Daily Programs (Monday, June 3)

Plenary Session 1

10:00-10:30, Hall C

Chairs: Nobuyuki Nishimiya *(Nihon University)*
Eiji Ohira *(New Energy and Industrial Technology Development Organization (NEDO))*

PL-1 **Energy Security and Sustainability; the Role of Hydrogen Technology**
Nobuo Tanaka
(The Sasakawa Peace Foundation)

Plenary Session 2

10:30-11:00, Hall C

Chairs: Nobuyuki Nishimiya *(Nihon University)*
Eiji Ohira *(New Energy and Industrial Technology Development Organization (NEDO))*

PL-2 **Deployment of Hydrogen and Fuel Cell Technology in Germany**
Thorsten Herbert
(Divisional Head Transport and Infrastructure and Head of Programme NIP of the NOW GmbH - National Organisation Hydrogen and Fuel Cell Technology)

Plenary Session 3

11:00-11:30, Hall C

Chairs: Nobuyuki Nishimiya *(Nihon University)*
Eiji Ohira *(New Energy and Industrial Technology Development Organization (NEDO))*

PL-3 **U.S. Department of Energy Hydrogen and Fuel Cell Overview**
Sunita Satyapal
(U.S. Department of Energy)

Plenary Session 4

11:30-12:00, Hall C

Chairs: Nobuyuki Nishimiya *(Nihon University)*
Eiji Ohira *(New Energy and Industrial Technology Development Organization (NEDO))*

PL-4 **Challenges for Japan's Energy Transition- Basic Hydrogen Strategy -**
Masana Ezawa
(Ministry of Economy, Trade and Industry)

Special Session: NEDO Activity for Hydrogen Society

13:00-15:00, Hall C

Chairs: Ko Sakata *(The Institute of Applied Energy)*
Minoru Inaba *(Doshisha University)*

KN-1 **NEDO activity on Hydrogen Energy**
13:00-13:40 Eiji Ohira
(New Energy and Industrial Technology Development Organization (NEDO))

KN-2 13:40-14:20
Status on Activities of Hydrogen Infrastructure in Japan
Tetsufumi Ikeda
(The Association of Hydrogen Supply and Utilization Technology (HySUT))

NE-1 14:20-14:40
Evolution of Residential Fuel Cell (Ene-Farm) and Developing Technologies for Hydrogen Society (Invited)
Yukimune Kani
(Technology Innovation Division, Panasonic Corporation)

NE-2 14:40-15:00
Techno-economic scenario study on future energy system using hydrogen
M. Ihara[1,2], Y. Kajikawa[2,3], T. Shimizu[1,2], K. Hasegawa[1,2], Y. Kikuchi[2,5], M. Tsujimoto[2,3], T. Okubo[1,2], H. Lee[1,2], I. Yamanaka[1,2], T. Nozaki[2,4], Y. Kudo[6], H. Takagi[7], Y. Mizuno[8], E. Kato[8], K. Murata[8], A. Kurosawa[8], S. Iida[8], K. Sakata[8] and K. Okazaki[2]
([1]Department of Chemical Science and Engineering, [2]Global Hydrogen Energy Research Unit, [3]Technology and Innovation Management / Department of Innovation Science, and [4]Department of Mechanical Engineering, Tokyo Institute of Technology, [5]Presidential Endowed Chair for "Platinum Society", The University of Tokyo,[6] Research Institute of Science for Safety and Sustainability and [7]Research Institute of Energy Frontier, National Institute of Advanced Industrial Science and Technology *(AIST), [8]Research and Development Division, The Institute of Applied Energy)*

PEMFC

15:30-17:30, Hall C

Chairs: Hiroyuki Uchida *(University of Yamanashi)*
Manabu Ihara *(Tokyo Institute of Technology))*

KN-3 15:30-16:10
TOYOTA's Efforts Toward a Hydrogen-based Society
Yoshihiko Hamamura
(Toyota Motor Corporation)

O4-12 16:10-16:30
Highly Active and Robust Pt-Skin/Pt Alloy Anode Catalysts for Hydrogen Oxidation in PEFCs (Invited)
Hiroyuki Uchida[1,2], Guoyu Shi[1], Hiroshi Yano[2], Donald A. Tryk[2], Akihiro Iiyama[2]
([1]Clean Energy Research Center, University of Yamanashi, [2]Fuel Cell Nanomaterials Center, University of Yamanashi)

O4-13 16:30-16:50
Development of Highly Active Pt Core-Shell Catalysts for Polymer Electrolyte Fuel Cells (Invited)
Minoru Inaba, Hideo Daimon
(Department of Molecular Chemistry and Biochemistry, Doshisha University)

O4-15 16:50-17:10
H2One™ Off-Grid Solution : a feasibility study - Hydrogen-Based Energy Supply System - (Invited)
Toshimitsu Kumazawa, Daigo Kittaka, Masahiro Tsuji, Junichi Mori, Ryo Nakajima
(Toshiba Energy Systems & Solutions Corporation)

O4-40 17:10-17:30
Queensland hydrogen industry development partnership with Japan (Invited)
The Honorable Cameron Dick
(QueensLand Parliament)

Hydrogen Utilization in Industries 1

13:00-15:00, Hall B5 (1)

Chairs: Shohei Tada *(The University of Tokyo)*
Mikihiro Nomura *(Shibaura Institute of Technology)*

KN-4 13:00-13:40
H2FUTURE – green hydrogen for steel production
Rudolf Zauner
(VERBUND Solutions GmbH)

O5-1 13:40-14:00
JISF long-term vision for climate change mitigation
A challenge towards zero-carbon steel
Toru Ono[1], Mio Kitayama[2]
([1]The Japan Iron and Steel Federation, [2]Nippon Steel Research Institute)

O5-2 14:00-14:20
Modelling of a Fuel Cell Forklift for Material Handling in Oil Refineries
Sachin Chugh, Kapil Sonkar, Tarun Jindal, Alok Sharma, G. S Kapur, S.S.V Ramakumar
(Alternative Energy (Hydrogen and Fuel cell), Indian Oil Corporation Ltd. R&D Centre Faridabad)

O5-3 14:20-14:40
Production of Ammonia Water and Ozone Water for Agricultural Field Using A Chemical Reaction Cycle Activated by Renewable Energy
Hideo Kameyama
(Faculty of Technology, Tokyo University of Agriculture and Technology)

O5-4 14:40-15:00
Effect of type of Cu precursors on catalytic activity towards methanol synthesis *via* CO_2 hydrogenation over Cu/ZrO_2
Shohei Tada[1], Yoshihiro Noda[2], Ryuji Kikuchi[1], Kazumasa Oshima[2], Minoru Sohmiya[2], Tetsuo Honma[3], Shigeo Satokawa[2]
([1]Department of Chemical System Engineering, The University of Tokyo, [2]Seikei University, [3]JASRI)

Organic Hydrogen Carrier

15:30-17:10, Hall B5 (1)

Chairs: Shin-ichi Nakao *(Research Institute of Innovative Technology for the Earth)*
Yoshimi Okada *(Chiyoda Corporation)*

KN-5 15:30-16:10
Development of SPERA Hydrogen™ System using LOHC
Yoshimi Okada
(Chiyoda Corporation)

O3-7 16:10-16:30
Dehydrogenation of methylcyclohexane by a membrane reactor with silica membranes (Invited)
Shin-ichi Nakao, Hiromi Urai, Kazuaki Sasa, Masahiro Seshimo, Hitoshi Nishino
(Inorganic Membranes Research Center, Research Institute of Innovative Technology for the Earth)

O3-8 16:30-16:50
Dynamic hydrogenation of a LOHC system in a continuously operated oneReactor setup
Patrick Preuster[1], Lisa Wagner[2], Johannes Geiling[3], Michael Steinberger[3], Richard Öchsner[3], Peter Wasserscheid[1,2]
([1]Helmholtz-Institute Erlangen-Nürnberg for Renewable Energy, [2]Chair of Chemical Reaction Engineering, FAU Erlangen-Nürnberg, [3]Fraunhofer-Institut fuer Integrierte Systeme und Bauelementetechnologie)

O3-9 16:50-17:10
High hydrogen permeance membrane reactor for decomposition of an organic hydride
Mikihiro Nomura[1], Kohei Suzuki[1], Daishi Takayama[1], Takuya Okuno[2], Hiromasa Tawarayama[2], Shinji Ishikawa[2]
([1]Applied Chemistry, Shibaura Institute of Technology, [2]Sumitomo Electric Industries, Ltd. Frontier Technologies Laboratory)

Thermochemical Water Spritting (TCWS) 1

13:20-15:00, Hall B5 (2)

Chairs: Ping Zhang *(Tsinghua University)*
Toshinori Tsuru *(Hiroshima University)*

O2-1 13:20-13:40
Development of low-overvoltage membrane Bunsen reaction technology for thermochemical IS process
Shin-ichi Sawada[1], Takehiro Kimura[2], Haruyuki Nishijima[2], Takehide Kodaira[2], Nobuyuki Tanaka[3], Shinji Kubo[3], Shinichiro Imabayashi[2], Mikihiro Nomura[2], Tetsuya Yamaki[1]
([1]Quantum Beam Science Research Directorate, National Institutes for Quantum and Radiological Science and Technology, [2]Shibaura Institute of Technology, [3]Japan Atomic Energy Agency)

O2-2
13:40-14:00

Development of SiO_2-based membrane for SO_3 decomposition at high temperature in Iodine-Sulfur cycle

Toshinori Tsuru, Xin Yu, Hiroki Nagasawa, Masakoto Kanezashi
(Department of Chemical Engineering, Hiroshima University)

O2-3
14:00-14:20

Challenge for adapting a hydrogen permselective membrane reactor to improve thermochemical IS process

Odtsetseg Myagmarjav[1], Nobuyuki Tanaka[1], Mikihiro Nomura[2], Shinji Kubo[1]
([1]IS Process Experiment Group, Department of Hydrogen and Heat Application Research and Development, Japan Atomic Energy Agency , [2]Department of Applied Chemistry, Shibaura Institute of Technology)

O2-4
14:20-14:40

Massive and Efficient H_2 production technology on Thermochemical Water-splitting Iodine-sulfur Process

Shinji Kubo, Hiroaki Takegami, Nobuyuki Tanaka, Hiroki Noguchi, Yu Kamiji, Jin Iwatsuki, Odtsetseg Myagmarjav, Yoshiyuki Inagaki
(HTGR R&D Center, Japan Atomic Energy Agency)

O2-5
14:40-15:00

R&D progress of nuclear hydrogen production in China

Ping Zhang, Songzhe Chen, Laijun Wang, Jingming Xu
(Institute of Nuclear and New Energy Technology, Tsinghua university)

Special Session: COUSE50 project for Innovative Ironmaking

15:30-17:30, Hall B5 (2)

Chairs: Yutaka Ujisawa *(Nippon Steel & Sumitomo Metal Corporation)*
Kazuya Goto *(Research Institute of Innovative Technology for the Earth)*

CO-1
15:30-15:50

COURSE50 project: Innovative Ironmaking Technology Development Utilizing Hydrogen (Invited)

Yutaka Ujisawa[1], Natsuo Ishiwata[2], Kazukuni Hase[3], Kyohichi Araki[4]
([1]R&D Planning Division, Nippon Steel & Sumitomo Metal Corporation, [2] Ironmaking Technology Department, JFE Steel Corporation, [3]Technology Planning Department, JFE Steel Corporation, [4]Ironmaking Technology Division, Nippon Steel & Sumitomo Metal Corporation)

CO-2
15:50-16:10

Development of hydrogen amplification technology from coke oven gas

Kenji Nakao, Kimihito Suzuki, Hitoshi Dohnomae
(Advanced Technology Research Laboratories, Nippon Steel & Sumitomo Metal Corporation)

CO-3
16:10-16:30

Development of coke improvement technologies to produce suitable coke for the hydrogen reduction process

Takahiro Shishido, Koji Sakai, Shohei Wada, Noriyuki Okuyama, Naoki Kikuchi
(Technical Development Group, KOBE STEEL, LTD.)

CO-4
16:30-16:50

Development of CO_2 Reduction Technology From Blast Furnace

Kaoru Nakano[1], Yutaka Ujisawa[1], Koki Nishioka[1], Kazumoto Kakiuchi[1], Kohei Sunahara[1], Yoshinori Matsukura[1], Hirokazu Yokoyama[1], Hiroshi Sakai[1], Ryohta Sugitani[3], Shin Tomisaki[2]
([1]Ironmaking Research Lab., Nippon Steel, [2]Nippon Steel & Sumikin Engineering corporation, [3]Hamada Heavy Industries LTD.)

CO-5
16:50-17:10

Development of CO_2 Capture Technology from Blast Furnace Gas

Ikuhiro Sumi[1], Masami Onoda[2], Yoichi Matsuzaki[3], Firoz Alam Chowdhury[4], Kazuya Goto[4], Yasuhiro Mogi[1], Nobuyuki Shigaki[1], Ryota Murai[1]
([1]Steel Research Laboratory, JFE Steel Corporation, [2]Former Technical Research & Development Bureau, Nippon Steel & Sumitomo Metal Corporation, [3]Technical Research & Development Bureau, Nippon Steel & Sumitomo Metal Corporation, [4]Chemical Research Group, Research Institute of Innovative Technology for the Earth)

CO-6
17:10-17:30

Development of Amine-based Solvents for CO2 Capture from Blast Furnace Gas

Kazuya Goto[1], Firoz Alam Chowdhury[1], Hidetaka Yamada[1], Shin Yamamoto[1], Yoichi Matsuzaki[2], Masami Onoda[2]
([1]Research Institute of Innovative Technology for the Earth, [2]Nippon Steel & Sumitomo Metal Corporation)

Special Program: HESS/Technova "Suiso Enerugi no Jiten" Publication Symposium

18:00-19:30, Hall B5 (2)

Shaping the Hydrogen Society (in Japanese)
Upon the publication of "Suiso Enerugi no Jiten" in March 2019, HESS and Technova organize the mini symposium focusing on how we shape the Hydrogen Society.

Solid Oxide Fuel and Electrolytic Cells (SOF&ECs) 1

13:20-14:40, G402

Chairs: Kei Hasegawa *(Tokyo Institute of Technology)*
Wenqiang Zhang *(Tsinghua University)*

O2-6
13:20-13:40
Development Status of High Temperature Steam Electrolysis Technology at Toshiba (Invited)
Masato Yoshino, Riko Inuzuka, Norikazu Osada, Naomi Tsuchiya, Seiji Fujiwara, Tsuneji Kameda, Ryo Nakajima
(Toshiba Energy Systems & Solutions Corporation)

O2-7
13:40-14:00
Reduced order model of solid oxide fuel assisted electrolysis (SOFEC) - a proposal
Jakub Kupecki[1,2], Jaroslaw Milewski[3]
([1]Department of High Temperature Electrochemical Processes (HiTEP), Institute of Power Engineering, [2]National Fuel Cell Research Center (NFCRC), University of California, Irvine, [3]Institute of Heat Engineering, Warsaw University of Technology)

O2-8
14:00-14:20
Unified Kinetics Model of Reversible Solid Oxide Fuel Cell / Electrolysis with Competitive Adsorption Reaction on Anode Triple Phase Boundary
Kei Hasegawa, Hyojae Lee, Keisuke Kameda, Yuta Iida, Manabu Ihara
(Department of Chemical Science and Engineering, Tokyo Institute of Technology)

O2-9
14:20-14:40
Manufacture of protonic ceramic cells
Julian Dailly, Anne-Laure Gruhier
(N43, EIFER)

SOF&ECs 2/TCWS 2

15:30-17:30, G402

Chairs: Yumiko Nakamura *(National Institute of Advanced Industrial Science and technology (AIST))*
Julian Dailly *(N43, EIFER)*

O2-10
15:30-15:50
Micro-/Nanohoneycomb Solid Oxide Electrolysis Cell Anodes with Ultralarge Current Tolerance
Bo Yu[1,2], Wenqiang Zhang[1,2], Jing Chen[1,2]
([1]Institute of Nuclear and New Energy Technology, Tsinghua University, [2]Collaborative Innovation Center of Advanced Nuclear Energy Technology, Tsinghua University)

O2-11
15:50-16:10
***In-Situ* exsolved nanoparticles on perovskite parent: A novel high-performance cathode for solid oxide electrolysis cells**
Wenqiang Zhang[1,2], Bo Yu[1,2], Jing Chen[1,2]
([1]Institute of Nuclear and New Energy Technology, Tsinghua University, [2]Collaborative Innovation Center of Advanced Nuclear Energy Technology, Tsinghua University)

O2-12
16:10-16:30
IAEA Activities and Support on Nuclear Hydrogen Production
Rami El-Emam, Ibrahim Khamis
(International Atomic Energy Agency (IAEA))

O4-16 16:30-16:50
Scaling up the electrolyser industry for bulk hydrogen - what is needed? (Invited)
David Hart, Franz Lehner
(E4tech)

KN-18 16:50-17:30
JXTG's Effort toward the Realization of Hydrogen-based Society
Seiji Maeda
(JXTG Nippon Oil & Energy)

Polymer Electrolyte Fuel Cells (PEFCs) 1

13:00-15:00, G409

Chairs: Rui Lin *(Tongji University)*
Akimitsu Ishihara *(Yokohama National University)*

O4-1 13:00-13:20
Application of 3D X-ray Imaging in PEMFC Cold Start Research
Rui Lin, Di Zhong, Yike Zhu, Shenghao Tang
(School of Automotive Studies, Tongji University)

O4-2 13:20-13:40
Catalyst-Coated Membranes for Fuel Cells: Preparation and Characterization
Yevheniia V. Lobko, Yurij V. Yakovlev, Peter Kúš, Vladimir Matolin
(Faculty of Mathematics and Physics, Charles University)

O4-3 13:40-14:00
Temperature effect of oxygen reduction reaction activity on Pt-Pd/C model core-shell catalyst
Tomoki Uchiyama[1], Liu Chen[1], Kentaro Yamamoto[1], Naoki Takao[2], Hideto Imai[2], Seiho Sugawara[3], Kazuhiko Shinohara[3], Yoshiharu Uchimoto[1]
([1]Graduate School of Human and Environmental Studies, Kyoto University, [2]Nissan ARC, [3]FC-Cubic)

O4-4 14:00-14:20
Oxygen reduction activity of group 4 and 5 oxide-based compounds as non-platinum cathode for PEFCs
Akimitsu Ishihara[1], Takaaki Nagai[2], Yoshiyuki Kuroda[2], Koichi Matsuzawa[2], Shigenori Mitsushima[1,2], Ken-ichiro Ota[2]
([1]Institute of Advanced Sciences, Yokohama National University, [2]Green Hydrogen Research Center, Yokohama National Univerersity)

O4-5 14:20-14:40
Highly Ordered Mesoporous Titanium Suboxides as Carbon-Free Supports
Yoshiyuki Kuroda[1], Hikaru Igarashi[1], Hirotaka Kajima[1], Takaaki Nagai[1], Teko W Napporn[2,3], Koichi Matsuzawa[1], Shigenori Mitsushima[1,3], Ken-ichiro Ota[1], Akimitsu Ishihara[3]
([1]Green Hydrogen Research Center, Yokohama National University, [2]IC2MP UMR 7285 CNRS University of Poitiers, [3]Institute of Advanced Sciences, Yokohama National University)

O4-6 14:40-15:00
PEM Based Ordered Superstructures as a Durable Dupport for Fuel Cell Catalyst
Yurii Yakovlev, Peter Kúš, Jaroslava Nováková, Iva Matolínová, Vladimír Matolín
(Faculty of Mathematics and Physics, Nanomaterials Group, Charles University)

Proton Exchange Membrane Water Electrolysis (PEMWE) 1/ Electrolytic Hydrogen Production

15:30-16:30, G409

Chairs: Kazuki Noda *(3M Company)*
Yoshiyuki Kuroda *(Yokohama National University)*

O4-14 15:30-15:50
Next Generation 3M Nanostructured Thin Film Catalysts for PEM Water Electrolyzers (Invited)
Andrew Steinbach, Krzysztof Lewinski, Andrew Haug, Fuxia Sun, Grant Thoma, Kimberly Struk, Chris Thomas, Laura Nereng, Kazuki Noda
(3M Company)

O2-17 15:50-16:10
A scheme for operating electrolysis system powered by a photovoltaic generation cooperated with a hydrogen refueling station
Ichiro Sugimoto[1], Masayoshi Ishida[2], Masahiro Kobayashi[2], Yusuke Mizaki[2], Hirohisa Aki[2], Kento Ogata[3], Akitoshi Fujisawa[3]
([1]Laboratory of Energy & Human Life Science Inc., [2]University of Tsukuba, [3]Kobe Steel Ltd.)

O2-18 16:10-16:30
Cost Estimations for PEM Electrolyzers
Sayed Mobasher Saba[1], Martin Müller[1], Martin Robinius[1], Detlef Stolten[1,2]
([1]Institute of Energy and Climate Research Electrochemical Process Engineering: IEK-3 , Forschungszentrum Juelich GmbH, [2]Chair for Fuel Cells, RWTH Aachen University)

Hydrogen Supply Chain/Energy Carrier

13:00-15:00, G502

Chairs: Sarbjit S Giddey *(Energy, CSIRO)*
Tetsuya Nanba *(National Institute of Advanced Industrial Science and Technology (AIST))*

O3-1 13:00-13:20
Cost Study of International Hydrogen Carrier Supply Chains
Yuji Mizuno, Yuki Ishimoto, Susumu Sakai, Shigeki Iida, Ko Sakata
(Research and Development Division, The Institute of Applied Energy)

O3-2 13:20-13:40
Study of the optimal means of hydrogen transportation by transport distance and volume
Masashi Oya[1], Takamichi Ochi[1], Chie Mitsui[1], Shoichiro Tsuruta[2]
([1]Pubulic sector, Deloitte Tohmatsu Consulting LLC, [2]Japan Environmental Management Association for Industry)

O3-3 13:40-14:00
Hydrogen Storage and Utilization by Using Carrier Compounds for effective usage of renewable energy
Tetsuya Nanba
(Renewable Energy Research Center, National Institute of Advanced Industrial Science and Technology (AIST))

O3-4 14:00-14:20
The CO2-free hydrogen supply chain project in New Zealand
Kiyoshi Shima[1], Kenichi Ando[1], Toshihiro Hisaeda[1], Aya Inagaki[1], Toshinori Nayuki[1], Yutaka Uchiumi[1], Steve Murray[2]
([1]Obayashi Corporation, [2]Tuaropaki Trust)

O3-5 14:20-14:40
Technological Barriers for using Ammonia as a Renewable Energy Vector
Sarbjit S Giddey, Aniruddha Kulkarni, Christopher Munnings, David Viano, Louis Wibberley
(Energy, CSIRO)

O3-6 14:40-15:00
REALISING MEGA SCALE HYDROGEN EXPORT FOR POWER GENERATION IN JAPAN
George Gilboy[1], Nancy Nguyen[2]
([1]Marketing Trading and Shipping, Woodside Energy, [2]Technology and Development Planning)

Hydrogen Materials

15:30-17:30, G502

Chairs: Toshimitsu A Yokobori, Jr *(SIRC, Teikyo University)*
Hisao Matsunaga *(Kyushu University)*

O6-1 15:30-15:50
Rubber Seal Materials for Hydrogen Infrastructure (Invited)
Shin Nishimura[1,2], Hirotada Fujiwara[1], Hiroaki Ono[1]
([1]Research Center for Hydrogen Industrial use and Storage, Kyushu University, [2]Department of Mechanical Engineering, Faculty of Engineering, Kyushu University)

O6-2 15:50-16:10

Recent progress in the study on strength properties of metallic materials in high-pressure hydrogen environments (Invited)

Hisao Matsunaga[1,2,3], Osamu Takakuwa[1,3,4], Junichiro Yamabe[4,5]
([1]Department of Mechanical Engineering, Kyushu University, [2]International Institute for Carbon-Neutral Energy Research (I2CNER), Kyushu University, [3]Research Center for Hydrogen Industrial Use and Storage (HYDROGENIUS) Kyushu University, [4]AIST-Kyushu University Hydrogen Materials Laboratory (HydroMate), [5]Department of Mechanical Engineering, Fukuoka University)

O6-3 16:10-16:30

Consideration on the effect of hydrogen on fatigue limit

Masanobu Kubota[1], Mio Fukuda[2], Ryosuke Komoda[3]
([1]International Institute for Carbon-Neutral Energy Research (WPI-I2CNER), Kyushu University, [2]Graduate School of Engineering, Kysuhu University, [3]Fukuoka University)

O6-4 16:30-16:50

Mechanical Control and Release of Hydrogen Mechanically Trapped Around a Notch Tip for Steel

Toshimitsu A Yokobori, Jr[1], Norihiro Yamaji[2], Toshihito Ohmi[3]
([1]SIRC, Teikyo University, [2]JFE, [3]Shonan Institute of Technology)

O6-5 16:50-17:10

Estimation of Hydrogen Embrittlement Sensitivity for Electromagnetic Stainless Steel Under Fatigue Condition Based on the Proposed Test Method Using a Small Scale Specimen

Toshihito Ohmi[1], Toshimitsu Yokobori[2], Norihiro Yamaji[3], Seiji Sugawara[4], Takashi Ebata[4], Tatsuya Naruse[4]
([1]Shonan Institute of Technology, [2]Teikyo University, [3]Graduate Student of Tohoku University, JFE,Current Affiliation, [4]Tohoku Steel Co., Ltd.)

O6-6 17:10-17:30

Pre-Heat Temperature Effect on Hydrogen Transportation Behavior for y-Grooved Weld Joint Based on α multiplication method

Go Ozeki[1], Toshimitsu A. Yokobori Jr.[1], Toshihito Ohmi[2], Tadashi Kasuya[3], Nobuyuki Ishikawa[4], Satoshi Minamoto[5], Manabu Enoki[3]
([1]Strategic Innovation and Research Center, Teikyo University, [2]Department of Mechanical Engineering, Shonan Institute of Technology, [3]Graduate School of Engineering, The University of Tokyo, [4]Steel Research Laboratory, JFE Steel Corporation, [5]Research and Services Division of Materials Data and Integrated System, National Institute for Materials Science)

Hydrogen Utilization and Transportation

13:00-15:00, G510

Chairs: Jian Yu *(University of Hawaii)*
Masatsugu Morimitsu *(Doshisha University)*

O4-32 13:00-13:20

Carbon-Negative Hydrogen Production and Utilization in Advanced Pressurized Oxy-Combustion Cycles (Invited)

Keith Lee Pronske, Rebecca Hollis, Joshua Perron
(Clean Energy Systems, Inc.)

O4-7 13:20-13:40

Drop-in Transportation Fuels from Renewable Hydrogen and Carbon Dioxide

Jian Yu
(Hawaii Natural Energy Institute, University of Hawaii at Manoa)

O4-8 13:40-14:00

Zeolite membrane for hydrogen separation in an artificial photosynthesis process

Takahiko Takewaki, Kiminori Sato
(Mitsubishi Chemical Corporation Yokohama Center, Japan Technological Research Association of Artificial Photosynthetic Chemical Process)

O4-9 14:00-14:20

VIABILITY ANALYSIS OF GREEN METHANOL PRODUCTION PLANT IN CHILE AND SUBSEQUENTLY TRANSPORT TO JAPAN

Carlos Funez Guerra[1], Gema Alcade Ranz[1], Emilio Nieto Gallego[1], Lorezo Reyes-Bozo[2], Maria Jaen Caparros[3], Alex Godoy-Faundez[4], Carmen Clemente-Jul[5], Eduardo Vyhmeister[6]
([1] National Hydrogen Center, [2]Universidad Central of Chile, [3]H2GAS, Hydrogen to Gas, S.L. Enagás – Energy Venture Center, [4]Center for Sustainability Research and Strategic Resource Management, Faculty of Engineering, Universidad del Desarrollo, [5]Department of Energy and Fuels Systems, School of Mining and Energy Engineering, Technical University of Madrid (UPM), [6]Universidad Austral de Chile)

O4-10 14:20-14:40
Utilization of Chemical Hydrogen Storage for Hydrogen Economy System
Jianjiang Hu
(Science and Technology on Aerospace Chemical Power Laboratory, Hubei Institute of Aerospace Chemotechnology)

O4-11 14:40-15:00
Performance of Metal Hydride/Air Secondary Battery for Next-Generation Energy Storage Device
Masatsugu Morimitsu[1], Tsukasa Gejoh[2], Shizuki Kino[2], Tatsuya Fukumoto[2], Kenji Kawaguchi[3]
([1]Department of Environmental Systems Science, Doshisha University, [2]Department of Science of Environment and Mathematical Modeling, Doshisha University, [3]Organization for Research Initiatives and Development, Doshisha University)

Analysis of Hydrogen Energy System 1

15:30-17:10, G510

Chairs: Yuki Kudoh *(National Institute of Advanced Industrial Science and Technology (AIST))*
Jianjiang Hu *(Hubei Institute of Aerospace Chemotechnology)*

O1-1 15:30-15:50
Contribution of CO2-free Hydrogen System toward Low Carbon Society (Invited)
Shigeki Iida
(Research and Development Division , The Institute of Applied Energy)

O1-2 15:50-16:10
Life Cycle CO2 Reduction Potential of Power Plants Using Hydrogen Energy Carriers
Yuki Kudoh, Akito Ozawa, Naomi Kitagawa, Ryoji Muramatsu
(National Institute of Advanced Industrial Science and Technology (AIST))

O1-3 16:10-16:30
Which Role for Power-to-Gas Systems Integrated to Electricity Markets? The French Case
Maxime Cremel, Olivier Damette
(BETA-CNRS, Faculte de Droit et d'Economie, Universite de Lorraine, Lorraine Universite d'Excellence)

O1-4 16:30-16:50
Power-to-Fuel as a Market-in Technology for a Transition to Hydrogen-based Transport Applications
Maximilian Decker[1], Remzi Can Samsun[1], Ralf Peters[1], Detlef Stolten[1,2]
([1]Electrochemical Process Engineering (IEK-3), Forschungszentrum Juelich GmbH, [2]Chair for Fuel Cells, RWTH Aachen University)

O1-5 16:50-17:10
The fuel cell industry in 2018: positioned for growth
David Hart[1], Franz Lehner[1], Stuart Jones[1], Jonathan Lewis[2], Matthew Klippenstein[3]
([1]E4tech, [2]Jonathan Lewis Consulting, [3]Electron Communications)

Daily Programs (Tuesday, June 4)

Plenary Session 5

9:00-9:30, Hall C

Chairs: Ko Sakata *(The Institute of Applied Energy)*
Hideo Kameyama *(Tokyo University of Agriculture and Technology)*

PL-5 9:00-9:30
Why we need Hydrogen? -New Zero Carbon Energy Source-
Masakazu Toyoda
(Institute of Energy Economics, Japan)

Plenary Session 6

9:30-10:00, Hall C

Chairs: Ko Sakata *(The Institute of Applied Energy)*
Hideo Kameyama *(Tokyo University of Agriculture and Technology)*

PL-6 9:30-10:00
Northeast Asia is the locomotive of world hydrogen economy
Zongqiang Mao
(Tsinghua University)

Plenary Session 7

10:00-10:30, Hall C

Chairs: Ko Sakata *(The Institute of Applied Energy)*
Hideo Kameyama *(Tokyo University of Agriculture and Technology)*

PL-7 10:00-10:30
European Hydrogen and Fuel Cell Technology Research and Innovation
Laurent Antoni
(Hydrogen Europe Research)

Large Scale Water Electrolysis

10:50-12:10, Hall C

Chairs: Katsutoshi Nagaoka *(Oita University)*
Yoshitaka Aoki *(Hokkaido University)*

KN-6 10:50-11:30
Large-scale electrolysis as enabler for CO2-free economy
Manfred F Waidhas
(Siemens AG)

O2-20 11:30-11:50
Development on 10MW alkaline water electrolyzer for renewable hydrogen production
Yusuke Suzuki, Norikazu Fujimoto, Taketoshi Usui, Masami Takenaka
(Energy System Development Group, Asahi Kasei Corporation)

O2-21 11:50-12:10
Development of water electrolysis
Hltoshi Oshiro
(INDUSTRIAL EQUIPMENT BUSINESS UNIT GLOBAL ENVIRONMENT PROTECTING TECHNOLOGY DEVELOPMENT & BUSINESS PROMOTION DEPARTMENT, HITACHI ZOSEN CORPORATION)

Special Session: JST Activity for Hydrogen Carrier

16:00-18:00, Hall C

Chairs: Tsutomu Minegishi *(The University of Tokyo)*
Jun Kubota *(Fukuoka University)*

JS-1
16:00-16:20

Development of Noble Catalytic Process for Synthesis and Decomposition of Ammonia as Energy/Hydrogen Carrier

Katsutoshi Nagaoka[1], Yuta Ogura[1], Shin-ichiro Miyahara[1], Kotoko Tsujimaru[1], Suguru Matsumoto[1], Takahiro Matsunaga[1], Katsutoshi Sato[1,2]
([1]Department of Integrated Science and Technology, Oita University, [2]Elements Strategy Initiative for Catalysts and Batteries, Kyoto University)

JS-2
16:20-16:40

Ammonia Synthesis from N_2 and H_2O using Electrochemical System with Ru Catalysts, H_2 Membrane, and Phosphate-electrolyte at 200~250℃

Jun Kubota, Kanako Imamura
(Department of Chemical Engineering, Fukuoka University)

JS-3
16:40-17:00

Direct ammonia type fuel cells based on a heterojunction of proton conducting oxide electrolytes and hydrogen permeable metal anode

Yoshitaka Aoki[1], Seong Woo Jeong[2], Chunyu Zhu[1], Hiroki Habazaki[1]
([1]Faculty of Engineering, Hokkaido University, [2]Graduate school of chemical sciences and engineering)

JS-4
17:00-17:20

High-pressure H_2 + CO_2 production and separation process from formic acid

Hajime Kawanami[1], Yuichiro Himeda[2]
([1]Department of Material and Chemistry, National Institute of Advanced Industrial Science and Technology, [2]Department of Energy and Environment, National Institute of Advanced Industrial Science and Technology)

JS-5
17:20-17:40

Vanadium Alloy Membranes for Extraction of Highly Pure Hydrogen from Ammonia and Methylcyclohexane

Chikashi Nishimura[1], Hiroshi Nakagawa[2], Seiji Sakurai[2], Hideo Yoshinaga[2], Hiroshi Yukawa[3], Nobuki Yukawa[3], Yoshihisa Matsumoto[4], Tomonori Nambu[5]
([1]Center for Green Research on Energy and Environmental Materials, National Institute for Materials Science, [2]Taiyo Koko Co. Ltd., [3]Nagoya University, [4]National Institute of Technology, Oita College, [5]National Institute of Technology, Suzuka College)

JS-6
17:40-18:00

Direct Production of Hydrogen Carrier Using Membrane Integrated-Photocatalyst Sheets

Tsutomu Minegishi[1,2]
([1]Department of Chemical System Engineering, The University of Tokyo, [2]JST-PRESTO)

Special Program: Tokyo Metropolitan Government

13:30-15:30, Hall B5 (1)(2)

Towards a Decarbonized Society - Finding the Future of Hydrogen Energy

The City of Tokyo aims to achieve a Zero Emission Tokyo, with a goal of reducing CO_2 emissions, a major cause of global warming, to zero. We are making efforts to promote hydrogen energy as one of the ways to achieve this. In this program, on the main themes of Hydrogen Derived from Renewable Energy and Electricity Storage as Hydrogen, experts from both public and private sectors present their efforts and discuss challenges for the spread of hydrogen energy and its future prospects.
Students will also make presentations on energies, such as hydrogen energy or other renewable energies.

Regional Activities for Hydrogen Society 1

10:50-12:30, G402

Chairs: Nobuyuki Nishimiya *(Nihon University)*
Shigenori Mitsushima *(Green Hydrogen Research Center, Yokohama National University)*

O1-6 10:50-11:10
Kawasaki Hydrogen Strategy for Realizing a Hydrogen Society
Ryuji Kuma, Tetsuya Majima, Akikazu Kobayashi
(Coastal Area Projects Promotion Department, Coastal Area International Strategy Headquarters, Kawasaki City)

O1-7 11:10-11:30
Yokohama's "Hydrogen Society" Initiatives
Shuhei Okuno
(Climate Change Policy Headquarters, City of Yokohama)

O1-8 11:30-11:50
Efforts for Promotion of Hydrogen Energy by Kanagawa Prefectural Government
Mitsuro Hanaue
(Industry and Labor Bureau, Kanagawa Prefectural Government)

O1-9 11:50-12:10
The Aichi Low-carbon Hydrogen Supply Chain
Toshiyuki Ono[1], Yasuo Suzuoki[2], Ken Okazaki[3]
([1]The Aichi Low-carbon Hydrogen Supply Chain Promotion Association, [2]Aichi Institute of Technology, [3]Tokyo Institute of Technology)

O1-10 12:10-12:30
KIX Hydrogen Grid Project (Invited)
Rika Ito
(Environmental Management, Tech. HQ, Kansai Airports)

PEMWE 2

16:00-17:00, G402

Chair: Lars Hensgen *(Tribotecc GmbH)*

O2-22 16:00-16:20
Pentlandite Electrocatalysts: Materials for the Hydrogen Evolution Reaction
Lars Hensgen[1], Ulf Peter Apfel[2,3], Mathias Smialkowski[2]
([1]Business Development, Tribotecc GmbH, [2]Inorganic Chemistry I, Ruhr University Bochum, [3]Fraunhofer UMSICHT)

O2-23 16:20-16:40
Pt-alloy Catalyst Used as Recombination Catalyst in a Thin Polymer Electrolyte Membrane Electrolyser
Stefania Siracusano[1], Nicola Briguglio[1], Giuseppe Bonura[1], David Sebastián[2], Antonino Salvatore Aricò[1]
([1]CNR-ITAE, Istituto di Tecnologie Avanzate per L Energia , [2]CSIC, Instituto de Carboquímica)

O2-24 16:40-17:00
In situ construction of Ni enriched 3D porous NiAl as long-lived electrode for hydrogen evolution at high current densities
Jingtao Zhang[1], Yuanjun Yao[1], Zhen Zhang[1], Xinzhou Ma[3], Yibin Yang[1], Riyang Shu[1], Chao Wang[1], Ying Chen[1], Zhengdong Cheng[1,2]
([1]School of Materials and Energy, Guangdong University of Technology, [2]Artie McFerrin Department of Chemical Engineering, Texas A&M University, [3]College of Materials Science and Energy Engineering, Foshan University)

PEFCs 2

10:50-12:30, G409

Chairs: Yoshiharu Uchimoto *(Kyoto University)*
ZENG Lin *(Southern University of Science and Technology)*

O4-17 10:50-11:10
**Effect of Annealing Treatment and Thickness for the Morphology and Proton Transport Property of Nafion
Thin-film on Platinum Electrode**
Yoshiharu Uchimoto[1], Xiao Gao[1], Kentaro Yamamoto[1], Tomoyasu Hirai[2], Tomoki Uchiyama[1], Hideto Imai[3], Seiho Sugawara[4], Kazuhiko Shinohara[4], Yuki Orikasa[5]
([1]Graduate School of Human and Environmental Studies, Kyoto University, [2]Department of Applied Chemistry, Osaka Institute of Technology, [3]Nissan Analysis and Research Center, [4]Fuel Cell Cutting-Edge Research Center Technology Research Association, [5]Department of Applied Chemistry, Ritsumeikan University)

O4-18 11:10-11:30
Fabrication of a cell-reversal tolerant anode for proton exchange membrane fuel cells
ZENG Lin[1,2], Jianhua Liao[1,2], Zhiliang Zhao[3], Haijiang Wang[1,2], Hui Li[2,3]
([1]Department of Mechanical and Energy Engineering, Southern University of Science and Technology, [2]Shenzhen General Hydrogen Energy Technology Corp., LTD, [3]Department of Materials Science and Engineering, Southern University of Science and Technology)

O4-19 11:30-11:50
CFD Modelling of Gas Diffusion Layer in PEM Type Fuel Cell
Monika Drakselova, Roman Kodým, Karel Bouzek
(Department of Inorganic Technology, University of Chemistry and Technology, Prague)

O4-20 11:50-12:10
Performance investigation of a novel 3D flow field in a proton exchange membrane fuel cell
Jun Shen[1,2], Huawei Chang[1], Zhengkai Tu[1,2]
([1]Huazhong University of Science and Technology, [2]Nanyang Technological University)

O4-22 12:20-12:30
Development of Membrane Electrode Assembly Applying on Methanol-Reforming-Hydrogen/Oxygen Intermediate Temperature Fuel Cells
Jie Yu, Hiroki Miura, Hirokazu Munakata, Tetsuya Shishido, Kiyoshi Kanamura
(Applied Chemistry for Environment, Tokyo Metropolitan University)

Alkaline Water Electrolysis (AWE) 1

16:00-17:00, G409

Chairs: Hiroshi Inoue *(Osaka Prefecture University)*
Chung-Jen Tseng *(National Central University)*

O2-27 16:00-16:20
Surface-Modified Transition Metal Silicide Catalysts for Hydrogen Evolution Reaction (Invited)
Hiroshi Inoue, Tomoyoshi Kataishi, Risa Nishida, Masanobu Chiku, Eiji Higuchi
(Department of Applied Chemistry, Osaka Prefecture University)

O2-29 16:20-16:40
CoTi Hydroxide Structures for Superior Hydrogen Evolution Reaction
Chung-Jen Tseng[1,2], Bhavanari Mallikarjun[1], Shen-Chien Tien[1], Kan-Rong Lee[2], Jhe-Wei Jhuang[1], Bing-Jian Su[1]
([1]Graduate Institute of Energy Engineering, National Central University, [2]Department of Mechanical Engineering, National Central University)

O2-31 16:40-17:00
A Novel Water-splitting Electrochemical Cycle for Hydrogen Production using an Intermediate Electrode with a Pulsed Current
Atsushi Tsutsumi[1], Masateru Nakoji[2], Masanori Ishizuka[2], Taiki Onishi[2], Kaduo Tsutsumi[2]
([1]Komaba Organization for Educational Excellence, The University of Tokyo, [2]Exergy Power Systems, Inc.)

Hydrogen Energy System using Metal Hydride 1

10:50-12:30, G502

Chairs: Tetsuhiko Maeda *(National Institute of Advanced Industrial Science and Technology)*
Takayuki Ichikawa *(Hiroshima University)*

O3-11 10:50-11:10
Development of Stationary Hydrogen Energy System with Metal Hydride Hydrogen Storage (Invited)
Tetsuhiko Maeda[1], Naruki Endo[1], Kiyotaka Goshome[1], Eisuke Shimoda[2], Toshihiro Yamane[2], Tsuyoshi Nodu[2]
([1]Renewable Energy Research Center, National Institute of Advanced Industrial Science and Technology, [2]Institute of technology, Shimizu Corporation)

O3-12 11:10-11:30
Development of large hydrogen storage system using Metal Hydrides (Invited)
Kazuya Kubo[1], Yoshinori Kawaharazaki[2], Hideaki Itoh[3]
([1]Metallic Materials Business Promotion Office, The Japan Steel Works,Ltd., [2]Hydrogen Business Promotion Office, Muroran Branch Office, The Japan Steel Works,Ltd., [3]Hydrogen Business Promotion Office, The Japan Steel Works,Ltd.)

O3-13 11:30-11:50
Chemical Hydrogen Compressor by using Hydrogen Storage Alloy
Takayuki Ichikawa[1], Nobuhito Tsurui[2], Satoshi Hino[2], Ankur Jain[3], Hiroki Miyaoka[3]
([1]Graduate school of Engineering, Hiroshima University, [2]Kobe Material Testing Laboratory Co., Ltd., [3]N-BARD, Hiroshima University)

O3-14 11:50-12:10
Energy transformation and application prospects of hydrogen storage technology in power system
Ke Xu
(State grid of China, Global Energy Internet Research Institute Ltd.)

O3-15 12:10-12:30
Metal hydride hydrogen storage system for fuel cell buses
Zhinian Li, Jianhua Ye, Baolong Yuan, Xiumei Guo, Yuanfang Wu, Miao Lu, Shumao Wang, Lijun Jiang
(Department of energy research and development, General Research Institute for Nonferrous Metals,Group Co., Ltd)

Hydrogen Energy System using Metal Hydride 2/Hydrogen Carrier 2

13:30-15:10, G502

Chairs: Tatsuoki Kono *(Tohoku University)*
Motohiko Nishimura *(Kawasaki Heavy Industries)*

O3-16 13:30-13:50
Operation of Stationary Hydrogen Energy System with Metal Hydride Hydrogen Storage
Naruki Endo[1], Eisuke Shimoda[2], Kiyotaka Goshome[1], Toshihiro Yamane[2], Tsuyoshi Nozu[2], Tetsuhiko Maeda[1]
([1]Renewable Energy Research Center, National Institute of Advanced Industrial Science and Technology (AIST), [2]Insistute of Technology, Shimizu Corporation)

O3-17 13:50-14:10
Energy Simulation Model for Disaster Prevention System by using Renewable Energy and Hydrogen Energy
Kazuteru Eguchi, Tatsuoki Kono,
(Institute for Materials Research, Tohoku University)

O3-18 14:10-14:30
DC-Controlled User-on-Demand Power Supply System with Water Splitting Hydrogen Energy Storage
Katsushi Fujii[1], Daiji Yamashita[1,3], Kayo Koike[1], Katsuhiko Tsuno[1], Masakazu Sugiyama[2,3], Satoshi Wada[1]
([1]Photonics Control Technology Team, RIKEN Center for Advanced Photonics, [2]RCAST, The University of Tokyo, [3]School of Engineering, The University of Tokyo)

O3-19 14:30-14:50
Direct Catalytic Biogas Methanation for SNG Production
Lukas Polak[1], Jirina Polakova[1], Jan Kulas[1,2], Ales Doucek[1]
([1]Department of Hydrogen Technologies, UJV Rez, plc., [2]Department of Gaseous and Solid Fuels and Air Protection, University of Chemistry and Technology, Prague)

O3-20 14:50-15:10
Catalytic strategies for reductive transformation of carbon dioxide to formic acid using silicon based agents
Ken Motokura[1], Ria Ayu Pramudita[1], Chihiro Nakagawa[1], Yuichi Manaka[1,2]
([1]Chemical Science and Engineering, Tokyo Institute of Technology, [2]Renewable Energy Research Center, National Institute of Advanced Industrial Science and Technology)

Liquid Hydrogen System

16:00-18:00, G502

Chairs: Takenori Numazawa *(National Institute for Materials Science)*
Katsushi Fujii *(RIKEN Center for Advanced Photonics)*

KN-8 16:00-16:40
International Liquefied Hydrogen Supply Chain and Hydrogen Gas Turbine
Motohiko Nishimura
(Kawasaki Heavy Industries)

O3-21 16:40-17:00
Energy Supply Chain for Hydrogen Economy and Society
Takashi Yoshiyama, Shigeru Yamamoto, Motohiko Nishimura
(Hydrogen Project Development Center, Kawasaki Heavy Industries, Ltd.)

O3-22 17:00-17:20
Development of Liquefied Hydrogen Storage System
Seiji Yamashita, Katsuya Morimoto
(Corporate Technology Division, Kawasaki Heavy Industries, LTD)

O3-23 17:20-17:40
Latest Global Trend in Liquid Hydrogen Production
Lutz Decker[1], Martin Knoche[2], Umberto Cardella[3]
([1]Linde Technologist, Linde Kryotechnik AG, [2]Sales, Linde Kryotechnik AG, [3]Process Engineering, Linde Kryotechnik AG)

O3-24 17:40-18:00
Estimation of Hydrogen Liquefaction Efficiency in Magnetic Refrigeration
Takenori Numazawa[1], Koji Kamiya[1], Nobuyuki Nishimiya[1,2], Tadashi Shimizu[1]
([1]National Institute for Materials Science, [2]Nihon University)

Hydrogen Safety

10:50-12:30, G510

Chairs: Stuart Hawksworth *(Centre for Energy and Major Hazards)*
Jun Ishimoto *(Tohoku University)*

KN-7 10:50-11:30
Current Priorities in Hydrogen Safety - Work of the International Association for Hydrogen Safety
Stuart Hawksworth
(Head, Centre for Energy and Major Hazards)

O6-7 11:30-11:50
Coupled particle and Euler computing for hydrogen leakage with arbitrary crack propagation of pressure vessel
Jun Ishimoto[1], Satoru Shimada[2]
([1]Institute of Fluid Science, Tohoku University, [2]Graduate School of Information Sciences, Tohoku University)

O6-8 11:50-12:10
Development of emergency response strategies for road accidents of hydrogen fuel cell vehicles
Zhiyong Li, Ke Sun
(Jiaxing University)

O6-19 12:10-12:30
Center for Hydrogen Safety... Connecting a Global Community (Invited)
Nick Barilo[1,2]
([1]AIChE, [2]Pacific Northwest National Laboratory)

Hydrogen Utilization in Industries 2

13:30-14:50, G510

Chair: Inga Buerger *(German Aerospace Center)*

O5-5 13:30-13:50
Progress of Artificial Photo Synthesis Project
Tohru Setoyama
(Science & Innovation Center, Mitsubishi Chemical Corporation)

O5-6 13:50-14:10
Aspects of reactor design for pre-heating of a fuel cell using unused onboard surplus energy with metal hydrides
Inga Buerger, Mila Koelbig, Christian Brack, Marc Linder
(Engineering Thermodynamics, German Aerospace Center)

O5-9 14:10-14:30
Dual borohydride (Li and Na borohydride) catalyst/additive together with intermetallic FeTi for optimization of hydrogen sorption characteristics of $Mg(NH_2)_2/2LiH$
Vivek Shukla, T P Yadav, M A Shaz, Onkar Nath Srivastav
(Hydrogen Energy Center, Dept of Physics, BANARAS HINDU UNIVERSITY)

O5-10 14:30-14:50
Hydrogen as the fuel of the future in aircrafts - challenges and opportunities
Marc Prewitz, Ramon Beck, Andreas Bardenhagen
(Chair of Aircraft Design and Aerostructures, Technische Universitaet Berlin)

PEFCs 3

16:00-18:00, G510

Chairs: Jakub Malis *(University of Chemistry and Technology Prague)*
Takashi Moriya *(Honda Motor Co., Ltd.)*

KN-9 16:00-16:40
Honda Fuel Cell Vehicle Development
Takashi Moriya
(Honda Motor Co., Ltd.)

O4-23 16:40-17:00
Mireo Plus H – A High Performing Modular Fuel Cell - Battery Traction System
Cornelia Mager, Katrin Seeger
(MO RS CRC BP, Siemens Mobility GmbH)

O4-24 17:00-17:20
Comparison of MEA with catalyst coated membrane and catalyst coated electrode for PEM fuel cell for mobile applications
Jakub Malis, Veronika Markova, Martin Paidar, Martin Prokop, Karel Bouzek
(Department of Inorganic Technology, University of Chemistry and Technology Prague)

O4-25 17:20-17:40
Effect of Contaminants Originating from the Future Hydrogen Gas Grid on Automotive Fuel Cell Performance
Luis Castanheira, Hans Becker, Gareth Hinds
(National Physical Laboratory)

O4-26 17:40-18:00
Fuel cell technology for cargo bikes for emission free last mile deliveries
Inga Buerger[1], Torsten Knöri[1], Tilo Maag[2], Björn Offermann[1], Mathias Schulze[1]
([1]Engineering Thermodynamics, German Aerospace Center, [2]Vehicle Concepts, German Aerospace Center)

Daily Programs (Wednesday, June 5)

Plenary Session 8

9:00-9:30, Hall C

Chairs: Etsuo Akiba *(Kyushu University)*
Hideo Kameyama *(Tokyo University of Agriculture and Technology)*

PL-8 9:00-9:30
International Partnership for Hydrogen and Fuel Cells in the Economy: Government Overview
Sunita Satyapal
(International Partnership for Hydrogen Economy (IPHE))

Special Program: Ministry of the Environment, Japan (MOEJ)

9:30-11:45, Hall C

PL-9 9:30-10:00
MOEJ's Challenges to create Hydrogen Society
Hirofumi Aizawa *(Ministry of the Environment)*

Japan's Approach Toward Realizing a Hydrogen Society
-Learning from the Demonstrations of Low-carbon Hydrogen Supply Chains-
Hydrogen emits no CO_2 at the usage phase and also it can be even more effective energy source when produced from renewable sources.
Therefore, MOEJ is carrying out projects that fit to regional characteristics in order to utilize hydrogen for CO_2 reduction.

Special Session: SIP Activity for Ammonia as Hydrogen Carrier

12:40-15:00, Hall C

Chairs: Hideaki Kobayashi *(Tohoku University)*
Atsumi Miyake *(Yokohama National University)*

KN-10 12:40-13:20
Innovative Use of Ammonia in the Energy Market
Shigeru Muraki
(Japan Science and Technology Agency)

SI-1 13:20-13:40
CO_2-free Ammonia Production Process from Variable Renewable Energy
Takayoshi Fujimoto[1], Mototaka Kai[1], Yasushi Fujimura[1], Hideyuki Takagi[2], Tetsuya Nanba[3], Ryosuke Atsumi[3]
([1]Technology Innovation Center, Process Technology Division, JGC CORPORATION, [2]National Institute of Advanced Industrial Science and Technology (AIST), Research Institute of Energy Frontier, [3]National Institute of Advanced Industrial Science and Technology (AIST), Renewable Energy Research Center)

SI-2 13:40-14:00
Ammonia Combustion for Gas-Turbine Power Generations (Invited)
Hideaki Kobayashi[1,2]
([1]Institute of Fluid Science, Tohoku University, [2]The Fukuoka Renewable Energy Institute, National Institute of Advanced Industrial Science and Technology)

SI-3 14:00-14:20
Development of Ammonia-fueled Solid Oxide Fuel Cell Systems (Invited)
Koichi Eguchi[1], Yosuke Takahashi[2], Hayahide Yamasaki[3], Hidehito Kubo[4], Akihiro Okabe[5], Takenori Isomura[6], Takahiro Matsuo[7]
([1]Department of Energy and Hydrocarbon Chemistry, Graduate School of Engineering, Kyoto University, [2]Noritake Co. Ltd., [3]Nippon Shokubai Co. Ltd., [4]Toyota Industries Corp., [5]Mitsui Chemicals, Inc., [6]Tokuyama Corp., [7]IHI Corp.)

SI-4 14:20-14:40

Technologies to use carbon free ammonia in power plant (Invited)

Toshiyuki Suda[1], Takamasa Ito[2], Masahiro Uchida[2], Takahiro Matsuo[3], Toshiro Fujimori[4]
([1]Resources, Energy & Environment Business Area, IHI Corporation, [2]Technology Platform Center, IHI Corporation, [3]Co-Creation Project Center, IHI Corporation, [4]Industrial Systems & General-Purpose Machinery Business Area, IHI Coporation)

SI-5 14:40-15:00

Risk analysis of hydrogen fueling stations and comprehensive societal risk framework (Invited)

Atsumi Miyake[1], Shunichi Hienuki[2], Junji Sakamoto[4], Kento Shiota[1], Yu-ichiro Izato[3], Kazuhiko Noguchi[2]
([1]Institute of Advanced Sciences, Yokohama National University, [2]Center for Creation of the Symbiosis Society with Risk, Yokohama National University, [3]Graduate School of Environment and Information Sciences, Yokohama National University, [4]Graduate School of Engineering, Okayama University)

GIGATON Workshop

16:00-18:20, Hall C

Chair: Hirohide Furutani *(National Institute of Advanced Industrial Science and Technology)*

GI-1 16:00-16:20

Welcome and Introduction to Gigaton Workshop

Tetsuhiko Kobayashi[1], Michael Berube[2], FCH JU Representative[3], Hirohide Furutani[1]
([1]National Institute of Advanced Industrial Science and Technology, [2]U.S. Department of Energy (DOE), [3]The Fuel Cells and Hydrogen Joint Undertaking (FCH JU))

GI-2 16:20-16:40

Techno-economic study of hydrogen carrier chains for long distance transport in a deployment phase

Yuki Ishimoto, Susumu Sakai, Yuji Mizuno, Shigeki Iida
(Research and Development Division, The Institute of Applied Energy)

GI-3 16:40-17:00

Hydrogen's Potential Role in Future Energy Systems

Mark Ruth
(Industrial Systems and Fuels Analysis Group, National Renewable Energy Laboratory)

GI-4 17:00-17:20

Cost drivers for green hydrogen productions by water electrolysis - How can R&D help to reduce them

Tom Smolinka
(Fraunhofer Institute for Solar Energy system (F-ISE))

G1-5 17:20-17:40

Large Scale PEM Electrolysis for Industrial Applications

Thomas Bielmeier
(Hydrogen Solutions, Siemens AG)

GI-6 17:40-18:00

Infrastructure Overview/Summary of R&D Needs (tentative title)

Shin-ichi Miura
(Kobe Steel, Ltd)

GI-7 18:00-18:20

Hydrogen's Grid Benefits and Expanding End Use

Richard Boadman
(Idaho National Laboratory)

Photocatalytic Water Splitting 1

10:40-11:40, Hall B5 (1)

Chairs: Chao Wang *(Guangdong University of Technology)*
Kazunari Domen *(University of Tokyo)*

O2-33 10:40-11:00
Pickering Interfacial Catalytic Hydrogen Production from Bio-derived Biphasic System over Raspberry Like-Janus Ag_2O-TiO_2/SiO_2
Chao Wang, Riyang Shu, Jingtao Zhang
(School of Materials and Energy, Guangdong University of Technology)

O2-35 11:00-11:20
Plasma-enhanced atomic layer deposition of nanolaminated Ta_3N_5-GaN composite film for enhanced photoelectrochemical water splitting
Ming-Wei Liao, Tsong-Pyng Perng
(Department of Materials Science and Engineering, National Tsing Hua University)

O2-36 11:20-11:40
Multiphasic 1T/2H $MoSe_2$ Nanosheets Integrated with 1D CdS for Drastically Enhanced Visible-light Photocatalytic Hydrogen Evolution
Yan-Zhen Zheng, Nan Li, Jiaojiao Wu, Xia Tao
(State Key Laboratory of Organic-Inorganic Composites, Beijing University of Chemical Technology)

Photocatalytic Water Splitting 2

12:40-14:20, Hall B5 (1)

Chair: Kazunari Domen *(The University of Tokyo)*

KN-11 12:40-13:20
Photocatalytic Water Splitting for Large Scale Solar Hydrogen Production
Kazunari Domen
(Center for Energy & Environmental Science, Shinshu University & Department of Chemical System Engineering, The University of Tokyo)

O2-37 13:20-13:40
Defect-rich O-incorporated 1T-MoS_2 Nanosheets for Remarkably Enhanced Visible-light Photocatalytic H_2 Evolution over CdS
Xia Tao, Nan Li, Jiaojiao Wu, Yan-Zhen Zheng
(Beijing University of Chemical Technology, State Key Laboratory of Organic-Inorganic Composites)

O2-39 13:40-14:00
Photolytic Perfect Photoabsorbers for Hydrogen Production
Noel W Duffy[1], Kevin Xiao[2], Kalim Kashif[1], Calum Kinnear[2,3], Tim U Connell[2,3], Daniel E Gomez[2,3], Anthony Chesman[2]
([1]Energy CSIRO, [2]Manifacturing CSIRO, [3]RMIT University)

O2-40 14:00-14:20
Design and Synthesis of Cycloplatinated Polymer Dots as Photocatalysts for Visible-Light-Driven Hydrogen Evolution (Invited)
Ho-Hsiu Chou
(Chemical Engineering, National Tsing Hua University)

AWE 2

10:40-11:40, Hall B5 (2)

Chair: Hiroshi Ito *(National Institute of Advanced Industrial Science and Technology (AIST))*

O2-41 10:40-11:00
Ni-Based Highly Active and Robust Electrocatalysts for Water Oxidation: An Insight into the Origin of Their Superior Oxygen-Evolving Activity
Mei Wang[1], Jian Jiang[1], Fanfei Sun[2], Si Zhou[3], Wei Hu[4], Hao Zhang[2], Zheng Jiang[2], Jijun Zhao[3], Wensheng Yan[4]
([1]State Key Laboratory of Fine Chemicals, Dalian University of Technology, [2]Shanghai Institute of Applied Physics, Chinese Academy of Sciences, [3]School of Physics, Dalian University of Technology, [4]National Synchrotron Radiation Laboratory, University of Science and Technology of China)

O2-42 11:00-11:20

Degradation of Ni and NiCo/Ni anode for alkaline water electrolysis simulated start and stop operation

Shigenori Mitsushima[1,2], Yao Xu[1], Soki Hino[1], Yu Kitamura[1], Kensaku Nagasawa[2], Yoshiyuki Kuroda[1], Akihiro Kato[3], Yoshinori Nishiki[3]

([1]Green Hydrogen Research Center, Yokohama National University, [2]Institute of Advanced Sciences, Yokohama National University, [3]De Nora Permelec Ltd)

O2-43 11:20-11:40

Effect on the system of alkaline water electrolysers following dynamic operation patterns in view of grid balancing services

Laura Abadia[1], Rodrigo Perez[1], Rubén Canalejas[1], Pablo Marcuello[3], Vanesa Gil[1,2]

([1]Foundation for the Development of New Hydrogen Technologies in Aragon, [2]Aragonese Foundation for Research & Development (ARAID), [3]IHT Industrie Haute Technologie SA)

AWE 3

12:40-14:00, Hall B5 (2)

Chairs: Martin Paidar *(University of Chemistry and Technology)*
Mei Wang *(Dalian University of Technology)*

O2-44 12:40-13:00

Perspectives and Challenges of alkaline water electrolysers providing grid services–lifetime assessment of novel materials and components

Vanesa Gil[1,2], Laura Abadia[1], Rodrigo Perez[1], Yolanda Alvarez-Gallego[3], Christian Bernäcker[5], Pablo Marcuello[4], Guillermo Matute[6]

([1]Aragon Hydrogen Foundation, [2]Aragonese Foundation for Research and Development (ARAID), [3]Flemish Institute of Technological Research (VITO), [4]Industrie Haute Technologies S.A. (IHT), [5]Fraunhofer Institute for Manufacturing Technology and Advanced Materials (IFAM), [6]Instrumentación y Componentes S.A. (INYCOM))

O2-45 13:00-13:20

Simulation of Hydrogen Production Using Alkaline Water Electrolyzer under Representative Patterns of Renewable Electricity

Hirokazu Kojima[1], Tomoki Matsuda[2], Hideyuki Matsumoto[1,3], Taku Tsujimura[1]

([1]Renewable Energy Research Center, National Institute of Advanced Industrial Science and Technology (AIST), [2]Department of Materials Science and Engineering, Graduate School of Engineering, Tokyo Denki University, [3]Department of Chemical Science and Engineering, School of Materials and Chemical Technology, Tokyo Institute of Technology)

O2-51 13:20-13:40

Catalyst Optimization of Anion Excahenge Membrane Electrolysis

Hiroshi Ito[1], Kai Inoguchi[2], Masato Ohashi[1], Satoshi Someya[1], Tetsuo Munakata[1]

([1]Research Institute for Energy Conservation, National Institute of Advanced Industrial Science and Technology (AIST), [2]Graduate School of Frontier Sciences, The University of Tokyo)

O2-52 13:40-14:00

Construction and Characterization of the Membrane Alkaline Water Electrolysis Stack

Martin Paidar[1], Karel Denk[1], Jaromir Hnat[1], Jan Zitka[2], Karel Bouzek[1]

([1]Department of Inorganic Technology, University of Chemistry and Technology, [2]Institute of Macromolecular Chemistry, Czech Academy of Sciences)

Reforming of Biomass

12:40-14:00, G402

Chairs: Riyang Shu *(Guangdong University of Technology)*
Krystina E Lamb *(Energy, CSIRO)*

O2-46 12:40-13:00

Low temperature hydrogenation of bio-oil model compounds over highly dispersed Ru-based catalyst

Riyang Shu, Rongxuan Li, Biqin Lin, Ying Chen

(School of Materials and Energy, Guangdong University of Technology)

O2-48
13:00-13:20

Nanofibered Alummina Promoted with Ni and Ce as Efficient Catalyst to Produce Hydrogen by Dry Reforming of Biogas

Antonio Chica, Juan Jose Gonzalez-Perez, Javier Francisco Da Costa-Serra
(Instituto de Tecnologia Quimica , Consejo Superior de Investigaciones Cientificas)

O2-49
13:20-13:40

Enhanced sewage sludge disintegration and hydrogen production by ionizing radiation pretreatment with Fe^{2+} addition

Yanan Yin, Jianlong Wang
(Institute of Nuclear and New Energy Technology, Tsinghua University)

O2-50
13:40-14:00

H2 gas production by *Escherichia coli* during fermentation of mixture of glycerol and acetate

Karen Trchounian[1,2,3], Satenik Mirzoyan[2,3], Anait Vassilian[4], Armen Trchounian[1,2]
([1]Biochemistry, Microbiology and Biotechnology, Yerevan State University, [2]Scientific-Research Institute of Biology, [3]Microbial Biotechnologies and Biofuel Innovation Center, [4]Ecology and Nature Protection)

Various Hydrogen Production Technologies

15:10-16:50, G402

Chairs: Yukio Hayakawa *(Gifu University)*
Yanan Yin *(Tsinghua University)*

O2-54
15:10-15:30

Ammonia Decomposition for Hydrogen Production

Krystina E Lamb, San H Hla, Michael D Dolan
(Energy, CSIRO)

O2-55
15:30-15:50

Output Power Fluctuation Suppression for Power Generation Using Renewable Energy: Simulation Model Generation for Hydrogen Energy System

Kazuto Kubota[1], Daigo Kittaka[2], Tatsuya Ohyama[3], Hiroshi Matsumoto[3], Yoichi Mashima[3], Hisashi Kato[3]
([1]Toshiba Infrastructure Systems & Solutions Corporation, [2]Toshiba Energy Systems & Solutions Corporation, [3]Tohoku Electric Power Co., Inc.)

O2-56
15:50-16:10

Catalysts and Membranes for Hydrogen Production

Krystina E Lamb, Matthew J Langley, David M Viano, San S Hla, Michael D Dolan
(Energy, CSIRO)

O2-57
16:10-16:30

Development of novel plasma membrane reactor filled with zeolite

Yukio Hayakawa[1], Shintaro Wakazono[1], Tomonori Miura[2], Shinji Kambara[1]
([1]Department of Engineering, Gifu University, [2]Sawafuji Electric Co., Ltd.)

O2-58
16:30-16:50

Assessment Study on Low Carbon Ammonia as a Hydrogen Carrier for Application to Thermal Power Generation

Sho Fujimoto[1], Kazutaka Hiraoka[1], Yasushi Fujimura[1], Mototaka Kai[1], Yuji Mizuno[2], Yuki Ishimoto[2], Ko Sakata[2]
([1]Technology Innovation Center, JGC Corporation, [2]Research and Development Division, The Institute of Applied Energy)

Analysis of Hydrogen Energy System 2

12:40-14:40, G409

Chairs: Akito Ozawa *(National Institute of Advanced Industrial Science and Technology (AIST))*
Bryan Pivovar *(NREL)*

O1-12
12:40-13:00

The role of hydrogen in low-carbon energy systems in Japan by 2050

Akito Ozawa[1], Yuki Kudoh[1], Akinobu Murata[1], Tomonori Honda[1], Itoko Saita[2], Hideyuki Takagi[2]
([1]Research Institute of Science for Safety and Sustainability, National Institute of Advanced Industrial Science and Technology (AIST), [2]Research Institute of Energy Frontier, National Institute of Advanced Industrial Science and Technology (AIST))

O1-13 13:00-13:20
Carbon foot print: a well-to-well method to evaluate CO2 free ammonia energy value chain for the future
Ken-ichi Aika
(Graduate School of Science and Technology, Kumamoto University)

O1-14 13:20-13:40
From Hydrogen Producers to Retailers in Japan: A Combinatorial Carbon Footprint Assessment
Antonio Valente[1,2], Diego Iribarren[1], Javier Dufour[1,2]
([1]Systems Analysis Unit, IMDEA Energy, [2]Chemical and Environmental Engineering Group, Rey Juan Carlos University)

O1-15 13:40-14:00
Advances in Life Cycle Sustainability Assessment of Hydrogen Value Chains
Antonio Valente[1,2], Diego Iribarren[1], Javier Dufour[1,2]
([1]Systems Analysis Unit, IMDEA Energy, [2]Chemical and Environmental Engineering Group, Rey Juan Carlos University)

KN-12 14:00-14:40
H2@Scale Advances being led through the National Renewable Energy Lab (NREL)
Bryan Pivovar
(NREL)

Analysis of Hydrogen Energy System 3

15:10-16:50, G409

Chairs: Antonio Valente *(IMDEA Energy)*
Mary Rose de Valladares *(IEA Hydrogen)*

KN-13 15:10-15:50
Hydrogen as an Enabler of a Sustainable and Integrated Energy System
Christopher Hebling
(Fraunhofer-Gesellschaft)

O1-16 15:50-16:10
IEA Hydrogen: previewing the Strategic Plan for 2020-2025
Mary Rose de Valladares[1], Paul Lucchese[2], Eiji Ohira[3], Jonathan Leaver [4]
([1]General Manager, IEA Hydrogen, [2]IEA Hydrogen Chairman from CEA, [3]IEA Hydrogen Vice-Chair from NEDO, [4]IEA Hydrogen Vice-Chair from Unitec)

O1-17 16:10-16:30
Environmental Policy Inclusion in Hydrogen Supply Chain Optimization: the Case for British Columbia
Hoda Talebian, Omar E. Herrera, Walter Mérida
(Clean Energy Research Centre, University of British Columbia)

O1-18 16:30-16:50
What is the role for hydrogen in the UK energy system? Assessment of hydrogen storage and injection into the gas grid using whole-system value chain optimisation
Christopher James Quarton, Sheila Samsatli
(Department of Chemical Engineering, University of Bath)

Regional Activities for Hydrogen Society 2

17:10-18:30, G409

Chairs: Boyuan Tian *(State Grid Global Energy Interconnection Research Institute Co.,Ltd.)*
Hoda Telebian *(University of British Columbia)*

KN-15 17:10-17:30
Hydrogen Activities in India/ IOCL
Alok Sharma
(Indian Oil Corporation Ltd)

O1-19 17:30-17:50
Hydrogen Technologies in the Czech Republic – Status and Trends
Karin Stehlik [1,2], Martin Tkáč[2,3]
([1]Czech Hydrogen Technology Platform, [2]Research Center Rez, [3]University of Chemistry and Technology Prague)

O1-20 17:50-18:10

BIG HIT: Creating a Green Hydrogen Energy System in the Orkney Islands

Jesus Simon[1], Vanesa Gil[1,2], Enrique Troncoso[3], Nigel Holmes[4]

([1]Foundation for the Development of the Hydrogen Technologies in Aragon, [2]Fundación Agencia Aragonesa para la Investigación y el Desarrollo (ARAID), [3]Systeng Consulting, [4]Scottish Hydrogen and Fuel Cell Association (SHFCA), Energy Technology Centre)

O1-21 18:10-18:30

H2 from abandon hydro-power for inland shipping - take upper Yangtze River as an example

Boyuan Tian[1], Jijiang He[2], Fu Wang[3], Yong Li[4], Chuang Liu[5], Ning Li[6], Tao Ma[7], Yongying Qi[8]

([1]Energy Storage, State Grid Global Energy Interconnection Research Institute Co.,Ltd., [2]Qinghua University, [3]Ningbo University, [4]Sirui Daotong Technology (Beijing) Co., Ltd., [5]Northeast Electric Power University, [6]Xi'an University of Technology, [7]Harbin Institute of Technology, [8]China National Petroleum Corporation Economic and Technological Research Institute)

Hydrogen Gas Turbine 1

12:40-14:00, G502

Chair: Atsushi Horikawa *(Kawasaki Heavy Industries, LTD.)*

O4-27 12:40-13:00

Oxygen-hydrogen combustion technology - for future power generation system

Toshiichi Matsumoto

(Research & Development Department, The Institute of Applied Energy)

O4-28 13:00-13:20

Development and Evaluation of a Combined Heat and Power Supply System using a Hydrogen Gas Turbine

Mitsugu Ashikaga[1], Masato Yamaguchi[1], Noriyoshi Kohama[1], Hajime Onojima[2], Kiyoshi Shima[2], Moriya Kajiki[2]

([1]Kawasaki Heavy Industries, Ltd., [2]Obayashi Corporation)

O4-29 13:20-13:40

Application of Low NOx MIcro-mix Hydrogen Combustion to Industrial Gas Turbine and DLN Combustor Developments for 2MW Class Gas Turbine

Atsushi Horikawa[1], Harald H.-W. Funke[2], Karsten Kusterer[3], Kunio Okada[1], Manfred Wirsum[4]

([1]Kawasaki Heavy Industries, LTD., [2]Aachen University of Applied Science, [3]B&B AGEMA GmbH, [4]RWTH Aachen University)

O4-31 13:40-14:00

Closed-loop Turbine Power and Energy Storage System using Hydrogen / Oxygen Combustion Technologies

Susan Marie Schoenung[1], Jay O Keller[2], Joshua Partheepan[3]

([1]Longitude 122 West, Inc., [2]Zero Carbon Energy Solutions, Inc., [3]West Texas A&M University)

Hydrogen Gas Turbine 2/Ammonia as Hydrogen Carrier 1

15:10-16:50, G502

Chairs: Yoshitsugu Kojima *(Hiroshima University)*
Cheng-Yu Wang *(National Chiao Tung University)*

KN-14 15:10-15:50

The role of fuel flexible gas turbines in an integrated, reduced carbon energy ecosystem

Jeffrey Goldmeer

(GE Gas Power)

O3-31 15:50-16:10

Hydrogen co-firing in Siemens industrial turbines (Invited)

Jenny Larfeldt

(Siemens Industrial Turbomachinery AB)

O3-32 16:10-16:30

Ammonia to High-Purity Hydrogen Conversion with High Efficiency

Yoshitsugu Kojima

(Natural Science Center for Basic Research and Development, Hiroshima University)

O3-33 16:30-16:50

Hydrogen generation by ammonia electrolysis in aqueous solution by platinum nanoparticle supported carbon nanotube film electrode

Nobuko Hanada, Yusuke Kohase, Suguru Noda
(Department of Applied Chemistry, School of Advanced Science and Engineering, Waseda University)

Ammonia as Hydrogen Carrier 2

17:10-18:30, G502

Chairs: Yoshitsugu Kojima *(Hiroshima University)*
Nobuko Hanada *(Waseda University)*

O3-34 17:10-17:30

Preparation and Characterization of Mesoporous Silica Materials-supported Cs-Ru Nanocatalysts for Mild Ammonia Synthesis

Shih-Yuan Chen, Masayasu Nishi, Hideyuki Takagi, Takehisa Mochizuki
(Energy Catalyst Technology Group, Research Institute of Energy Frontier, AIST)

O3-35 17:30-17:50

Ammonium salts conversion into urea for solid state hydrogen storage

Yuichi Manaka[1,2], Yuki Nagatsuka[1], Ken Motokura[1]
([1]School of Materials and Chemical Technology, Tokyo Institute of Technology, [2]Renewable Energy Research Center, National Institute of Advanced Industrial Science and Technology)

O3-36 17:50-18:10

Applications of Metal-Organic Frameworks and the Derivatives in Hydrogen Adsorption, and Ammonia Borane Hydrogen Generation

Cheng-Yu Wang[1], Jing-Yang Chung[2], Chi-Wei Liao[2], Yi-Ju Wu[1], Po-Sen Tseng[1]
([1]Materials Science and Engineering, National Chiao Tung University, [2]Materials Science and Engineering, Feng Chia University)

O3-37 18:10-18:30

Synthesis of ammonia borane from ammine complex

Tessui Nakagawa, Haruka Yasuda, Kazue Tsukiji
(Faculty of Science, University of the Ryukyus)

Metal Hydride

12:40-14:40, G510

Chairs: Kouji Sakaki *(National Institute of Advanced Industrial Science and Technology)*
Walter Jose Botta *(Federal University of Sao Carlos)*

O3-25 12:40-13:00

Ti-based Hydrogen Absorbing Alloys

Etsuo Akiba[1,3], Rika Hayashi[1], Hai-Wen Li[1,3,4], Makoto Arita[2], Zenji Horita[2,3], Kaveh Edalati[3]
([1]International Research Center for Hydrogen Energy, Kyushu University, [2]Faculty of Engineering, Kyushu University, [3]WPI International Institute for Carbon-Neutral Energy Research (WPI-I2CNER), Kyushu University, [4]Kyushu University Platform of Inter/Transdisciplinary Energy Research, Kyushu University)

O3-27 13:00-13:20

Development of hydrogen storage materials for power to gas technology

Kouji Sakaki[1], Hyunjeong Kim[1], Yumiko Nakamura[1], Yoshinori Kawaharazaki[2], Hideaki Itoh[2], Kazuya Kubo[2]
([1]Research Institute of Energy Frontier, National Institute of Advanced Industrial Science and Technology, [2]Japan Steel Works, LTD)

O3-28 13:20-13:40

Intelligent catalysis of niobium oxide for magnesium hydrogen storage

Hiroki Miyaoka[1], Hiroyuki Gi[2], Keita Shinzato[2], Takashi Ogi[2], Masahiro Sadakane[2], Takayuki Ichikawa[2]
([1]Natural Science Center for Basic Research and Development, Hiroshima University, [2]Graduate school of Engineering, Hiroshima University)

O3-26 13:40-14:00

Development of lightweight and inexpensive Mg based alloys for hydrogen storage

Kohta Asano, Yanshan Lu, Véronique Charbonnier, Hyunjeong Kim, Kouji Sakaki, Yumiko Nakamura
(Research Institute of Energy Frontier, National Institute of Advanced Industrial Science and Technology (AIST))

O3-29 14:00-14:20

Lightweight Hydrides for High Density Hydrogen Storage

Hai-Wen Li[1,2,3], Liqing He[4], Etsuo Akiba[2,3,4]
([1]Kyushu University Platform of Inter/Transdisciplinary Energy Research, Kyushu University, [2]International Research Center for Hydrogen Energy, Kyushu University, [3]WPI International Institute for Carbon-Neutral Energy Research, Kyushu University, [4]Faculty of Engineering, Kyushu University)

O3-30 14:20-14:40

Scientific and Technological Perspectives for Hydrogen Storage in Metal Hydrides

Walter Jose Botta, Lucas Faccioni Chanchetti, Douglas Henrique Milanez, Guilherme Zepon, Alberto Moreira Jorge Jr, Tomaz Toshimi Ishiwaka, Daniel Rodrigo Leiva
(Department of Materials Engineering, Federal University of Sao Carlos)

Hydrogen Quality

15:10-16:50, G510

Chair: Yoshiyuki Matsuda *(Japan Automobile Research Institute)*

O6-9 15:10-15:30

Mapping of Quality of Hydrogen Fuel Dispensed from Hydrogen Refuelling Stations in Europe (Invited)

Thor Anders Aarhaug[1], Ole Sigmund Kjos[2], Alain Ferber[3], JP HSU[4], Thomas Bacquart[5]
([1]Sustainable Energy, SINTEF Industry, [2]Industrial Process Technology, SINTEF Industry, [3]Smart Sensor Systems, SINTEF Digital, [4]Smart Chemistry, [5]National Physics Laboratory)

O6-10 15:30-15:50

Hydrogen fuel impurity measurements for the development of ISO 14687 standard

Jaana M. Viitakangas, Pauli Koski, Sonja Auvinen, Jari Ihonen
(Digital engineering, VTT Technical Research Centre of Finland Ltd)

O6-11 15:50-16:10

Hydrogen quality for and in FCEV: Challenges in analysis according to ISO14687 and in sampling at HRS and in the FCEV

Thomas Bacquart, Abigail Morris, Niamh Moore, Sam Bartlett, Robbie Wilmot, Arul Murugan
(Gas and particulate metrology group, National Physical Laboratory)

O6-12 16:10-16:30

Effect of impurities in hydrogen fuel on the performance of polymer electrolyte fuel cells for automotive applications (Invited)

Yoshiyuki Matsuda
(E-mobility Research Division, Japan Automobile Research Institute)

O6-13 16:30-16:50

Development of International Standards for Maritime Hydrogen Fuel Cells

Timothy E. Meyers
(Systems Engineering Division, U.S. Coast Guard Office of Design & Engineering Standards)

Daily Programs (Thursday, June 6)

Dissemination Strategy for Hydrogen Energy System

9:00-11:10, Hall C

Chairs: Jun Miyazaki *(Iwatani Corporation)*
David Hart *(E4tech)*

KN-16 9:00-9:40
Another approach to the realization of a hydrogen based society (provisional)
Jun Miyazaki
(Iwatani Corporation)

O1-24 9:40-10:00
Hydrogen mobility transition: policies and strategies in Japan
Midori Aoyagi[1], Ritsuko Ozaki[2], Fred Steward[3]
([1]Center for Social and Environmental Systems, National Institute for Environmental Studies, [2]University of Winchester, [3]Imperial College London)

O1-25 10:30-10:50
Fuel cell supply chains – fragile but strengthening
David Hart, Franz Lehner, Luca Bertuccioli
(E4tech)

O1-26 10:50-11:10
A Role for Social Science in Understanding Acceptance of a Hydrogen Energy Future in Australia
Krystina E Lamb[1], Simone Carr-Cornish[2], Michelle Rodriguez[2]
([1]Energy, CSIRO, [2]Land and Water, CSIRO)

SOFC

9:00-11:30, G402

Chairs: Koji Amezawa *(Tohoku University)*
Kazunari Sasaki *(Kyushu University)*

O4-33 9:00-9:20
Mechanism of Cathodic Reaction in SOFC and PCFC Investigated by Using *Operando* X-Ray Absorption Measurements (Invited)
Koji Amezawa[1], Keita Mizuno[2], Yoshinobu Fujimaki[1], Katsuya Nishidate[2], Takashi Nakamura[1], Yuta Kimura[1], Oki Sekizawa[3], Kiyofumi Nitta[3], Keiji Yashiro[4], Tatsuya Kawada[4]
([1]IMRAM, Tohoku University, [2]Graduate School of Engineering, Tohoku University, [3]JASRI, [4]Graduate School of Environmental Studies, Tohoku University)

O4-34 9:20-9:40
Cell Design and Performance of Proton-conducting Ceramic Fuel Cells by Controlling Transport Properties of Solid Electrolyte Membranes
Junichiro Otomo[1], Gen Kojo[1], Hiroki Matsuo[1], Yoshio Matsuzaki[2,3]
([1]Department of Environment Systems, Graduate School of Frontier Sciences, The University of Tokyo, [2]Fundamental Technology Department, Tokyo Gas Co., Ltd., [3]Next-Generation Fuel Cell Research Center (NEXT-FC), Kyushu University)

O4-35 9:40-10:00
Key parameters of proton conducting Solid Oxide Fuel Cells from point of view of coherence with models
Jarek Milewski, Arkadiusz Szczęśniak, Łukasz Szabłowski, Olaf Dybiński
(Faculty of Power and Aeronautical Engineering, Warsaw University of Technology)

O4-36 10:30-10:50
The effect of conductivity of alternative protective coatings on the performance of a SOFC stack - a numerical analysis
Jakub Kupecki[1,2], Peter Vang Hendriksen[3], Sebastian Molin[4], Yevgeniy Naumovich[1]
([1]Department of High Temperature Electrochemical Processes (HiTEP), Institute of Power Engineering, [2]National Fuel Cell Research Center (NFCRC), University of California, Irvine, [3]Department of Energy Conversion and Storage, Technical University of Denmark, [4]Faculty of Electronics, Telecommunications and Informatics, Gdansk University of Technology)

O4-37
10:50-11:10

Long-term Stability of Anode-Supported Solid Oxide Fuel Cell under Accelerated Test Conditions

Rak-Hyun Song[1,2], Muhammad Zubair Khan[1], Amjad Hussain[1,2], Beomsu Kwon[1,2], Seung-Bok Lee[1,2], Jong-Eun Hong[1], Tak-Hyoung Lim[1,2]
([1]Fuel Cell Research Laboratory, Korea Institute of Energy Research, [2]University of Science and Technology, Korea)

O4-39
11:10-11:30

Kyushu University Hydrogen Project: A challenge with industry, academia, and local government (Invited)

Kazunari Sasaki[1,2,3,4,5], Kohei Ito[1,2,3], Akari Hayashi[1,2,3,5], Shunsuke Taniguchi[1,2], Miki Fujita[1], Ayumi Zaitsu[1]
([1]International Research Center for Hydrogen Energy, Kyushu University, [2]Next-Generation Fuel Cell Research Center (NEXT-FC), [3]Faculty of Engineering (Department of Hydrogen Energy Systems), [4]International Institute for Carbon-Neutral Energy Research (WPI-I2CNER), [5]Platform of Inter / Transdisciplinary Energy Research (Q-PIT))

Special Session: Hydrogen Engine

9:00-11:30, G409

Chairs: Kimitaka Yamane *(Yamane Hydrogen Energy Research Laboratory)*
Taku Tsujimura *(National Institute of Advanced Industrial Science and Technology)*

IC-1
9:00-9:20

The Shortest Path to Hydrogen Energy Society: Strategy for the way to realize the hydrogen society and clearing obstacles to FCEV adoption

Kimitaka Yamane[1], Paul C. Lavalla[2], Takashi Inoue[3]
([1]President, Yamane Hydrogen Energy Research Laboratory, [2]Business Development, Yamane Hydogen Energy Research Laboratory, [3]Chairman, Inoue Public Relations, Inc.)

IC-2
9:20-9:40

The New Hydrogen Engine for High Performance Heavy-Duty Vehicles with Zero-Impact Emissions: From Today to Commercialisation

Alvaro Sousa[1], Thomas Korn[2]
([1]CTO, KEYOU GmbH, [2]CEO, KEYOU GmbH)

IC-3
9:40-10:00

Simultaneous Attainment of Near-zero Emissions, High Thermal Efficiency and High Output Power by Optimizing Jet Geometry in Direct-injection Hydrogen Engine

Keisuke Goma, Masakuni Oikawa, Yasuo Takagi, Yuji Mihara
(Tokyo City University)

IC-5
10:00-10:20

R&D on Direct Injection Hydrogen Engine for Stationary Generation

Taku Tsujimura, Yasumasa Suzuki
(Renewable Energy Research Center, National Institute of Advanced Industrial Science and Technology)

IC-6
10:30-11:30

Panel Discussion

Reforming of Hydrocarbon

9:00-11:10, G502

Chairs: Japp Ventre *(TNO)*
Rongwen Lyu *(Dalain University of Technology)*

O2-59
9:00-9:20

Hydrogen Production from Liquid Hydrocarbon Feedstock

Aadesh Harale[1], Aqil Jamal[1], Steve Paglieri[1], Sai Katikaneni[1], Axel Behrens[2], Nicole Schoedel[2], Wolfgang Mueller[2], Henk van Veen[3], Jaap Vente[3]
([1]Research and Development Center, Saudi Aramco, [2]Chemical Development and Service RDC, Engineering Division, Linde AG, [3]Sustainable process technology, ECN part of TNO)

O2-61
9:20-9:40

Next- generation high efficiency hydrogen production process and development of catalysts

Kana Motomura, Chika Takada, Osamu Okada
(R&D group, Technical headquarters, Renaissance Energy Research Corporation)

O2-62 9:40-10:00
A City Gas Reforming Type Hydrogen Generator "suidel"
Takuto Kushi, Kohei Eguchi, Hiroki Iinuma, Takayasu Uchi, Shin Inagaki, Yoshitaka Baba
(Application Technology Research Institute, Tokyo Gas Co., Ltd.)

O2-63 10:30-10:50
Pd Clusters Supported on Amino-functionalized Chemical Inert SiO_2 by Diamine-Alkalized Graphene Oxide as Catalyst for Hydrogen Production from Formic Acid
Wanyue Ye, Rongwen Lyu, Yuzhen Ge
(State Key Laboratory of Fine Chemicals, Dalain University of Technology)

O2-64 10:50-11:10
Thin Palladium Electroless Pore-Plated Membranes with CeO_2 Intermediate Barrier for H_2 Production in Membrane Reactors
David Alique Amor, David Martinez-Diaz, Daniel Sanz, Raúl Sanz, José Antonio Calles, Arturo Vizcaíno
(Chemical en Environmental Engineering Group, Rey Juan Carlos University)

Codes, Standards and Regulation

9:00-11:30, G510

Chairs: Eveline Weidner *(European Commission Joint Research Centre)*
Nicolas Javahiraly *(University of Strasbourg)*

KN-17 9:00-9:40
International regulations for FCV
Koshi Sekizawa
(Japan Automobile Manufacturers Association, Inc.)

O6-14 9:40-10:00
A European perspective on Regulation and Standardisation for fuel cells and hydrogen technologies: gap analysis and priorities (Invited)
Eveline Weidner, Pietro Moretto, Beatriz Acosta
(European Commission Joint Research Centre)

O6-16 10:30-10:50
Metrology for Hydrogen Vehicles
Arul Murugan[1], Marc de Huu[2], Thomas Bacquart[1], Janneke van Wijk[3], Karine Arrhenius[4], Indra te Ronde[5], David Hemfrey[1]
([1]NPL, [2]METAS, [3]VSL, [4]RISE, [5]NEN)

O6-17 10:50-11:10
Recent Developments of nano-plasmonic sensors for hydrogen detection
Nicolas Javahiraly
(ICube Laboratory, University of Strasbourg)

O6-18 11:10-11:30
Life Predecition Based on an Improved Extreme Learning Machine for PEMFC
Xuexia Zhang, Zixuan Yu, Weirong Chen
(School of Electrical Engineering, Southwest Jiaotong University)