

C-4 Environmental and Energy Materials

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Katsuya TESHIMA (Shinshu University)

Co-organizers

Nobuyuki ZETTSU (Shinshu University)

Takahiro ISHIZAKI (Shibaura Institute of Technology)

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Chiaki TERASHIMA (Tokyo University of Science)

Yuji MATSUMOTO (Tohoku University)

Tomoaki WATANABE (Meiji University)

Yoshitake MASUDA (National Institute of Advanced Industrial Science and Technology)

Shusaku NAGANO (Nagoya University)

Koji TOMITA (Tokai University)

Daisuke ISHII (Nagoya Institute of Technology)

Oral Session 1 March 28 (Sat.) Room 5

Chair : Chiaki Terashima (Tokyo University of Science)

- 8:50 C4-I-01 **Photovoltaic Properties of Clay Nanoparticle-Dispersing Titania Films** [Invited Lecture]
Hiomasa Nishikiori, Masaaki Ito, Naohiro Kanada
DEPARTMENT OF ENVIRONMENTAL SCIENCE AND TECHNOLOGY, FACULTY OF ENGINEERING, SHINSHU UNIVERSITY
- 9:10 C4-I-02 **Two Step NH₃-Assisted Flux Coating of Porous Ta₃N₅ Crystal Layers on Ta Substrate** [Invited Lecture]
¹Hajime Wagata, ¹Mugi Komatsu, ¹Shuji Oishi, ^{1,2}Katsuya Teshima
1 DEPARTMENT OF ENVIRONMENTAL SCIENCE AND TECHNOLOGY, FACULTY OF ENGINEERING, SHINSHU UNIVERSITY
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Chair : Mirabbos Khujamberdiev (Shinshu University)

- 9:30 C4-I-03 **Ionic Liquid Nano Thin Films for New Materials Processes and Devices** [Invited Lecture]
Shingo Maruyama, Kaho Toyabe, Miho Yamauchi, Yuji Matsumoto
DEPARTMENT OF APPLIED CHEMISTRY, TOHOKU UNIVERSITY
- 9:50 C4-I-04 **Fabrication of Nanostructures Using Focused Electron Beams** [Invited Lecture]
Masayuki Shimojo
DEPARTMENT OF MATERIALS SCIENCE AND ENGINEERING, SHIBAURA INSTITUTE OF TECHNOLOGY

Chair : Koji Tomita (Tokai University)

- 13:00 C4-I-05 **Flux Growth, Characterization, and Application of Alkaline Earth Tantalum Oxynitride Crystals in the Form of Thin Film and Powder** [Invited Lecture]
¹Mirabbos Hojamberdiev, ¹Hajime Wagata, ¹Shuji Oishi, ^{1,2}Katsuya Teshima
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2 CENTER FOR ENERGY AND ENVIRONMENTAL SCIENCE, SHINSHU UNIVERSITY
- 13:20 C4-I-06 **Photocatalytic CO₂ Reduction by Diamond Nanoparticles** [Invited Lecture]
^{1,2}Chiaki Terashima, ^{1,2}Kazuya Nakata, ^{1,2}Akira Fujishima
1 PHOTOCATALYSIS INTERNATIONAL RESEARCH CENTER, TOKYO UNIVERSITY OF SCIENCE
2 ACT-C/JST

Chair : Hajime Wagata (Shinshu University)

13:40 C4-I-07 **Structure and Morphology Control of Titanium Dioxide for Environmental and Energy Materials by Solution Processes** [Invited Lecture]

¹Kouji Tomita, ¹Miwako Furue, ¹Takahiro Kikuchi, ²Yuki Shimoyama, ²Yoshihito Kunugi, ³Shinjiro Umezu, ⁴Masato Kakihana

1 DEPARTMENT OF CHEMISTRY, SCHOOL OF SCIENCE, TOKAI UNIVERSITY

2 DEPARTMENT OF APPLIED CHEMISTRY, SCHOOL OF ENGINEERING, TOKAI UNIVERSITY

3 SCHOOL OF CREATIVE SCIENCE AND ENGINEERING, WASEDA UNIVERSITY

4 INSTITUTE OF MULTIDISCIPLINARY RESEARCH FOR ADVANCED MATERIALS, TOHOKU UNIVERSITY

14:00 C4-I-08 **Unusual Flux Growth of Orthorhombic LiMnO₂ Crystal in LiCl-KCl Flux** [Invited Lecture]

¹Fumitaka Hayashi, ²Shota Kurokawa, ²Hajime Wagata, ²Hiromasa Shiiba, ³Kunio Yubuta, ^{1,2}Katsuya Teshima, ²Shuji Oishi

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Chair : Katsuya Teshima (Shinshu University)

14:20 C4-I-09 **Efficient Exploration of Li Ion Conductors by First-Principles Density Functional Theory with Machine Learning Techniques** [Invited Lecture]

^{1,2,3}Masanobu Nakayama, ^{1,2}Randy Jalem

1 DEPARTMENT OF MATERIALS ENGINEERING, NAGOYA INSTITUTE OF TECHNOLOGY

2 ELEMENT STRATEGY INSTITUTE FOR CATALYST AND BATTERY (ESICB), KYOTO UNIVERSITY

3 PRESTO RESEARCHER, JAPAN SCIENCE AND TECHNOLOGY AGENCY(JST)

Chair : Kei Nishikawa (National Institute for Materials Science)

14:50 C4-I-10 **3DOM Separator for Next Generation Rechargeable Batteries Using Lithium Metal Anode** [Invited Lecture]

Hirokazu Munakata, Kazuhei Miyahara, Yohei Aoyama, Kiyoshi Kanamura

GRADUATE SCHOOL OF URBAN ENVIRONMENTAL SCIENCES, TOKYO METROPOLITAN UNIVERSITY

15:10 C4-I-11 **In-Situ Electron Microscope Observations of Electrochemical Li Deposition/Dissolution with a LiPON Electrolyte** [Invited Lecture]

¹Munekazu Motoyama, ¹Makoto Ejiri, ^{1,2}Yasutoshi Iriyama

1 DEPARTMENT OF MATERIALS, PHYSICS AND ENERGY ENGINEERING, NAGOYA UNIVERSITY

2 JST-ALCA

Chair : Masanobu Nakayama (Nagoya Institute of Technology)

15:30 C4-I-12 **Single Particle Measurement Technique for New Electrode Materials of Next-Generation Li-Ion Batteries** [Invited Lecture]

^{1,2}Kei Nishikawa, ^{2,3}Nobuyuki Zettsu, ^{2,3}Katsuya Teshima, ^{1,4}Kiyoshi Kanamura

1 NATIONAL INSTITUTE FOR MATERIALS SCIENCE

2 CREST, JAPAN SCIENCE AND TECHNOLOGY AGENCY

2 DEPARTMENT OF ENVIRONMENTAL SCIENCE & TECHNOLOGY, SHINSHU UNIVERSITY

3 GRADUATE SCHOOL OF URBAN ENVIRONMENTAL SCIENCES, TOKYO METROPOLITAN UNIVERSITY

15:50 C4-I-13 **Crystal Structure and Thermodynamic Stability of Electrochemically and Chemically Delithiated Cathode Materials of Li_{1-2x}Mn_{0.54}Ni_{0.13}Co_{0.13}O₂** [Invited Lecture]

Naoya Ishida, Naoto Kitamura, Yasushi Idemoto

DEPARTMENT OF PURE & APPLIED CHEMISTRY, FACULTY OF SCIENCE & TECHNOLOGY, TOKYO UNIVERSITY OF SCIENCE

Chair : Naoya Ishida (Tokyo University of Science)

16:10 C4-I-14 **Growth of Li(Ni_{1/3}Co_{1/3}Mn_{1/3})O₂ Crystals in Sulfate Fluxes and Characterization of Their Electrochemical Properties for Advanced Lithium Ion Batteries** [Invited Lecture]

^{1,2}Nobuyuki Zettsu, ²Takeshi Kimijima, ^{1,2}Katsuya Teshima

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2 DEPARTMENT OF ENVIRONMENTAL SCIENCE AND TECHNOLOGY, FACULTY OF ENGINEERING, SHINSHU UNIVERSITY

- 16:30 C4-O-01 **Study on the Highly Pure Graphene Flkes Manufactured by Using RF Thermal Plasama System**
- ¹Ji Soo Oh, ¹Jong Sik Oh, ^{3,4}Myoung Sun Shin, ^{3,4}Kyu Hang Lee, ^{3,4}Jung-Gil Kim, ³Sung Yong Choi, ³Seong In Kim
^{1,2}Geun Young Yeom
- 1 DEPARTMENT OF MATERIALS SCIENCE AND ENGINEERING, SUNGKYUNKWAN UNIVERSITY*
2 SKKU ADVANCED INSTITUTE OF NANO TECHNOLOGY(SAINT), SUNGKYUNKWAN UNIVERSITY
3 CHEORWON PLASMA RESEARCH INSTITUTE
4 DEPARTMENT OF ELECTRICAL AND BIOLOGICAL, KWANGWOON UNIVERSITY

Oral Session 2 March 29 (Sun.) Room 5

Chair : Takahiro Ishizaki (Shibaura Institute of Technology)

- 8:50 C4-I-15 **Nano-Structuring of Metal Oxides in Aqueous Solutions -SnO₂, TiO₂, ZnO-** [Invited Lecture]
- Yoshitake Masuda
NATIONAL INSTITUTE OF ADVANCED INDUSTRIAL SCIENCE AND TECHNOLOGY (AIST)

- 9:20 C4-I-16 **Functional Diamond Electrodes** [Invited Lecture]
- ^{1,2,3}Takeshi Kondo
- 1 DEPARTMENT OF PURE AND APPLIED CHEMISTRY, TOKYO UNIVERSITY OF SCIENCE*
2 RESEARCH INSTITUTE FOR SCIENCE AND TECHNOLOGY, TOKYO UNIVERSITY OF SCIENCE
3 JST ACT-C

Chair : Yoshitake Masuda (National Institute of Advanced Industrial Science and Technology)

- 9:40 C4-I-17 **Electrocatalytic Activity for Oxygen Reduction Reaction of Nitrogen-Containing Carbons Synthesized via Solution Plasma Process** [Invited Lecture]
- ^{1,2}Takahiro Ishizaki, ¹Satoshi Chiba, ¹Gasidit Panomsuwan
- 1 DEPARTMENT OF MATERIALS SCIENCE AND ENGINEERING, SHIBAURA INSTITUTE OF TECHNOLOGY*
2 THE CORE RESEARCH FOR EVOLUTIONAL SCIENCE AND TECHNOLOGY (CREST), JAPAN SCIENCE AND TECHNOLOGY (JST)
- 10:00 C4-I-18 **Determination of Intermolecular Structure of Water and Solutions Confined in Hydrophobic Nanospaces** [Invited Lecture]
- ^{1,2}Taku Iiyama
- 1 DEPARTMENT OF CHEMISTRY, FACULTY OF SCIENCE, SHINSHU UNIVERSITY*
2 CENTER FOR ENERGY AND ENVIRONMENTAL SCIENCE, SHINSHU UNIVERSITY

Chair : Nobuyuki Zettsu (Shinshu University)

- 15:50 C4-I-19 **Proton Conductivity Enhancement in Organized Polyimide Thin Films** [Invited Lecture]
- ¹Yuki Nagao, ¹Karthik Krishnan, ²Mitsuo Hara, ³Shusaku Nagano
- 1 SCHOOL OF MATERIALS SCIENCE, JAPAN ADVANCED INSTITUTE OF SCIENCE AND TECHNOLOGY*
2 DEPARTMENT OF MOLECULAR DESIGN & ENGINEERING GRADUATE SCHOOL OF ENGINEERING, NAGOYA UNIVERSITY
3 NAGOYA UNIVERSITY VENTURE BUSINESS LABORATORY, NAGOYA UNIVERSITY
- 16:10 C4-I-20 **Block Copolymer-Mediated Assembly of Silica Nanospheres into One-, Two-, and Three-Dimensional Nanostructures** [Invited Lecture]
- Ayae Sugawara Narutaki
DEPARTMENT OF CRYSTALLINE MATERIALS SCIENCE, NAGOYA UNIVERSITY
- 16:30 C4-I-21 **Synthesis and Deposition of Metal Nanoparticles Using Ultrasound** [Invited Lecture]
- Toshio Sakai
DEPARTMENT OF CHEMISTRY AND MATERIAL ENGINEERING, FACULTY OF ENGINEERING, SHINSHU UNIVERSITY

Chair : Ayae Sugawara-Narutaki (Nagoya University)

- 16:50 C4-I-22 **Plasma Assisted Solution Processing for Nano Sized 12CaO·7Al₂O₃ Particles Synthesis** [Invited Lecture]
- ^{1,2}Naonori Sakamoto, ²Kenta Kamimura, ^{1,2}Shiori Maneyama, ^{1,3}Naoki Wakiya, ¹Hisao Suzuki
- 1 RESEARCH INSTITUTE OF ELECTRONICS, SHIZUOKA UNIVERSITY*
2 DEPARTMENT OF ELECTRONICS AND MATERIALS SCIENCE, SHIZUOKA UNIVERSITY
3 GRADUATE SCHOOL OF SCIENCE AND TECHNOLOGY, SHIZUOKA UNIVERSITY

17:10 C4-O-02 **Layer by Layer Etching on MoS₂ Film with Low Damage Using Atomic Layer Etching System**
¹Tai Zhe Lin, ²Min Hwan Jeon, ^{1,2}Geun Young Yeom
1 DEPARTMENT OF MATERIALS SCIENCE AND ENGINEERING, SUNGKYUNKWAN UNIVERSITY
2 SKKU ADVANCED INSTITUTE OF NANO TECHNOLOGY(SAINT), SUNGKYUNKWAN UNIVERSITY

17:25 C4-O-03 **Novel Plasma Diagnostic Approach for the PECVD Synthesis of High Rate Hydrogenated Nanocrystalline Si Using RF/UHF Hybrid Plasmas**
¹Jeon G.Han, ¹B.B.Sahu, ¹Kyung Sik Shin, ²K.Takeda, ²M.Hori
1 NU-SKKU JOINT INSTITUTE FOR PLASMA NANO MATERIALS (IPNM), CENTER FOR ADVANCED PLASMA SURFACE TECHNOLOGY (CAPST), DEPARTMENT OF ADVANCED MATERIALS SCIENCE AND ENGINEERING, SUNGKYUNKWAN UNIVERSITY
2 PLASMA NANOTECHNOLOGY RESEARCH CENTER, NAGOYA UNIVERSITY

Oral Session 3 March 30 (Mon.) Room 5

Chair : Fumitaka Hayashi (Shinshu University)

8:50 C4-I-23 **Biomimetic Water Droplet Manipulation on High Adhesive Superhydrophobic Surfaces** [Invited Lecture]
¹Daisuke Ishii, ²Masatsugu Shimomura
1 CENTER FOR YOUNG INNOVATIVE RESEARCHERS, NAGOYA INSTITUTE OF TECHNOLOGY
2 CHITOSE INSTITUTE OF SCIENCE AND TECHNOLOGY

9:10 C4-I-24 **Aliphatic Polycarbonates from Epoxides and Carbon Dioxide: Syntheses, Properties, and Their Applications** [Invited Lecture]
Koji Nakano
DEPARTMENT OF ORGANIC AND POLYMER MATERIALS CHEMISTRY, TOKYO UNIVERSITY OF AGRICULTURE AND TECHNOLOGY

9:30 C4-I-25 **Characterization of Interface in Functional Materials Using Atom Probe Tomography** [Invited Lecture]
¹Ai Serizawa, ²Michael K.Miller
1 DEPARTMENT OF MATERIALS SCIENCE AND ENGINEERING, SHIBAURA INSTITUTE OF TECHNOLOGY
2 MICROSCOPY GROUP, MATERIALS SCIENCE AND TECHNOLOGY DIVISION, OAK RIDGE NATIONAL LABORATORY

Chair : Tetsuya Yamada (Shinshu University)

9:50 C4-I-26 **Control of Electromagnetic Waves with Artificial Metallic Structures in Terahertz Region** [Invited Lecture]
^{1,2}Fumiaki Miyamaru
1 DEPARTMENT OF PHYSICS, FACULTY OF SCIENCE, SHINSHU UNIVERSITY
2 CENTER FOR ENERGY AND ENVIRONMENTAL SCIENCE, SHINSHU UNIVERSITY

10:10 C4-O-04 **Fabrication of Organic-Inorganic Nanocomposites for Energy Storage**
Xiaoxia Liu, Ming-Hua Bai
DEPARTMENT OF CHEMISTRY, NORTHEASTERN UNIVERSITY

10:25 C4-O-05 **Oxygen Vacancy Diffusion in La_{1-x}Sr_xCo_{1-y}Fe_yO_{3-δ}(LSCF) Using Density Functional Theory**
¹Takayuki Ohshiro, ¹Tomoaki Nakamura, ^{1,2,3}Masanobu Nakayama, ¹Toshiro Kasuga
1 DEPARTMENT OF MATERIALS SCIENCE AND ENGINEERING, NAGOYA INSTITUTE OF TECHNOLOGY
2 UNIT OF ELEMENTS STRATEGY INITIATIVE FOR CATALYSTS & BATTERIES (ESICB), KYOTO UNIVERSITY
3 JAPAN SCIENCE AND TECHNOLOGY AGENCY, PRESTO

10:40 C4-I-27 **Amorphous Carbon Semiconductor Capable of Controlling Its Optical Gap and Conductivity by Incorporating Two Types of Foreign Atoms** [Invited Lecture]
Kensuke Honda, Yoshiya Nagata, Masahiro Yamada, Yohsuke Shimai
DIVISION OF ENVIRONMENTAL SCIENCE AND ENGINEERING, GRADUATE SCHOOL OF SCIENCE AND ENGINEERING, YAMAGUCHI UNIVERSITY