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
• Fatih 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-Tiffe: 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. Yamaguchi1,2, 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.
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. Garland³; 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. Suzuki¹, 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 La1-xSrxFexGa3O8 Dense Membranes
A. Vivet¹², P.-M. Geffroy¹, N. Richet¹, 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. Mitsuishi², A. Mineshige², T. Yazawa²; ¹Hyogo prefectural institute of technology, Japan, ²University of Hyogo, Japan
S9B-015  Ceramics-based PEM Fuel Cell Activities in WHUT
M. Pan; Wuhan University of Technology, China

S9B-016  Relationship between Oxide-ion Conductivity and Ordering of Oxygen Vacancy in the Ln$_2$Zr$_2$O$_7$ (Ln = La, Nd, Eu) System Having a Pyrochlore Composition
T. Hagiwara, H. Yamamura, H. Nishino; Kanagawa University, Japan

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  Oxygen Permeability and Phase Stability of Surface-Modified Sr(Ti, Fe)O$_{3.5}$
S. Sasaki, H. Takamura; Tohoku University, Japan

9:15 - 9:30  Oxygen Permeability and Electrical Properties of Layered Perovskite Sr$_{5}$La$_{4}$FeCoO$_{7.5}$ Ceramics
I. Kagomiya, M. Suzumura, K. Kakimoto, H. Ohsato; Nagoya Institute of Technology, Japan

9:30 - 9:45  Hierarchical Nanostructured CeO$_2$ Based Materials as Catalysts for SOFC
C. Xian$^1$, S. Shi$^2$, H. Li$^2$, L. Chen$^1$; $^1$Chinese Academy of Sciences, China, $^2$Zhejiang Sci Tech Univ, China

9:45 - 10:00  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  Improvement of LSM Performance under Co-sintering at High Temperature Via CeO$_2$ Addition
J. P. Wiff$^1$, K. Jono$^1$, M. Suzuki$^1$, S. Suda$^1$, F. Hashimoto$^2$; $^1$Japan Fine Ceramics Center, Japan, $^2$FCO Corp., Japan

10:15 - 10:30  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  Cation Deficiency and Structural and Electrical Properties of the Perovskites (Sr$_{1-x}$La$_x$)$_3$Ti$_2$O$_7$ and (Sr$_{1-x}$La$_x$)Ti$_3$O$_7$
S. Yabu$^1$, Y. Higashi$^1$, K. Mural$^1$, Z. Wang$^2$, M. Mori$^2$, T. Moriga$^1$; $^1$The University of Tokushima, Japan, $^2$Central Research Institute of Electrical Power Industry, Japan

11:00 - 11:15  Preparation and Characterization of Anode-Supported YSZ Thin-Film Electrolyte by Co-tape Casting and Co-sintering Process
Q. L. Liu$^1$, C. J. Fu, S. H. Chan, G. Pasciak$^2$; $^1$Nanyang Technological University, Singapore, $^2$Electrotechnical Institute, Poland
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, T. Shimura; Hosei University, Japan, Hokkaido University, Japan

Synthesis of La₈₋ₓSrₓCoₓFe₈₋ₓO₁₅ 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

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

Electrochemical Property of Tubular Type of Solid Oxide Electrolysis Cell for NOx Decomposition

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

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

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

Synthesis and Electrical Conductivity of LaₓSn₄₋ₓMgₓ₋₁O₁₅₋₄ₓ (x = 0.1-0.4) Perovskite Solid Solution

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

LaSrAlFeO₁₂ Oxygen Ion Conducting Membranes Sintered under Various Gas Atmosphere

Y. Takahashi, M. Kasahara, W. Shin; Nagoya Institute of Technology, Japan, Noritake Co., Limited, Japan, National Institute of Advanced Industrial Science and Technology, Japan

Oxide-ion Conduction and Dielectric Relaxation in the Fluorite-type ZrₓLn₀.₃O₁₉ (Ln = Nd, Sm, Eu, Gd, Dy, Er, Lu) System

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

Synthesis of New Brownmillerite-type Systems A₂(M⁺⁺, M⁺⁺⁺)₂O₅ (A = Ba, Sr, Ca; M⁺⁺ = Zn, Mg, Cd, Be; M⁺⁺⁺ = Zr, Ce, Ti, Hf, Sn)

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

Proton Conduction in New Brownmillerite Baₓ(Zn, B')₂O₅ systems (B' = Nb, Ta, W)

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

Preparation and Characterization of LaₓS₃Sl₀₂₋ₓCeₓ₋ₓSmₓ₋ₓO₄₋ₓ Composite Oxygen-ion Conductors

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

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

Effect of Dy on the Microstructure and Electrical Properties of Ceₓ₋ₓGdₓ₋₂-Dy₂O₂ (0≤x≤0.05) Electrolytes for IT-SOFC

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

Internal Friction, Oxygen Relaxation and Microstructure of CeO₂-ZrO₂-Y₂O₃ Solid Solution

M. Ozawa, K. Imura, N. Amimoto; Nagoya Institute of Technology, Japan
S9B-P013 Fabrication of Ba(Ce, Zr)_{0.2}Y_{0.8}O_{3-δ} Thin Film on Dense Pd Substrate by UV-MOD
K. Asano¹, Y. Kozawa², Y. Mugikura², T. Watanabe¹,²; 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, Sr_{2-x}La_xFeMoO_{6-δ} (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 (Sr_{1-x}La_x)_{1-y}Ti_{1-y}O_3 Perovskies
M. Mori¹, Z. Wang¹, T. Itoh¹, S. Yabui¹, K. Murali¹, P. Moriga¹; ¹Central Research Institute of Electric Power Industry, Japan

S9B-P017 Fabrication and Properties of LaNi_{0.6}Fe_{0.4}O_3-Ni Composite for Solid Oxide Fuel Cell Interconnect
T. Nomura, S. Nishimoto, Y. Kameshima, M. Miyake; Okayama University, Japan

S9B-P018 LaSrTiFeO_{3-δ} Paste for Screen Printing Process of SOFC
Y. Takahashi¹,², M. Kasahara², B. N. Nair², W. Shin¹,², 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