

Symposium 9A: Ceramics for Electricity; Energy Conversion and Storage Systems for Green World

Main Organizers

- Kiyoshi Kanamura, Tokyo Metropolitan University, Japan
- Koichi Kajihara, Tokyo Metropolitan University, Japan

Co-Organizers

- Dominique Guyomard, CNRS - Université de Nantes, France
- Tatsumi Ishihara, Kyushu University, Japan
- Ryoji Kanno, Tokyo Institute of Technology, Japan
- Tsutomu Miyasaka, Yokohama Toin University, Japan
- Ramaswamy Murugan, Pondicherry Central University, India
- Shigeto Okada, Kyushu University, Japan
- Yang Shao-Horn, Massachusetts Institute of Technology, USA
- Yasuo Takeda, Mie University, Japan
- Masahiro Tatsumisago, Osaka Prefecture University, Japan

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Oral Session

Monday, November 15

Room: 1009

14:15 - 16:15: Joint Symposium 9A&9B Ceramics for Energy Conversion

Chair: Akitoshi Hayashi (Osaka Prefecture University, Japan)

14:15 - 14:45

S9A-001 Recent Developemant of Materials and Unique Strctures for High Energy Density Batteries for Future Society (President Designated)

K. Kanamura; Tokyo Metropolitan University, Japan

14:45 - 15:15

S9A-002 Development of Chemically Stable Garnet Structured Electrolytes for All Solid State Lithium Ion Batteries (Invited)

R. Murugan; Puducherry Central University, India

15:15 - 15:45

S9A-003 The Current Status of Cathode Materials for LIB: Mobile and Electric Vehicle Applications (Invited)

J.-S. Kim; Korea Electronics Technology Institute, Korea

15:45 - 16:15

S9A-004 Electron Energy-Loss Spectroscopy for Nano Characterization of Battery Materials and Electrodes (Invited)

P. Moreau, B. Lestriez, J. Gaubicher, A.-C. Gaillot, N. Dupré, D. Guyomard; CNRS - Université de Nantes, France

* Presentation of 9B (16:15-18:00) is on page 123

Symposium 9A

Tuesday, November 16

Room: 1009

9:00 - 10:30: Electrolytes and All-Solid-State Batteries

Chair: Ramaswamy Murugan (Pondicherry Central University, India)

9:00 - 9:15

S9A-005 Effect of the Neutral and Charged Oxygen Vacancies in TiO₂ on the Mobility of Li⁺ Ions

P. V. Sushko^{1,2}, K. M. Rosso²; ¹University College London, UK, ²Pacific Northwest National Laboratory, USA

9:15 - 9:30

S9A-006 Effect of Ca-doping on the Ionic Conductivity of LiSi₂N₃

E. Narimatsu, Y. Yamamoto, T. Takeda, T. Nishimura, N. Hirotsuki; National Institute for Materials Science, Japan

9:30 - 10:00

S9A-007 All-Solid-State Sodium-ion Symmetric Battery Based on NASICON-Related Compounds (Invited)

S. Okada, Y. Noguchi, E. Kobayashi, L. S. Plashnitsa, J. Yamaki; Kyushu University, Japan

10:00 - 10:30

S9A-008 All-Solid-State Rechargeable Lithium Batteries with Sulfide Glass-Ceramic Electrolytes (Invited)

A. Hayashi, M. Tatsumisago; Osaka Prefecture University, Japan

10:30 - 10:45 Break

10:45 - 11:30: Electrolytes and All-Solid-State Batteries

Chair: Shigeto Okada (Kyushu University, Japan)

10:45 - 11:00

S9A-009 All-Solid-State Rechargeable Lithium Batteries with Lithium Sulfide Electrode

M. Nagao, A. Hayashi, M. Tatsumisago; Osaka Prefecture University, Japan

11:00 - 11:15

S9A-010 All-Solid-State Li-ion Battery Fabricated by Aerosol Deposition Technique

D. Popovici¹, H. Nagai², S. Fujishima², J. Akedo¹; ¹National Institute of Advanced Industrial Science and Technology, Japan, ²Toyota motor corporation, Japan

11:15 - 11:30

S9A-011 All-Solid-State Thin Film Batteries – Processing and Properties

J. Feng, J. Zhu, H. Xia, K. Zeng, M. O. Lai, L. Lu; National University of Singapore, Singapore

14:30 - 15:15: Cathodes and Anodes

Chair: Tatsumi Ishihara (Kyushu University, Japan)

14:30 - 14:45

S9A-012 Single Particle Measurement at High Temperatures for Various Cathode Materials of Lithium Ion Battery

B. Takemura, H. Munakata, K. Kanamura; Tokyo Metropolitan University, Japan

14:45 - 15:00

S9A-013 High-throughput Screening Process of Candidate Cathode Materials for Lithium Ion Secondary Battery

K. Fujimoto, H. Otake, S. Ito; Tokyo University of Science, Japan

15:00 - 15:15

S9A-014 Synthesis and Characterization of Nanostructured LiMnPO₄/C Composites

I. Taniguchi, D. T. N. Long, Z. Bakenov; Tokyo Institute of Technology, Japan

15:15 - 16:00: Cathodes and Anodes

Chair: Philippe Moreau (CNRS - Université de Nantes, France)

15:15 - 15:30

S9A-015 Physical and Electrochemical Properties of $\text{Li}_2\text{FeSiO}_4/\text{C}$ Nanocomposites Prepared by a Combination of Spray Pyrolysis with Wet Ballmilling

B. Shao, T. Izumi; Tokyo Institute of Technology, Japan

15:30 - 15:45

S9A-016 Fabrication of Orientated LiCoO_2 Using Slip Casting in a Strong Magnetic Field

H. Yamada^{1,2}, T. S. Suzuki², T. Uchikoshi², M. Hozumi³, S. Yokoishi³, K. Kohama³, Y. Sakka^{2,1}; ¹University of Tsukuba, Japan, ²National Institute for Materials Science, Japan, ³TOYOTA Motor Corporation, Japan

15:45 - 16:00

S9A-017 Study and Optimization of Spinel Nickel Cobaltite Electrode for Hybrid Battery-Supercapacitor

W. Wang¹, S. H. Chan²; ¹Agency for Science, Technology and Research (A*STAR), Singapore, ²Nanyang Technological University, Singapore

16:00 - 16:15 Break

16:15 - 17:30: Cathodes and Anodes

Chair: Jeom-Soo Kim (Korea Electronics Technology Institute, Korea)

16:15 - 16:45

S9A-018 Intercalation of PF_6^- Anion into Graphitic Carbon for New Type Rechargeable Battery, Dual Carbon Battery (Invited)

T. Ishihara, R. Tokunaga, Y. Yokoyama; Kyushu University, Japan

16:45 - 17:00

S9A-019 Water-Stable Lithium Electrode Based on NASICON-Type Lithium Conducting Glass Ceramics

T. Zhang, N. Imanishi, A. Hirano, Y. Takeda, O. Yamamoto; Mie University, Japan

17:00 - 17:15

S9A-020 MnO Anodes for Li-ion Batteries

K. Zhong, R. Wang, X. Yu, H. Li, X. Huang, L. Chen; Chinese Academy of Sciences, China

17:15 - 17:30

S9A-021 Nanostructuring Electrode Materials for High Power Lithium-Ion Batteries

Y.-S. Hu¹, L. Zhao¹, H. Li¹, X. Huang¹, L. Chen¹, J. Maier²; ¹Chinese Academy of Sciences, China, ²Max Planck Institute for Solid State Research, Germany

Wednesday, November 17

Room: 1009

9:15 - 10:30: Solar Cells

Chair: Kiyoshi Kanamura (Tokyo Metropolitan University, Japan)

9:15 - 9:45

S9A-022 Dye-sensitized Solar Cells Consisting of Nanoporous Titania Sheets -Tanden, Hybrid, Rod and Fiber Solar Cells- (Invited)

S. Hayase; Kyushu Institute of Technology, Japan

9:45 - 10:00

S9A-023 Anatase Nanocrystals with Specific Crystal Plane on Surface for High Performance Dye-Sensitized Solar Cell

Q. Feng, P. Wen, Y. Ishikawa, H. Itoh; Kagawa University, Japan

Symposium 9A

10:00 - 10:15

S9A-024 Fabrication of TiO₂ Blocking Layer for Solid State Dye Sensitized Solar Cells
H. Sakamoto, S. Igarashi, K. Niime, M. Nagai; Tokyo City University, Japan

10:15 - 10:30

S9A-025 Structural Design and Fabrication of ZnO Photoelectrodes for Dye-Sensitized Solar Cells with Higher Performance
S. Ueno, S. Fujihara; Keio University, Japan

10:30 - 10:45 **Break**

10:45 - 11:45: Electrolytes, Electrode Catalysts, and Related Devices

Chair: Hirokazu Munakata (Tokyo Metropolitan University, Japan)

10:45 - 11:00

S9A-026 Intermediate Temperature Fuel Cell Using Gypsum Based Electrolyte and Electrodes
S. Suzuki¹, Y. Katagiri², M. Nagai¹; ¹Tokyo City University, Japan, ²Nippon Sheet Glass, Japan

11:00 - 11:15

S9A-027 Effective Storage of Electrical Charge in Hydroxyapatite Ceramics Using Ionic Conductive Property
Y. Tanaka^{1,2}, M. Nakamura¹, J. Hojo², A. Nagai¹, K. Yamashita¹; ¹Tokyo Medical and Dental University, Japan, ²Kyushu University, Japan

11:15 - 11:30

S9A-028 Novel Anhydrous Proton-Conducting Materials for Intermediate-Temperature PEM Fuel Cells
H. Kato, A. Obata, T. Kasuga; Nagoya Institute of Technology, Japan

11:30 - 11:45

S9A-029 Catalytic Reforming of Methane to Syngas in an Oxygen-Permeative Membrane Reactor
T. Urano, K. Kubo, T. Saito, A. Hitomi; TDK Corporation, Japan

Poster Session

Tuesday, November 16

Room: Event Hall

12:00 - 14:00

S9A-P001 Comparison of Various Bulk Properties of Olivine-type LiMPO₄ (M=Mn, Fe, Co, Ni) Materials for Cathodes of Li Ion Battery: A First-principles Study
M. Nakayama^{1,2}, M. Nogami¹; ¹Nagoya Institute of Technology, Japan, ²Tokyo Institute of Technology, Japan

S9A-P002 Effects of Atmosphere and Particle Size on the Crystallization of LiFePO₄ in Lithium Iron Phosphate Glasses
K. Nagamine^{1,2}, S. Reinsch³, R. Mueller³, T. Honma¹, T. Komatsu¹; ¹Nagaoka University of Technology, Japan, ²Japan Society for the Promotion of Science, Japan, ³BAM Federal Institute for Materials Research and Testing, Germany

S9A-P003 Hydrothermal Synthesis of Lithium Iron Phosphate Mesocrystals from a Precursor Phase and Electrochemical Properties
Y. Matsuzawa¹, Y. Oaki¹, H. Uchiyama¹, E. Hosono², H. Zhou², H. Imai¹; ¹Keio University, Japan, ²Advanced Industrial Science and Technology, Japan

S9A-P004 Characterization of Carbon Composite LiMn_{1-x}Fe_xPO₄ Cathodes
Y. Mishima^{1,3}, S. Honda¹, H. Sadamura¹, N. Nakayama², C. Moriyoshi³, Y. Kuroiwa³; ¹Todakogyo Corporation, Japan, ²Yamaguchi University, Japan, ³Hiroshima University, Japan

- S9A-P005 Crystal and Electronic Structure Changes of Li_2CuO_2 Cathode Materials for Lithium-ion Batteries**
T. Setsu¹, Y. Arachi¹, Y. Nakata²; ¹Kansai University, Japan, ²Iwaki Meisei University, Japan
- S9A-P006 Preparation and Electrochemical Properties of MgCu_2O_3**
 F. Kobayashi, S. Maruyama, Y. Miyazaki, T. Kajitani; Tohoku University, Japan
- S9A-P007 Preparation and Electrode Property of Layered-type $\text{LiNi}_{0.4}\text{Co}_{0.6-x}\text{Ti}_x\text{O}_2$**
K. Ikezawa, S. Ito, K. Fujimoto; Tokyo University of Science, Japan
- S9A-P008 Magnetic Studies on Layered Solid Solution $\text{Li}_x(\text{Ni}_{0.4}\text{Mn}_{0.6})_{2-x}\text{O}_2$**
K. Nakao¹, T. Nakamura¹, Y. Yamada¹, N. Koshiha²; ¹University of Hyogo, Japan, ²Tanaka Chemical Corporation, Japan.
- S9A-P009 Synthesis and Electrochemical Properties of Li-Mn-Ni Oxide Cathode Materials for Li-ion Secondary Battery**
M. Nii¹, W. Tang², Y. Ishikawa¹, Q. Feng¹; ¹Kagawa University, Japan, ²Research Institute for Solvothermal Technology, Japan
- S9A-P010 Low-Temperature Flux Growth of LiCoO_2 and LiMn_2O_4 Crystals for Rechargeable Lithium Ion Batteries**
H. Inagaki¹, K. Teshima¹, S. H. Lee¹, M. Hozumi², K. Kohama², S. Oishi¹; ¹Shinshu University, Japan, ²Toyota Motor Corporation, Japan
- S9A-P011 Thin Film Electrode Materials $\text{Li}_4\text{Ti}_5\text{O}_{12}$ and LiCoO_2 Prepared by Spray Pyrolysis Method**
M. Takahashi¹, J. Tani¹, H. Kido¹, A. Hayashi², K. Tadanaga², M. Tatsumisago²; ¹Osaka Municipal Technical Research Institute, Japan, ²Osaka Prefecture University, Japan
- S9A-P012 Fabrication of 3D Patterned Electrodes for Micro Lithium Ion Batteries**
K. Yoshima, H. Munakata, K. Kanamura; Tokyo Metropolitan University, Japan
- S9A-P013 Electrochemical Properties of Cathode Composite Prepared Using Carbon Wool Conducting Additive**
S. Masuda¹, T. Nakamura¹, Y. Yamada¹, M. Tabuchi²; ¹University of Hyogo, Japan., ²National Institute of Advanced Industrial Science and Technology, Japan.
- S9A-P014 Properties and Mechanism of Layered Polysilane (Si_6H_6) Anode**
Y. Kumai, S. Shirai, H. Okamoto, Y. Sugiyama, H. Nakano; Toyota Central R&D Labs., Inc., Japan
- S9A-P015 Garnet-Type Lithium Ion Conducting Solid Electrolyte $\text{Li}_7\text{La}_3\text{Zr}_2\text{O}_{12}$**
Y. Shimonishi, N. Imanishi, T. Zhang, A. Hirano, Y. Takeda, O. Yamamoto; Mie University, Japan
- S9A-P016 Low-temperature Flux Growth of $\text{Li}_7\text{La}_3\text{Zr}_2\text{O}_{12}$ Crystals for Crystalline Lithium-ion Batteries**
S. Tanaka¹, K. Teshima¹, S. H. Lee¹, M. Hozumi², K. Kohama², S. Oishi¹; ¹Shinshu University, Japan, ²Toyota Motor Corporation, Japan
- S9A-P017 Fast Lithium Ion Conduction In Zirconium Containing Garnet Structured Ceramic Electrolyte**
N. Janani, S. Ramakumar, R. Murugan; Pondicherry Engineering College, India
- S9A-P018 Preparation and Characterization of Glass-ceramic Electrolytes in the System $\text{Li}_2\text{S}-\text{P}_2\text{S}_5-\text{Li}_3\text{PO}_4$**
K. Noi¹, A. Hayashi¹, Y. Seino², T. Ohta², M. Tatsumisago¹; ¹Osaka Prefecture University, Japan, ²Idemitsu Kosan Co., Ltd., Japan
- S9A-P019 Cyclic Durability of All Solid-state Lithium Polymer Batteries Using Poly(Ethylene Oxide) Based Solid Polymer Electrolytes**
M. Nakayama^{1,2}, S. Wada², S. Kuroki³, M. Nogami¹; ¹Nagoya Institute of Technology, Japan, ²Tokyo Institute of Technology, Japan
- S9A-P020 DFT Study on the Mechanism of Oxygen Reduction Reaction on Carbon Alloy Electrodes**
T. Nakazono¹, N. Takeuchi¹, T. Yamabe², H. Kobayashi¹; ¹Kyoto Institute of Technology, Japan, ²Nagasaki Institute of Applied Science, Japan



Symposium 9A

- S9A-P021 A Comparative Study of Nanocomposite Ionic Gel Electrolytes for High Efficient Quasi-solid-state Dye-sensitized Solar Cells**
P.-C. Liu, P.-Y. Hsu, H.-F. Lee, J.-J. Kai; National Tsing Hua University, Taiwan
- S9A-P022 Application of Nanocomposite Gel Electrolyte in Flexible Dye-Sensitized Solar Cell**
P.-Y. Hsu, H.-F. Lee, P.-C. Liu, J.-J. Kai; National Tsing Hua University, Taiwan
- S9A-P023 Nitridation of Titanate Particles and its Electrochemical Performance in Nonaqueous Electrolyte EC/DEC**
K. Tateki¹, T. Kinumoto¹, H. Kiyono³, O. Tanaike², T. Tsumura¹, S. Shimada³, M. Toyoda¹; ¹Oita University, Japan, ²National Institute of Advanced Industrial Science and Technology, Japan, ³Hokkaido University, Japan
- S9A-P024 TNO Transparent Conductive Films for Dye-sensitized Solar Cells**
R. Muramoto¹, Y. Yamazaki¹, E. Sakai², N. Yamada², T. Hitosugi^{2,3}, T. Hasegawa^{2,4}, M. Okuya¹; ¹Shizuoka Univ., Japan, ²KAST, Japan, ³Tohoku Univ., Japan, ⁴Univ. of Tokyo, Japan
- S9A-P025 Fabrication of KTiNbO₅ Crystal Photoactive Electrodes for the Dye-Sensitized Solar Cells**
A. Yamaguchi, S. Suzuki, K. Teshima, S. H. Lee, S. Oishi; Shinshu University, Japan
- S9A-P026 Effect of Nitrogen Doping Using Titanium Nitride on Photovoltaic Property of Ferroelectric PLZT (3/52/48) Ceramic**
N. Cherdtham, S. Phungsripheng, T. Wasanapiarnpong; Chulalongkorn University, Thailand
- S9A-P027 Preparation of Bulk Na₂O–BaO–PbO–Nb₂O₅–SiO₂ Glass-Ceramic Dielectrics for Energy Storage Sources**
J. Luo, Q. Tang, Q. Zhang, J. Zhu, D. Han, L. Wang, J. Du; General Research Institute for Nonferrous Metals, China