

Symposium 9B: Ceramics for Electricity; SOFC and Related Technologies

Main Organizers

- Yoshinobu Fujishiro, AIST, Japan
- Nigel Sammes, Colorado School of Mines, USA
- Masashi Mori, CRIEPI, Japan

Co-Organizers

- Masanobu Awano, AIST, Japan
- Fatith Dogan, Missouri University of Science and Technology, USA
- Manabu Ihara, Tokyo Institute of Technology, Japan
- Yasunobu Mizutani, TOHO GAS Co., Ltd., Japan
- Prabhakar Singh, Connecticut Global Fuel Cell Center UTC, USA
- Toshio Suzuki, AIST, Japan
- Yasuo Takeda, University of Mie, Japan
- Hiroyuki Uchida, University of Yamanashi, Japan

Oral Session

Monday, November 15

Room: 1009

16:15 - 18:00: Joint Symposium 9A&9B Ceramics for SOFC and the Related Technology

Chairs: Nigel Sammes (Colorado School of Mines, USA) and
Yoshinobu Fujishiro (National Institute of Advanced Industrial Science and Technology, Japan)

16:15 - 16:45

S9B-001 Performance Analysis and Development Strategies for Solid Oxide Fuel Cells (Invited)

E. Ivers-Tiffée; Universität Karlsruhe and Karlsruhe Institut für Technologie, Germany

16:45 - 17:15

S9B-002 Microstructural Change and Performance of Electrodes during Operation of Solid Oxide Fuel Cells (Invited)

K. Eguchi; Kyoto University, Japan

17:15 - 17:45

S9B-003 Polarization Properties of Oxygen and Hydrogen Electrodes for Reversible Solid Oxide Fuel Cells (Invited)

H. Uchida, H. Nishino, K. Kakinuma, M. Watanabe; University of Yamanashi, Japan

17:45 - 18:00

S9B-004 Physical and Electrochemical Performances of SOFC Anode under Various Fuels (Invited)

T. Yamaguchi^{1,2}, K. Galloway¹, T. Suzuki², Y. W. Sin¹, N. Sammes¹; ¹Colorado School of Mines, USA, ²National Institute of Advanced Industrial Science and Technology, Japan

* Presentation of 9A (14:15-16:15) is on page 117.

Symposium 9B

Wednesday, November 17

Room: 1009

13:15 - 14:45: Cell and Stack Technology

Chairs: Kouichi Kikuta (Nagoya University, Japan) and

Toshio Suzuki (National Institute of Advanced Industrial Science and Technology, Japan)

13:15 - 13:45

S9B-005 Value Applications for Fuel Cells (Invited)

J. D. Carter¹, P. R. Devlin², N. L. Garland²; ¹Argonne National Laboratory, USA, ²US Department of Energy, USA

S9B-006 Cancelled

13:45 - 14:00

S9B-007 Performance Evaluation of Anode-supported Planar SOFC with Precisely-Simulated Reformate Gases

Y. Tanaka, A. Momma, K. Takano, T. Kato; National Institute of Advanced Industrial Science and Technology, Japan

14:00 - 14:15

S9B-008 Solid Oxide Technology for Power, Hydrogen Production, Reforming and Oxygen Separation

A. Demin, A. Malakhov, H. Nabielek; SolidCell Inc., USA

14:15 - 14:30

S9B-009 Development of Residential SOFC Cogeneration System

T. Ono¹, I. Miyachi¹, M. Suzuki², K. Higaki²; ¹KYOCERA Corp., Japan, ²OSAKA GAS Co.,Ltd., Japan

14:30 - 14:45

S9B-010 Development of SOFC Stack and CHP System at NGK Spark Plug Co., Ltd.

Y. Itoh, M. Shibata, D. Nishijima, T. Matsuno, I. Gonda, H. Ishikawa, K. Furusaki; NGK Spark Plug Co., Ltd, Japan

14:45 - 15:15 Break

15:15 - 17:15: Cell and Electrolyte Materials Technology

Chairs: Toshihiro Moriga (Tokushima University, Japan) and

Kouichi Hamamoto (National Institute of Advanced Industrial Science and Technology, Japan)

15:15 - 15:45

S9B-011 Effect of Anode Composition and Microstructure on Fuel Flexible Utilization of Solid Oxide Fuel Cells (Invited)

F. Dogan; Missouri University of Science and Technology, USA

15:45 - 16:00

S9B-012 Metal Supported Solid Oxide Fuel Cells – Selected Aspects

P. Jasinski, W. Lewandowska, S. Molin; Gdansk University of Technology, Poland

16:00 - 16:15

S9B-013 Influence of Oxygen Surfaces Exchanges on Oxygen Semi-permeation Performances of La_{1-x}Sr_xFe_{1-y}Ga_yO_{3-δ} Dense Membranes

A. Vivet^{1,2}, P.-M. Geffroy¹, N. Richet², T. Chartier¹; ¹University of Limoges, France, ²Air Liquide, France

16:15 - 16:30

S9B-014 Anode Supported SOFC Using Plasma-sprayed Apatite-type Lanthanum Silicate Films as an Electrolyte

H. Yoshioka¹, T. Mitsui², A. Mineshige², T. Yazawa²; ¹Hyogo prefectural institute of technology, Japan, ²University of Hyogo, Japan

16:30 - 16:45

S9B-015 Ceramics-based PEM Fuel Cell Activities in WHUT

M. Pan; Wuhan University of Technology, China

16:45 - 17:00

S9B-016 Relationship between Oxide-ion Conductivity and Ordering of Oxygen Vacancy in the $\text{Ln}_2\text{Zr}_2\text{O}_7$ (Ln = La, Nd, Eu) System Having a Pyrochlore Composition

T. Hagiwara, H. Yamamura, H. Nishino; Kanagawa University, Japan

17:00 - 17:15

S9B-017 Processing, Microstructures and Electrical Properties of Zirconia- and Ceria-based Thin Films

B. Scherrer, A. Bieberle-Hütter, J. L. M. Rupp, L. J. Gauckler; ETH Zurich, Switzerland

Thursday, November 18

Room: 1009

9:00 - 11:45: Electrode Materials and Processing Technology

Chairs: Masashi Mori (Central Research Institute of Electric Power Industry (CRIEPI), Japan) and Yoshinobu Fujishiro (National Institute of Advanced Industrial Science and Technology(AIST), Japan)

9:00 - 9:15

S9B-018 Oxygen Permeability and Phase Stability of Surface-Modified $\text{Sr}(\text{Ti}, \text{Fe})\text{O}_{3-5}$

S. Sasaki, H. Takamura; Tohoku University, Japan

9:15 - 9:30

S9B-019 Oxygen Permeability and Electrical Properties of Layered Perovskite $\text{Sr}_{3-x}\text{La}_x\text{FeCoO}_{7-8}$ Ceramics

I. Kagomiya, M. Suzumra, K. Kakimoto, H. Ohsato; Nagoya Institute of Technology, Japan

9:30 - 9:45

S9B-020 Hierarchical Nanostructured CeO_2 Based Materials as Catalysts for SOFC

C. Xian¹, S. Shi², H. Li¹, L. Chen¹; ¹Chinese Academy of Sciences, China, ²Zhejiang Sci Tech Univ, China

9:45 - 10:00

S9B-021 Development of Bi-metal Anode Microtubular Supports for Solid-Oxide Fuel Cells

T. Suzuki, T. Yamaguchi, K. Hamamoto, Y. Fujishiro; National Institute of Advanced Industrial Science and Technology, Japan

10:00 - 10:15

S9B-022 Improvement of LSM Performance under Co-sintering at High Temperature Via CeO_2 Addition

J. P. Wiff¹, K. Jono¹, M. Suzuki¹, S. Suda¹, F. Hashimoto²; ¹Japan Fine Ceramics Center, Japan, ²FCO Corp., Japan

10:15 - 10:30

S9B-023 Preparation and Electrical Properties of Heavily Donor-Doped SrTiO_3

H. Machida, H. Takamura; Tohoku University, Japan

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

10:45 - 11:00

S9B-024 Cation Deficiency and Structural and Electrical Properties of the Perovskites $(\text{Sr}_{1-x}\text{La}_x)_{1-y}\text{TiO}_3$ and $(\text{Sr}_{1-x}\text{La}_x)\text{Ti}_{1-z}\text{TiO}_3$

S. Yabui¹, Y. Higashi¹, K. Murai¹, Z. Wang², M. Mori², T. Moriga¹; ¹The University of Tokushima, Japan, ²Central Research Institute of Electrical Power Industry, Japan

11:00 - 11:15

S9B-025 Preparation and Characterization of Anode-Supported YSZ Thin-Film Electrolyte by Co-tape Casting and Co-sintering Process

Q. L. Liu¹, C. J. Fu, S. H. Chan, G. Pasciak²; ¹Nanyang Technological University, Singapore, ²Electrotechnical Institute, Poland



Symposium 9B

11:15 - 11:30

S9B-026 Liquid-Phase Oxidation Joining of Yttria-Stabilized Zirconia and Fe-Cr Alloy via Al Interlayer as a Gas Sealing Technique for Planar SOFCs

T. Akashi^{1,2}, T. Shimura²; ¹Hosei University, Japan, ²Hokkaido University, Japan

11:30 - 11:45

S9B-027 Synthesis of $\text{La}_{0.8}\text{Sr}_{0.2}\text{Co}_{0.8}\text{Fe}_{0.2}\text{O}_3$ Nanopowders and their Application in Solid Oxide Fuel Cells

C. Ding, H. Lin, K. Sato, T. Hashida; Tohoku University, Japan

Poster Session

Monday, November 15

Room: Event Hall

12:00 - 14:00

S9B-P001 Application of the Nano-composite Material on the Anode Support for Increasing the Performance for Intermediate Temperature SOFCs

S. H. Min, J. K. Rhee, Y. K. Jeon, S. Park, Y. Shul; Yonsei University, Korea

S9B-P002 Electrochemical Property of Tubular Type of Solid Oxide Electrolysis Cell for NO_x Decomposition

K. Hamamoto, T. Suzuki, Y. Fujishiro, M. Awano; National Institute of Advanced Industrial Science and Technology, Japan

S9B-P003 Steam Electrolytic Characteristics under Various H₂ or O₂ Concentration in Supplying Gases

Z. Wang, M. Mori; Central Research Institute of Electric Power Industry, Japan

S9B-P004 Synthesis and Electrical Conductivity of $\text{La}_{1-x}\text{Sr}_x\text{Al}_{0.9}\text{Mg}_{0.1}\text{O}_{3.5}$ (x = 0.1-0.4) Perovskite Solid Solution

A. Shinomiya, Y. Hirata, S. Sameshima, N. Matsunaga; Kagoshima University, Japan

S9B-P005 LaSrAlFeO_{3.5} Oxygen Ion Conducting Membranes Sintered under Various Gas Atmosphere

Y. Takahashi^{1,2}, M. Kasahara², W. Shin^{1,3}; ¹Nagoya Institute of Technology, Japan, ²Noritake Co., Limited, Japan, ³National Institute of Advanced Industrial Science and Technology, Japan

S9B-P006 Oxide-ion Conduction and Dielectric Relaxation in the Fluorite-type $\text{Zr}_{0.8}\text{Ln}_{0.2}\text{O}_{1.9}$ (Ln = Nd, Sm, Eu, Gd, Dy, Ho, Er, Tm, Yb, Lu) System

J. Kawamoto, Y. Yagi, M. Saito, H. Yamamura; Kanagawa University, Japan

S9B-P007 Synthesis of New Brownmillerite-type Systems $\text{A}_2(\text{M}^{2+}, \text{M}^{4+})_2\text{O}_5$ (A = Ba, Sr, Ca; M²⁺ = Zn, Mg, Cd, Be; M⁴⁺ = Zr, Ce, Ti, Hf, Sn)

S. Ito, M. Saito, H. Yamamura; Kanagawa University, Japan

S9B-P008 Proton Conduction in New Brownmillerite $\text{Ba}_2(\text{Zn}, \text{B}')_2\text{O}_5$ systems (B' = Nb, Ta, W)

M. Saito, S. Ito, M. Watanabe, H. Yamamura; Kanagawa University, Japan

S9B-P009 Preparation and Characterization of $\text{La}_{9.33}\text{Si}_6\text{O}_{26}\text{-Ce}_{0.8}\text{Sm}_{0.2}\text{O}_{1.9}$ Composite Oxygen-ion Conductors

H. Zhang, Y. Liu, C. Liu, Z. Zhang, Z. Li; Central South University, China

S9B-P010 Fabrication and Characterization of the LSGM Thin Film Electrolyte for SOFC by RF Magnetron Sputtering

K. Sasaki, H. Fujii, Y. Endo, A. Suzuki, T. Terai; The University of Tokyo, Japan

S9B-P011 Effect of Dy on the Microstructure and Electrical Properties of $\text{Ce}_{0.8}\text{Gd}_{0.2-x}\text{Dy}_x\text{O}_2$ (0 ≤ x ≤ 0.05) Electrolytes for IT-SOFC

Y. G. Choi, H. K. Hwang, K. Park; Sejong University, Korea

S9B-P012 Internal Friction, Oxygen Relaxation and Microstructure of $\text{CeO}_2\text{-ZrO}_2\text{-Y}_2\text{O}_3$ Solid Solution

M. Ozawa, K. Imura, N. Amimoto; Nagoya Institute of Technology, Japan

- S9B-P013 Fabrication of $\text{Ba}(\text{Ce}, \text{Zr})_{0.9}\text{Y}_{0.1}\text{O}_{3-\delta}$ Thin Film on Dense Pd Substrate by UV-MOD**
K. Asano¹, Y. Kozawa², Y. Mugikura^{1,2}, T. Watanabe^{1,2}; ¹Central Research Institute of Electric Power Industry, Japan, ²Yokohama National Univ., Japan
- S9B-P014 Improvement of SOFC Cathode by Coating of Cobalt-rich Oxide Layer**
N. Kitano, A. Hirano, N. Imanishi, Y. Takeda; Mie University, Japan
- S9B-P015 Characterization of Perovskite-type Anode Materials, $\text{Sr}_{2-x}\text{La}_x\text{FeMoO}_{6-\delta}$ ($x = 0-0.5$) for SOFCs**
H. Kawanishi, A. Hirano, N. Imanishi, Y. Takeda; Mie University, Japan
- S9B-P016 A-site and B-site Nonstoichiometries and Sintering Characteristics of $(\text{Sr}_{1-x}\text{La}_x)_{1-y}\text{Ti}_{1-z}\text{O}_3$ Perovskites**
M. Mori¹, Z. Wang¹, T. Itoh², S. Yabu³, K. Murai³, T. Moriga³; ¹Central Research Institute of Electric Power Industry, Japan, ²AGC Seimi Chem. Co. Ltd., Japan, ³Tokushima University, Japan
- S9B-P017 Fabrication and Properties of $\text{LaNi}_{0.6}\text{Fe}_{0.4}\text{O}_3$ -Ni Composite for Solid Oxide Fuel Cell Interconnect**
T. Nomura, S. Nishimoto, Y. Kameshima, M. Miyake; Okayama University, Japan
- S9B-P018 $\text{LaSrTiFeO}_{3.5}$ Paste for Screen Printing Process of SOFC**
Y. Takahashi^{1,2}, M. Kasahara², B. N. Nair², W. Shin^{1,3}, S. Murakami³, K. Ri³, T. Itoh³, I. Matsubara³; ¹Nagoya Institute of Technology, Japan, ²Noritake Co., Limited, Japan, ³National Institute of Advanced Industrial Science and Technology, Japan
- S9B-P019 3DOM Anode Design for Improvement of SOFC Performance Based on Structural Observations**
Y. Katsuki, H. Munakata, K. Kanamura; Tokyo Metropolitan University, Japan
- S9B-P020 Co-firing and Characterization of Microtubular NiO-GDC/GDC/LSM-GDC SOFC**
Y. Takeuchi, T. Usui, K. Kikuta; Nagoya University, Japan
- S9B-P021 Application of Dispenser Printing to Prepare Cathode Layer for SOFC**
S. Ayabe, N. Yashiro, K. Kikuta; Nagoya University, Japan
- S9B-P022 A Theoretical Model for the Relationship between Thermal Expansion and Ionic Conduction**
S. Taniguchi, M. Aniya; Kumamoto University, Japan
- S9B-P023 Microstructure-Based Solid Oxide Fuel Cell Seal Design Using Statistical Continuum Mechanics**
J. Milhans¹, D. Li², X. Sun², M. Khaleel², H. Garmestani¹; ¹Georgia Institute of Technology, USA, ²Pacific Northwest National Laboratory, USA
- S9B-P024 Oxide-ion Conduction and Dielectric Relaxations for Fluorite Type Structure**
Y. Yagi, J. Kawamoto, M. Saito, H. Yamamura; Kanagawa University, Japan