

# **Lucerne FUEL CELL FORUM 2004**

28 June – 2 July 2004, Lucerne / Switzerland

Conference featuring SOFC science and technology:

## **6th European SOFC Forum**

### **Posters**

#### **A Spring System to Ensure Electrical Contact within the SOFC-Stack**

Axel Müller<sup>1</sup> and Wilfried Becker<sup>2</sup>

<sup>1</sup>Universität Siegen and <sup>2</sup>Technische Universität Darmstadt / Germany

#### **Detecting Directions for Crack Nucleation at Sealing Joints of SOFC-Stacks**

Axel Müller<sup>1</sup>, Sanjib Goswami<sup>1</sup>, Wilfried Becker<sup>2</sup>, Detlef Stolten<sup>3</sup>, Andreas Gubner<sup>3</sup> and Rolf W. Steinbrech<sup>3</sup>

<sup>1</sup>Universität Siegen, <sup>2</sup>Technische Universität Darmstadt and <sup>3</sup>FZ Jülich / Germany

#### **Doped Lanthanum Cobaltite Ferrite as a Cathode Support Tube for Lanthanum Gallate Based SOFCs**

Anoop Samant and Nigel M. Sammes

Connecticut Global Fuel Cell Center, University of Connecticut, Storrs, CT / USA

#### **Behavior of a SOFC System for Small Stationary Applications under Full and Partial Load Operation**

Roberto Bove<sup>1,2</sup> and Nigel M. Sammes<sup>2</sup>

<sup>1</sup>on leave from University of Perugia, Perugia / Italy

<sup>2</sup>Connecticut Global Fuel Cell Center, University of Connecticut, Storrs, CT / USA

#### **A Statistical Mechanical Model for Hydrogen Adsorption in Porous Substrates for Use in Solid Oxide Fuel Cell Systems**

Eldred H. Chimowitz

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#### **Characteristics and Power Generation Test Results of Heavy Rare Earth Stabilized Zirconia**

Kazutaka Mori<sup>1</sup>, Akira Ogawa<sup>1</sup>, Koichi Takenobu<sup>2</sup>, Hiroshi Kishizawa<sup>2</sup> and Yoshinori Sakaki<sup>3</sup>

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<sup>2</sup>Mitsubishi Heavy Industries, Ltd., Kobe / Japan, <sup>3</sup>Chubu Electric Power Company, Inc. Nagoya / Japan

#### **Use of Plasma Deposition Technique to Form Nano-Structured YSZ as an SOFC Electrolyte**

Peter R. Strutt<sup>1</sup> and Nigel M. Sammes<sup>2</sup>

<sup>1</sup>Materials Science and Engineering, <sup>2</sup>Mechanical Engineering

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**Effect of Additional CeO<sub>2</sub> on Steam Reforming Performance of Ni/ZrO<sub>2</sub> Fueled by Natural Gas for Application in SOFC**

Navadol Laosiripojana

The Joint Graduate School of Energy and Environment, KMUTT, Bangkok / Thailand

**Improvement of High Temperature Properties of Ferritic Fe-Cr Alloy for SOFC Interconnects**

Toshihiro Uehara<sup>1</sup>, Akihiro Toji<sup>1</sup> and Takehiro Ohno<sup>2</sup>

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**Design of Experiments for Lifetime Modelling of Solid Oxide Fuel Cells**

Markus J. Heneka and Ellen Ivers-Tiffée

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**Parametric Analysis of a Planar SOFC Model with Geometric Optimization**

Paolo Iora and Stefano Campanari

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**Electrochemical FE-Simulations for Optimization of the Sulzer Hexis SOFC**

Pascal Held<sup>1</sup>, Thomas Hocker<sup>1</sup>, Jeanette Frei<sup>2</sup> and Jan Hoffmann<sup>2</sup>

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<sup>2</sup>Sulzer Hexis AG, Winterthur / Switzerland

**Development of SOFC Using Scandia-Doped Tetragonal Zirconia Polycrystalline Electrolyte**

Hirofumi Sumi<sup>1</sup>, Kenji Ukai<sup>1</sup>, Koji Hisada<sup>1</sup>, Yasunobu Mizutani<sup>1</sup> and Osamu Yamamoto<sup>2</sup>

<sup>1</sup>Toho Gas Co., Ltd., Tokai-City, Aichi / Japan

<sup>2</sup>Aichi Institute of Technology, Aichi / Japan

**The Influence of Synthetic Method on the Properties, Morphology and Performance of the Lanthanum Strontium Ferrite SOFC Cathode**

Sergio Fernández-Armas<sup>1</sup>, Lide M. Rodríguez-Martínez<sup>2</sup>, María L. Nó<sup>1</sup>, Teófilo Rojo<sup>1</sup>, Andrés Aguayo<sup>1</sup>, Ander Laresgoiti<sup>2</sup> and María I. Arriortua<sup>1</sup>

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<sup>2</sup>IKERLAN, Miñao / Spain

**Synthesis and Characterisation of Gadolinium Manganites Doped with Transition Metals as Potential Cathode Materials for Solid Oxide Fuel Cells**

María I. Arriortua<sup>1</sup>, Iratxe de Meaza<sup>1</sup>, Jon P. Chapman<sup>1</sup>, José I. Ruiz de Larramendi<sup>1</sup>, Pedro Nuñez<sup>2</sup> and Teófilo Rojo<sup>1</sup>

<sup>1</sup>Universidad del País Vasco, Bilbao / Spain

<sup>2</sup>Universidad de La Laguna, Tenerife / Spain

**Novel Composition Above the Limit of Bi:Zr Solid Solution; Synthesis and Physical Properties of Bi<sub>1.33</sub>Zr<sub>0.67</sub>O<sub>3+δ</sub>**

Teófilo Rojo<sup>1</sup>, Iratxe de Meaza<sup>1</sup>, Jon P. Chapman<sup>1</sup>, Fabrice Mauvy<sup>2</sup>, José I. Ruiz de Larramendi<sup>1</sup> and María I. Arriortua<sup>1</sup>

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<sup>2</sup>ICMCB-CNRS, Pessac / France

### **Reactivity in the Systems LaGaO<sub>3</sub>/Ni and CeO<sub>2</sub>/Ni**

Nuri Solak, Matvei Zinkevich and Fritz Aldinger  
Max-Planck Institut für Metallforschung, Stuttgart / Germany

### **The Potentials of Liquid Ceramics Technology for Film Electrolyte Deposition**

Ata Myatiev, Alexander Pomadchik and Galina Khilchenko  
The Moscow State Institute of Steel and Alloys, Moscow / Russia

### **Electrical Conductivity and Structural Stability of Y<sub>2</sub>O<sub>3</sub>-ZrO<sub>2</sub>-TiO<sub>2</sub>/Ni Cermets for SOFC Anode Electrode**

Panagrotis Nikolopoulos<sup>1</sup>, Xenofon Mantzouris<sup>1</sup>, Dionysios Skarmoutsos<sup>1</sup> and Frank Tietz<sup>2</sup>

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<sup>2</sup>Forschungszentrum Jülich GmbH, Jülich / Germany

### **Preparation and Characterization of Ceria-Based Electrolytes for IT-SOFCs**

Daniela La Rosa<sup>1</sup>, Laura R. Gullo<sup>1</sup>, Antonino S. Aricò<sup>1</sup>, Vincenzo Antonucci<sup>1</sup>, Agusti Sin<sup>2</sup> and Yuri Dubitsky<sup>2</sup>

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### **Development of Metal-Supported SOFC Technology**

Igor Villarreal, Unai Castro, Nagore Lecanda, Lide Rodriguez-Martinez and Ander Laresgoiti  
IKERLAN, Miñao / Spain

### **Effect of Transition Metal Oxide Doping in the Sintering Temperature of Yttria-Stabilized Zirconia**

Nagore Lecanda<sup>1</sup>, Isabel Alava<sup>1</sup>, Igor Villarreal<sup>1</sup>, Sergio Fernández-Armas<sup>2</sup>, Marian L. Nó<sup>2</sup> and Ander Laresgoiti<sup>1</sup>

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### **Thermodynamic Modelling of the La<sub>2</sub>O<sub>3</sub>-Ga<sub>2</sub>O<sub>3</sub>-MgO System**

Sandra Geupel, Matvei Zinkevich and Fritz Aldinger  
Max-Planck-Institut für Metallforschung, Stuttgart / Germany

### **Diagnosis of SOFC-Systems Using Fractional Calculus**

Markus Haschka<sup>1</sup>, Bernd Rüter<sup>1</sup>, Volker Krebs<sup>1</sup>, André Weber<sup>2</sup>, Volker Sonn<sup>2</sup> and Ellen Ivers-Tiffée<sup>2</sup>

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Universität Karlsruhe (TH), Karlsruhe / Germany

### **A Microstructural Study of Doped-LaGaO<sub>3</sub>(La<sub>0,9</sub>Sr<sub>0,1</sub>Ga<sub>0,8</sub>Mg<sub>0,2</sub>O<sub>2,85</sub>) Produced by an Autocombustion from a Gel-Like Precursor**

Karl Traina<sup>1</sup>, Cesar M. Steil<sup>2</sup>, Christophe Bossuot<sup>3</sup>, Jean-Paul Pirard<sup>3</sup>, Andre Rulmont<sup>1</sup> and Rudi Cloots<sup>1</sup>

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### **Synthesis and Functional Properties of La<sub>2</sub>NiO<sub>4</sub> as Cathode Material for ITSOFCs**

Nikolay Velinov, Nadezhda Brashkova and Vladimir Kozhukharov  
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### **Degradation of Zirconia Electrolytes**

Axel C. Müller, André Weber and Ellen Ivers-Tiffée  
Werkstoffe der Elektrotechnik IWE, Universität Karlsruhe, Karlsruhe / Germany

### **Sol-Gel Derived Yttria-Stabilized Zirconia Electrolytes for Solid Oxide Fuel Cells**

Ralf Hansch, Günter Blaß, Norbert H. Menzler and Detlev Stöver  
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### **Reactive Coatings against Chromium Evaporation in Solid Oxide Fuel Cells**

Mohsine Zahid, Frank Tietz and Hans Peter Buchkremer  
IWV-1, Forschungszentrum Jülich, Jülich / Germany

### **An Actualization of the SOFC's Patents Status**

Vladimir Kozhukharov, Mariya Machkova, Mariya Ivanova and Nadezhda Brashkova  
University of Chemical Technology and Metallurgy, Sofia / Bulgaria

### **Experimental Evidences of Hybrid Oxygen and Proton Conduction in Ceria-Based Composite Electrolytes for ITSOFC Applications**

Bin Zhu  
Royal Institute of Technology (KTH), Stockholm / Sweden

### **Elaboration of an Anode for Internal Reforming by Injection of a Suspension in a DC Plasma**

Karine Wittmann-Ténèze and Luc Bianchi  
Commissariat à l'Énergie Atomique (CEA), Monts / France

### **The Influence of Calcine Temperature on the Properties of YSZ Powder**

Wenhui Su<sup>1,2,3</sup>, Zhe Lu<sup>1</sup>, Li Jia<sup>3</sup> and Xiqiang Huang<sup>1</sup>  
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### **Manganese-Chromium-Iron-Oxide in Oxide Scale of Alloy Interconnects**

Natsuko Sakai<sup>1</sup>, Teruhisa Horita<sup>1</sup>, Yue Ping Xiong<sup>1</sup>, Katsuhiko Yamaji<sup>1</sup>, Haruo Kishimoto<sup>1</sup>, Manuel E. Brito<sup>1</sup>, Harumi Yokokawa<sup>1</sup> and Toshio Maruyama<sup>2</sup>  
<sup>1</sup>N.I. of Advanced Industrial Science and Technology (AIST), Tsukuba / Japan  
<sup>2</sup>Tokyo Institute of Technology, Tokyo / Japan

### **Fabrication of a Mixed Molten Carbonate and Solid Oxide Fuel Cell Using a Porous Ceria Matrix**

Suk Woo Nam<sup>1</sup>, Bin Zhu<sup>2</sup>, Jonghee Han<sup>1</sup>, Sung Pil Yoon<sup>1</sup>, Tae-Hoon Lim<sup>1</sup> and Seong-Ahn Hong<sup>1</sup>  
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### **Performance of Anode-Supported Solid Oxide Fuel Cell in Methane-Air Mixtures**

Sung Pil Yoon, Vo Nguyen Xuan Phuong, Suk Woo Nam, Jonghee Han, Tae-Hoon Lim and Seong-Ahn Hong

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### **Processing and Characterization of Electrolytes Based on Doped Lanthanum Gallates for IT-SOFCs**

Mariya Ivanova<sup>1</sup>, Karl Traina<sup>2</sup>, Rudi Cloots<sup>2</sup> and Vladimir Kozhukharov<sup>1</sup>

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### **Utilization of a Scandia-Stabilized Zirconia Electrolyte for Direct Methane SOFCs**

Katsuhiko Yamaji, Yue Ping Xiong, Haruo Kishimoto, Teruhisa Horita,

Natsuko Sakai, Manuel E. Brito and Harumi Yokokawa

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### **Analysis of Reaction Kinetics in SOFC Anodes Operated by Methane**

Daniel Fouquet, Henrik Timmermann, Axel C. Müller and Ellen Ivers-Tiffée

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### **Recent R&D Activity at KIST to Develop SOFC Stack Using 10x10 cm<sup>2</sup> Anode Supported Cells**

Hae-Weon Lee, Hwa Young Jung, Tae-Wook Roh, Joosun Kim and Jong-Ho Lee

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### **Synthesis and Characterization of Ceria-Based Electrolytes Prepared by the Acetylacetonate Sol-Gel Related Method**

Salvador Piñol<sup>1</sup>, Mustapha Najib<sup>1</sup>, David Martínez Bastidas<sup>2</sup> and Xavier Garcia Capdevila<sup>2</sup>

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### **Thermal Cycling of YSZ-Based SOFC's in Unmanned Undersea Vehicle (UUV) Applications**

Alan Burke<sup>1</sup>, Louis G. Carreiro<sup>1</sup>, Eric Greene<sup>2</sup> and Craig M. Deschenes<sup>3</sup>

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### **Single Chamber Solid Oxide Fuel Cells with Integrated Current Collectors**

Brandon E. Buegler, Marco E. Siegrist and Ludwig J. Gauckler

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### **Applicability and Problems for Direct Feeding of Liquid Hydrocarbon Fuels to Ni-ScSZ anode**

Haruo Kishimoto, Teruhisa Horita, Katsuhiko Yamaji, Yueping Xiong, Natsuko Sakai, Manuel E. Brito and Harumi Yokokawa

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**Oxide Scale Formation of Fe-Cr Based Alloys under Current Flow for SOFC Interconnects**

Teruhisa Horita, Yueping Xiong, Katsuhiko Yamaji, Haruo Kishimoto, Natsuko Sakai, Manuel Brito and Harumi Yokokawa

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**Synergies and Differences between Future FC Applications for Transportation**

Wolfgang Winkler

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**Electrochemical Properties of Different Anodes for Solid Oxide Fuel Cells**

Nikolai Trofimenko<sup>1</sup>, Michael Kuznecov<sup>1</sup>, Vladimir Vashook<sup>2</sup> and Peter Otschik<sup>1</sup>

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**Glass Foils as Sealing Elements in SOFC Stacks**

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**3-D Finite Element Analysis of an SOFC-Stack**

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**Determination of Transport Parameters on Thin Cathodes of Planar Anode Substrate Type Solid Oxide Fuel Cells**

Christian Wedershoven, Richard Rommerskirchen, Andreas Gubner and Detlef Stolten  
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**Fabrication and Development of Optimized Plasma sprayed SOFC Layers for Use in the DLR Spray Concept**

Patric Szabo, Michael Lang, Thomas Franco and Günter Schiller

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**Study on Electrolyte of  $Ce_{0.9}RE_{0.1}O_{2-\delta}$  (RE = Pr, Nd, Sm, Gd, Dy)**

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**Electrochemical Characterization of Vacuum Plasma Sprayed SOFC in Different Anode Gases**

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**Properties and Performance of SOFC Cells Produced on a Pre-Pilot Plant Scale**

Anke Hagen, Mohan Menon, Severine Ramousse, Peter Halvor Larsen,

Rasmus Barfod and Peter Vang Hendriksen

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### **Modelling of the Heat-up Process of an SOFC Stack**

Nicola Bundschuh, Michael Bader and Günter Schiller  
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### **Short-Stack Testing of IT-SOFC**

Anders R. Dinesen, Rasmus Barfod, Karsten A. Nielsen and Peter V. Hendriksen  
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### **Characteristics of Ca-Doped LaCrO<sub>3</sub> for Ceramic Interconnect Manufactured by Slurry Dip Coating and Plasma Spray Coating Processes**

Rak-Hyun Song<sup>1</sup>, Gil-Yong Lee<sup>1,2</sup>, Jong-Hee Kim<sup>1,2</sup>, Yong-Gun Seol<sup>2</sup>,  
Dong-Hyun Peck<sup>1</sup>, Doo-Hwan Jung<sup>1</sup> and Dong-Ryul Shin<sup>1</sup>

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### **Contact Resistance between La<sub>0.65</sub>Sr<sub>0.3</sub>MnO<sub>3</sub> and Different Steels Using a Perovskite Intermediate Contact Layer**

Elena Konycheva<sup>1</sup>, Joachim Laatsch<sup>2</sup>, Frank Tietz<sup>3</sup>, Niels Christiansen<sup>3</sup>,  
Lorenz Singheiser<sup>1</sup> and Klaus Hilpert<sup>1</sup>

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### **Rolling Tape-Casting Technological Development of High-Performance ITSOFCs Based on Functional Ceria-Salt Composite Materials**

Alagiah Sampathrajan<sup>1</sup>, Anil Kumar Dubey<sup>2</sup>, Nassos Stylos<sup>3</sup>, Yohannes Kiros<sup>3</sup>  
and Bin Zhu<sup>3,4,5</sup>

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### **Study on Ceria-Salt Composite Electrolytes**

Lizhai Yang, Ranran Peng, Jianbing Huang and Zongqiang Mao  
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### **Modelling the Dynamic Behaviour of a Planar SOFC CHP System**

Matthias Finkenrath, Ahmet Lokurlu, Ludger Blum and Detlef Stolten  
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### **Micro Solid Oxide Fuel Cell**

Partho Sarkar and Hongsang Rho  
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### **High-Temperature Invar Alloys Destined to Match with Ceramics of High-Temperature Fuel Cells**

Aleksandr Gorelov<sup>1</sup>, Sergey Mishanin<sup>1</sup>, Irina Korms<sup>2</sup>, Boris Mogutnov<sup>2</sup>  
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**Development of the Ti – V and Ti – Nb Alloys for Current Collector of Planar SOFC**

Vladimir Malinov<sup>1</sup>, Sergey Mishanin<sup>1</sup>, Irina Korms<sup>2</sup>, Boris Mogutnov<sup>2</sup>  
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**Analysis of Ultra Thin Layers of SOFC Electrolyte by Impedance Spectroscopy**

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