:Green Ammonia Production: Assessing Utility Scale Batteries and Gas Turbines Strategies for Plant Operation Continuity Thomas Helm Roos,CSIR	
482:Design of a B-Site Cobalt-Free High-Entropy Perovskite as Oxygen Electrode for Efficient CO2 Solid Oxide Electrolysis Cells Jun Zhou, Xi'an Jiaotong University	
465:Characterisation of Fe/Cu/Ce/HZSM-5 catalysts for methanol and DME synthesis, with emphasis on the reverse water gas shift reaction Gianluca Landi,Institute of Science and Technology for Sustainable Energy and Mobility - CNR	

472:NH <sub>3</sub> synthesis from H <sub>2</sub> O and N <sub>2</sub> using electrochemical cells with molten NaOH-KOH electrolytes at 250°C. Jun Kubota, Department of Chemical Engineering, Graduate School of Engineering, Fukuoka University			
490:Flower-like Sb/MXene as anodes in solid-state battery Yifei Shao, Hiroshima University			
504:Characteristics control of hydrogen storage alloys driven heat-pump Chenghao Yin, Hiroshima University			
441:Techno-Economic Assessment for PV Waste Recycling in the Sultanate of Oman Sausan Alriyami, Oman Hydrogen Centre, German University of Technology in Oman			
456:ZnO Nanorods: Emerging Photocatalysts for Produced Water Treatment and H <sub>2</sub> Production Hadi Basma, Oman Hydrogen Centre, German University of Technology in Oman			
506:Enhanced Hydrogen Evolution Reaction Performance and Stability of Palladium-Iron Hydride in Acidic Media Sheng-Wei Lee, National Central University, Taiwan			
495:Influence of Megasphaera elsdenii, Clostridium beijerinckii, and Clostridium butyricum on H <sub>2</sub> production from lactic acid effluent Ivan Moreno-Andrade, Instituto de Ingeniería, Universidad Nacional Autónoma de México			
433:Evaluating the performance and efficiency of hydrogen carriers for the SOEC/SOFC system in daytime energy storage and nighttime power generation with thermodynamic methods Yen-Hsin Chan, Department of Mechanical and Computer-Aided Engineering, Feng Chia University, Taiwan			
489:Optimization of organosilica membranes for water vapor/gas separation at moderate-to-high temperature Kubo Takuya, Hiroshima University, Japan			
468: Synthesis of layered-hybrid silica membranes for hydrogen separation using plasma polymerization of liquid siloxane oligomers Masataka Imayoshi, Hiroshima University, Japan			
509:Catalytic reaction of glycolic acid in supercritical water using activated carbon Kosuke Yamada, Hiroshima University, Japan			
513:Hydrogen Production from Glucose Under Supercritical Water Gasification Conditions Using Ru/CNT Catalyst Mizuki Kodama, Hiroshima University, Japan			
514:Reaction pathway of supercritical water gasification of xylose Raito Arakawa, Hiroshima University, Japan			
Parallel session1@ room of "Cosmos" Hydrogen economy Chair: Dr. Naruki Endo		Parallel session2@room of "Ran" Low Temperature Fuel Cells 1 Chair: Prof. Sheng-Wei Lee	
14:40-15:10	Keynote:476 Relationship between information, stakeholder involvement and public acceptance in the development of the hydrogen economy Agatino Nicita, CNR-ITAE, Italy	14:40-15:10	Keynote: 473 Pt catalysts supported on conducting oxide for cathodic and anodic catalyst layers of PEFC K. Kakinuma, M. Uchida, and A. Iiyama, Hydrogen and Fuel Cell Nanomaterials Center, University of Yamanashi
15:10-15:30	Oral:443 Design of an open-source ship CAPEX and OPEX model for liquid H <sub>2</sub> import from Australia to Singapore Kamini Singh, Nanyang Technical University, Singapore	15:10-15:30	Oral: 483 Challenges of group 4 and 5 oxide-based cathodes for future advanced polymer electrolyte fuel cells A. Ishihara, Y. Takeuchi, T. Nagai, K. Matsuzawa, R. Monden, and S. Tominaka, Yokohama National University

15:30-15:50	<p>Invite:457</p> <p>Techno-economic Analysis of Integrated Offshore Wind and Solar Energy Systems for Green Hydrogen Production</p> <p>Giwangkara Ricky Perdana, Research Center for Advanced Science and Technology, The University of Tokyo, Japan</p>	15:30-15:50	<p>Oral: 475</p> <p>Impacts of flexible load regulation strategy on multiple types of integrated energy systems driven by PEMFC</p> <p>Ruyi Zhang, Xu Li, Shanshan Cai, Zhengkai Tu, Huazhong University of Science and Technology</p>
15:50-16:10	<p>Oral: 466</p> <p>Green Hydrogen vs. Batteries for energy communities</p> <p>Gaetano Squadrito, CNR - Istituto di Tecnologie Avanzate per l'Energia "Nicola Giordano", Italy</p>	15:50-16:10	<p>Oral: 517</p> <p>Development of Carbon-free Ionomer-free Electrode Using Unsupported Pt Catalysts</p> <p>H. Fukunaga, H. Segawa, T. Sasaki, and S. Takenaka, Shinshu University</p>
16:10-16:30	<p>Oral:499</p> <p>Measures to Produce Less Expensive Green Hydrogen as well as to Put Renewables as the Main Power Source</p> <p>Hirofumi Egusa, Hiroshima University, Japan</p>	16:10-16:30	<p>Invite :463</p> <p>Performances of Proton Exchange Membrane Fuel Cells in Marine application</p> <p>Ivan Tolj, Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture, University of Split, Croatia</p>

Tuesday 2024-07-16	
8:30-9:00	Registration @ Reception Desk in front of Dahlia
	Plenary Session @ Himawari Hall Chair: Prof. Ankur Jain
9:00-9:40	Plenary Speech 5 Hydrogen Perspective in Japan Eiji Ohira, NEDO, Japan
9:40-10:20	Plenary Speech 6 Green Hydrogen Supply Chain Using Methylcyclohexane as Hydrogen Carrier Koji Matsuoka, General Manager, Innovation Technology Center, ENEOS Corporation, Japan
10:20-10:40	Coffee break @ room of "Sakura"
	Plenary Session @ Himawari Hall Chair: Prof. Mikihiro Nomura
10:40-11:20	Plenary Speech 7 Water electrolysis for renewable electricity utilization Shigenori Mitsushima, Vice-dean of the Graduate School of Engineering Science and Director of the Advanced Chemical Energy Research Center, Yokohama National University, Japan
11:20-12:00	Plenary Speech 8 Carbon Recycling Initiatives of Hiroshima Prefecture Koji Masuhiro, Hydrogen production by sodium redox cycle as conversion technique of low temperature heat Hiroki Miyaoka, Hiroshima University
12:00-13:00	Lunch @ room of "Dahlia"



13:00-14:40	Poster Session 2 @ room of "Dahlia"
439:MgAlNiFeA(A=Cr,V) Alloys for Rechargeable Nickel Metal Hydride Battery Gülhan Çakmak ,Muğla Sıtkı Koçman University, Faculty of Engineering	
431:Development of High Entropy Oxides for Use Medium Temperature in Solid Oxide Fuel Cells Gülhan Çakmak, Muğla Sıtkı Koçman University,Türkiye	
442:Electrochemical Study of the Ti-V-Ni-La-A(A=Fe,Mn, Zr) Alloy Used As Anode in Nickel-Metal Hydride Batteries Hakan Yüce, Muğla Sıtkı Koçman University, Faculty of Engineering	
508:Conversion of CO <sub>2</sub> into Value-added Products through an Alkaline Electrolysis Cell Vitaliano Chiodo, CNR	
507:Activated bio-carbon from local residual-biomasses for H <sub>2</sub> storage Vitaliano Chiodo,CNR	
430:Study on the Performance of Passive Direct Formate Fuel Cells with Different Foamed Electrode Conditions Jin-Cherng Shyu,National Kaohsiung University of Science and Technology, Taiwan	
479:Effect of Cathode Binder on Performance and Current Output Stability of Alkaline Direct Liquid Fuel Cells: Comparison of PTFE and Nafion Jin-Cherng Shyu, National Kaohsiung University of Science and Technology, Taiwan	
484:Effect of partial doping on the hydrogen storage performance of Ti <sub>1.1</sub> Cr <sub>1.3</sub> Mn <sub>0.2</sub> Fe <sub>0.5</sub> alloy for hydrogen storage application Mingyang Han,Tokai University, Japan	
492:Investigation of hydrogen absorption and desorption properties of Li-Mg-Al-Ti-M based lightweight high entropy alloys Hirotada Hashimoto, Hokkaido University,Japan	
447:Defect detection inside polymer electrolyte fuel cell stack by magnetic field measurement Yuki Okuhigashi, the University of Kitakyushu, Japan	
445:Tetravalent metal pyrophosphate based composite membranes as electrolytes for high temperature proton exchange membrane fuel cells Nitika Devi, Department of Mechanical Engineering and Advanced Institute of Manufacturing with High-tech Innovat, Taiwan	
458:Interface engineering for improving the performance of protonic ceramic fuel cells Chung-Jen Tseng, National Central University, Taiwan	
487:Yb Doped Air Electrode of Protonic Ceramic Electrochemical Cells with Efficient Co-Eletrolysis Jun Zhou, Xi'an Jiaotong University, China	
502:A Ce/Ni co-doped SrFeO <sub>3-δ</sub> perovskite for symmetrical electrode of protonic ceramic fuel cells Jun Zhou, Xi'an Jiaotong University, China	
515:Effect of Ru loading on hydrogen adsorption characteristics of Ru/CNT paper gas sensor Hirotada Fujita,Hiroshima university, Japan	
516:Activity Characteristics of Ni-Based Composite Catalysts with Added Promoters for Ammonia Methanation Reiji Sunamoto,Hiroshima university, Japan	
449:A novel wave channel and its impacts on the high power PEMFC with metal bipolar plates Shanshan Cai, Huazhong University of Science and Technology, China	
477:Low-resistance flow field design for high-power metal bipolar fuel cells based on enhanced gas uniformity Shanshan Cai,Huazhong University of Science and Technology, China	

Parallel session1@ room of "Cosmos" Hydrogen production from Renewable Energy Sources 1 Chair: Prof. Hitoshi Saima		Parallel session2@room of "Ran" High Temperature Fuel Cells Chair: Prof. Shigenori Mitsushima	
14:50-15:20	Keynote 523 Plasma-assisted synthesis of silica-based membranes for hydrogen separation Hiroki Nagasawa, Hiroshima University, Japan	14:40-15:00	Invite:429 Feasibility study of a Molten Carbonate Fuel Cell as a CO2 separator for various industrial exhaust emissions Jarosław Milewski, Warsaw University of Technology, Faculty of Power and Aeronautical Engineering, Poland
		15:00-15:20	Invite:493 Transverse Rupture Strength Analysis of 3D Structured Support-Layers Developed for Solid Oxide Electrolysis Cells Özgür Aydın, Technical University of Munich, Germany
15:20-15:40	Oral:464 Role of Ru in the resistance of Ni-Ru/CeO2 steam reforming catalysts towards steam inhibition G. Sorbino, Institute of Science and Technology for Sustainable Energy and Mobility - CNR, Italy	15:20-15:40	Oral:462 Modelling for Life-Cycle Sustainability: High-Temperature Proton-Exchange Membrane Fuel Cell Propulsion System for Aviation Vafa Feyzi IMDEA Energy, Systems Analysis Unit
15:40-16:00	Oral:474 Tuning H2/syngas production by tuning the redox properties of La0.6Sr0.4MxM'1-x(M,M'=Fe, Mn, Co)O3 as oxygen carriers for chemical looping reforming of methane Gianluca Landi, Institute of Science and Technology for Sustainable Energy and Mobility - CNR, Italy	15:40-16:00	Oral:459 Energy and exergy investigation on a PCFC hybrid system running on ethanol Sasmoko, R, National Central University, Taiwan
16:00-16:20	Oral: 512 Primary products of glucose decomposition in hot compressed water Afiah Liana Binti Sazali, Hiroshima University, Japan	16:00-16:20	Oral:455 Synthesis and Electrochemical Performance of PrBa0.5Sr0.5Co1.5Fe0.5O5+δ double perovskite cathode material for Solid Oxide Fuel Cell Yi-Wen Chen, Yuan Ze University, Taiwan
16:20-16:40	Invite :519 Life Cycle Assessment of a 1 MW alkaline electrolyser designed for the production of green hydrogen Daniele Candelaresi, EnTraT srls, Academic Spin-Off of the University of Cassino and Southern Lazio, Italy	16:20-16:40	Oral:470 Experimental study on the flame stability and state characterization in a 1kW SOFC afterburner Xi Li, Huazhong University of Science and Technology, China

Wednesday 2024-07-17			
8:30-9:00	Registration @Reception Desk in front of Dahlia		
Parallel session1@ room of "Cosmos" Hydrogen production from Renewable Energy Sources 2 Chair: Prof. Kazuhiro Mochidzuki		Parallel session2@room of "Ran" Hydrogen storage 1 Chair: Dr. Sharma Khushbu	
9:00-9:30	Keynote:469 Preferential oxidation of carbon monoxide in hydrogen over copper-based catalysts prepared using sol-gel method Kaoru Takeishi, Shizuoka University, Japan	9:00-9:30	Keynote:451 Hydrogen storage systems: technologies, applications, trends and challenges Marolop Simanullang, Air Liquide, Research and Development, Innovation Campus Tokyo, Yokosuka, Japan



9:30-9:50	<p>Invite:437</p> <p>Microscopic insight into UiO-66@proton exchange composite membrane by molecular simulation</p> <p>Song Li, Huazhong University of Science and Technology, China</p>	9:30-9:50	<p>Invite:444</p> <p>Ultra-sensitive hydrogen sensor based on metal alloy@metal oxide core-shell nanoparticles</p> <p>Sonalika Agarwal, Graduate School of Advanced Science and Engineering, Hiroshima University, Japan</p>
9:50-10:10	<p>Invite:481</p> <p>Hydrogen Production via Electrolysis of Ammonia Water</p> <p>Fangqin Guo, Hiroshima University, Japan</p>	9:50-10:10	<p>Invite:460</p> <p>A Novel Approach to Simulate Ortho-Para Conversion in Hydrogen Liquefaction based on the van't Hoff equation</p> <p>Benjamin Kanz, Institute of Plant and Process Technology, TU München &amp; TUMCREATE Ltd., Singapore</p>
10:10-10:30	<p>Invite:440</p> <p>Low-temperature Desalination based on Adsorption System</p> <p>Mohammed Al Saidi, University of Technology and Applied Sciences, Oman</p>	10:10-10:30	<p>Invite:520</p> <p>Hydrogen Energy Utilization System for Building -Annual Operating Results with Energy Shift-</p> <p>Naruki Endo, AIST/FREA, Koriyama, Japan</p>
10:30-10:50	Coffee break @ room of "Sakura"		
<p>Parallel session1@ room of "Cosmos"</p> <p>Hydrogen separation technologies</p> <p>Chair: Prof. Jie Zheng</p>		<p>Parallel session2@room of "Ran"</p> <p>Hydrogen storage 2</p> <p>Chair: Prof. Shigehito Isobe</p>	
10:50-11:20	<p>Keynote: 480</p> <p>Pore size controllability and improved stability of microporous silica membranes for H<sub>2</sub> separation</p> <p>M. Kanezashi, Graduate School of Advanced Science and Engineering, Hiroshima University</p>	10:50-11:20	<p>Keynote:488</p> <p>Development of Hydrogen Storage Materials for Hydrogen Compression and Purification</p> <p>Kouji Sakaki, National Institute of Advanced Industrial Science and Technology, Japan</p>
11:20-11:40	<p>Oral:432</p> <p>Enhanced hydrogen selectivity of allylhydridopolycarbosilane (AHPCS)-derived Silicon Carbide membranes via air curing</p> <p>G. Sushanti, N. Moriyama, H. Nagasawa, M. Kanezashi, T. Tsuru,</p>	11:20-11:40	<p>Oral:452</p> <p>Metamaterial-Enhanced Reactor for Optimal Metal Hydride Hydrogen Storage</p> <p>Luthfan Adhy Lesmana, The University of Tokyo, Japan</p>
11:40-12:00	<p>Oral: 491</p> <p>Evaluation of hydrogen permeation properties of Pd-Ag with a view to membrane reactors</p> <p>H. Ogura, M.R. Harada, and H.T. Uchida, Graduate School of Engineering, Department of Mechanical Engineering, Tokai University</p>	11:40-12:00	<p>Oral:446</p> <p>Synthesis of high-entropy alloys (HEA) through high energy ball milling (HEBM) for hydrogen storage</p> <p>Rolando Pedicini, CNR-ITAE, Italy</p>
12:00-13:00	Lunch break (Lunch box) @ room of "Dahlia"		
<p>Parallel session1@ room of "Cosmos"</p> <p>Hydrogen separation technologies/Hydrogen distribution</p> <p>Chair: Prof. Chung-Jen Tseng</p>		<p>Parallel session2@room of "Ran"</p> <p>Low Temperature Fuel Cells 2</p> <p>Chair: Prof. Akimitsu Ishihara</p>	
13:00-13:20	<p>Invite:498</p> <p>Development of AB<sub>2</sub>-type alloys for hydrogen purification</p> <p>Keita Shinzato, National Institute of Advanced Industrial Science and Technology (AIST), Japan</p>	13:00-13:20	<p>Oral:454</p> <p>Manifold design principles for large-scale PEMFC</p> <p>Lixin Fan, School of Energy and Power Engineering, Huazhong University of Science and Technology, China</p>

13:20-13:40	Oral:448 Dose Pressure Effect on Adsorption Isotherms for Ammonia Seiya Kusaka, Aisan Industry Co., Ltd. , Japan	13:20-13:40	Oral:500 Study on the performance of H <sub>2</sub> /O <sub>2</sub> PEMFCs with dead-end gas management under various humidity levels Panida Kanha, National Chung Cheng University, Taiwan
13:40-14:00	Oral:511 (Online) Hydrogen purification performance related adsorption characteristics of zeolites 5A, LiX, 13X and MOF UTSA-16 adsorbents Chenglong Li, Wuhan University of Technology	13:40-14:00	Oral:467 Numerical Investigation on the HT-PEMFCs Performance under the various of Geometric Design Parameters Pongsapak Treegosol, National Chung Cheng University, Taiwan
14:00-14:20	Coffee break @ room of "Sakura"		
Parallel session1@ room of "Cosmos" Hydrogen production from Renewable Energy Sources 3 Chair: Prof. Masakoto Kanezashi		Parallel session2@room of "Ran" Hydrogen storage 3 Chair: Dr.Kouji Sakaki	
14:30-14:50	Oral:503 Thermodynamic analysis of chemical looping hydrogen production for multigeneration at existing natural gas combined cycle Muhammad Aziz, The University of Tokyo, Japan	14:20-14:50	Keynote:485 Synthesis of Lightweight High-Entropy Alloys and Their Application to Hydrogen Storage Shigehito Isobe, Hokkaido University, Japan
14:50-15:10	Invite:471 Advancing Hydrogen Production: Low-Temperature Na-Redox Cycle with Nickel Modification Khushbu Sharma, Hiroshima University, Japan	14:50-15:10	Oral:494 Enhancing the Anti-oxidation Properties of TiFe Alloy through Third Element Addition Zhiwen Chen, Hiroshima University, Japan
15:10-15:30	Oral:486 Scalable Optofluidic Microreactors for Visible-light-driven Photocatalytic Overall Water Splitting: A Novel Approach Towards Commercialization Ameer Suhail, Centre for Nanotechnology, IIT Guwahati, India	15:10-15:30	Invite:522 Hydrogen absorption properties of titanium irradiated by nanosecond pulsed laser in acetone Yuki Nakagawa, Genki Sugimoto, Mizuho Ishigaki, and Tamaki Shibayama
18:00-20:00	Banquet@"ANA Crowne Plaza Hiroshima" (10-15 mins from conference venue to banquet venue)		

Thursday 2024-07-18			
9:00-16:00	Excursion: Hiroshima Gas Co., Ltd.(TBC) and Miyajima Island Departure time @ 9:00, Bus station in front of "Prayer Fountain"		