Table of Contents

Preface iii

Chapter 1
Plenary Papers

Recent Developments in the SECA Program
S. D. Vora 3

Status of National Project for SOFC Development in Japan
K. Hosoi, M. Ito, and M. Fukae 11

European SOFC Technology - Status and Trends
R. Steinberger-Wilckens 19

Solid Oxide Fuel Cells Canada NSERC Strategic Research Network
V. I. Birss, A. Petric, and S. Thomas 31

The Strategic Electrochemical Research Center in Denmark
M. Mogensen and K. Hansen 43

Recent Results in Solid Oxide Fuel Cell Development at Forschungszentrum Juelich
R. Steinberger-Wilckens, L. Blum, H. Buchkremer, B. de Haart, J. Malzbender, and M. Pap 53

Chapter 2
Stacks and Systems

Development of Solid Oxide Fuel Cells at Versa Power Systems
B. Borglum, E. Tang, and M. Pastula 63

Recent Progress in Development and Manufacturing of SOFC at Topsoe Fuel Cell A/S and Risø DTU
N. Christiansen, H. Holm-Larsen, S. Primdahl, M. Wandel, S. Ramouss, and A. Hagen 71
CFCL's BlueGen Product
R. J. Payne, J. Love, and M. Kah

Status of Hexis' SOFC Stack Development and the Galileo 1000 N Micro-CHP System
A. Mai, B. Iwanschitz, U. Weissen, R. Denzler, D. Haberstock, V. Nerlich, and A. Schuler

Development of Residential SOFC CHP System with Flatten Tubular Segmented-In-Series Cells Stack

Development of SOFC-GT Combined Cycle System with Tubular Type Cell Stack

Performance of a 10 kW SOFC Demonstration Unit

Progress on SOFC Power Generation Module and System Developed by NTT, SPP and THG

Manufacturing and Market-Oriented Development of SOFC Generators at SOFCpower SpA
M. Bertoldi, O. Bucheli, S. Modena, D. Larrain, and A. Ravagni

Latest Update on Delphi's Solid Oxide Fuel Cell Stack for Transportation and Stationary Applications
S. Mukerjee, K. Haltiner, R. Kerr, J. Kim, and V. Sprenkle

Metal Supported Solid Oxide Fuel Cells and Stacks for Auxiliary Power Units - Progress, Challenges and Lessons Learned

Product Development for SOFC and SOE Applications
A. Glauche, T. Betz, and M. Ise

Characterization of Propane-Fueled SOFC Portable Power Systems
Y. Du, D. Cui, and K. Reifsnider
Universal SOFC Module for Rapid Start-Ups
U. Bossel

Long-Term Operation of Planar Type SOFC Stacks
L. de Haart and I. Vinke

Post-Test Characterization of an SOFC Short-Stack after 17,000 Hours of Steady Operation
N. Menzler, P. Baťalsky, S. Groß, V. Shemet, and F. Tietz

Current Status of NEDO Project on Durability/Reliability of Solid Oxide Fuel Cell Stacks/Systems
H. Yokokawa

Durability Tests of Flatten Tubular Segmented-in-Series Type SOFC Stacks for Intermediate Temperature Operation

In situ Observation of the Deformation and Mechanical Damage of SOFC Cell/Stack

Demonstration of a Highly Efficient SOFC System with Combined Partial Oxidation and Steam Reforming
D. Schimanke, O. Posdziech, B. Mai, S. Kluge, T. Strohbach, and C. Wunderlich

System Relevant Redox Cycling in SOFC Stacks
J. Brabandt, Q. Fang, D. Schimanke, M. Heinrich, B. Mai, and C. Wunderlich

Portable \(\mu\)-SOFC System Based on Multilayer Technology
S. Reuber, M. Schneider, M. Stelter, and A. Michaelis

Metal-Supported Cells with Comparable Performance to Anode-Supported Cells in Short-Term Stack Environment
M. Rüttinger, R. Mücke, T. Franco, O. Büchler, N. Menzler, and A. Venskutonis

High Efficiency CFY-Stack for High Power Applications
System Tests and Operation Control Strategies of an SOFC-CHP-Device for Field Testing
R. Belitz, M. Heddrich, M. Jahn, R. Nüke, J. Paulus, and M. Pohl

The Effects of Dynamic Dispatch on the Degradation and Lifetime of Solid Oxide Fuel Cell Systems
A. Nakajo, F. Mueller, D. McLarty, J. Brouwer, J. Van Herle, and D. Favrat

Environmental Effects on a Thermally Self-Sustained SOFC Hot Zone
D. Cui, Y. Du, K. Reifsnider, and F. Chen

Chapter 3
Cell Designs, Processing and Performance

Recent Development of Electrolyte Supported Cells with High Power Density
N. Trofimenko, M. Kusnezoff, and A. Michaelis

Development of Anode-Supported Flat-Tube Solid Oxide Fuel Cell (SOFC) Stack with High Power Density
S. Lee, J. Lee, T. Lim, S. Park, R. Song, and D. Shin

Medium Temperature Solid Oxide Fuel Cells Based on Supporting Porous Anode and Bilayered Electrolyte
E. Lust, I. Kivi, K. Tamm, P. Möller, E. Anderson, H. Kurig, M. Vestli, and G. Nurk

Development of Metal-Supported Solid Oxide Fuel Cells

Development of Highly Robust, Volume-Manufacturable Metal-Supported SOFCs for Operation Below 600°C
R. T. Leah, A. Bone, A. Selcuk, D. Corcoran, M. Lankin, Z. Dehaney-Steven, M. Selby, and P. Whalen

Development of Long-Term Stable and High-Performing Metal-Supported SOFCs

Metal Supported Solid Oxide Fuel Cell by Freeze Tape Casting
P. Wei, S. Sofie, Q. Zhang, and A. Petric
NexTech's FlexCell Technology for Planar SOFC Stacks
M. Day, S. L. Swartz, and G. Arkenberg

2R-Cell: A Universal Cell for an Easy and Safe SOFC Operation
R. Ihringer

Development of an All Ceramic SOFC
I. Wærnhus, A. Vik, C. Ilea, and S. Faaland

Improved Redox and Thermal Cycling Resistant Tubular Ceramic Fuel Cells

Transient Performance of Micro-Tubular Solid Oxide Fuel Cells and Stacks
K. Howe and K. Kendall

Performance and Energy Efficiency of a Microtubular Solid Oxide Fuel Cell
T. Suzuki, S. Sugihara, K. Hamamoto, T. Yamaguchi, and Y. Fujishiro

Evaluation of ScSZ-Based Microtubular SOFCs under 3% Humidified CH4 Fuel Flow at Intermediate Temperature
T. Yamaguchi and N. Sammes

Impact of Sintering Mechanism Evolution on Electrochemical Performance of Cathode Support Tubular Solid Oxide Fuel Cells
J. Zhou, C. Zhao, X. Ye, S. Wang, and T. Wen

Tubular Metal Support Solid Oxide Fuel Cell Manufacturing and Characterization

IP-SOFC Performance Measurement and Prediction
B. Haberman, C. Martinez Baca, and T. Ohrn

Ultra-Low Mass Planar SOFC Design
M. Badding, W. Bouton, J. Brown, L. Kester, S. Pollard, C. W. Tanner, and P. Tepesch

Thin Film Low Temperature Solid Oxide Fuel Cell (LTSOFC) by Reactive Spray Deposition Technology (RSDT)
R. Maric, K. Furusaki, D. Nishijima, and R. Neagu

Materials for Proton Conducting Solid Oxide Fuel Cells (H-SOFCs)
V. Thangadurai, W. H. Kan, B. Mirfakhraei, S. Bhella, and T. Trinh
Imaging of Oxide Ionic Flows at Practical SOFC Cells by Isotope Labeling Technique
T. Horita, T. Shimonosono, H. Kishimoto, K. Yamaji, M. E. Brito, and H. Yokokawa

The Influence of Porous Support Morphology on the Electrochemical Performance of Solid Oxide Fuel Cells
A. Torabi, A. R. Hanifi, T. H. Etsell, and P. Sarkar

Accelerated Degradation by Impurities for Evaluating Life Time of SOFCs

Evaluation of Stress Conditions in Operated Anode Supported Type Cells Based on In-Situ Raman Scattering Spectroscopy
M. Nagai, F. Iguchi, S. Onodera, N. Sata, T. Kawada, and H. Yugami

Anode/Electrolyte Interface Modification in LSGM Electrolyte Supported SOFC
K. Kawahara, S. Suda, M. Suzuki, M. Kawano, H. Yoshida, and T. Inagaki

Fractal Current Distribution Structures for Thin Electrolyte Supported Fuel Cells
C. W. Tanner and K. L. Work

Development of Planar Solid Oxide Fuel Cell in Niroo Research Institute, Iran

Fabrication of Solid Oxide Fuel Cell Using the Dual Tape Casting Method
A. H. Ghobadzadeh, H. Mohebbi, A. Raoufi, H. Aslannejad, and S. Davari

Fabrication and Development of Perovskite Anode Supported Planar SOFCs
A. T. Tesfai, C. Savaniu, and J. T. Irvine

SOFC Material and Stack Characterization Tests for Micro-CHP Application
S. McPhail, F. Padella, G. Cinti, and G. Discepoli

A New Type of SOFC for Conversion of High Temperature Heat to Electricity without Carnot Limitation
K. T. Jacob

Current-Voltage Relationship Considering Electrode Degradation Using Sm-Doped Ceria Electrolytes in SOFCs
T. Miyashita
Progress Toward Inkjet Deposition of Segmented-in-Series Solid-Oxide Fuel Cell Architectures
N. Faino, W. Rosensteel, B. Gorman, and N. Sullivan

Challenges Of Thin Layers For SOFC Devices: From Low-Cost Chemical Bath Deposition (CBD) to Atomic Layer Deposition (ALD)

Electrochemical Performance of Cone-Shaped Tubular Anode Supported Solid Oxide Fuel Cells Fabricated by Low-Pressure Injection Moulding Technique
J. Xiao, J. Liu, and J. Ding

Performance of Anode Microstructure Controlled Ni-ScSZ/LSGM/LSCF-Ag SOFCs by Low Temperature Fabrication Process
Y. Endo, K. Sasaki, A. Suzuki, and T. Terai

Evaluation of Fuel Cell Performance and Degradation
M. Williams, R. Gemmen, and G. Richards

Impedance Analysis of Practical Segmented-in-Series Tubular Solid Oxide Fuel Cells
B. Liu, T. Matsui, H. Murayama, K. Tomida, T. Kabata, and K. Eguchi

Impedance Behavior of SOFC at High Fuel Utilization and a Way of Evaluating Diffusion Contribution
A. Momma, Y. Tanaka, K. Takano, and T. Kato

La$_0.4$Sr$_{0.6}$Co$_{0.8}$Fe$_{0.2}$O$_{3-\delta}$ / Ce$_{0.9}$Gd$_{0.1}$O$_{2-\delta}$ Interface: Characterization by High Resolution SEM and TEM
A. L. Soldati, L. Baqué, H. Troiani, C. Cotaro, A. Schreiber, A. Caneiro, and A. Serquis

Hydrogen-Oxidation Kinetics in Reformate-Fuelled Anode Supported SOFC
A. Kromp, A. Leonide, A. Weber, and E. Ivers-Tiffée

Operation Characteristics of Tubular Segmented-In-Series Solid Oxide Fuel Cells (SOFC)
T. Lim, U. Yun, J. Lee, S. Lee, S. Park, R. Song, and D. Shin

Metal-Supported SOFC with Ceramic-Based Anode
Analytical Investigation of Cell Performance of Intermediate-Temperature Disk Type Seal-Less SOFC Fueled by Methane

T. Tanaka, Y. Inui, and N. Chitose

Anode-Supported Tubular SOFC at Low Temperature Using Ni, Fe, GDC, and YSZ Based Anode Support


Power Generating Property of Tubular SOFC Using DME as Fuel: Focus on Portable Device


Investigation on the Electrochemical Properties of the Ni-YSZ/Ni-ScSZ/ScSZ/LSM Tubular Solid Oxide Cell for High Temperature Steam Electrolysis

L. Shao, S. Wang, J. Qian, Y. Xue, and R. Liu

Combined Theoretical and Experimental Studies of H₂ and CO Oxidation over YSZ Surface

A. Gorski, V. Yurkiv, W. G. Bessler, and H. Volpp

Numerical Simulation of Anode-Supported Disc-Type Single Cell at Anode Off-Gas Recycle

Y. Tanaka, A. Momma, K. Sato, and T. Kato

Production of Compliant Current Collector-Supported Micro-Tubular Solid Oxide Fuel Cells

R. De La Torre, M. Casarin, and V. M. Sglavo

Investigations on Single Chamber Solid Oxide Fuel Cells: From Single Cell to Micro-Stack

Z. Lü, B. Wei, M. Liu, Z. Wang, Y. Tian, and W. Su

The Performance of a Single-Chamber Solid Oxide Fuel Cell Operated under Thin Oxygen Condition within Methane Fuel

Y. Liu, Z. Lü, and Y. Tian

Towards Understanding the Dual Membrane Fuel Cell (IDEAL-Cell) Using a Metallic Central Membrane

Z. Ilhan, A. Ansar, N. Wagner, S. Presto, M. Viviani, A. Babucci, D. Vladikova, Z. Stoynov, and A. Thorel

Low Temperature Operating Micro Solid Oxide Fuel Cells with Perovskite Type Proton Conductors

F. Iguchi, K. Kubota, Y. Inagaki, S. Tanaka, N. Sata, M. Esashi, and H. Yugami
Internal Methane Reforming High Temperature Proton Conductor (HTPC) Fuel Cells
I. Luisetto, E. Di Bartolomeo, A. D’Epifanio, F. Basoli, and S. Licoccia

Performance of Solid Oxide Fuel Cells with In-Doped BaZrO₃ Electrolyte Films on Different Anode Substrates
L. Bi, E. Fabbri, and E. Traversa

Chemically Stable Electrolytes and Advanced Electrode Architectures for Efficient Proton Ceramic Fuel Cells
G. Taillades, P. Battochi, M. Taillades, D. Jones, and J. Rozière

Chapter 4
Cell, Stack and System Modeling

Modeling SOFC Cathodes Based on 3-D Representations of Electrode Microstructure

First Principles Modeling of Oxygen Mobility in Perovskite SOFC Cathode and Oxygen Permeation Membrane Materials
E. Kotomin, R. Merkle, Y. Mastrikov, M. M. Kuklja, and J. Maier

Three-Dimensional Simulation of SOFC Anode Polarization Characteristics Based on Sub-Grid Scale Model
M. Kishimoto, H. Iwai, M. Saito, and H. Yoshida

Modeling the Electrochemistry of an SOFC through the Electrodes and Electrolyte
E. Ryan, K. Recknagle, and M. A. Khaleel

Computational Study on Impurities Poisoning and Degradation of an SOFC Anode Based on Density Functional Theory
T. Ogura, K. Nakao, T. Ishimoto, and M. Koyama

Multi-Scale Modeling of Solid Oxide Fuel Cells: From Patterned Anodes to a Power Plant System
W. G. Bessler

Simulation of Two-Dimensional Electrochemical Impedance Spectra of Solid Oxide Fuel Cells Using Transient Physical Models
Y. Shi, H. Wang, and N. Cai
Mathematical Modeling and Simulation for Optimization of IDEAL-Cell Performance
A. Bertei, C. Nicolella, F. Delloro, W. G. Bessler, N. Bundschuh, and A. Thorel
883

Modeling Segmented-in-Series SOFCs with Distributed Charge Transfer and Internal Reforming
H. Zhu and R. J. Kee
895

A Three Dimensional Electrical Model of SOFC Stack
M. Le-Ny, O. Chadebec, G. Cauffet, J. Dedulle, and Y. Bultel
903

Analytical Models for SOFC Electrodes with Variable Cross-Section Microstructures
G. Nelson, A. Peracchio, B. Cassenti, and W. K. Chiu
913

Multiscale Simulation of Electro-Chemo-Mechanical Coupling Behavior of PEN Structure under SOFC Operation
923

Numerical and Experimental Analysis of a Solid Oxide Fuel Cell Stack
S. Beale, A. D. Le, H. Roth, J. Pharoah, H. Choi, L. de Haart, and D. Froning
935

Modeling of a SOFC Fuelled by Methane: Influence of the Methane Steam Reforming Kinetics
K. Girona, J. Toyir, P. Gélin, and Y. Bultel
945

Thermodynamic Influence Analysis of Available Fuels and Reforming Methods on SOFC System Efficiency
M. Heddrich, M. Jahn, A. Michaelis, and E. Reichelt
955

A Micro-Scale Model for Oxygen Reduction on LSM-YSZ Cathode
S. R. Pakalapati, I. Celik, H. O. Finklea, M. Gong, and X. Liu
963

A Near Triple-Phase Boundary Region Model for H2S Poisoning of SOFC Anodes
D. S. Monder and K. Karan
977

An Innovative Electrochemical Model for Three-Dimensional Modeling of a SOFC Stack Used in Electrolysis Mode
D. Grondin, J.Deserue, A. Brisse, M. Zahid, B. Grondin-Perez, J. Chabrierat, and P. Ozil
987
Comparison between FIB-SEM Experimental 3-D Reconstructions of SOFC Electrodes and Random Particle-Based Numerical Models

H. Choi, D. Gawel, A. Berson, J. Pharoah, and K. Karan

Exchange Current Density of Solid Oxide Fuel Cell Electrodes

T. Yonekura, Y. Tachikawa, T. Yoshizumi, Y. Shiratori, K. Ito, and K. Sasaki

Experimental And Theoretical Approach Of Surface Reactivity Of CeO₂ For SOFC Application

T. Désaunay, B. Medina-Lott, A. Ringuedé, M. Cassir, C. Adamo, and F. Labat

Three Dimensional Simulation of a Counter-Flow Planar Solid Oxide Fuel Cell

Y. Mollayi Barzi, A. Raoufi, N. Manafi Rasi, and S. Davari

Numerical Approach of a Single-Chamber Solid Oxide Fuel Cell without Mixed Reactant Feeding

S. Ould Ahmedou, J. Deseure, O. Doche, and Y. Bultel

Numerical Analysis on the Dynamic Behavior of a Solid Oxide Fuel Cell with a Multivariable Control Strategy

Y. Komatsu, S. Kimijima, and J. Szmyd

Self-Consistent-Field Electrochemistry

D. Gatewood, C. Turner, and B. I. Dunlap

Numerical Simulation of Multi-Channel Planar Solid Oxide Fuel Cell Unit by Integrating Continuum Micro-Scale PEN Sub-Model

H. Wang, Y. Shi, and N. Cai

Phase Field Model of Electrochemical Impedance Spectroscopy

W. Gathright, M. Jensen, and D. Lewis

Current Distribution Analysis of a Microtubular Solid Oxide Fuel Cell with Surface Temperature Measurements

H. Nakajima and T. Kitahara

Solid Oxide Fuel Cell Electrode 3D Microstructure and Performance Modeling

K. Rhazaoui, Q. Cai, P. Shearing, C. Adjiman, and N. Brandon

Effect of Porous Microstructural Properties on the Results of a Cell-Level Model in Solid Oxide Fuel Cells

H. Choi, A. Berson, J. Pharoah, and S. Beale
Chapter 5
Electrolyte Materials, Processing and Performance

Strain Effect on Oxygen Migration in Yttria-Stabilized Zirconia
W. Araki, M. Kuribara, and Y. Arai

Pulsed Laser Deposition of Superlattices Based on Ceria and Zirconia
D. Pergolesi, A. Tebano, E. Fabbri, G. Balestrino, S. Licoccia, and E. Traversa

Chemical Expansion and Frozen-In Oxygen Vacancies in Pr-Doped Ceria
Y. Kuru, S. R. Bishop, J. Kim, B. Yildiz, and H. L. Tuller

Mechanical, Electrical, and Optical Properties of (Pr,Ce)O₂ Solid Solutions: Kinetic Studies
S. R. Bishop, J. Kim, N. Thompson, D. Chen, Y. Kuru, T. Stefanik, and H. L. Tuller

Mechanical Properties of Ce₀.₉Gd₀.₁O₂₋ₓ at High Temperatures under Controlled Atmospheres
T. Kushi, K. Sato, A. Unemoto, K. Amezawa, and T. Kawada

Oxygen Diffusion in Ordered/Disordered Double Perovskites
A. Tarancón, A. Chroneos, D. Parfitt, and J. Kilner

Gadolinia-Doped Ceria Cathode Interlayer for Low Temperature Solid Oxide Fuel Cell
Y. Kim, T. M. Gür, and F. B. Prinz

Influence of Small Amounts of NiO on the Electrical Conductivity of 8YSZ
R. Batista and E. N. Muccillo

Phase Transformation of Stabilized Zirconia on SOFC Stacks
H. Kishimoto, T. Shimonosono, K. Yamaji, M. E. Brito, T. Horiga, and H. Yokokawa

Defect Formation in SOFC Electrolyte Films during Fabrication
X. Wang, T. Yota, and A. Atkinson

Characterization of Zirconia-India Ceramics Sintered by Spark Plasma
D. Z. de Florio and F. Coral Fonseca

Self-Supported Thin Yttria-Stabilized Zirconia Electrolytes for Solid Oxide Fuel Cells Prepared by Laser Machining
A. Larrea, D. Sola, M. Laguna-Bercero, J. Peña, R. Merino, and V. Orera
ZrO$_2$-CeO$_2$ Interface Properties: A First-Principle Investigation  
*M. Fronzi, A. De Vita, Y. Tateyama, and E. Traversa*  
1203

A Study of Coarsening Samarium Doped Ceria on Interaction with Yttria Stabilized Zirconia  
*X. Zhang, P. Hamel, S. Yick, and M. Robertson*  
1211

Electrical Properties of Tb and Sm Co-Doped Ceria Electrolyte at Different Oxygen Partial Pressures  
*M. Vestli, G. Nork, and E. Lust*  
1219

The Influence of Sintering Time of Feedstock Powders on the Electrical Properties of La$_{0.6}$(SiO$_4$)$_3$O$_2$ Electrolyte Coatings  
*W. Gao, H. Liao, and C. Coddet*  
1225

Soft Chemistry Routes for the Synthesis of Sr$_{0.02}$La$_{0.98}$Nb$_{0.6}$Ta$_{0.4}$O$_4$ Proton Conductor  
*A. Santibáñez-Mendieta, E. Fabbri, S. Licoccia, and E. Traversa*  
1235

BaCe$_{0.8}$Zr$_{0.1}$Y$_{0.1}$O$_{3-\delta}$ Thin Film Elaborated by Reactive Magnetron Sputtering  
*M. Arab Pour Yazdi, P. Briois, and A. Billard*  
1243

Synthesis and Properties of BaZr$_{0.1}$Ce$_{0.7}$Y$_{0.2-x}$M$_{x}$O$_{3-\delta}$ (x = 0, 0.1; M = Dy, Yb) Compounds  
*R. Muccillo and E. N. Muccillo*  
1251

Development of Novel Fe-Doped Barium Calcium Niobates as Promising Mixed Conductors for Solid Oxide Fuel Cells (SOFCs)  
*W. H. Kan, T. Trinh, T. Fürstenhaupt, and V. Thangadurai*  
1259

Low Temperature Densification and Electrical Property of a Carbonate-Added Proton Conducting Ceramic  
*X. Li, N. Xu, L. Zhang, and K. Huang*  
1267

Apatite Coatings Deposited by DC Magnetron Sputtering  
*P. Briois, C. Mazataud, S. Fourcade, F. Mauvy, J. Grenier, and A. Billard*  
1275

**Chapter 6**  
**Anode Materials, Processing and Performance**

Single Step Preparation of Nano-Dispersed NiO/YSZ Composites for Solid Oxide Fuel Cell  
*J. Song, Y. Park, H. Bae, J. Ahn, B. Seong, D. Kim, and J. Jun*  
1285
<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multilayered SOFC Anode Structure with Electroless Ni-YSZ for Enhanced Cell Performance</td>
<td>1293</td>
</tr>
<tr>
<td><em>M. Mukhopadhyay, J. Mukhopadhyay, A. Das Sharma, and R. N. Basu</em></td>
<td></td>
</tr>
<tr>
<td>Influence of Tertiary Phases Incorporated into Ni-Based Cermets by Solution Precursor Plasma Spraying (SPPS) on Anode Stability</td>
<td>1303</td>
</tr>
<tr>
<td><em>E. Lay, C. Metcalfe, and O. Kesler</em></td>
<td></td>
</tr>
<tr>
<td>3D Imaging of Nickel Oxidation States using Full Field X-ray Absorption Near Edge Structure Nanotomography</td>
<td>1315</td>
</tr>
<tr>
<td>X-ray Imaging and Analysis of 3D Microstructural Changes in Aged Ni-YSZ Anode</td>
<td>1323</td>
</tr>
<tr>
<td>Characterization and Carbon Tolerance of New Au - Mo - Ni/GDC Cermet Powders for use as Anode Materials in Methane Fuelled SOFCs</td>
<td>1329</td>
</tr>
<tr>
<td><em>D. K. Niakolas, M. Athanasiou, S. Neophytides, and S. Bebelis</em></td>
<td></td>
</tr>
<tr>
<td>Study of Ga Doped LSCM as an Anode for SOFC</td>
<td>1337</td>
</tr>
<tr>
<td><em>A. Ghosh, A. Azad, and J. T. Irvine</em></td>
<td></td>
</tr>
<tr>
<td>Preliminary Studies of the Ba-Doped La/Sr Chromo-Manganite Series as New SOFC Anode Materials</td>
<td>1345</td>
</tr>
<tr>
<td><em>E. Lay, G. Gauthier, and L. Dessemond</em></td>
<td></td>
</tr>
<tr>
<td>A Novel Redox Stable Catalytically Active Electrode for Solid Oxide Fuel Cells</td>
<td>1357</td>
</tr>
<tr>
<td><em>Q. Liu, G. Xiao, T. Howell, T. L. Reitz, and F. Chen</em></td>
<td></td>
</tr>
<tr>
<td>Microstructural Characterization of SOFC Electrodes: Observations and Simulations</td>
<td>1367</td>
</tr>
<tr>
<td><em>P. Shearing, Q. Cai, C. Adjiman, A. Marquis, R. Clague, J. Gelb, R. Bradley, P. Withers, and N. Brandon</em></td>
<td></td>
</tr>
<tr>
<td>Correlation between Microstructure and Electrochemical Characteristics of Ni-YSZ Anode Subjected to Redox Cycles</td>
<td>1379</td>
</tr>
<tr>
<td><em>H. Muroyama, H. Sumi, R. Kishida, J. Kim, T. Matsui, and K. Eguchi</em></td>
<td></td>
</tr>
<tr>
<td>Microwave-Assisted Preparation of Cu Coated Ni/YSZ Anode for Direct Utilization of Dry CH₄ in SOFC</td>
<td>1389</td>
</tr>
<tr>
<td><em>S. Islam and J. M. Hill</em></td>
<td></td>
</tr>
</tbody>
</table>
Evaluation of Sn-Modified Ni/YSZ SOFC Anodes for the Direct Utilization of Methane
   A. Singh and J. M. Hill

In-Situ Measurement of SOFC Anode Surface Processes
   E. J. Brightman, R. Maher, D. G. Ivey, G. Offer, and N. Brandon

Impedance Studies on Solid Oxide Fuel Cells with Yttrium-Substituted SrTiO₃ Ceramic Anodes
   Q. Ma, F. Tietz, A. Leonide, and E. Ivers-Tiffée

Evaluating Overpotentials in GDC Electrodes for H₂/H₂O Reactions in Solid Oxide Electrochemical Cells

Understanding Performance Losses at Ni-Based Anodes Due to Sulphur Exposure
   V. I. Birss, L. Deleebeeck, S. Paulson, and T. Smith

Mg and Fe Modified Ni/GDC Cermets as Sulfur Tolerant Anodes of Solid Oxide Fuel Cells
   L. Zhang and S. Jiang

Characterization of the Ni-8YSZ Cermet Creep and Its Impact on the Cell 'Redox' Tolerance
   J. Laurencin, G. Delette, F. Usseglio-viretta, S. di Iorio, and F. Lefebvre

Effect of Redox Cycling on Mechanical Properties of Ni-YSZ Cermets for SOFC Anodes
   S. Sukino, S. Watanabe, K. Sato, F. Iguchi, H. Yugami, T. Kawada, J. Mizusaki, and T. Hashida

A Study of the Rheological Properties of NiO/ScSZ Screen-Printing Inks and Their Application to SOFC Anodes
   M. Somalu, N. Brandon, and V. Yufit

Measurement of Knudsen and Effective Ordinary Diffusion Coefficients in Solid Oxide Fuel Cell Anodes Fabricated by Atmospheric Plasma Spraying Using Powder, Suspension, and Solution Precursor Feedstocks
   C. Metcalfe, E. Lay, and O. Kesler

Electrooxidation of Reformate Gases at Model Anodes
Gas Transport and Internal Reforming Chemistry in SOFC Anode Supports and Structures
A. E. Richards, N. Sullivan, R. J. Kee, M. McNeeley, and S. Babiniec

Performance of Sm$_{0.95}$Ce$_{0.05}$Fe$_{1-x}$Ni$_x$O$_{2-\delta}$ Perovskite as Anode Materials under Methane Fuel for Low Temperature Solid Oxide Fuel Cells (LT-SOFC)
S. M. Bukhari and J. B. Giorgi

Adsorptive Properties of the Ni$_{1-x}$Co$_x$-Based Cermet Anode for the Oxidation of Methane
T. Sawahata, H. Takayanagi, T. Wah Tzu, and K. Sato

Gas Products Analysis during the Electrochemical Conversion of Dry Methane with a La$_{0.3}$Sr$_{0.7}$TiO$_3$ and Ni/YSZ Bi-Layer SOFC Anode
M. A. Buccheri and J. M. Hill

Thermal Imaging of Solid Oxide Fuel Cell Anode Degradation with Dry and Wet Ethanol Fuel Flows
M. B. Pomfret, D. Steinhurst, and J. Owrutsky

Safe Operating Conditions to Prevent Damage in Ni-YSZ Anode Supported SOFC
V. Roche, C. Roux, and M. Steil

Impact of Ni on Accelerated Degradation of 8.5 Mol% Y$_2$O$_3$-Doped Zirconia
A. Lefarth, B. Butz, H. Störmer, A. Utz, and D. Gerthsen

Influence of Additive Oxides on Electrochemical Performance of Y-Doped SrTiO$_3$ Anode in SOFCs
P. Puengjinda, H. Muroyama, T. Matsui, and K. Eguchi

Catalytic Activities and Electrochemical Properties of Y and Fe Co-Doped SrTiO$_3$-Based Composite Anodes for Solid Oxide Fuel Cells (SOFCs)
S. Yoon, Y. Kim, H. Hwang, M. Ji, and B. Choi

Ceramic Oxide Anode with Precipitated Catalytic Nanoparticles for Ethanol Fueled SOFC
N. Monteiro, S. Nobrega, and F. C. Fonseca

Ab Initio Study of Activity and Coke-Tolerance of Ni/CeZrO$_2$ Anodes of SOFC as a Function of Zirconia Concentration
M. Shishkin and T. Ziegler

Kinetic Modeling of Nickel Oxidation in SOFC Anodes
J. Neidhardt, M. Henke, and W. G. Bessler
<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaluation of Porous Ni-YSZ Cermet with Ni content of 0-30 vol% As</td>
<td>1631</td>
</tr>
<tr>
<td>Insulating Substrates for Solid Oxide Fuel Cells</td>
<td></td>
</tr>
<tr>
<td>Z. Wang, M. Mori, and T. Itoh</td>
<td></td>
</tr>
<tr>
<td>Influence of Anode Thickness on Cell Performance in Internal Reforming</td>
<td>1641</td>
</tr>
<tr>
<td>Operation of SOFCs</td>
<td></td>
</tr>
<tr>
<td>Y. Lee, H. Sumi, H. Muroyama, T. Matsui, and K. Eguchi</td>
<td></td>
</tr>
<tr>
<td>Mesoporous NiO-CGO Obtained by Hard Template as High Surface Area</td>
<td>1647</td>
</tr>
<tr>
<td>Anode for IT-SOFC</td>
<td></td>
</tr>
<tr>
<td>L. Almar, T. Andreu, A. Morata, and A. Tarancón</td>
<td></td>
</tr>
<tr>
<td>Determination of Three Dimensional Microstructure Parameters from a</td>
<td>1655</td>
</tr>
<tr>
<td>Solid Oxide Ni/YSZ Electrode after Electrolysis Operation</td>
<td></td>
</tr>
<tr>
<td>P. S. Jørgensen and J. R. Bowen</td>
<td></td>
</tr>
<tr>
<td>Theoretical Study for the Sintering of Nickel Anode in Solid Oxide</td>
<td>1661</td>
</tr>
<tr>
<td>Fuel Cell</td>
<td></td>
</tr>
<tr>
<td>K. Nakao, T. Ogura, T. Ishimoto, and M. Koyama</td>
<td></td>
</tr>
<tr>
<td>Electrochemical Oxidation at SOFC Anodes: Comparison of Patterned</td>
<td>1669</td>
</tr>
<tr>
<td>Nickel Anodes and Nickel/YSZ Cermet Anodes</td>
<td></td>
</tr>
<tr>
<td>A. Utz, J. Joos, A. Weber, and E. Ivers-Tiffée</td>
<td></td>
</tr>
<tr>
<td>Investigation of MgO Promoted NiO: SDC Anode Material for Intermediate</td>
<td>1683</td>
</tr>
<tr>
<td>Temperatures Solid Oxide Fuel Cells</td>
<td></td>
</tr>
<tr>
<td>M. Phongaksorn, A. Yan, M. Ismail, A. Ideris, E. Croiset, S. Corbin,</td>
<td></td>
</tr>
<tr>
<td>Y. Yoo</td>
<td></td>
</tr>
<tr>
<td>Synthesis and Characteristics of Nano-Ceria Supported Bimetallic</td>
<td>1689</td>
</tr>
<tr>
<td>Catalysts For S-Tolerant SOFCs</td>
<td></td>
</tr>
<tr>
<td>J. Bozeman, A. Marruffo, I. Barney, A. Jackson, S. Mukhopadhyay, and</td>
<td></td>
</tr>
<tr>
<td>H. Huang</td>
<td></td>
</tr>
<tr>
<td>Reverse Cell Bias for the Prevention of Ni Oxidation during Air</td>
<td>1697</td>
</tr>
<tr>
<td>Exposure</td>
<td></td>
</tr>
<tr>
<td>J. L. Young, V. Vedharathinam, and V. I. Birss</td>
<td></td>
</tr>
<tr>
<td>Reaction Sites of Mixed Conductor Anodes in Solid Oxide Fuel Cells</td>
<td>1707</td>
</tr>
<tr>
<td>R. Kikuchi, T. Okamoto, K. Akamatsu, T. Sugawara, and S. Nakao</td>
<td></td>
</tr>
<tr>
<td>Sulfur Poisoning of SOFCs: Dependence on Operational Parameters</td>
<td>1717</td>
</tr>
<tr>
<td>T. Yoshizumi, C. Uryu, T. Oshima, Y. Shiratori, K. Ito, and K. Sasaki</td>
<td></td>
</tr>
<tr>
<td>Electrochemical Performance and H2S Poisoning Study of Mo-Doped Ceria</td>
<td>1727</td>
</tr>
<tr>
<td>(CMO) SOFC Anodes</td>
<td></td>
</tr>
<tr>
<td>B. Mirfakhraei, V. I. Birss, V. Thangadurai, S. Paulson, K. E. Béré,</td>
<td></td>
</tr>
<tr>
<td>F. Gitzhofer</td>
<td></td>
</tr>
</tbody>
</table>

xxi
Study on Degradation of Solid Oxide Fuel Cell with Pure Ni Anode
Z. Jiao, N. Shikazono, and N. Kasagie

Elementary Kinetic Numerical Simulation of Electrochemical CO Oxidation on Ni/YSZ Pattern Anodes
V. Yurkiv, A. Utz, A. Weber, E. Ivers-Tiffée, H. Volpp, and W. G. Bessler

Fuel Flexible Anode for Solid Oxide Fuel Cells: An Electrochemical and Catalytic Study
M. Lo Faro, A. Stassi, G. Monforte, M. Minutoli, V. Antonucci, V. Modafferi, P. Frontera, C. Busacca, P. Antonucci, and A. Aricò

Key Issues in Processing Metal-Supported Proton Conducting Anodes for SOFCs Applications
E. Mercadelli, A. Gondolini, P. Pinasco, A. Sanson, S. Barison, and M. Fabrizio

Optimization of Solid Oxide Fuel Cell Ni-CGO Anode Porosity
K. Tamm, I. Kivi, E. Anderson, P. Möller, G. Nurk, and E. Lust

Fabrication of Direct Oxidation Solid Oxide Fuel Cell Anodes Using a Novel Atmospheric Plasma Spraying Technique
M. Cuglietta and O. Kesler

Development, Fabrication and Testing of Perovskite-Based Anodes for Tubular Solid Oxide Fuel Cells
S. Babiniec, A. E. Richards, N. Faino, and N. Sullivan

Analysis of Microscopic Anode Structure Effects on an Anode-Supported SOFC Including Knudsen Diffusion
M. Andersson, X. Lu, J. Yuan, and B. Sundén

Performances of Metal Particle-Dispersed Ceria Hydrogen Electrodes in Reversible SOFCs

Enhanced Performances of Ln₂NiO₄₋δ / CGO Multilayered Anodes for High Temperature Steam Electrolysis (HTSE)
T. Ogier, F. Chauveau, J. Bassat, F. Mauvy, J. Grenier, J. Mougín, and M. Petitjean

Numerical Modeling of Nickel-Impregnated Porous YSZ-Supported Anodes and Comparison to Conventional Composite Ni-YSZ Electrodes
E. Hardjo, D. S. Monder, and K. Karan
Chapter 7
Cathode Materials, Processing and Performance

CeO₂ Addition for Improving Electrochemical Behavior of La₀.₈Sr₀.₂MnO₃ Cathodes Sintered at High Temperature
J. Wiff, M. Suzuki, and S. Suda

High Performance LSM-ESB Cathode on ESB Electrolyte for Low to Intermediate Temperature Solid Oxide Fuel Cells
K. Lee, D. Jung, H. Yoon, M. Camaratta, N. Sexton, and E. D. Wachsman

Quantification of Microstructural Change at the Interface between (La,Sr)MnO₃⁺δ Cathode and YSZ Electrolyte Upon Discharge Operation
T. Matsui, Y. Mikami, H. Muroyama, and K. Eguchi

Oxygen Nonstoichiometry of Perovskite-type La₀.₆Sr₀.₄Co₁₋ᵧFeₓO₃₋δ (y=0, 0.2, 0.4, 0.5, 0.6, 0.8, 1) SOFC Cathode Materials
M. Kuhn, Y. Fukuda, S. Hashimoto, K. Sato, K. Yashiro, and J. Mizusaki

Oxygen Non Stoichiometry in Nanocrystalline La₀.₅Sr₀.₅CoO₃₋δ Thin Films
S. Wang, S. Cho, H. Wang, and A. Jacobson

Electrical Conductivity and Oxygen Diffusivity of Perovskite-Type Solid Solution La₀.₆Sr₀.₄Co₁₋ᵧFeₓO₃₋δ (y=0.2, 0.4, 0.5, 0.6, 0.8)
K. Yashiro, I. Nakano, M. Kuhn, S. Hashimoto, K. Sato, and J. Mizusaki

Microstructure of Sol-Gel Derived Nanoscaled La₀.₆Sr₀.₄CoO₃₋δ Cathodes for Intermediate-Temperature SOFCs

Sm(Sr)CoO₃ Nano Cone Cathode and Ni-Fe Metal Support for High Power Density and Reliability
T. Ishihara, Y. Ju, T. Inagaki, and S. Ida
Performance of Metal-Supported Composite and Single-Phase Cathodes Based on LSCF and SSC  
*J. Harris and O. Kesler*  
1927

Low Temperature Preparation of LaNi_{1-x}Fe_{x}O_3 as New Cathode Material for SOFC - Advantage of Liquid Phase Mixing Method -  
*E. Niwa, C. Uematsu, E. Miyashita, T. Ohzeki, and T. Hashimoto*  
1935

Doped / Undoped Ceria Buffer Layers for Improved LT SOFC Performances with Pr_{2}NiO_{3-δ} Cathode  
*J. Bassat, D. Mesguich, C. Ferchaud, Y. Zhang-Steenwinkel, F. van Berkel, C. Aymonier, J. Watkins, and J. Grenier*  
1945

Towards a Fundamental Understanding of the Oxygen Reduction Mechanism  
*E. D. Wachsman and E. N. Armstrong*  
1955

Performance Analysis and Development Strategies for Solid Oxide Fuel Cells  
*E. Ivers-Tiffée, J. Hayd, D. Klotz, A. Leonide, F. Han, and A. Weber*  
1965

Surface Cation Segregation and its Effect on the Oxygen Reduction Reaction on Mixed Conducting Electrodes Investigated by ToF-SIMS and ICP-OES  
*M. Kubicek, A. Limbeck, T. Frömling, H. Hutter, and J. Fleig*  
1975

On the Thermodynamic Stability and the Kinetic Activity of SOFC Materials  
*X. Zhou, J. Templeton, and J. Stevenson*  
1985

Viable AC Two-Probe Impedance Spectroscopy Based on Spatially-Limited Contact Probe for SOFC Cathode  
*J. Lee, H. Ji, H. Kim, J. Son, and J. Hwang*  
1995

Multi-Scale Assessment of Cr Contamination Levels in SOFC Cathode Environment  
*J. Schuler, A. Schuler, Z. Wullemmin, A. Hessler-Wyser, C. Ludwig, and J. Van Herle*  
2001

Degradation of Solid Oxide Fuel Cell Performance by Cr-Poisoning  
*M. Kornely, A. Neumann, N. Menzler, A. Weber, and E. Ivers-Tiffée*  
2009

In-situ Investigation of the Chromium Induced Degradation of the Oxygen Exchange Kinetics of the IT-SOFC Cathode Material La_{0.6}Sr_{0.4}CoO_{3-δ}  
*E. Bucher, M. Yang, and W. Sitte*  
2019

Is Chromium Poisoning of LSM Cathodes Avoidable  
*L. de Haart, A. Neumann, N. Menzler, and I. Vinke*  
2027

Impact of the Volatile Cr-Species’ Attack on the Conductivity of La(Ni,Fe)O_3  
*M. K. Stodolny, B. Boukamp, and F. van Berkel*  
2035
<table>
<thead>
<tr>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stability and Performance of LSCF-Infiltrated SOFC Cathodes: Effect of Nano-Particle Coarsening</td>
<td>2045</td>
</tr>
<tr>
<td>M. Shah, G. Hughes, P. W. Voorhees, and S. A. Barnett</td>
<td></td>
</tr>
<tr>
<td>Microstructural Aspects on the Performance of LSCF Cathodes for SOFCs</td>
<td>2055</td>
</tr>
<tr>
<td>R. Costa, Z. Ilhan, and A. Ansar</td>
<td></td>
</tr>
<tr>
<td>Microstructural Effects on the Oxygen Exchange Kinetics of La$<em>{0.7}$Sr$</em>{0.3}$MnO$_3$ Thin Films</td>
<td>2063</td>
</tr>
<tr>
<td>L. Yan, B. Kavaipatti, K. Chang, H. You, and P. Salvador</td>
<td></td>
</tr>
<tr>
<td>The Structural Disorder and Lattice Stability of (Ba$<em>x$Sr$</em>{1-x}$)(Co$_{1-x}$Fe$_x$)O$_3$ Complex Perovskites</td>
<td>2077</td>
</tr>
<tr>
<td>M. M. Kuklija, Y. Mastrikov, S. Rashkeev, and E. Kotomin</td>
<td></td>
</tr>
<tr>
<td>Systematic Studies of the Cathode-Electrolyte Interface in SOFC Cathodes Prepared by Infiltration</td>
<td>2085</td>
</tr>
<tr>
<td>R. Kängas, J. Vohs, and R. Gorte</td>
<td></td>
</tr>
<tr>
<td>Strain Effects on the Surface Chemistry of La$<em>{0.7}$Sr$</em>{0.3}$MnO$_3$</td>
<td>2097</td>
</tr>
<tr>
<td>J. Han, H. Jalili, Y. Kuru, Z. Cai, and B. Yildiz</td>
<td></td>
</tr>
<tr>
<td>The Effects of Stress on the Defect and Electronic Properties of Mixed Ionic Electronic Conductors</td>
<td>2105</td>
</tr>
<tr>
<td>O. Comets and P. W. Voorhees</td>
<td></td>
</tr>
<tr>
<td>Strain Effects on Defect Chemistry in Epitaxial Perovskite Thin Films for Solid Oxide Fuel Cells</td>
<td>2113</td>
</tr>
<tr>
<td>M. Gadre, Y. Lee, N. Swaminathan, and D. Morgan</td>
<td></td>
</tr>
<tr>
<td>Mechanistic Interpretation of the Oxygen Reduction Kinetics of La$<em>{0.85}$Ca$</em>{0.15}$MnO$_3$ Cathode</td>
<td>2119</td>
</tr>
<tr>
<td>L. Miara, U. Pal, and S. Gopalan</td>
<td></td>
</tr>
<tr>
<td>Investigation of Cathode Kinetics in SOFC: Model Thin Film SrTi$_{1-x}$Fe$<em>x$O$</em>{3-x}$ Mixed Conducting Oxides</td>
<td>2129</td>
</tr>
<tr>
<td>W. Jung and H. L. Tuller</td>
<td></td>
</tr>
<tr>
<td>Ln(Sr,Ca)$_3$(Fe,Co)$<em>3$O$</em>{10}$ Intergrowth Oxide Cathodes for Solid Oxide Fuel Cells</td>
<td>2137</td>
</tr>
<tr>
<td>J. Kim, Y. Kim, K. Lee, and A. Manthiram</td>
<td></td>
</tr>
<tr>
<td>In situ Sinterable Cathode for Solid Oxide Fuel Cells</td>
<td>2147</td>
</tr>
<tr>
<td>H. Kim, Y. Park, J. Kim, and H. Jin</td>
<td></td>
</tr>
<tr>
<td>Title</td>
<td>Page</td>
</tr>
<tr>
<td>----------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>Aerosol Jet Printing and Microstructure of SOFC Electrolyte and Cathode Layers</td>
<td>2151</td>
</tr>
<tr>
<td>Effect of Gel Viscosity on the LSM Films Supported on Metallic Substrate</td>
<td>2161</td>
</tr>
<tr>
<td>L. Conceição, N. Ribeiro, and M. M. Souza</td>
<td></td>
</tr>
<tr>
<td>Nanosized Ceria Modified GdBaCo$<em>2$O$</em>{5+δ}$ Cathode for IT-SOFC</td>
<td>2169</td>
</tr>
<tr>
<td>B. Wei, Z. Lü, D. Jia, L. He, X. Huang, Y. Zhang, and W. Su</td>
<td></td>
</tr>
<tr>
<td>Pr Doped Ceria and La$<em>{0.6}$Sr$</em>{0.4}$Co$<em>2$Fe$</em>{0.8}$O$_3$ Composite Cathode for Solid Oxide Fuel Cell</td>
<td>2175</td>
</tr>
<tr>
<td>M. Chen and S. Cheng</td>
<td></td>
</tr>
<tr>
<td>Effect of the Strontium Content on the Electrochemical Performance of the Perovskite-Type Pr$<em>{1-x}$Sr$<em>x$Fe$</em>{0.8}$Co$</em>{0.2}$O$_3$ Oxides</td>
<td>2183</td>
</tr>
<tr>
<td>R. Pinedo, I. Ruiz de Larramendi, D. Jimenez de Aberasturi, J. Ruiz de Larramendi, M. Arriortua, and T. Rojo</td>
<td></td>
</tr>
<tr>
<td>Cooperative Investigations on Degradation of Cathode Materials in Segment-In-Series Cells by MHI</td>
<td>2191</td>
</tr>
<tr>
<td>Nanofiber Scaffold for Solid Oxide Fuel Cell Cathode</td>
<td>2201</td>
</tr>
<tr>
<td>M. Zhi, N. Mariani, K. Gerdes, and N. Wu</td>
<td></td>
</tr>
<tr>
<td>Silver Nanomesh as a Cathode for Solid Oxide Fuel Cells</td>
<td>2209</td>
</tr>
<tr>
<td>J. Shim, Y. Kim, J. Park, and F. B. Prinz</td>
<td></td>
</tr>
<tr>
<td>Effect of Polarization on Platinum Deposition at LSM/YSZ Interfaces</td>
<td>2213</td>
</tr>
<tr>
<td>Monitoring Active and Resistive Zones of SOFC Cathodes by Voltage Driven Tracer Incorporation</td>
<td>2217</td>
</tr>
<tr>
<td>J. Fleig, A. Opitz, A. Schintlmeister, M. Kubicek, and H. Hutter</td>
<td></td>
</tr>
<tr>
<td>Development of Purification Methods of Rare Earth Compounds for Preparation of More Cost Effective Solid Oxide Fuel Cell Cathodes</td>
<td>2227</td>
</tr>
<tr>
<td>R. Kanarbik, P. Möller, I. Kivi, K. Tamm, and E. Lust</td>
<td></td>
</tr>
<tr>
<td>Nanostructured Composite Cathodes by Suspension Plasma Spraying for SOFC Applications</td>
<td>2233</td>
</tr>
<tr>
<td>D. Soysal, A. Ansar, Z. Ilhan, and R. Costa</td>
<td></td>
</tr>
<tr>
<td>Page</td>
<td>Title</td>
</tr>
<tr>
<td>------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>2243</td>
<td>Study of Ca₃₋ₓBₓCo₄O₉₊δ (0 &lt; x ≤ {less than or equal to} 0.5) as Novel Cathodes for IT-SOFCs</td>
</tr>
<tr>
<td>2249</td>
<td>Material Stability and Cation Transport of La₀.₈Sr₀.₂Co₀.₂Fe₀.₈O₃₋δ in SOFC Cathodic Conditions</td>
</tr>
<tr>
<td>2255</td>
<td>Influence of SO₂ on the Long-Term Durability of SOFC Cathodes</td>
</tr>
<tr>
<td>2261</td>
<td>Detailed Electrochemical Analysis of High-Performance Nanoscaled La₀.₆Sr₀.₄Co₀.₂O₃₋δ Thin Film Cathodes</td>
</tr>
<tr>
<td>2275</td>
<td>Electrode and Electrolyte Layers for Solid Oxide Fuel Cells Applied by Physical Vapor Deposition (PVD)</td>
</tr>
<tr>
<td>2283</td>
<td>Comparison of Electrochemical Performances of Electrospayed LSCF Cathode Films for IT-SOFCs for Different Morphologies and Cobalt Contents</td>
</tr>
<tr>
<td>2295</td>
<td>Fabrication and Characterization of La₀.₆Sr₀.₄Co₀.₂Fe₀.₈O₃₋δ-Yttria Stabilized Zirconia Composites Cathode Prepared by Infiltration Method</td>
</tr>
<tr>
<td>2305</td>
<td>Exploring Mixed Protonic/Electronic Conducting Oxides as Cathode Materials for Intermediate Temperature SOFCs Based on Proton Conducting Electrolytes</td>
</tr>
<tr>
<td>2313</td>
<td>Investigation of the Particle Size Change of a La(Ni, Fe)O₃ as a Cathode</td>
</tr>
</tbody>
</table>
Microstructural Aspects of Cation Interdiffusion Across the LSCF/GDC Interface
M. E. Britto, M. Izuki, K. Yamaji, H. Kishimoto, T. Shimonosono, T. Horita, and H. Yokokawa

Influence of Cathode Thickness on the Oxygen Reduction Kinetics at the Intermediate Temperature SOFC Cathodes

Detailed Microstructure Analysis and 3D Simulations of Porous Electrodes
J. Joos, T. Carraro, M. Ender, B. Rüger, A. Weber, and E. Ivers-Tiffée

Firing Temperature Effect on 3D Microstructure and Performance of LSM-YSZ Composite SOFC Cathodes
J. Cronin, K. Muangnapoh, Z. Patterson, K. Yakal-Kremski, and S. A. Barnett

Characterization of SOFC Cathodes Prepared by Pulse Laser Deposition

Preparation of Mesoporous La₈₀Sr₂₀MnO₃ Infiltrated Coatings in Porous SOFC Cathodes Using Evaporation-Induced Self-Assembly Methods
R. Chao, J. Kitchin, K. Gerdes, E. Sabolsky, and P. Salvador

Microstructural Control of Composite Cathode by Wetting Nature of Infiltrated Solutions
S. Lee, N. Miller, and A. Manivannan

Chemical, Electronic and Nanostructure Dynamics on Sr(Ti₁₋ₓFeₓ)O₃ Thin-Film Surfaces at High Temperatures
Y. Chen, W. Jung, Y. Kuru, H. L. Tuller, and B. Yildiz

Comparison of X-ray Nanotomography and FIB-SEM in Quantifying the Composite LSM/YSZ SOFC Cathode Microstructure

Potential and Limitation of Application of Pulsed Laser Deposited Nano-Structure LSC Thin Film Cathode to YSZ Electrolyte SOFC
J. Son, D. Myung, J. Hwang, H. Lee, and J. Lee
Chapter 8
Interconnection, Seal and Contact Materials

Development of New Alloys for SOFC Interconnects with Excellent Oxidation Resistance and Reduced Cr-Evaporation
N. Yasuda, T. Uehara, S. Tanaka, and K. Yamamura

Low-Chromium Alloys for Solid Oxide Fuel Cell Interconnects
J. Fergus and Y. Zhao

Oxide Modification by Alloying Molybdenum to Fe-22Cr-0.5Mn for Solid Oxide Fuel Cell Interconnect
D. Yun, H. Seo, J. Jun, J. Lee, D. Kim, and K. Kim

High Temperature Oxidation of Plastically Deformed Ferritic Interconnect Steel
U. Bexell, M. Olsson, and M. W. Lundberg

Oxide Protective Coatings for Solid Oxide Fuel Cell Interconnects
M. Seabaugh, S. Ibanez, M. Beachy, M. Day, and L. Thrun

On Potential Application of Coated Ferritic Stainless Steel Grades K41X and K44X in SOFC/HTE Interconnects

Electrodeposition Of CoMn Onto Stainless Steels Interconnects For Increased Lifetimes In SOFCs

Multifunctional Nano-Coatings for SOFC Interconnects
J. Froitzheim and J. Svensson

Synthesis and Characterization of Nanocrystalline MnCo2O4,8 Spinel for Protective Coating Application in SOFC
A. Das Sharma, J. Mukhopadhyay, and R. N. Basu
Characteristics of the Sintered Phlogopite Mica/SiO2-B2O3-Al2O3-BaO-La2O3 Glass Blends
C. Liu, K. Lin, and R. Lee

Analysis of Joint Strength between a Metallic Interconnect and Glass-Ceramic Sealant for Use in Solid Oxide Fuel Cells
C. Lin, J. Chen, L. Chiang, and S. Wu

Characterization of Sr and Ba-Doped LaCrO3 Powders Synthesized by EDTA Method
A. Silva, A. Rocco, and M. M. Souza

Lanthanum Chromite Based Ceramic and Glass Composite Interconnects for Solid Oxide Fuel Cells
S. Lee, S. Pi, J. Lee, T. Lim, S. Park, R. Song, C. Park, and D. Shin

Synthesis and Electrical Properties of Strontium Titanate-Based Materials for Solid Oxide Fuel Cells
B. Park, J. Lee, S. Lee, T. Lim, S. Park, R. Song, and D. Shin

Anomalous Sintering Behavior of (Sr0.7La0.3)1-xTiO3+δ Perovskites (0 ≤ x ≤ 0.12) Synthesized by the Pechini Method
M. Mori and T. Itoh

First 3D-Modeling of Proton-Conducting SOFC's Interconnect
S. Sailler, J. Deseure, O. Doche, and Y. Bultel

High-Temperature Stress-Rupture Properties of a Ferritic Steel for Solid Oxide Fuel Cell Interconnect
Y. Chiu and C. Lin

Oxidation Resistance and Mechanical Properties of ZMG232L and Improved Fe-Cr Ferritic Alloys for SOFC Interconnects
T. Uehara, N. Yasuda, S. Tanaka, and K. Yamamura

Characterization of Vaporization Rates on SOFC Interconnect Alloys
M. Casteel, D. Lewis, A. Renko, and P. Willette

Method for Measuring Chromium Evaporation from SOFC Balance-of-Plant Components
O. Thomann, M. H. Pihlatie, J. Schuler, O. Himanen, and J. Kiviaho

Metallic Seals: A Possible Alternative Solution for High Temperature Steam Electrolysis
M. Reytier, L. Bruguière, M. Lefrançois, and J. Besson
Cathode Contact Materials for Solid Oxide Fuel Cells  
* M. Tucker, L. Cheng, and L. DeJonghe  

SOFC Module Material Development at Fuel Cell Energy  
* P. Huang and H. Ghezel-Ayagh  

### Chapter 9  
**Operation on Alternative Fuels**  

Application of Biofuels to Solid Oxide Fuel Cell  
* Y. Shiratori, T. Tran, Y. Takahashi, and K. Sasaki  

Biogas Fuel Reforming for Solid Oxide Fuel Cells  
* D. M. Murphy, A. E. Richards, A. M. Colclasure, W. Rosensteel, and N. Sullivan  

SOFC Power Generation from Biogas: Improved System Efficiency with Combined Dry and Steam Reforming  

Biomass Conversion in a Solid Oxide Fuel Cell  
* B. R. Alexander, R. Mitchell, and T. M. Gür  

Sorbents for BioFueled SOFCs  
* G. Alptekin, A. Jayaraman, and M. Schaefer  

Influence of Operation Conditions on Carbon Deposition in SOFCs Fuelled by Tar-Containing Biosyngas  
* M. Liu, M. G. Millan-Agorio, P. Aravind, and N. Brandon  

Transient Operation Effects of SOFCs Driven with Tar Loaded Synthesis Gas  
* M. Hauth, T. Kienberger, and J. Karl  

Liquid Tin-Lead Anode Solid Oxide Fuel Cell Fueled by Coal  
* M. LaBarbera, M. Fedkin, and S. Lvov  

Startup Characteristics of Propane-Fueled Solid Oxide Fuel Cell Hot Zones  
* Y. Du, D. Cui, K. Reifsnider, and F. Chen  

An Electrochemical Model of Anode Supported Microtubular SOFCs Powered by Ammonia  
* J. Y. Huo and X. Zhou
Direct-DME SOFC for Intermediate Operation Temperature Using Proton Conductor as the Electrolyte

Electrocatalysis and Reforming in Oscillatory Reaction of Methane on a Pt-LSC/Ceria Anode for Solid Oxide Fuel Cells
  V. Medvedev, S. B. Adler, and E. M. Stuve

Design and Testing of Structured Catalysts for Internal Reforming of CH₄ in Intermediate Temperature Solid Oxide Fuel Cells (IT SOFC)

Towards Understanding the Hydrocarbon Oxidation Activity of Oxides for Direct Hydrocarbon SOFC Anodes
  S. McIntosh and M. van den Bossche

In Situ Optical Studies of Solid Oxide Fuel Cells Operating With Dry and Humidified Oxygenated Fuels
  B. Eigenbrodt, J. Kirtley, and R. A. Walker

Effect of Hydrogen Sulfide on Electrochemical Oxidation of Syngas for SOFC Applications
  M. Roushanafshar, J. Luo, K. Chuang, and A. Sanger

Impurity Poisoning of SOFCs

Analysis of Fuel Options for SOFC-Based Power Systems in Undersea Vehicles
  A. Burke and L. Carreiro

Non-Thermal Plasma Reformation of Liquid Fuels
  J. Hartvigsen, S. Elangovan, M. Hollist, P. Czernichowski, and L. Frost

Ceramic Microchannel Heat Exchanger and Reactor for SOFC Applications
  D. M. Murphy, B. Rosen, J. Blasi, N. Sullivan, R. J. Kee, M. Hartmann, and N. E. McGuire

Studies on Direct Ethanol Use in SOFCs
  G. P. Corre and J. T. Irvine

Low Temperature Direct Methanol Fuel Cell with YSZ Electrolyte
  J. Komadina, Y. Kim, J. Park, T. M. Güür, S. Kang, and F. B. Prinz
Chapter 10
Electrolysis and Other Applications

Materials for Solid Oxide Electrolysis Cells
S. Elangovan, J. Hartvigsen, D. Larsen, I. Bay, and F. Zhao

Experimentally Validated Simulations of Undoped Ceria Electrodes for H₂ Oxidation and H₂O Electrolysis in Solid Oxide Electrochemical Cells
S. C. DeCaluwe and G. Jackson

Development of Reversible Solid Oxide Fuel Cells (RSOFCs) and Stacks
N. Q. Minh

Performance and Durability of High Temperature Steam Electrolysis: From the Single Cell to Short-Stack Scale
M. Petitjean, M. Reytier, A. Chatrous, L. Bruguère, A. Mansuy, H. Sassoulas, S. di Iorio, B. Morel, and J. Mougin

Long Term Testing of Short Stacks with Solid Oxide Cells for Water Electrolysis
J. Schefold, A. Brisse, M. Zahid, J. Ouweijes, and J. Nielsen

Hydrogen and Power by Fuel-Assisted Electrolysis Using Solid Oxide Fuel Cells
G. Tao, B. Butler, and A. Virkar

Production of Sustainable Fuels by Means of Solid Oxide Electrolysis
J. B. Hansen, N. Christansen, and J. Nielsen

High-Temperature CO₂ and H₂O Electrolysis with an Electrolyte-Supported Solid Oxide Cell
Q. Fu, J. Dailly, A. Brisse, and M. Zahid

Hydrogen Production by High Temperature Electrolysis Using Solid Oxide Electrolyzer Cells
S. Kim, J. Yu, D. Seo, I. Han, and S. Woo

Electrochemical Analysis of Biogas Fueled Anode Supported SOFC
A. Leonide, A. Weber, and E. Ivers-Tiffée
A Proposed Method for High Efficiency Electrical Energy Storage Using Solid Oxide Cells
D. M. Bierschenk, J. R. Wilson, E. Miller, E. Dutton, and S. A. Barnett

Development of Tubular Solid Oxide Electrolysis Stacks for Hydrogen Production

Novel Micro-Tubular High Temperature Solid Oxide Electrolysis Cells
C. Jin, C. Yang, and F. Chen

Model-Based Evaluation of the Production of Pure Oxygen through SOFC/SOEC Integration
M. A. Taher, C. Adjiman, P. Iora, P. Chiesa, and N. Brandon

Author Index