FINAL ANNOUNCEMENT
20 – 23 October
KKL Lucerne, Switzerland

24th conference in series of the European Fuel Cell Forum in Lucerne
14th EUROPEAN SOFC & SOE FORUM

Chaired by
Prof. Anke Hågen
Prof. Peter Vang Hendriksen
DTU Technical University of Denmark

Fuel Cells, Electrolysers & Membrane Reactors
CO₂ Emission Reduction & Reuse

Register with no Risk in case of no show due to Covid restrictions
Reimbursement of the Fees at www.EFCF.com

Swiss Official Carrier
<table>
<thead>
<tr>
<th>Day</th>
<th>Time</th>
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<tr>
<td><strong>Monday, 19 October 2020</strong></td>
<td></td>
<td><strong>Registration for Grid Service Markets symposium</strong></td>
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<td></td>
<td>09:00 – 09:30</td>
<td><strong>Conference Sessions 1 – 6, keynote, invited talks;</strong></td>
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<td>presentations on projects &amp; activities in various countries, status of industry &amp; major groups; technical highlights; networking &amp; exhibition</td>
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<td>09:30 – 17:50</td>
<td><strong>GSM Network Dinner</strong></td>
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<tr>
<td><strong>Tuesday, 20 October 2020</strong></td>
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<td><strong>Registration for Tutorials – 2nd floor Club Rooms above Auditorium</strong></td>
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<td></td>
<td>08:30 – 09:00</td>
<td><strong>FCH: Fuel Cells &amp; Hydrogen Tutorial</strong> Dr. G. G. Scherer &amp; Dr. J. Van herle</td>
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<td></td>
<td>10:00 – 17:00</td>
<td><strong>EIS: Electrochemical Impedance Spectroscopy Tutorial</strong> Dr. André Weber &amp; Dr. Dino Klotz</td>
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<td><strong>Wednesday, 21 October 2020</strong></td>
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<td><strong>On-site Registration, Speakers Breakfast until 09:00, info at main desk</strong></td>
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<td>08:00 – 16:00</td>
<td><strong>Conference Sessions 7–13, keynote, invited talks,</strong></td>
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<td>networking &amp; exhibition</td>
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<td>09:00 – 18:00</td>
<td><strong>Exhibition &amp; Poster area open</strong></td>
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<td>13:15 – 15:00</td>
<td><strong>Poster Session I</strong></td>
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<td>18:30 – 23:00</td>
<td><strong>Swiss Surprise Night</strong> – separate registration, 80 places available</td>
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<td><strong>Thursday, 22 October 2020</strong></td>
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<td><strong>On-site Registration, Speakers Breakfast until 09:00, info at main desk</strong></td>
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<td>08:00 – 16:00</td>
<td><strong>Conference Sessions 14 – 17, keynote, invited talks,</strong></td>
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<td>individual poster presentation, exhibition &amp; networking</td>
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<td></td>
<td>09:00 – 16:15</td>
<td><strong>Exhibition &amp; Poster area open</strong></td>
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<td>15:00 – 16:15</td>
<td><strong>Closing &amp; Award Ceremony:</strong> Best poster, best scientific contribution &amp; outstanding lifetime work; <strong>Keynote by the EFCF Gold Medal of Honour Winner</strong></td>
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<td><strong>Friday, 23 October 2020</strong></td>
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<td><strong>On-site Registration, Speakers Breakfast until 09:00, info at main desk</strong></td>
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<td>08:00 – 10:00</td>
<td><strong>Exhibition &amp; Poster area open</strong></td>
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<td>15:00 – 16:15</td>
<td><strong>Goodbye coffee and travel refreshment in front of the Luzerner Saal</strong></td>
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The European Fuel Cell Forum EFCF

The sole purpose of the European Fuel Cell Forum is the promotion of fuel cell and hydrogen technologies through the EFCF conference, the Green Salon & Rondo event, literature and media. It is a high-level exchange platform, providing scientific sessions and tutorials, an exhibition, as well as international project meeting support and recreational networking events in the charming and inspirational area of Lucerne, the heart of Switzerland.

Every summer the European Fuel Cell Forum invitations more than 10'000 stakeholders to participate in this internationally recognised event on the shores of the picturesque Lake Lucerne. More than 300 contributions and posters will be presented in 28 sessions over the course of 3.5 intensive and stimulating days. The high level scientific content is complemented with plenary & keynote presentations on country overviews, grid services based on fuel cells and electrolyzers, status of leading industry & major groups, and an overview on proton conducting ceramics. Two extended poster sessions recognise the excellence of the poster contributions that are also accessible throughout the entire conference. Closing with the award ceremony, the audience will be privileged to hear a keynote from the winner of the 2020 Gold Medal of Honour. Awarded is Prof. Ludger Blum from the Forschungszentrum Jülich in Germany for his outstanding contribution to the advancement of SOC systems. Based on the convincing number and quality of submissions, more than 500 participants from 35–40 countries are expected at this year’s conference.

The EFCF has a heritage of more than 20 years! As far back as 1994 the 1st EUROPEAN SOFC FORUM attracted leading international speakers as well as a global audience. Since then, a high-quality conference series has been established. The conference topics alternate annually. On even years the conference concentrates on “Solid Oxide Cells” (SOC): Fuel Cells, Electrolyzers and Membrane Reactors. On odd years, the conference concentrates on “Direct Alcohol and Hydrogen Fuel Cells” as well as “Hydrogen Processing: Production, Storage and Infrastructure”. The 14th EUROPEAN SOFC & SOE FORUM 2020 is expected to be again world’s largest dedicated SOC event.

Over the years, many strong relationships and contacts have been established at these events. This is thanks to a caretaking organisation with dedicated advisors and conference chairs, who keep a watchful eye on scientific quality. Unlike many commercial conferences, this event is organised by fuel cell technicians and scientists. Active members of the European fuel cell and hydrogen community, they consider the recommendations of the EFCF International Board of Advisors and observe and anticipate the trends of the sector. The conference organisers ensure that the stakeholder’s needs are always the focus of the European Fuel Cell Forum.

We are dedicated to continuously grow the European Fuel Cell Forum as one of the most prominent meeting places for the comprehensive exchange of scientific and technical information and for high-level networking. This creates an environment that enables scientific breakthroughs and their subsequent transfer into industry.

A very special thank you for this year’s conference goes to Prof. Dr. Anke Hagen and Prof. Dr. Peter Vang Hendriksen from the Technical University of Denmark DTU. Both present a very strong scientific experience and cooperate closely with industrial partners on fundamental aspects of understanding. In this way, they reflect well the ambition of the EFCF: Building a bridge from science to technology – from technology to products! Together we are proud to offer a sound scientific programme, unforgettable side events and invite you to the pleasant surroundings of Lucerne. Finally, we would like to thank all the authors, exhibitors and suppliers for their excellent contributions, the Scientific Advisory and Organising Committees for their review work, and our staff members for fastidiously taking care of all the organizational details. Together with the numerous participants and exhibitors, the stage has been set for an exuberant 14th EUROPEAN SOFC & SOE FORUM 2020.

Thank you and we look forward to seeing you in Lucerne in July.
Olivier Bucheli & Michael Spirig
European Fuel Cell Forum – www.EFCF.com
The 2020 EFCF theme is Solid Oxide Technologies broadly; including Fuel Cells, Electrolysers & Membrane Reactors and puts in focus concepts for CO₂ Emission Reduction & Reuse.

The Paris Agreement from 2015 formulates ambitious emission reduction targets to mitigate the adverse climate effects of anthropogenic CO₂ emissions. More and more countries have formulated policies in line with this agreement; Europe aims to be “climate neutral” by 2050 and launched the European Climate law to transform this political promise into law. Realising this transition to a climate neutral society over the next 30 years represents a tremendous societal challenge and calls for improved energy conversion technologies, huge energy infrastructure investments, development of large scale energy storage and complete re-shaping of the transport sectors, including road-transport, shipping as well as aviation.

Solid oxide fuel cells and perhaps even more so solid oxide electrolysis technologies have the potential to play a key role in this transition, due to high efficiencies and fuel flexibilities. Now is the window of opportunity. However, improvements in terms of overall economic competitiveness and lifetime are still called for as well as an up-scale in module size and manufacturing capacity.

Hence, contributions from academia on basic understanding of performance and lifetime limiting processes are still in high demand as are identification of improved materials and manufacturing routes enabling fabrication of desired microstructures and components. Design and process optimisation by advanced modelling approaches and clever engineering to improve products, their reliability, and performance remain important challenges for the industrial as well as academic stakeholders in this field.

We are glad to chair the 14th European SOFC & SOE Forum and appreciate the worldwide contributions by the research groups from academia and research institutions and from industries as well to this event. The Forum will present a comprehensive overview of the current state of the art in solid oxide technology, covering both fuel cells and electrolyzers. This year a special emphasis is put on solid oxide technology based on proton conducting ceramics and use of CO₂. The technical program spans from basic science at the materials- and cell level right up to stacks, products and industrial achievements.

The Scientific Advisory Committee has provided a serious and unbiased evaluation of all contributions leading to a high quality of the technical program. All papers presented as lectures or posters will be collated in the electronic proceedings which will be distributed to all participants and later to libraries, research institutions and universities.

The European SOFC & SOE Forum has always provided an excellent opportunity to present the worldwide recent technical progress, establish new contacts, and to exchange technical, industrial and business information. The covid-19 pandemic has forced us to postpone the conference. We are looking forward to fulfilling the expectations for a constructive and productive atmosphere with intense discussions and hope to meet you in Lucerne in October 20-23 for a great EFCF 2020.

Anke Hagen and Peter Vang Hendriksen
DTU Energy, Technical University of Denmark

Conference language is English
Prof. Dr. Dr. Anke Hagen is professor at the Department of Energy Conversion and Storage at the Technical University of Denmark. She holds a Dr. rer. nat. degree in the field of heterogeneous catalysis from the University of Leipzig 1994 and a Dr. techn. degree in the field of solid oxide fuel cells from the Technical University of Denmark 2018. Anke held research positions at the University of Leipzig, Germany, Yale University, USA, University of Oldenburg, Germany, and Technical University of Denmark. Her research focused on heterogeneous catalysis, before she joined the research staff at the former Risø National Laboratory to work on electrochemistry and solid oxide cells in 2003, since 2007 part of the Technical University of Denmark. Her current research interests include electrochemistry and catalysis, diagnostics and lifetime.

In her current position, she is responsible for the coordination of the solid oxide fuel cell program at DTU Energy. She has actively engaged in the Hydrogen Europe partnership and in the International Energy Agency Annex 32: Solid Oxide Fuel Cells. Anke is author/co-author of 97 publications in reviewed scientific journals (155 in total), several book chapters and two patents. She has been project manager of a number of national (German and Danish) and international projects (mainly European projects in the area of SOFC and SOE).

Prof. Peter Vang Hendriksen heads the section „Solid State Chemistry“ at the Department of Energy Conversion and Storage at the Technical University of Denmark (DTU) which currently counts ca. 20 employees. Peter did his Ph.D. at the Laboratory of Technical Physics, DTU, from where he graduated in 1993 with a dissertation on magnetic properties of nanoparticles. Immediately after, he joined the research group at the former Riso National Laboratory in Denmark working on development of solid oxide fuel cells. Initially he worked on modelling of stacks but soon got involved in materials development and testing activities. He became a member of the management team in 2003.

Peter has led numerous projects on materials and component development both in the area of SOFC and SOEC, and has served as work package leader/coordinator in European projects in the related area of oxygen transport membranes.

His current research involves synthesis and characterization of functional oxides (charge transport and catalytic properties), high temperature corrosion, mechanical and fracture mechanical issues in functional ceramics and various aspects of SOEC development. He is the author/co-author of more than 140 papers in reviewed scientific journals, 75 conference papers, 18 patents and several book chapters.
FCH Tutorial: Excellent Kick-Start to EFCF 2020

The Tutorial will provide the basic concepts required to address the general but also more specialised field of fuel cells. Fuel cell technology is interdisciplinary par excellence, and requires knowledge in electrochemistry, materials science, mechanical and electrical engineering, catalysis, corrosion, thermal management, systems engineering etc. The course will cover these different aspects as broadly as possible, illustrated by many examples. All fuel cell families will be addressed i.e. Hydrogen Fuel Cells (H₂FC) and High Temperature Fuel Cells (HTFC) as well as Hydrogen Production, Storage and Infrastructure (H₂PSI). Applications and examples will be mostly surrounding the two most popular fuel cell types, PEFC (G. G. Scherer = GGS) and SOFC (J. Van herle = JVh), this is due to the expertise of both lecturers in their respective specialties.

The Tutorial will be targeted to newcomers as well as those who have been working in the area of fuel cells for some time. Participants will gain, or revise, current understanding of the operation and key challenges of fuel cell technology, where considerable progress in recent years has been achieved and new insights gathered. The requirements for fuel cell market introduction will be discussed.

The Tutorial lecture topics are fuel cell operating principles, thermodynamics, kinetics, efficiencies, central notions such as electrolyte ionic conductivity, electrode overpotential, triple phase boundary, Nernst equation, fuel reforming, cell and stack architectures and design, fuels (both fossil and renewable) for different fuel cells including their treatment, all fuel cell families (SOFC, MCFC, PAFC, PEFC/DMFC, AFC).

Tutorial Schedule:
09:30 Registration, welcome refreshments
10:00 Lecture 1: Fundamentals of Electrochemical Energy Conversion (GGS)
10:45 Lecture 2: Characteristics of the Important Fuel Cell Technologies (GGS)
11:30 Coffee break
11:45 Lecture 3: Fuels for fuel cells, fuel processing (JVh)
12:30 Lunch break
14:00 Lecture 4: Applications of Polymer Electrolyte Fuel Cells PEFC (GGS)
14:45 Lecture 5: System aspects, applications of High Temperature Fuel Cells SOFC,…(JVh)
15:30 Coffee break
15:45 Lecture 6: State-of-the-art, challenges, summary (JVh)
17:00 End of Tutorial, Possibility to visit the exhibition

The Tutorial language is English. Register online at - www.EFCF.com/TutReg

Each participant will receive a copy of all of the Tutorial lectures. The tutorial registration fee for all participants is CHF 500.–.
Electrochemical Impedance Spectroscopy (EIS) has become an important tool in Solid State Ionics for studying mass and charge transport in electrochemical systems. It is not only of importance for fundamental research, but also for characterizing batteries, fuel cells, sensors, etc. The EIS Tutorial is focused on medium to experienced level users, who are already familiar with the principles of the SOCs (Solid Oxide Cells).

The EIS Tutorial will support you with new findings and relevant experiences. During the EIS Tutorial you will receive answers to questions before you have to ask them, as well as the chance to ask questions you may not dare to voice in front of a general audience. You will come into contact with the specialists and other experienced users. You enlarge your exchange and discussion network within the EIS community. Opportunity for discussion and exchange are provided, especially during the the 'EIS challenge'.

The EIS Tutorial is an excellent extension of your current know-how. It contains 5 lectures and an 'EIS challenge': The lectures will range from the basic principles, that makes EIS one of the most powerful analysing instruments available today, to more advanced applications of EIS, to very sophisticated cases and many practical experiences. Many results will be presented, and the right interpretation discussed. The lectures are followed by an 'EIS challenge', where all kinds of impedance questions, problems, and latest experiences can be discussed and exchanged with other participants.

**Tutorial Schedule:**

09:30  Registration, welcome refreshments  
10:00  Lecture 1: Fundamentals of Electrochemical Impedance Spectroscopy  
10:45  Lecture 2: Applications I - Analysis of SOC - Materials and (Model-) Electrodes  
11:30  Coffee break  
11:45  Lecture 3: Applications II - Analysis of SOC - Single Cells and Stacks  
12:30  Lunch break  
14:00  Lecture 4: Evaluation of Impedance Spectra - Kramers-Kronig Test, DRT-Analysis & CNLS Fit  
14:45  Lecture 5: Impedance Modelling and Simulation  
15:30  Coffee break  
15:45  Lecture 6: „EIS challenge“ - Summary  
17:00  End of EIS Tutorial, opportunity to visit the exhibition

The Tutorial language is English. Register online at - www.EFCF.com/Reg

Each participant will receive a copy of all the Tutorial lectures. The EIS tutorial registration fees are as follows: CHF 500.–, for EFCF & GSM 2020 participants CHF 350.–.
The 14th European SOFC & SOE Forum 2020 will be held from 20 – 23 October in the renowned Kultur- und Kongresszentrum Luzern (KKL) in Lucerne, Switzerland. The parallel lectures will be presented in the „Luzerner Saal“ and the „Auditorium“, while all posters will be permanently exhibited in the „Auditorium Foyer“. The KKL is located next to the Railway Station on the shore of Lake Lucerne. Boat traffic, waterfront activities, as well as spectacular views of the old town and snow-capped mountains add to the charm of the venue. View Video on www.EFCF.com/Lucerne.

The EFCF 2020 is the 14th European SOFC & SOE Forum and will focus on Solid Oxide Technologies: Fuel Cells (SOFC), Electrolysers (SOE) & Membrane Reactors (SOMR) and concepts for CO2 Emission Reduction & Reuse. The forum will be the world’s largest dedicated event, allowing industry and major groups an unparalleled opportunity to present their status and outlook. The technical program will range from fundamental science and new materials, through cell, stack, and system design, performance and BoP, to the latest results on commercial deployment. The topics also cover manufacturing, lifetime, characterisation, modelling and optimization. Also product and novel concepts, SOC integration and P2X as well as CO2 capture and chemical processing applications are addressed. In the plenary sessions overviews of the progresses in the EU, US, Japan and China are given. Representatives of the leading industry players and the major groups will present and summarise their current technology status. Keynote presentations are given on energy systems, grid flexibility and business models as well as latest findings for proton conducting SOCs. The surprise presentation from the this years Gold Medal of Honour winner, Prof. Ludger Blum from FZJ, will be the final high light of EFCF 2020.

Including the GSM 2020 (Grid Service Market symposium on Monday and Tuesday, featuring grid flexibility and business, see next page) and the two tutorials, a highly attractive five-day program results. It offers product presentations, scientific lectures, demonstrations, posters, exhibits... a lot of knowhow and contacts. EFCF alone provides about 300 scientific contributions i.e. 120 oral presentations in 26 sessions and up to 180 posters in two large dedicated poster sessions, with extended time for technical discussions and fruitful exchange. The posters are permanently accessible throughout the entire event. All events are held in the same building.

Registration covers unrestricted admission to both conference and exhibition. European global developers present innovative high temperature fuel cell and electrolysis solutions, as well as materials, development equipment, fuel cell components and supplies. The technical programme is designed to inform representatives from industry, trade, finance, utilities and users as well as planners, engineers, technology brokers and members of the scientific research community. Product and application information are available from the exhibitors. The EFCF 2020, the 14th European SOFC & SOE Forum will be the major international event on these subjects this year.
The Electricity Market is changing, opening opportunities for more flexibility in generation, storage and consumption. The integration of a large amount of new renewable energy sources poses great challenges for the European electricity grids & markets. Network reinforcement, market harmonisation and integration are both solutions and challenges for the various players in the electricity industry.

The GSM 2020 is the 4th Symposium. It will outline recent developments in European grid service markets, highlight advancements and challenges in international cooperation, and discuss technological progress. In addition, it will report on experiences and success stories, supporting a rating of the performance and future potential of new technologies.

The two-day symposium will feature sessions with invited and contributed talks and posters. The International Advisory Board (IAB) ensures that all presentations are of high quality. The technical program will include: Development in GSM, international collaboration, enabling & advanced technologies to grid service operation, and impacts of trends to real world case studies. In the field of Virtual Power Plant (VPP), special panels with high level keynotes and deepening discussions are planned in collaboration with the FCH JU project www.PACE-energy.eu.

The GSM 2020 symposium is chaired by Prof. Dr. Christoph Imboden from HSLU, Switzerland. It takes place at the Culture & Convention Centre Lucerne (KKL) before and in conjunction with EFCF 2020. For EFCF 2020 participants it is possible to join the GSM 2020 sessions for a reduced fee. Book on-line on www.EFCF.com/Registration.

You like to add a poster contribution? Download the template and inform info@GridServiceMarket.com
Exhibition  www.EFCF.com/ExReg

EFCF 2020 offers you a top chance to catch up on some exhibition opportunities, and share your products directly with potential new clients - possibly for the first time this year. The technical exhibition will be held in the splendid Foyer of the Lucerne Hall. This event offers industry, suppliers, test equipment providers and research laboratories the opportunity to showcase their latest products and services, as well as allowing important face-to-face contact with potential new clients.

Exhibitors from all over the world are invited to participate.

In addition to fuel cell, electrolyser and hydrogen technology developers showing systems, related hardware and applications, suppliers can present new materials, stack and system components, control devices, production technology, qualification and test benches and diagnostic tools alongside research and development services.

For further information please contact the European Fuel Cell Forum or visit www.EFCF.com/Exhibition. The details of confirmed exhibitors are listed in the rear of this booklet.

International Project Meetings  www.EFCF.com/FPM

As many international experts participate in the European Fuel Cell Forum, Monday and Tuesday of the conference week offer an ideal opportunity for international project meetings. Please feel free to use this time to schedule your meetings for your ongoing projects, setting-up of new projects, or for other topic related events such as the GSM symposium on „European Grid Service Markets“ related to FCH JU projects QualyGridS & PACE.

To simplify project initiators’ and organizers’ life, the organisation of such events for registered participants and exhibitors are supported by our organization. Get more information at www.EFCF.com/FPM or send an e-mail to forum@efcf.com

Scientific Organizing Committee  www.EFCF.com/SOC

from DTU Technical University of Denmark

Peter Blennow
Anne Hauch
Ming Chen
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Christopher R. Graves
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Xiufu Sun

Scientific Advisory Committee of EFCF 2020  www.EFCF.com/SAC

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Prof. Dr. Peter Vang Hendriksen (Chair), DTU, DK
Prof. Eric Wachsman, University of Maryland, USA
Dr. André Weber, Karlsruhe Institute of Technology, DE

Presentation available with approved participant login www.EFCF.com/Presentations

At the EFCF conferences, participants are not permitted to take pictures of the presentations (literary property). This allows presenters to show their latest results, which are, for example, intended for publication in a scientific paper at a later date. However, presenters usually indicate their willingness to share their presented and eventually copyedited slides to the conference registrants. Upon receiving the authors permission, presentations of the current and previous years will be made available in the online library www.EFCF.com/PRESENTATIONS for all registered participants of the European Fuel Cell Forum with an approved login. To obtain download rights after the conference, post-registration is possible by „filing Contact Data” on the www.EFCF.com/Lib on-line form.
Who should attend?

The conference with exhibition offers an attractive programme for potential users of fuel cells, decision makers, researchers and engineers in industry, laboratories, academic institutions, governments, investors, consultants and electric power engineers. The event provides many opportunities for informal exchanges between industry, market and academia, a platform for technology transfer and recruitment of qualified students and trainees. The European Fuel Cell Forum combines the personal atmosphere of a workshop with the format of a scientific conference. This is the time and the place where decision makers meet politicians, inventors meet investors, engineers meet scientists, power & transport industry meet OEMs and users meet providers. Participants from all continents are invited and welcome to attend this prestigious event.

International Board of Advisors

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Prof. Constantinos Vayenas, University of Patras, Greece
Prof. Wei Guo Wang NIMTE, PR China
Prof. Jianbo Zhang, Tsinghua University, China
Assoc. Prof. Zhichuan Jason Xu, NTU, Singapore
# Session Program

**14th European SOFC & SOE Forum**

**GSM 2020, 19-20 October**

**KKL, 20-23 October**

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<tr>
<td><strong>Mo 09:00 - Tu 18:00</strong></td>
<td>Extra Event: Grid Service Market Symposium</td>
<td>G Auditorium</td>
<td>12</td>
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<tr>
<td><strong>Th 09:00</strong></td>
<td>Keynote Grid Flexibility - Business Models</td>
<td>Auditorium Foyer</td>
<td>12</td>
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<tr>
<td>09:30</td>
<td>Keynote by FCH JU - EU Programs, US, Japan, China</td>
<td>Auditorium Foyer</td>
<td>12</td>
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<tr>
<td>11:15</td>
<td>Technology status at industry &amp; major groups I</td>
<td>Auditorium Foyer</td>
<td>12</td>
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<tr>
<td>13:15</td>
<td>Poster Session I covering All Session Topics</td>
<td>Auditorium Foyer</td>
<td>12</td>
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<tr>
<td>15:00</td>
<td>Technology status at industry &amp; major groups II</td>
<td>Auditorium Foyer</td>
<td>12</td>
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<td>16:30</td>
<td>Products &amp; demonstrations</td>
<td>Auditorium Foyer</td>
<td>12</td>
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<td><strong>Fr 09:00</strong></td>
<td>Proton Conducting Cells, Stacks &amp; materials</td>
<td>Auditorium Foyer</td>
<td>12</td>
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<tr>
<td>11:00</td>
<td>SOC integration, Power-to-X, CO2 capture etc.</td>
<td>Auditorium Foyer</td>
<td>12</td>
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<tr>
<td>13:30</td>
<td>System design, performance &amp; BoP</td>
<td>Auditorium Foyer</td>
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<tr>
<td>15:05</td>
<td>Closing Ceremony, Keynote by the EFCF 2020 Gold Medal of Honour Winner</td>
<td>Auditorium Foyer</td>
<td>12</td>
</tr>
</tbody>
</table>
09:00 A01: P1: Opening Session
S-Chairs: Anke Hagen, Peter Vang Hendriksen, M. Spirig, O. Bucheli

09:00 Welcome by the Organizers (A0101)
Olivier Bucheli, Michael Spirig; European Fuel Cell Forum, Luzern/Switzerland

09:05 Welcome by the Chairs (A0102)
Anke Hagen, Peter Vang Hendriksen; Technical University of Denmark, Lyngby/Denmark

09:15 Welcome to Switzerland (A0103)
Stefan Oberholzer, Rolf Schmitz, Benoît Revaz; Swiss Federal Office of Energy, Bern/Switzerland

09:30 A02: P2: Keynotes by FCH JU - EU Programs, US, Japan, China
S-Chairs: Anke Hagen, Peter Vang Hendriksen

09:30 The Status of SOFC and SOEC R&D in the European Fuel Cell and Hydrogen Joint Undertaking Programme (A0201)
A. Aguilo-Rullan, M. Atanasiu, B. Biebuyck, D. Dirmikis, N. Lymperopoulos, D. Tsimis
FCH JU - Fuel Cells and Hydrogen Joint Undertaking, Brussels/Belgium

09:50 High Temperature Electrolysis for Hydrogen Production: US Research Highlights (A0202)
Olga Marina
Pacific Northwest National Laboratory, Richland/USA

10:10 Current status of NEDO project on durability and reliability of SOFC cell-stacks (A0203)
Teruhisa Horita
National Inst. of Advanced Industrial Science and Technology (AIST), Ibaraki/Japan

10:30 Solid Oxide Cells Development in China (A0204)
Minfang Han
(1) State Key Lab. of Power Systems, Dept. of Energy and Power Engineering, Tsinghua University, Beijing/P.R. China,
(2) Beijing Key Lab. of CO2 Utilization and Reduction Technology, Dept. of Energy and Power Engineering, Tsinghua University, Beijing/P.R. China

10:50 Break - Ground Floor in the Exhibition
<table>
<thead>
<tr>
<th>Time</th>
<th>Session A03: Technology status at industry and major groups I</th>
<th>Session B03: Manufacturing Processes</th>
</tr>
</thead>
<tbody>
<tr>
<td>11:15</td>
<td>Status of Stack &amp; System Development at Sunfire (A0301)</td>
<td>Electrosyn electrodes for IT-SOFC applications: state of the art and perspective (B0301)</td>
</tr>
<tr>
<td></td>
<td>Christian Walter, Robert Blumentritt, Oliver Fosdziech, Matthias Boltze</td>
<td>Paola Costamagna (1), Caterina Sanna (1), Wenjing Zhang (2), Peter Hoftappels (2)</td>
</tr>
<tr>
<td></td>
<td>Sunfire GmbH, Dresden/Germany</td>
<td>(1) Dept. of Chemistry and Industrial Chemistry, Uni of Genoa, Genoa/Italy,</td>
</tr>
<tr>
<td>11:30</td>
<td>Commercialization of the SteelCell® technology: Latest Update (A0302)</td>
<td>(2) Technical Uni of Denmark, Lyngby/Denmark</td>
</tr>
<tr>
<td></td>
<td>Robert Leah, Adam Bone, Ahmet Selcuk, Mike Larkin, Mahfuur Rahman, Andy Clare, Gavin Reade, Florence Felix, Jeffrey De Vero, Xin Wang, Subhasish Mukerjee, Mark Selby</td>
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<td>Ceres Power Ltd., Horsham/UK</td>
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<tr>
<td>11:45</td>
<td>Status of HEXIS’ SOFC Module Development (A0303)</td>
<td>A novel SOFC stack design for the uniformity of internal thermodynamic properties (B0302)</td>
</tr>
<tr>
<td></td>
<td>Andreas Mai, Jan Grolig, Venkatesh Sarda, Michael Dold, Bernhard Schindler, Alexander Schuler</td>
<td>Jongsup Hong (1), Wooseok Lee (1), Ji-Young Kim (1), Yonggyun Bae (1), Sanghyeok Lee (2), Dong-Hwan Kim (2)</td>
</tr>
<tr>
<td></td>
<td>Hexis AG, Winterthur/Switzerland</td>
<td>(1) School of Mechanical Engineering, Yonsei University, Seoul/South Korea,</td>
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<td></td>
<td>(2) Center for Energy Materials Research, Korea Inst. of Science and Technology, Seoul/South Korea</td>
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<tr>
<td>12:00</td>
<td>Progress of SOE development at Elcogen (A0304)</td>
<td>Reducing chromium removal from SOFC interconnects and BoP</td>
</tr>
<tr>
<td></td>
<td>Matti Noponen (1), Pauli Torri (1), Jukka Göös (1), Jouni Puranen (1), Jyrki Niinistö (1), Sergii Pylypko (2), Marek Roostar (2), Enn Öunpuu (2)</td>
<td>Results from the EU projects MMLCR-SOFC, SCORED 2:0, and HEATSTACK (B0303)</td>
</tr>
<tr>
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<td>(1) Elcogen, Vantaat/Finland,</td>
<td>Robert Steinberger-Wilckens; Centre for Fuel Cell &amp; Hydrogen Research, School of Chemical</td>
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<tr>
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<td>(2) Elcogen, Tallinn/Estonia</td>
<td>Engineering, Uni of Birmingham, Birmingham/UK</td>
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<td>Anode supported solid oxide fuel cells designated for operating below 750°C</td>
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<td>prepared using large-scale capable production methods (B0304)</td>
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<td>Ryszard Kluczowski (1), Michał Wierzbicki (2), Yevgenyi Naumovich (2), Agnieszka Żurawska (2),</td>
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<td>Stanisław Jagielski (2), Michał Kawalec (1), Mariusz Krauz (1)</td>
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<td>(1) Inst. of Power Engineering Ceramic Dept. CEREL, Techniczna 1 St., Boguchwała/Poland,</td>
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<td></td>
<td></td>
<td>(2) Inst. of Power Engineering, Dept. of High Temperature Electrochemical Processes, Warsaw/Poland</td>
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<tr>
<td>12:15</td>
<td>Power-to-X activities at Haldor Topsoe:</td>
<td>Manufacturing ScCeSZ/GDC Electrolyte Composite Layers</td>
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<td>Our approach for electrification of the chemicals industry (A0305)</td>
<td>for IT-SOFC by Reverse Aqueous Tape Casting (B0305)</td>
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<td>Rainer Küngas, Peter Blennow, Thomas Heiredal-Clausen, Tobias Holt Morby, Jeppe Rass-Hansen, John</td>
<td>Abigail Snowdon, Zeyu Jiang, Robert Steinberger-Wilckens</td>
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<td></td>
<td>Buglidi Hansen, Poul Georg Moses</td>
<td>Centre for Fuel Cell &amp; Hydrogen Research, School of Chemical Engineering, Uni of Birmingham,</td>
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<td></td>
<td>Haldor Topsoe A/S, Lyngby/Denmark</td>
<td>Birmingham/UK</td>
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</table>

12:30 Lunch - 2nd Floor on the Terrace / Coffee - Ground Floor in the Exhibition & in the Poster Session
<table>
<thead>
<tr>
<th>Time</th>
<th>Session Title</th>
<th>Chairs</th>
<th>Authors</th>
<th>Institutions</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>15:00</td>
<td><strong>A05: Technology status at industry and major groups II</strong></td>
<td>Andreas Mai, Jari Kiviaho</td>
<td>Ludger Blum (1), Qingping Fang (1), L.G.J. (Bert) de Haart (1), Jürgen Malzbender (1), Nikolaos Margaritis (2), Norbert H. Menzler (1), Roland Peters (1) Forschungszentrum Jülich GmbH: (1) Inst. of Energy and Climate Research, Jülich/Germany, (2) Central Inst. of Engineering, Electronics and Analytics, Jülich/Germany</td>
<td>Forschungszentrum Jülich GmbH: (1) Inst. of Energy and Climate Research, Jülich/Germany, (2) Central Inst. of Engineering, Electronics and Analytics, Jülich/Germany</td>
<td>Luzerner Saal</td>
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<tr>
<td>15:15</td>
<td><strong>Commercialization of Solid Oxide Fuel Cell Technology at SOFCMAN (A0502)</strong></td>
<td>Peter Holtappels (1)</td>
<td>Daniel Bøgh Drasbæk (1), Nazan Muzaffar (1,2), Nasima Arshad (2), Bhaskar Reddy Sudireddy (1), Marie Lund Traulsen (1), Peter Holtappels (1) Technical Uni of Denmark, Dept. of Energy Conversion and Storage, Lyngby/Denmark, (2) Dept. of Chemistry, Allama Iqbal Open University, Islamabad/Pakistan</td>
<td>Technical Uni of Denmark, Dept. of Energy Conversion and Storage, Lyngby/Denmark, (2) Dept. of Chemistry, Allama Iqbal Open University, Islamabad/Pakistan</td>
<td>Luzerner Saal</td>
</tr>
<tr>
<td>15:45</td>
<td><strong>Solid Oxide Cell Technology for Space Applications (A0504)</strong></td>
<td>Brandon Buergler</td>
<td>Haris Ansari, Adam Bass, Scott Paulson, Viola Binns Dept. of Chemistry, Uni of Calgary, 2500 Uni Drive NW, Calgary/Canada</td>
<td>Dept. of Chemistry, Uni of Calgary, 2500 Uni Drive NW, Calgary/Canada</td>
<td>Luzerner Saal</td>
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<tr>
<td>16:00</td>
<td><strong>Break - Ground Floor in the Exhibition &amp; in the Poster Session</strong></td>
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<td>Auditorium - Afternoon</td>
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<tr>
<td>Time</td>
<td>Session</td>
<td>Title</td>
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<td>16:30</td>
<td>A06: Products and demonstrations</td>
<td>Demonstration of 200kW SOFC power generation using cleaned bio-methane gas from waste water treatment (A0601)</td>
<td>Kimito Kawamura (1,2), Kenichiro Takeda (1), Toshihiro Oshima (2), Tsutomu Kawabata (2), Shunsuke Taniguchi (2), Tomomasa Kanda (1), Kazunari Sasaki (2)</td>
<td>(1) Asahi Quality and Innovations Ltd. Research &amp; Development Center, Moriya-shi/Ibaraki/JAPAN, (2) Kyushu Uni Next-Generation Fuel Cell Research Center, Fukuoka-shi/Fukuoka/JAPAN</td>
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<tr>
<td>16:45</td>
<td>Product development and experiences of a new Convion SOFC system (A0602)</td>
<td>Tuomas Hakala, Kim Åström, Erkko Fontell Convion Oy, Espoo/Finland</td>
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<td>17:00</td>
<td>Development and testing of a 25 kWe Large Stack Module for SOFC and SOE applications (A0603)</td>
<td>Z. Wuillemin (1), E. Varkaraki (1), C. Beetschen1, Y. Antonetti (1), O. Bucheli (1), S.Diethelm (1), A. Nesci (1), M. Bertoldi (2), Srikanth S. (3), D. Ullmer (3)</td>
<td>(1) SOLIDpower SA, Yverdon-les-Bains/Switzerland, (2) SOLIDpower S.p.A., Mezzolombardo/Italy, (3) German Aerospace Center (DLR), Inst. of Engineering Thermodynamics, Stuttgart/Germany</td>
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<td>17:15</td>
<td>Practical evaluation of Solid Oxide Fuel Cell (SOFC) – Micro Gas Turbine (MGT) Hybrid Power Generation System (A0604)</td>
<td>Yasuharu Kawabata (1,3), Daishiro Takeda (4), Kazuyoshi Ochi (4), Hiroshi Fujiki (4), Toshihiro Oshima (2), Yuya Tachikawa (1), Shunsuke Taniguchi (1,2)</td>
<td>(1) Center for Coevolutionary Research for Sustainable Communities, Kyushu University, Fukuoka/Japan, (2) Next-Generation Fuel Cell Research Center(NEXT-FC), Kyushu University, Fukuoka/Japan, (3) Digital Innovation Division, Tokyo Gas Co., Ltd., Yokohama/Japan, (4) Energy Solution Division, Tokyo Gas Co., Ltd., Minato-ku/Japan</td>
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<td>17:30</td>
<td>Fuel Flexibility of SOFCs (B0601)</td>
<td>André Weber Inst. of Applied Materials (IAM), Karlsruhe/Deutschland</td>
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<td>17:45</td>
<td>Equivalent circuit model of a triple-carrier conductor with partially blocking electrodes (B0602)</td>
<td>Kotaro Okuyama (1), Keiji Yashiro (1), Yoshitaka Aoki (2), Tatsuya Kawada (1)</td>
<td>(1) Graduate School of Environmental Studies, Tohoku University, Sendai/Japan, (2) Graduate School of Engineering, Hokkaido University, Sapporo/Japan</td>
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<td>17:50</td>
<td>Impedance study of ceria-based electrodes reveals an excellent fuel electrode material for solid oxide cells (B0603)</td>
<td>Andreas Nenning (1), Cornelia Bischof (2), Matthias Gerstl (1), Jürgen Fleig (1), Martin Bram (2), Alexander K. Opitz (1)</td>
<td>(1) TU Wien, Inst. of Chemical Technologies and Analytics, Vienna/Austria, (2) Forschungszentrum Jülich GmbH, Inst. of Energy and Climate Research, Materials Synthesis and Processing (IEK-1), Jülich/Germany</td>
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</tbody>
</table>
17:30 Experimental study of large Solid Oxide Cell (SOC) reactor module in co-generation operation mode producing hydrogen and power (A0605)  
Srikanth S (1), M. P. Heddrich (1), D. Ullmer (1), S. Asif Ansar (1), Z. Wuillemin(2), E. Varkaraki (2), C. Beetschen (2), Y. Antonetti (2)  
(1) German Aerospace Center (DLR), Inst. of Engineering Thermodynamics, Stuttgart/Germany, (2) SOLIDPower SA, Yverdon/Switzerland

17:45 $La_{0.65}Sr_{0.3}Cr_{0.85}Ni_{0.15}O_3 - \delta$ perovskite electrocatalyst for high temperature steam and dry CO$_2$ electrolysis (A0606)  
Diana M. Amaya-Dueñas (1), Matthias Riegraf (1), Andreas Nenning (2), Alexander K. Opitz (2), Rémi Costa (1), K. Andreas Friedrich (1)  
(1) German Aerospace Center (DLR), Inst. of Engineering Thermodynamics, Stuttgart/Deutschland, (2) Inst. of Chemical Technologies and Analytics, Vienna Uni of Technology, Vienna/Austria

18:00 End of Sessions ➔ 18:30 Swiss Surprise Registered participants meet between KKL and railway station

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Morning - Luzerner Saal  Thursday, 22 October 2020  Auditorium - Morning

09:00 A07: Keynote Grid Flexibility - Business Models  S-Chairs: Olivier Bucheli, Robert Braun
Where flexibility might save your case, and at what cost (A0701)  
Christoph Imboden  Lucerne Uni of Applied Sciences & Arts, Lucerne/Switzerland

09:00 B07: Keynote about proton conducting SOC  S-Chairs: Olivier Bucheli, Robert Braun
Proton ceramics – applications, status and prospect (B0701)  
Christian Kjølseth, Harald Malerød-Fjeld, Dustin Beeaff, Camilla Vigen, Selene H. Morejudo, Simen Aamot, Per Vestre, Daniel Clark, Michael Budd  CoorsTek Membrane Sciences, Oslo/Norway

09:25 5 Min to change to Luzerner Saal for A08 Session or to Auditorium for B08 Session
<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Authors</th>
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</thead>
<tbody>
<tr>
<td>09:30</td>
<td>A08:</td>
<td>Commercial-scale SOFC systems - ComSos (A0801)</td>
<td>Jari Kivioho (1), Aki Nieminen (1), Marcus Münch (2), Elli Varkaraki (3), Stefano Modena (4), Massimo Santarelli (5), Marta Gandiglio (5), Arjen de Jong (6), Tuomas Hakala (7)</td>
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<td>09:30:08: System design &amp; performance</td>
<td>S-Chairs: Satet Raphaelle, Min-Fang Han</td>
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<tr>
<td>09:45</td>
<td>B08:</td>
<td>Distribution of Electrochemical Reaction Sites in SOFC Composite Cathode Based on Isotope Labeling Coupled with Three-dimensional Electrochemical Simulation (B0802)</td>
<td>Takaaki Shimura (1,2), Tsuyoshi Nagasawa (3), Naoki Shikazono (2), Katsunori Hanamura (3)</td>
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<tr>
<td></td>
<td></td>
<td>(1) Dept. of Mechanical Systems Engineering, Tokyo Uni of Agriculture and Technology, Tokyo/Japan, (2) Inst. of Industrial Science, The Uni of Tokyo, Tokyo/Japan, (3) School of Engineering, Tokyo Inst. of Technology, Tokyo/Japan</td>
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<tr>
<td>10:00</td>
<td>A08:</td>
<td>Nanoscale spectroscopy studies of long term operated solid oxide electrolysis cells (B0803)</td>
<td>Aline Léon (1), Julie Villanova (2), Annabelle Brisse (1), Sabine Schlabach (3)</td>
</tr>
<tr>
<td></td>
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<td>(1) European Inst. for Energy Research, Karlsruhe/Germany, (2) ESRF –The European Synchrotron, Grenoble/France, (3) Karlsruhe Inst. for Technology, Inst. for Applied Mat, Karlsruhe/Germany</td>
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<td>Operating Experience with a 5kW-class Reversible Solid Oxide Cell System (A0803)</td>
<td>Roland Peters, Wilfried Tiedemann, Ingo Hoven, Robert Deja, Nicolas Kruse, Qingping Fang, Ludger Blum, Ralf Peters</td>
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<td></td>
<td>(1) Forschungszentrum Jülich GmbH, Inst. of Energy and Climate Research (IEK), Jülich/Germany</td>
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<td>09:30:08: System design &amp; performance</td>
<td>S-Chairs: André Weber, Keiji Yashiro</td>
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<tr>
<td>10:15</td>
<td>B08:</td>
<td>Active thermography applied to solid oxide cells (B0804)</td>
<td>Guillaume Jeanmonod, Jan Van Herle</td>
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<tr>
<td></td>
<td></td>
<td>Distribution of Electrochemical Reaction Sites in SOFC Composite Cathode Based on Isotope Labeling Coupled with Three-dimensional Electrochemical Simulation (B0802)</td>
<td>Takaaki Shimura (1,2), Tsuyoshi Nagasawa (3), Naoki Shikazono (2), Katsunori Hanamura (3)</td>
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<td></td>
<td></td>
<td>(1) Dept. of Mechanical Systems Engineering, Tokyo Uni of Agriculture and Technology, Tokyo/Japan, (2) Inst. of Industrial Science, The Uni of Tokyo, Tokyo/Japan, (3) School of Engineering, Tokyo Inst. of Technology, Tokyo/Japan</td>
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<td>(1) VTT Technical Research Centre of Finland Ltd, Espoo/Finland,</td>
<td>(2) SolidPower SpA, Mezzolombardo/Italy, (5) Politecnico di Torino, Torino/Italy, (6) Blueterra, Veenendaal/The Netherlands, (7) Convion Oy, Espoo/Finland</td>
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<td>09:30:08: Advanced characterization II</td>
<td>S-Chairs: André Weber, Keiji Yashiro</td>
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<td>10:30</td>
<td>Break</td>
<td>Break - Ground Floor in the Exhibition</td>
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<tr>
<td>Time</td>
<td>Session A09: Emerging SO technology electrode investigation and modelling</td>
<td>Session B09: Lifetime: Stacks and cells</td>
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<td>11:00</td>
<td>Mixed-Ionic Transport Properties of Acceptor Doped Ceria Systems (A0901)</td>
<td>Long-term stability of SOC stacks under realistic operating conditions (B0901)</td>
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<td></td>
<td>N. J Williams, S. J Skinner</td>
<td>Qingping Fang, Florian Thaler, Ute de Haart, Dominik Schäfer, Roland Peters, Ludger Blum</td>
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<td></td>
<td>Dept. of Materials, Imperial College London, London/UK</td>
<td>Forschungszentrum Jülich GmbH, Inst. of Energy and Climate Research (IEK), Jülich/Germany</td>
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<td>11:15</td>
<td>Effects of current density and H₂/H₂O ratio on the electrolytic performance of anode-supported and metal-supported solid oxide electrolysis cell stacks (A0902)</td>
<td>Post-test analysis of an SOFC after nearly 100,000h of stack operation (B0902)</td>
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<td>Chien-Kuo Liu, Szu-Han Wu, Hung-Hsiang Lin, Yung-Neng Cheng, Ruey-Yi Lee</td>
<td>Norbert H. Menzler, Doris Sebold</td>
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<td></td>
<td>Inst. of Nuclear Energy Research, Taoyuan City/Taiwan (R.O.C.)</td>
<td>Forschungszentrum Jülich GmbH, Inst. of Energy and Climate Research (IEK), Jülich/Germany</td>
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<td>11:30</td>
<td>High-resolution modelling of SOFC stack layers (A0903)</td>
<td>Test and characterization of reversible solid oxide cells and stacks for innovative renewable energy storage (B0903)</td>
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<td>Niklas Russner, Sebastian Dierickx, André Weber, Ellen Ivers-Tiffée</td>
<td>Anne Hauch* (1), Alexandra Pioner (2), Sergii Pylpko (3), Julie Mougin (4), Geraud Cubizolles (4)</td>
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<td></td>
<td>Inst. for Applied Materials (IAM-WET), Karlsruhe/Germany</td>
<td>(1) Dept. of Energy Conversion and Storage, Technical Uni of Denmark, Lyngby/Denmark,</td>
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<td>(2) SGL Carbon GmbH, Meißen/Germany, (3) Elcogen AS, Tallinn/Estonia,</td>
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<td>(4) Univ. Grenoble Alpes, CEA/LITEN, Grenoble Cedex 9/France</td>
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<tr>
<td>11:45</td>
<td>Solid oxide cells with infiltrated electrodes – Evaluation in reversible operation (A0904)</td>
<td>Long-term steam electrolysis with an SOC with thin (40 µm) 3YSZ electrolyte and Ni/GDC cathode (B0904)</td>
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<td>Bhaskar Reddy Sudireddy (1), Xiufu Sun (1), Xiaofeng Tong (1), Ming Chen (1), Karen Brodersen (1), Anne Hauch (1), Giorgio Rinaldi (2), Priscilla Caliandro (2), Arata Nakajo (2), Suhas Sampathkumar (2), Mar Perez-Fortes (2), Jan Van herle (2)</td>
<td>Annabelle Bisse (1), Josef Schefold (1), Christian Walter (2)</td>
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<td>(1) Dept. of Energy Conversion and Storage, Technical Uni of Denmark, Lyngby/Denmark,</td>
<td>(1) European Inst. for Energy Research (EIFER), Karlsruhe/Germany,</td>
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<tr>
<td></td>
<td>(2) École Polytechnique Fédérale de Lausanne, Sion/Switzerland</td>
<td>(2) Sunfire GmbH, Dresden/Germany</td>
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<tr>
<td>12:00</td>
<td>Modeling of microstructure evolution in solid oxide cells (A0905)</td>
<td>In-operando monitoring and lifetime improvement of SOFCs on single-cell and stack level (B0905)</td>
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<td></td>
<td>Ming Chen (1), Kaiming Cheng (2), Huixia Xu (3), Lijun Zhang (3), Martina Trini (1), Salvatore De Angelis (1), Peter Vang Hendriksen (1)</td>
<td>Vanja Subotić (1), Mihails Kusnezoff (2), Stefan Pofahl (3), Vincent Lawlor (3), Benjamin Königshofer (2), Teko W. Napporn (4), Stefan Megel (2), Christoph Hochenaue (1)</td>
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<td></td>
<td>(1) Dept. of Energy Conversion and Storage, Technical Uni of Denmark, Lyngby/Denmark,</td>
<td>(1) Inst. of Thermal Engineering, Graz Uni of Technology, Graz/Austria,</td>
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<td>(2) Shandong Provincial Key Lab. of High Strength Lightweight Metallic Materials, Advanced Materials Institute, Qilu Uni of Technology, Jinan/China,</td>
<td>(2) Fraunhofer-Institut für Keramische Technologien und Systeme IKTS, Dresden/Germany,</td>
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<td>(3) State Key Lab. of Powder Metallurgy, Central South University, Changsha/China</td>
<td>(3) AVL List GmbH, Graz/Austria,</td>
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<td>(4) Uni of Poitiers, Institut de Chimie des Milieux et Matériaux de Poitiers (IC2MP), Poitiers/France</td>
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</table>
| 12:15 | Solid oxide batteries for low-cost long-duration energy storage (A0906)| Christopher Graves (1,2,3)  
(1) Technical Uni of Denmark, Dept. of Energy Conversion and Storage, Lyngby/Denmark,  
(2) Cyclotron Road Fellow, Lawrence Berkeley National Laboratory, Berkeley/USA,  
(3) Noon Energy Inc, Palo Alto/USA |
|       | Degradation analysis of CFY-stacks MK35x and Illusiveness of accuracy  | Stefan Megel (1), Stefan Rothe (1), Viktar Sauchuk (1), Nikolai Trofimenko (1), Jochen Schilm (1),  
Mihails Kusnezoff (1), Martin Hauth (2), Christoph Sallai (2)  
(1) Fraunhofer IKTS, Dresden/Germany,  
(2) AVL GmbH, Graz/Austria |
| 12:30 | Lunch                                                                 | - 2nd Floor on the Terrace / Coffee - Ground Floor in the Exhibition & in the Poster Session |
| 13:15 | Afternoon - Luzerner Saal                                             | Thursday, 22 October 2020  
S-Chairs: Anke Hagen, Peter Vang Hendriksen |
| 15:00 | A10: Poster Session II covering All Session Topics                    | Smart Energy Systems and Electrolysers in Renewable Energy Systems (A1101)  
Brian Vad Mathiesen; Department of Planning, Aalborg University, Kobenhavn SV/Denmark |
| 15:25 | 5 Min to change to Auditorium for B12 Session                         | |

Here is your space for info about your products and services...........

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<th>Time</th>
<th>Session</th>
<th>Title</th>
<th>Authors/Institutions</th>
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<tr>
<td>15:30</td>
<td>A12: SOC integration, Power-to-X, CO2 capture etc.</td>
<td>Integration of carbonate looping and solid oxide electrolysis cell for CO\textsubscript{2} capture and reduction (A1201)</td>
<td>Chengzhi Guan (1,2), Yue Lu (1), Song Wan (1), Chunfeng Hong (1), Xianlong Du (1,2), Guoping Xiao (1,2), Zhongfeng Tang (1), Jian-Qiang Wang (1,2) (1) Shanghai Inst. of Applied Physics, Chinese Academy of Sciences, Jiading District/Shanghai, (2) Key Lab. of Interfacial Physics and Technology, Chinese Academy of Sciences, Jiading District/Shanghai</td>
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<tr>
<td>15:45</td>
<td>B12: Oxygen electrodes I</td>
<td>Approaching Theoretical Current Density: A Micro-/Nano- Honeycomb Solid Oxide Electrolysis Cell Anode (B1201)</td>
<td>Bo Yu*, Wengiang Zhang, Jing Chen (Inst. of Nuclear and New Energy Technology, Tsinghua University, Beijing/P. R. China)</td>
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<tr>
<td>16:00</td>
<td>Break - Ground Floor in the Exhibition &amp; in the Poster Session</td>
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<td>16:30</td>
<td>A13: Products, demonstrations, novel concepts &amp; BoP</td>
<td>SOFC technology for heavy-duty vehicle propulsion (A1301)</td>
<td>Marcus Taylor, Robert Steinberger-Wilckens (Centre for Fuel Cell &amp; Hydrogen Research, School of Chemical Engineering, Uni of Birmingham, Birmingham/UK)</td>
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<tr>
<td>16:45</td>
<td>B13: Cells, stacks, and interconnects</td>
<td>Protonic Ceramic Electrochemical Hydrogen Compression with Planar Cell Geometries (A1302)</td>
<td>Benjamin Kee (1), Sandrine Ricote (1), Robert J. Kee (1), W.G. Coors (2) (1) Mechanical Engineering, Colorado School of Mines, Golden/USA, (2) Hydrogène Hélix, SAS, Cannes/France</td>
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<td>Conditioning optimization in Sandvik Sanergy® HT 441 after the forming process (B1301)</td>
<td>Carlos Bernuy-López, Pablo Collantes-Jiménez, Ulf Bexell, Jürgen Westlinder (Surface Research, Strategic Research, AB Sandvik Materials Technology, Sandviken/Sweden)</td>
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<td></td>
<td></td>
<td>Material development for operation of solid oxide cells under specific conditions (B1302)</td>
<td>David Udomsilp (1), Christian Lenser (1), Olivier Guillou (1,2), Norbert H. Menzler (1) (1) Forschungszentrum Jülich GmbH, Inst. of Energy and Climate Research, Materials Synthesis and Processing (IEK-1), Jülich/Germany, (2) Jülich Aachen Research Alliance: JARA-ENERGY, Jülich/Germany</td>
</tr>
</tbody>
</table>
17:00  Demonstration of High-Temperature (Co-)Electrolysis Systems and their Evolution towards Multi-MW Scale (A1303)
Konstantin Schwarze, Robert Blumentritt, Thomas Geißler, Hubertus Richter, Oliver Posdziech
Sunfire GmbH, Dresden/Germany

17:15  SOE stack deterioration caused by reactant contaminations in realistic operation conditions (A1304)
Dominik Schäfer, Larissa Queda, Qingping Fang, Ludger Blum
Forschungszentrum Jülich GmbH, Inst. of Energy and Climate Research (IEK), Jülich/Germany

17:30  Effect of Temperature and Water Content on the Oxidation Behavior and Cr Evaporation of High-Cr Steels for SOFC Cathode Air Preheater (A1305)
Kun Zhang, Ahmad El-kharouf, Robert Steinberger-Wilckens; Centre for Fuel Cell & Hydrogen Research, School of Chemical Engineering, Uni of Birmingham, Birmingham/UK

17:45  Summary of the RECOGEN project: SOFC System with Heat-Driven Recirculation and Cogeneration (A1306)
Patrick H. Wagner (1), Zacharie Wuillemin (2), David Constantin (3), Stefan Diethelm (2,3), Jan Van herle (3), Jürg Schiffermann (1)
(1) EPFL-LAMD, Neuchâtel/Suisse,
(2) SOLIDpower, Yverdon-les-Bains/Suisse,
(3) EPFL-GEM, Sion/Suisse

18:00  End of Sessions ➔ 19.20 Boarding for Dinner on the Lake - Lake side of KKL pier 5/6 - 19:30 Departure - back 23.15, for earlier return by train short stop in Brunnen 22:30.
09:00 A14: Proton Conducting Cells, Stacks and materials
S-Chairs: Jose M. Serra, Ellen Ivers-Tiffée

09:00 Development Activities
for Realizing kW-scale Protonic Ceramic Fuel Cell Stacks and Systems (A1401);
Pastula, A. Wood, T. Joia (S)

09:15 On the development of planar metal supported electrochemical cells
with proton conducting ceramics (A1402)
Rémi Costa (1), Haoyu Zheng (1), Feng Han (1), Noriko Sata (1), Amir Masoud Dayaghi (2), Truls Norby
(2), Marit Stange (3); (1) German Aerospace Center (DLR), Inst. of Engineering Thermodynamics,
Stuttgart/Deutschland, (2) Centre for Materials Science and Nanotechnology, Uni of Oslo, Oslo/Norway,
(3) SINTEF, Oslo/Norway

09:30 Study of the oxygen diffusion behaviour of
(La0.8Sr0.2)0.95Cr0.5Fe0.5O3 - δ A-site deficient perovskites in humid conditions (A1403)
Zijie Sha*, Stephen J. Skinner; Dept. of Materials, London/UK

09:45 Electrodes and operating conditions
for high temperature electrolysis of CO2 for Mars exploration (A1404)
Ivar Waernhus (1), Nelson Thambiraj (1), Jörgen Svendby (1), Arild Vik (1), Brandon Buergler (2)
(1) Prototech AS, Bergen/Norway, (2) ESTEC, Noordwijk/The Netherlands

10:00 Research Summary of Protonic Ceramic Electrochemical Cells (PCECs)
at Idaho National Laboratory (A1405)
Dong Ding, Hanping Ding, Wei Wu; Idaho National Laboratory, Idaho Falls/USA
10:15 Intensification of Catalytic Reactors using Electrochemical Protonic Cells (A1406)
Instituto de Tecnología Química (Universitat Politècnica de València – Consejo Superior de
Investigaciones Científicas), Valencia/Spain

Influence of the defect chemistry in calcium-doped lanthanum manganese perovskites on oxygen evolution reactions (OER) and oxygen reduction reactions (ORR) (B1406)
Sabrina A. Heuer (1,2), Trutz Theuer (1,2), Roland Schierholz (1), Hermann Tempel (1), Izaak C. Vinke (1),
Lambertus G.J. de Haart (1), (2), Gjorgij Nusev (2), Hartmuth Schröttner (3), Christoph Hochanauer
(1), Hans Kungl (1), Rüdiger-A. Eichel (1,2); (1) Forschungszentrum Juelich GmbH, Inst. of Energy and
Climate Reseach, Juelich/Germany, (2) RWTH Aachen University, Inst. of Physical Chemistry,
Aachen/Germany

10:30 Break - Ground Floor in the Exhibition

Morning - Luzerner Saal

11:00 A15: Cell, stack & system modelling and optimization
S-Chairs: John Bøgild Hansen, Yoshio Matsuzaki

11:00 Fabrication of Porous Structure with 3D Printing Technology (A1501)
Kotaro Miyamoto (1), Hirotaka Koga (1), Masaaki Mizui (1), Hidekazu Nishiguchi (2)
(1) The Uni of Kitakyushu, Fukuoka/Japan,
(2) Kyushu Kiyoritsu University, Fukuoka/Japan,
(3) Meiryo Corporation, Fukuoka/Japan,
1-2, Kurosaki shiroishi, Yahatanishi-ku, Kitakyushu, Fukuoka/Japan

11:15 A methodology for the assessment of sealing joints in high-temperature SOFC stacks (A1502)
Sophia Bremm (1), Sebastian Dölling (1), Wilfried Becker (1), Ludger Blum (2), Roland Peters (2), Jürgen
Malzbender(2), Detlef Stolten (2)
(1) Technische Universität Darmstadt, Fachgebiet Strukturmechanik, Darmstadt/Germany,
(2) Forschungszentrum Jülich GmbH, Jülich/Germany

Morning - Luzerner Saal

Friday, 23 October 2020

11:00 B15: Lifetime: Cells, components and interfaces
S-Chairs: Robert Steinberger-Wilckens, Koichi Eguchi

11:00 Electrochemical analysis of Ni-YSZ anode in anode-supported cells: reaction mechanism and effective reaction zone (B1501)
Riyan Achmad Budiman, Katherine-Develos Bagarinao, Tomohiro Ishiyama, Haruo Kishimoto, Katsuhiko
Yamaji, Teruhsa Horita
National Inst. of Advanced Industrial Science and Technology, Ibaraki/Japan

11:15 Repairing solid oxide cell electrodes during operation (B1502)
Theis L. Skafte (1,2,3), Frederik Schweer-Gori (1), Seren B. Simonsen (1), Marie L. Taulsen (1), Bhaskar
Sudireddy (1), Michael C. Tucker (2), Christopher Graves (1,3,4)
(1) Technical Uni of Denmark, Dept. of Energy Conversion and Storage, Lyngby/Denmark,
(2) Lawrence Berkeley National Laboratory, Energy Storage and Distributed Resources Division,
Berkeley/USA,
(3) Noon Energy Inc, Alto/USA,
(4) Cyclotron Road Fellow, Lawrence Berkeley National Laboratory, Berkeley/USA
11:30 Multi-scale model to describe the local degradation and mechanical failures in a SOFC stack (A1503)
Henrik Lund Frandsen, Omid Babaie Rizvandi, Xing-Yuan Miao, Aiswarya Krishnakumar Padinjarethil, Anke Hagen, Anne Hauch
Dept. of Energy Conversion and Storage, Technical Uni of Denmark (DTU), Lyngby/Denmark

11:45 Reaction mechanism analysis and microscopic modeling for co-electrolysis (A1504)
M. Nohl (1), L. Dittrich (1), E.E. Jaekel (1), I.C. Vinke (1), L.G.J. de Haart (1), R. A. Eichel (1,2)
(1) Inst. of Energy and Climate Research, Fundamental Electrochemistry (IEK-9), Forschungszentrum Jülich GmbH, Jülich/Germany,
(2) Inst. of Physical Chemistry, RWTH Aachen University, Aachen/Germany

12:00 Reaction mechanisms and durability of LSCF and LSCF-CGO electrodes: a coupled approach with elementary kinetic modelling and long-term testing under aggravated conditions (A1505)
E. Effori (1,2), E. Siebert (2), M. Petitjean (1), L. Dessemond (2), J. Laurencin (1)
(1) Univ. Grenoble Alpes – CEA/LITEN, Grenoble/France,
(2) Univ. Grenoble Alpes, Univ. Savoie Mont Blanc, CNRS, Grenoble/France

12:15 Lifetime prediction of high temperature fuel cells using machine learning (A1506)
Aiswarya Krishnakumar Padinjarethil, Stefan Pollok, Anke Hagen
Dept. of Energy Conversion and Storage, Technical Uni of Denmark (DTU), Lyngby/Denmark

12:30 Lunch - 2nd Floor on the Terrace / Coffee - Ground Floor in the Exhibition & 2nd Floor on the Terrace
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<tr>
<td>13:30</td>
<td>A16</td>
<td>Results of 5 kW SOFC CHP system development in the SOFC5-60 project</td>
<td>Christopher Saliai, Stephan Weissensteiner, Michael Seidl, Stephan Pickelberger, Martin Hauth AVL List GmbH, Graz/Austria</td>
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<td>13:45</td>
<td>A16</td>
<td>Thermal Integration of a 150 kW SOEC System within a Nuclear Power Plant Facility</td>
<td>Joshua Mermistel, Tyler Westover, Richard Boardman Idaho National Laboratory, Idaho Falls/USA</td>
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<td>14:00</td>
<td>A16</td>
<td>Results from the operation of the first industrial size biogas-fed SOFC plant in Europe</td>
<td>M Acir, M. Gandiglio, T. Hakala, A. Hawkes, M. Rautanen, M. Santarelli Dept. Of Energy DENERG, Politecnico di Torino, Torino/Italy</td>
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<td>14:15</td>
<td>A16</td>
<td>SchIBZ® - experiences with liquid fuelled SOFC for ship applications</td>
<td>Keno Leites thyssenkrupp Marine Systems GmbH, Hamburg/Germany</td>
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<td>13:30</td>
<td>B16</td>
<td>In-situ diagnosis for chromium and silicon poisoning of porous air electrodes</td>
<td>Andreas Egger, Timothy Hofmann, Edith Bucher, Werner Sitte Montanuniversitaet Leoben, Chair of Physical Chemistry, Leoben/Austria</td>
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<td>13:45</td>
<td>B16</td>
<td>Inkjet printing of Cu-Co-Mn Oxide spinel as protective coating on solid oxide fuel cell interconnects</td>
<td>Samaneh Davian, Manuel Bianco, Jan Van Herle; Group of Energy Materials (GEM), Lausanne/Switzerland</td>
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<td>14:00</td>
<td>B16</td>
<td>Characterization of Interconnects Operated in Real Stacks up to 9000 hours in a reversible mode</td>
<td>Paolo Piccardo (1,2), Roberto Spoto (1,3), Giorgia Ghiara (1), Valeria Bongiorno (1); (1) Dept. Of Chemistry and Industrial Chemistry, Uni of Genoa, Genoa/Italy, (2) CNR - IMEM, Genova/Italy, (3) CNR - ICMATE, Genova/Italy</td>
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<td>14:15</td>
<td>B16</td>
<td>Corrosion Issues of Metallic Materials</td>
<td>Joanna Zurek (1), Nikolaos Margaritis (2), Norbert H. Menzler (3), Willem J. Quadakkers (1), Dmitri Naumenko (1); (1) Inst. of Energy and Climate Research IEE-2, (2) Engineering and Technology ZEA-1, (3) Inst. of Energy and Climate Research IEE-1, Forschungszentrum Jülich, Jülich/Germany</td>
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<td>14:30</td>
<td>B16</td>
<td>The Influence of Different Parameters on the Dual Atmosphere Effect Observed in Simulated Solid Oxide Fuel Cell Conditions</td>
<td>Alberto Visibile, Kerem Gündüz, Claudia Göbel, Jan-Erik Svensson, Jan Froitzheim; Energy and Materials, Chemistry and Chemical Engineering, Chalmers Uni of Technology, Gothenburg/Sweden</td>
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<tr>
<td>14:45</td>
<td>B16</td>
<td>Measurement of the effective mechanical properties of SOG oxygen contact layers by computational homogenization and effects on contact pressure during stack operation</td>
<td>Hossein Pourrahmani (1), Hamza Moussaoui (1), Manuel Bianco (1), Arata Nakajo (1), Xiufu Sun (2), Bhaskar Reddy Sudireddy (2), Jan Pieter Ouwersljes (3), Dario Montinaro (4), Jan Van Herle (1); (1) Group of Energy Materials (GEM), Ecole Polytechnique Federale de Lausanne (EPFL), Sion/ Switzerland, (2) Dept. of Energy Conversion and Storage, Technical Uni of Denmark, Lyngby/Denmark, (3) SOLIDpower S.p.A., Yverdon-les-Bains/Switzerland, SOLIDpower SA., Mezzolombardo (TN)/Italy</td>
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Afternoon - Luzerner Saal  
Friday, 23 October 2020

15:05  A17: P4: Closing Ceremony  
Keynote by the EFCF Gold Medal of Honour Winner 2020  
S-Chairs: Anke Hagen, Peter Vang Hendriksen, O. Bucheli, M. Spirig

15:05  Summary by the Chairs (A1701)  
Anke Hagen, Peter Vang Hendriksen 
Technical University of Denmark, Lyngby/Denmark

15:20  Information on Next EFCF:  
EFCF 2022 15th European SOFC & SOE Forum  
EFCF 2021 9th FC, Electrolyser & H2 Processing Forum (A1702)  
Olivier Bucheli (1), Thomas Schmidt (2), Michael Spirig (1)  
(1) European Fuel Cell Forum, Lucerne/Switzerland,  
(2) Paul Scherer Institut, Villigen PSI/Switzerland

15:30  Christian Friedrich Schönbein Award  
for the Best Poster, Best Science Contribution, Medal of Honour (A1703)  
Peter Vang Hendriksen, Anke Hagen  
Technical University of Denmark, Lyngby/Denmark

15:40  Gold Medal Winner Keynote 2020  
History, status and prospects of SOC Systems (A1704)  
Ludger Blum, Forschungszentrum Jülich, Jülich/Germany

16:05  Thank you and Closing by the Organizers (A1705)  
Olivier Bucheli, Michael Spirig  
European Fuel Cell Forum, Luzern/Switzerland

16:15  End of Sessions - End of Conference  
Good bye coffee and travel refreshment in front of the Luzerner Saal

See you again in Lucerne ...
A03 Poster Session I covering All Session Topics

Wednesday, 21 October 2020 Afternoon 13.15 - 15:00

A09 Poster Session II covering All Session Topics

Thursday, 22 October 2020 Afternoon 13.15 - 15:00

A03 + A05: Technology status at industry and major groups I + II

Evaluating the market attractiveness for Fuel Cell micro-Cogeneration units by applying a Multi-Criteria Evaluation (MCE) (A0307)
Tanaka Mbavarira, Marco Kunz; Lucerne University of Applied Sciences and Arts (HSLU), Horw/Lucerne

Development of 1 kW-class ammonia-fueled solid oxide fuel cell stack (A0308)
Masashi Kishimoto (1), Hiroki Muroyama (2), Shinsuke Suzuki (3), Masaki Saito (3), Takeshi Koido (3), Yoosuke Takahashi (3), Toshitaka Horiuchi (4), Hayahide Yamasaki (4), Shohei Matsumoto (5), Hidehito Kudo (5), Naoya Takahashi (6), Akihiro Okabe (6), Satoshi Ueguchi (7), Munsuk Jun (7), Akira Tateno (7), Takahiro Matsuo (7), Toshiaki Matsu (7), Hiroshi Iwai (1), Hideo Yoshida (1), Koichi Eguchi (2);
(1) Dept. of Aeronautics and Astronautics, Kyoto University, Nishikyo-ku, Kyoto/Japan,
(2) Dept. of Energy and Hydrocarbon Chemistry, Kyoto University, Nishikyo-ku, Kyoto/Japan,
(3) Toyota Industries Corporation, Aichi/Japan,
(4) Nippon Shokubai Co., Osaka/Japan,
(5) No ritake Co., Ltd., Aichi/Japan,
(6) Mitsubishi Chemical Inc., Chiba/Japan,
(7) HIL Corporation, Kanagawa/Japan

The analysis of the status of industrial ecology system and technical level
Korea’s fuel cell technology sector (A0309)
Yoo Ran, Seongkon Lee; Energy Policy Research Center, Korea Inst. of Energy Research, Daejeon/Republic of Korea

A06: Products and demonstrations

Development progress of a Residential SOFC CHP system "ENEFARM type S" at Osaka Gas (A0607)
Naseruddin Khan, Yousif Al-Sagheer, Pietro Tricoli, Robert Steinberger-Wilkens; Osaka Gas Co. Ltd., Osaka/Japan

B03: Manufacturing Processes

Electrochemical performance improvement of solid oxide fuel cells by meso/nanostructure control (B0307)
Haewon Seo (1), Masashi Kishimoto (1), Hiroshi Iwai (2), Changsheng Ding (1), Motohiro Saito (1), Hideo Yoshida (1);
(1) Dept. of Aeronautics and Astronautics, Kyoto University, Kyoto/Japan,
(2) Dept. of Mechanical Engineering and Science, Kyoto University, Kyoto/Japan

Characterization of femtosecond-laser-structured solid oxide electrolysis cell (B0308)
Tobias Marquardt (1), Andreas Gabler (2), Stephan Kabelac (1);
(1) Dept. of Thermodynamics, Leibniz University Hannover, Hannover/Germany,
(2) Forschungszentrum Energiespeichertechnologien, TU Clausthal, Goslars/Germany

Thin-film Gd-doped Ceria Diffusion Barrier Layers for Electrolyte Supported Solid Oxide Cells (B0309)
Feng Han (1), Matthias Rieggraf (1), Christian Geipel (2), Christian Walter (2), Remi Costa (1);
(1) Inst. of Engineering Thermodynamics, German Aerospace Center (DLR), Stuttgart/Deutschland,
(2) Sunfire GmbH, Dresden/Germany

Facile and durable TC film approach buffer layer design for suppressing chemical degradation of solid oxide fuel cell (B0310)
Amin Khosain (1,2), Alk-Hyung Song (1,2), Jong-Eun Hong (1), Seung-Bok Lee (1,2), Tak-Hyoung Lim (1,2);
(1) Fuel Cell Research Center, Korea Inst. of Energy Research, Daejeon/Korea,
(2) Inst. of Advanced Energy and System Engineering, Uni. of Science and Technology (UST), Daejeon/Korea

Highly effective diffusion-blocking layer to suppress the interfacial reaction between cathode and electrolyte of SOFCs (B0311)
Jong-Ho Lee, Kyung-Joong Yoon, Seunghwan Lee, Sungeun Yang, Ho-II Ji, Hyeongchul Kim, Ji-Won Son,
Byung-Kook Kim, Hae-Weon Lee; Korea Inst. of Science and Technology, Seoul/Republic of Korea

Additive manufacturing-based 3D printed Solid Oxide Fuel Cells (B0312)
Shrikant S. Kawale, Chenyang Liao, Sivaprakash Sengodan, Stephen J. Skinner
Dept. of Material, Imperial College London, Royal School of Mines, London/UK
Development Of A High-Efficiency, Low-Cost Hybrid SOFC/Internal Combustion Engine Power Generator (A0608)

SOFC Hybrid as Solution for Bus & Truck Electrification (A0609)
Bernd Reiter, Thomas Krauss, Raphael Neubauer, Martin Hauth, Jürgen Rechberger
AVL List GmbH, Graz/Austria

The impacts of collaborations in the development of Solid oxide Fuel Cells technologies during 2000-2019: A bibliometric analysis (A0808)
Osaze Omoregbe, Ahmad El-kharouf, Robert Steinberger-Wilckens
Centre for Fuel Cell & Hydrogen Research, School of Chemical Engineering, Uni of Birmingham, Birmingham/UK

Integration and Operation of 20kW-HTSE Using SOC Technology to Produce Green Hydrogen (A0809)
Guoping Xiao, Xianlong Du, Chunfeng Hong, Huijuan Yan, Jian-Qiang Wang; Center for Thorium Molten Salt Reactor System, Shanghai Inst. of Applied Physics, Chinese Academy of Sciences, Shanghai/China

Teaching FCH Technologies in a Masters’ Course across Europe (A0810)
Robert Steinberger-Wilckens (1), Aravind Purushothaman Vellayani (2), Massimo Santarelli (3), Yegor Brodinovskiy (4), Lars N. Cleeman (5), Izaak C. Vinke (3) ; (1) Prototech AS, Bergen/Norway, (2) DTU, Lyngby/Denmark, (3) Politecnico di Torino, Torino/Italy, (4) EPFL, Sion/Switzerland, (5) Univer. Grenoble Alpes – CEA/LITEN, Grenoble/France

Characteristics of solid oxide fuel cell components fabricated by ultrasonic spray coating process (B0318)
Soohee, Youngwook Lee, Taeho Shin; Energy & Environmental Division, Korea Inst. of Ceramic Engineering and Technology, Gyeonggsangnam-do/Republic of Korea

Engineering and optimization of electrode/electrolyte interfaces to increase solid oxide fuel cell (SOFC) performances (B0319)
Rosen Tchakalov (1), A. Chesnau (1), A. Thorel (1), G. Dezanneau (2); (1) MINES PARISTECH, PSL Research University, Ervy/Lyon, France, (2) CENTRALESUPELEC, Université Paris-Saclay, Gif-sur-Yvette/France
System simulation and experimental investigation of Ammonia reforming and its application to SOFC power generation system (A0811)
Dong Keun Lee (1), Sang Ho Lee (1), Young Sang Kim (1), Young Duk Lee (1,2), Kook Young Ahn (1,2); (1) Korea Institute of Machinery & Materials (KIMM), (2) University of Science and Technology (UST), Daejeon/South Korea,

On-line diagnosis of a solid oxide fuel cell stack by means of uncertain equivalent circuit models (A0812)
Luka Znidarič (1), Gjorgji Nusev (1), Bertrand Morel (2), Julie Mougin (2), Danijuričić (1), Pavle Božkoski (1); (1) Jožef Stefan Institute, Ljubljana/Slovenia, (2) Univ. Grenoble Alpes – CEA/LITEN, Grenoble CEDEX 9/France

Operation Characteristics according to Steam Temperature of External Steam-related SOEC System (A0813)
Young Sang Kim (1), Young Duk Lee (1,2), Kook Young Ahn (1,2); (1) Dept. of Clean Fuel and Power Generation, Korea Inst. of Machinery & Materials (KIMM), Daejeon/South Korea, (2) Univ. of Science and Technology (UST), Daejeon/South Korea

Syngas fueled Solid Oxide Fuel Cells – Experiments and thermodynamic equilibrium analysis (A0814)
Rakesh N, Anand M S, S Dasappa; Centre for Sustainable Technologies, Indian Institute of Science, Bangalore/Karnataka/India

A09: Emerging SO technology electrode investigation and modelling

Complex transport phenomena inside a planar SOFC stack at high fuel utilization (A0907)
Sanghyeon Lee (1), Yanggyoon Bae (2), Kyung Joon Yoon (1), Jong-Ho Lee (1), Jongsup Hong (2); (1) Center for Energy Materials Research, Korea Inst. of Science and Technology, Seoul/South Korea, (2) Dept. of Mechanical Engineering, Yonsei University, Seoul/South Korea

Three-dimensional Microstructure Reconstructions of Solid Oxide Fuel Cell Electrodes with Large Volume Size using Generative Adversarial Networks (A0908)
Zilin Yan (1,2), Zhenjun Jiao (1), Naoki Shikazono (2), Shotaro Hara (3); (1) School of Science, Harbin Inst. of Technology, Shenzhen/China, (2) Inst. of Industrial Sciences, The Uni of Tokyo, Tokyo/Japan, (3) Japan Science and Technology, Institute of High Technology, Chiba Inst. of Technology, Chiba/Japan

B05: Fuel electrodes

Digital Materials Design (DMD) of SOFC electrodes (B0507)
(1) Zurich Uni of Applied Sciences, ICP, Wintertthur/Switzerland, (2) Hexis AG, Winterthur/Switzerland, (3) Math2Market GmbH, Kaiserslautern/Germany, (4) Uni of Ulm, Dept. of Stochastics, Ulm/Germany

Cation-swapped homogeneous nanoparticles in perovskite oxides for Solid oxide fuel cell anodes (B0508)
Sivaprakash Sengodan; Dept. of Materials, Imperial College London, London/UK

Electrochemical performance and carbon resistance comparison between Sn, Cu, Ag, and Rh-doped Ni/ScCeSZ anode SOFCs operated by biogas (B0509)
Zeyu Jiang, Abigail Snowdon, Ahmad El-kharouf, Robert Steinberger-Wickens
Centre for Fuel Cell & Hydrogen Research, School of Chemical Engineering, Uni of Birmingham, Birmingham/UK

Microstructure, performance and stability of thin film Ni-YSZ anodes (B0510)
Buse Bilbey (1), Meltem Sezen (2), Cleva Ow-Yang (3), Ali Güli Büyükaksoy (1,4)
(1) Dept. of Materials Science and Engineering, Kocaeli/Turkey, (2) SÜNUM Nanotechnology Research Center, Sabanci University, Tuzla/Istanbul, (3) Faculty of Engineering and Natural Sciences, Sabanci University, Tuzla/Istanbul, (4) Inst. of Nanotechnology, Gebze Technical University, Kocaeli/Turkey

Improving the performance of solid oxide electrolysis cell with GDC nanoparticles-modified Ni-YSZ cathode (B0511)
Xiao Lin, Linjuan Zhang, Guoping Xiao, Jing Zhou, Yu Wang, Jian-Qiang Wang*
Shanghai Inst. of Applied Physics, Chinese Academy of Sciences, Shanghai/P. R. China

Gd0.1Ce0.9O2−δ nanosol coating in porous metal support for development of high performance metal-supported solid oxide fuel cells (B0512)
Sang-Kuk Woo, Sun-dong Kim Energy Materials Laboratory, Korea Institute of Energy Research (KIER) Sang-Kuk Woo, Sun-dong Kim; Energy Materials Laboratory, Korea Inst. of Energy Research (KIER), Daejeon/Republic of Korea

Investigation on B-site exsolved titanates and its structure-property relationship as fuel electrode in solid oxide cells (B0513)
Shuai He; School of Chemistry, University of St Andrews, Fife/United Kingdom
Advancements in ceramic nanocomposite fuel cell research and challenges (A0909)
Muhammad Imran Asghar (1,2), Peter Lund (2)
(1) Faculty of Physics and Electronic Science, Hubei University, Wuhan Hubei/China,
(2) New Energy Technologies Group, Dept. of Applied Physics, Aalto Uni School of Science, Espoo/Finland

Thermal stress analysis of a planar SOFC stack under long-term operation (A0910)
Guang-Jhih Jheng (1), Chih-Kuang Lin (1), Szu-Han Wu (2), Chien-Kuo Liu (2), Ruey-Yi Lee (2)
(1) Dept. of Mechanical Engineering, National Central University, Tao-Yuan/Taiwan,
(2) Nuclear Fuels and Materials Division, Inst. of Nuclear Energy Research, Tao-Yuan/Taiwan

Lifetime prediction of SteelCell® stacks using advanced multiphysics modelling (A0911)
Ameir Mahgoub, Robert Leah, Duncan Gawel, Gavin Reade, Jack Howlett,
Nick Lawrence, Subhashis Mukerjee, Mark Selby
Ceres Power Ltd., Horsham/UK

Model based engineering for improved SOFC system development (A0912)
Raphael Neubauer, Thomas Krauss, Bernd Reiter, Jürgen Rechberger; AVL List GmbH, Graz/Austria

Transmission Line Modeling of Composite Electrodes (A0913)
Sebastian Dierickx, Florian Wankmüller, André Weber, Ellen Ivers-Tiffée
Inst. of Applied Materials (IAM), Karlsruhe/Deutschland

CFD simulation of SOFC stack layer under fuel cell and electrolysis conditions (A0914)
Stephan Herrmann (1), Sebastian Wilhelm (1), Maximilian Hauck (1), Felix Fischer (1), Jeremias Weinrich (2),
Matthias Gaderer (2), Hartmut Spliethoff (1)
(1) Lehrstuhl für Energiesysteme, Technische Universität München (TUM), Garching/Germany,
(2) Professur für Regenerative Energiesysteme, Technische Universität München, Straubing/Germany

Interaction of BZCY with YSZ, NiO and sintering aids (A0915)
Xinge Zhang, Luigi Alde, Mark Robertson, Jason Fahlman
EME Research Center, National Research Council Canada, Vancouver/Canada

Effect of the Porosity of Cathode Layers on the Performance of Solid Oxide Fuel Cells (A0916)
N. Alhazmi (1), G.N. Almutairi (2), Feraih Alenazey (2), B. Alotalib (2)
(1) Materials Science Research Institute, ,
(2) Energy Research Institute, King Abdul Aziz City for Science and Technology (KACST), Riyadh/Saudi Arabia

Nd and Ni co-doped BaFeO₃₋δ cathode materials for intermediate-temperature solid oxide fuel cells (B0514)
You-Dong Kim, Ja-Yoon Yang, Kwangho Park, Jun-Young Park
Dept. of Nanotechnology and Advanced Materials Engineering, Sejong University, Seoul/Korea

Advanced Anodes for Direct Hydrocarbon Fueled-SOFCs with Improved Thermal Management (B0515)
Boxun Hu (1), Seraphim Belko (1), Michael Reisert (1), Junsung Hong (1), Ashish Aphale (1), Rabi Bhattacharya (2), Brian J. Koeppe1 (4), Prabhakar Singh (1), (1) Uni of Connecticut, Storrs CT/USA, (2) UES Inc., Dayton/USA, (3) Pacific Northwest National Lab, Richland/USA, (4) Lawrence Berkeley National Lab, Berkeley/USA

B06: Advanced characterization I

Discrimination of the RWGS and the CO₂ Electro-Catalytic reduction reactions on Ni/GDC during Solid Oxide H₂O/CO₂ Co-Electrolysis (B0607)
Evangelia Ioannidou (1,2), Mara Chavani (1,2), Stylianos G. Neophytides (1), Dimitrios K. Niakolas (1)
(1) Foundation for Research and Technology, Inst. of Chemical Engineering Sciences (FORTH/ICE-HT), Patras/Greece,
(2) Dept. of Chemical Engineering, Uni of Patras, Patras/Greece

Recent Process about the SOEC Materials by Synchrotron Radiation-based X-ray absorption Spectra (B0608)
Linjuan Zhang*, Ze Liu, Yuxuan Zhang, Xiao Lin, Jian-Qiang Wang
Dept. of Molten Salt Chemistry and Engineering, Shanghai Inst. of Applied Physics, Shanghai/China

SOFC In-Field Test of an Advanced Monitoring and Diagnostics Tool (B0609)
Jan Pieter Ouwe1tjes (1), Francesco Galloino (2), Marco Gallo (3), Pavle Boškoski (4), Stefan Pofahl (5), Aki Niiminen (6), Bertrand Morel (7), Andrea Leonardi (8)
(1) SOLIDpower SA, Yverdon-les-Bains/Switzerland, (2) Bitron, Grugliasco/Italy,
(3) Uni of Salerno, Salerno/Italy, (4) Jožef Stefan Institute, Ljubljana/Slovenia,
(5) AVL List, Graz/Austria, (6) VTT, Espoo/Finland,
(7) CEA, Grenoble/FRance, (8) SOLIDpower SpA, Mezzolombardo/Italy,

Mechanical characterization of thin YSZ electrolyte-supported solid oxide fuel cells (SOFC) (B0610)
Tom Lienßdorf, Ferdinand Dömling, Carolin Sitzmann, Nico Langhof, Walter Krenkel
Ceramic Materials Engineering, Uni of Bayreuth, Bayreuth/Bavaria
Multiphase-field simulations of nickel-coarsening in SOFC-anodes (A0917)
Paul W. Hoffrogge (1), Daniel Schneider (1,2), Florian Wankmüller (1), André Weber (1), Patricia Haremski (3), Anika Maruszczzyk (3), Matthias Wieler (3), Piero Lupetin (3), Britta Nestler (1,2)
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Transient Analysis of the solid oxide fuel cell coupled absorption refrigeration system for refrigerated transportation (A0918)
Bhargav Pandya, Ahmad El-kharouf, Robert Steinberger-Wilckens
Centre for Fuel Cell & Hydrogen Research, School of Chemical Engineering, Uni of Birmingham, Birmingham/UK

A study of Surface modified Ba(Sr)Co(Fe)O$_3$ perovskite electrocatalyst for Oxygen Electrode Reaction beyond Room Temperature Application (A0919)
Kim Han Seul, Lee Young Wook, Kwang Chul Roh, Shin Tae Ho
(1) Energy & Environmental Division, Korea Inst. of Ceramic Engineering & Technology (KICET), Jinju-si/South Korea,
(2) Dept. of Nanofusion Technology, Pusan National University, Busan/Republic of Korea,
(3) Dept. of Applied Science for Electronics and Materials, Kyushu University, Fukuoka/Japan

High performance BaZrO$_3$ based oxide ion electrolyte for Solid oxide fuel cells (A0920)
Akanksha Yadav, Preetam Singh; Department of Ceramic Engineering, Varanasi/India

Investigating Ruddlesden-Popper (n=1) oxide materials for hydrogen generation via chemical looping water splitting (A0921)
George Wilson, Andrea Cavallaro, Ainara Aguedoer
Dept. of Materials, Imperial College London, London/UK

Effect of Ni-alloying on CO2 electrolysis at Ni/YSZ fuel electrode (A0922)
Sungeun Yang, Min-Jun Oh, Ho-Il Ji, Kyung Joong Yoon, Ji-Won Son, Jong-Ho Lee
Center for Energy Materials Research, Korea Inst. of Science and Technology (KIST), Seoul/South Korea

High-performance backbone-supported BaZr$_{0.8}$Ce$_{0.1}$Y$_{0.15}$O$_{3-δ}$ systems for membrane reactors with multi-product streams (A0923)
S. Robinson, H. Tempel, H. Kungf, R. Eichel; Inst. of Energy and Climate Research - Fundamental Electrochemistry (IEEKJ), Forschungszentrum Jülich GmbH, Jülich/Germany

B08: Advanced characterization II

A novel method to determine the transport coefficients of an YSZ electrolyte based on impedance spectroscopy (B0807)
Pablo Radici, Nele Geesmann, Gerardo Valadez Huerta, Stephan Kabelac
Inst. of Thermodynamics, Leibniz Uni Hannover, Hannover/Germany

Oxygen surface exchange in lanthanum nickelates (B0808)
Artur J. Majewski (1), Maxim Ananyev (2), Peter R. Slater (3), Robert Steinberger-Wilckens (1)
(1) School of Chemical Engineering, Uni of Birmingham, Birmingham/UK,
(2) Inst. of High Temperature Electrochemistry, Yekaterinburg/Russia,
(3) 2 School of Chemistry, Uni of Birmingham, Birmingham/UK

Towards in operando XAS investigation of CO$_2$ electrolysis in Solid Oxide Cells: Ca doping in La$_{1-x}$M$_x$CrFeO$_{3-δ}$ perovskites (B0809)
Oliver Calderon, Viola Ingrid Birss, Simon Trudel; Dept. of Chemistry, Uni of Calgary, Calgary AB/Canada

Residual stress evaluation of metal support solid oxide fuel cell (B0810)
Takumi Komaya (1), Ruhma Zaka (1), Satoshi Watanabe (1), Keigo Kumada (2), Itaru Oikawa (2),Kazuhisa Sato (2), Keki Yashiro (1), Hitoshi Takamura (2),Tatsuya Kawada (1)
(1) Graduate School of Environmental Studies, Tohoku University,
(2) Graduate School of Engineering Tohoku University, Sendai/Japan

B09: Lifetime: Stacks and cells

Quantitative evaluation of SOFC anode microstructure based on optical microscope (B0907)
Dong Yan, JiaJun Yang, Jian Pu, Bo Chi, Jian Li
Center for FuelCell Innovation, Huazhong Uni of Science and Technology, Wuhan/China

Anode fuel recirculation on solid oxide fuel cells (SOFCs) fueled with landfill gas (B0908)
Hendrik Langnickel, Daniele Reschiotto, Christopher Graves, Anke Hagen
DTU Energy, Technical Uni of Denmark, Lyngby/Denmark
Design of Multiple Repetitive Electrolyte Structure to Improve Thermal Durability of Solid Oxide Fuel Cell Using Thin Film Electrolyte (A0924)
Taehong Kim, Sungmin Kang, Minseok Bae, Jaeseok Lee, Joongmyeon Bae; Dept. of Mechanical Engineering, Korea Advanced Inst. of Science and Technology (KAIST), Daejeon/Republic of Korea

A12: SOC integration, Power-to-X, CO2 capture etc.
E-fuels for SOFC mobility – A Systematic Approach (A1207)
Robert Steinberger-Wilckens
Centre for Fuel Cell & Hydrogen Research, School of Chemical Engineering, Uni of Birmingham, Birmingham/UK

Waste2Grids:
Converting wastes efficiently and flexibly for grid balancing services and sector coupling (A1208)
Ligang Wang (1), Mar Perez-Fortes (1), Yi Zong (2), Vincenzo Motola (3), Stefan Diethelm (4), Alessandro Agostini (3), Olivier Bucheli (4), Jan Van herle (1)
(1) Swiss Federal Inst. of Technology, Lausanne/Switzerland,
(2) Technical Uni of Denmark, Lyngby/Denmark,
(3) ENEA, Rome/Italy,
(4) SOLIDpower SA, Switzerland

Sizing and market evaluation of building power storage systems based on a reversible SOEC / SOFC (A1209)
Meleika Hounsou, Chloé Duchayne, Stéphane Hody; ENGIE Lab CRIGEN, Stains/France

Nuclear Hydrogen Production Research by High Temperature Steam Electrolysis in SINAP (A1210)
Jian-Qiang Wang (1,2), Guoqing Xiao (1,2), Chengzhi Guan (1,2), Linjuan Zhang (1,2), Xiao Lin (1,2)
(1) Key Lab. of Interfacial Physics and Technology, Chinese Academy of Sciences, Shanghai/China,
(2) Shanghai Inst. of Applied Physics, Chinese Academy of Sciences, Shanghai/China

Production of CO from CO2
using low-temperature, molten carbonate and solid oxide electrolysis (A1211)
Rainer Küngas, Peter Blennow, Thomas Heiredal-Clausen, Tobias Holt Narby, Jeppe Rass-Hansen, Poul Georg Moses;
Haldor Topsoe A/S, Lyngby/Denmark

Electro-chemo-mechanical Analysis System of Solid Oxide Fuel Cell Considering Gas and Heat Distributions (B0909)
Mayu Muramatsu, Masami Sato, Kenjiro Terada, Keiji Yashiro, Tatsuya Kawada, Fumitada Iguchi, Harumi Yokokawa
(1) Department of Mechanical Engineering, Keio University, Yokohama/Japan,
(2) Graduate School of Engineering, Tohoku University, Sendai/Japan,
(3) International Research Institute of Disaster Science, Sendai/Japan,
(4) Graduate School of Environmental Studies, Tohoku University, Sendai/Japan,
(5) Institute of Industrial Science, the University of Tokyo, Tokyo/Japan

Long term behaviour of solid oxide electrolyser (SOEC) stacks (B0910)
Michael Lang, Corinna Bohn, Nageeb Alqubati, Michael Braig
German Aerospace Center (DLR), Inst. for Engineering Thermodynamics, Stuttgart/Deutschland

Degradation Analysis of SOFC Performance (B0911)
Tohru Yamamoto (1,2), Akifumi Ido (1), Koichi Asano (1), Hiroshi Morita (1,2), Yoshihiro Mugikura (1,2)
(1) Central Research Inst. of Electric Power Industry (CRIEPI), Kanagawa/Japan,
(2) Yokohama National University, Kanagawa/Japan

B12: Oxygen electrodes I
Proton Conductivity of BaCe0.2Zr0.7Y0.1O3 (B1207)
Izaak C. Vinke (1), Hans Kungl (1), L.G.J.(Bert) de Haart (1), Rüdiger-AEichel (1,2)
(1) Inst. of Energy and Climate Research, Fundamental Electrochemistry (IEK-9), Forschungszentrum Jülich GmbH, Jülich/Germany,
(2) Inst. of Physical Chemistry, RWTH Aachen University, Aachen/Germany

Composite Cathodes of Ba4Sr2Sm2Co4O15–BaCe0.5Pr0.3Y0.2O3–δ for PCFCs (B1208)
Toshiaki Matsui, Kohei Manriki, Kazunari Miyazaki, Hiroki Muroyama, Koichi Eguchi
Graduate School of Engineering, Kyoto University, Kyoto/Japan

Nanofibrous LaCoO3 perovskite cathode for solid oxide fuel cells fabricated via chemically assisted electrodeposition (B1209)
Seung-Bok Lee (1,2), Saeed Ur Rehman (1), Tak-Hyoung Lim (1,2), Jong-Eun Hong (1), Hye-Sung Kim (1), Dong Woo Joh (1), Seok-Joo Park (1,2), Rak-Hyun Song (1,2)
(1) Korea Inst. of Energy Research, Daejeon/Korea, (2) Korea Uni of Science and Technology, Daejeon/Korea
Sn Electrodeposition on Gas Diffusion Electrodes for the Electrochemical CO₂ Reduction (A1212)
Mila Manolova (1), Renate Freudenberger (1), Joachim Hildebrand (2), Elias Klemm (2), Fabian Bienen (3), Denis Kopiljar (3), Norbert Wagner (3)
(1) fem - Research Inst. for Precious Metals & Metals Chemistry, Schwäbisch Gmünd/Germany,
(2) ITC - Inst. of Chemical Technology, Uni of Stuttgart, Stuttgart/Germany,
(3) DLR – German Aerospace Center, Inst. of Engineering Thermodynamics, Stuttgart/Germany

CO₂ utilization in Power-to-liquid routes: effect of SOEC pressure on the synthesis of Fischer-Tropsch products (A1213)
Marco Marchese, Massimo Santarelli, Andrea Lanzini; Dept. Of Energy DENERG, Politecnico di Torino, Torino/Italy

Operation and Scale-Up of a Lab. scale Power-to-Liquid plant (A1214)
Gregor Herz, Michael Gallwitz, Paul Adam, Erik Reichelt; Fraunhofer IKTS, Dresden/Germany

Experimental investigation of reversible Solid Oxide Cells for fast switching between co-electrolysis and natural gas-based fuel cell operation (A1215)
Luca Mastropasqua (1), Alireza Saeedmanesh (1), Derek McVey (2), Jack Brouwer (1); (1) Advanced Power and Energy ProgramEngineering Lab. Facility, Uni of California, Irvine/USA, (2) HydroLoop, Inc., Irvine/USA

Boundaries of High-Temperature Co-Electrolysis of H₂O and CO₂ towards pure CO₂ electrolysis (A1216)
L. Dittrich (1, 2), E. J. Jaekel (2), S. R. Foit (1), I.C. Vinke (1), R.-A. Eichel (1,2), L.G.J. de Haart (1)
(1) Inst. of Energy and Climate Research, Fundamental Electrochemistry (IEK-9), Forschungszentrum Jülich GmbH, Jülich/Germany, (2) Inst. of Physical Chemistry, RWTH Aachen University, Aachen/Germany

Model-based assessment of the integration of a high temperature electrolysis in green steelmaking routes (A1217)
Nils Müller, Gregor Herz, Erik Reichelt, Matthias Jahn; Fraunhofer IKTS, Dresden/Germany

System Assessment of Synthetic Fuel Production via CO2/H2O Co-Electrolysis (A1218)
Samuel Sogbesan, Robert Steinberger-Wilckens; Centre for Fuel Cell & Hydrogen Research, School of Chemical Engineering, College of Engineering and Physical Sciences, Uni of Birmingham, Birmingham/UK

Utilization of Solid Wastes as H2S Adsorbent for Biogas-fueled SOFC System (A1219)
Hendrik Setiawan (1), Mio Sakamoto (2), Yusuke Shiratori (2,3)
(1) Dept. of Hydrogen Energy Systems, Graduate School of Engineering, Kyushu University, Fukuoka/Japan,
(2) International Research Center for Hydrogen Energy, Kyushu University, Fukuoka/Japan,
(3) Dept. of Mechanical Engineering, Faculty of Engineering, Kyushu University, Fukuoka/Japan

Combined effects of A-site non-stoichiometry, crystal structure and microstructure for enhanced catalytic activity of \((La, Sr)_(1-x)(Co, Fe)O_{3-δ}\) cathodes for IT-SOFCs (B1210)
Ozden Celikbilek (1,2), Cam-Anh Thieu (3,4), Fabio Agnese (5), Eleonora Cali (2), Christian Lenser (6), Norbert H. Menzler (6), Ji-Won Son (3,4), Stephen J. Skinner (2), Elisabeth Djurado (1)
(1) Univ. Grenoble Alpes, Univ. Savoie Mont Blanc, CNRS, Grenoble/France,
(2) Inst. of Materials, Imperial College London, London/United Kingdom,
(3) Div. of Energy Materials Research, Korea Inst. of Science and Technology (KIST), Seoul/Korea,
(4) Division of Nano & Information Technology, KIST School, Korea Uni of Science and Technology (UST), Seoul/Korea,
(5) Univ. Grenoble Alpes, Grenoble Cedex 9/France,
(6) Forschungszentrum Jülich GmbH, Inst. of Energy and Climate Research: Materials Synthesis and Processing (IEK-1), Jülich/Germany

Fe nano particle-dispersed Ni-YSZ hydrogen electrode for high-temperature solid electrolyzer cells (B1211)
Kyoung-Jin Lee, Min-Jin Lee, Haejin Hwang; Inha University, Incheon/Korea

Ceramic Composite Fuel Electrode of La(Sr)Cr(Mn)O₃/ Ce(Mn, Fe)O₂ for CO₂ reduction in Solid Oxide Electrochemical Cells (B1212)
Min Kyu Kim, Young Wook Lee, Tae Ho Shin; Energy & Environmental Division, Korea Inst. of Ceramic Engineering & Technology (KICET), Jinju-si/South Korea

B13: Cells, stacks, and interconnects

Design and Optimization of Fiber Electrodes for Direct Carbon Fuel Cells (B1307)
Min Xu, John T.S. Irvine; School of Chemistry, Uni of St Andrews, Scotland/UK

New concepts for solid oxide cells manufacturing: The use of 3D printing technologies (B1308)
Arianna Pesce (1)*, Maritta Lira Dos Santos (1), Natalia Kostretsova (1), Aitor Hornes (1), Alex Morata (1), Marc Torrell (1), Albert Tarancón (1,2)
(1) IREC, Catalonia Inst. for Energy Research, Jardins de les Dones de Negre 1, Barcelona/Spain,
(2) ICREA, Passeig Lluís Companys 23, Barcelona/Spain

Influence of spinel protective coating on Crofer interconnects conductivity (B1309)
Pierre Coquoz, Fabien Morand, Daniela Correia, Raphael Hijinger, Fiaxell Särl, Lausanne/Switzerland
Development of a zero-dimensional transient model of reversible SOE integrated PV system under real-world operating conditions (A1220)
Alper Can Ince, Mustafa Fazil Serincan, Selim Sivrioglu
Gebze Technical University, Faculty of Engineering, Mechanical Engineering Department, Kocaeli/Turkey

Integrating SOEs with a methanation reactor for methane gas production using an MCFC for CO2 capture from biogas (A1221)
Mohammed Kaazeem Ayodeji, Robert Steinberger-Wilckens; Centre for Fuel Cell & Hydrogen ResearchSchool of Chemical Engineering, College of Engineering and Physical Sciences, Uni of Birmingham, Birmingham/UK

Experimental Investigation of H2O and CO2 Electrolysis and H2O/CO2 Co-electrolysis (A1222)
Alireza Saeedmanesh (1), Luca Mastropasqua (1), Derek McVay (2), Jack Brouwer (1)
(1) Advanced Power and Energy ProgramEngineering Lab. Facility, Uni of California, Irvine/USA,
(2) HydroLoop, Inc., Irvine/California

Reversible solid oxide cell systems for integration with natural gas pipelines and grid energy management (A1223)
E. Reznicek, R.J. Braun; Colorado School of Mines, Dept. of Mechanical Engineering, Golden/Colorado/U.S.A

Evaluation of different CCUS systems based on the MCFC technology for decarbonising the power generation sector (A1224)
Stavros Michailos; Uni. of Sheffield, Sheffield/UK

A13: Products, demonstrations, novel concepts & BoP

Biogas cleaning and integration with solid oxide fuel cells (A1307)
Jan Van herle (1), Nina Montport (2), Marta Gandiglio (3), Serge Biollaz (4), Stephen McPhail (5), Sander Reijerkerk (6), Bertrand Morel (7), Frank Mittmann (8), Stefan Diethelm (10), Fabrizio Gualandris (11)

Analysis of gas phase transport effect in a planar SOFC (B1310)
Samuel Koomson, Arthur Ebenezer, Choong-Gon Lee
Dept. of Chemical & Biological Eng., Hanbat National University, Daejeon/Korea

Shaping of Mn1.5Co1.5O dense coating on flat and profiled metal surface (B1311)
Agnieszka Żurawska, Leszek Ajdys, Yevgeniy Naumovich
Inst. of Power Engineering, Dept. of High Temperature Electrochemical Processes, Warsaw/Poland

Comparison of different SOFC types running on bio-syngas at moderate working temperatures (B1312)
Benjamin Steinrücken (1), Michael Hauser (1), Stephan Herrmann (1), Christian Lenser (2), Sebastian Fendt (1), Hartmut Spleiethoven (1)
(1) Technische Universität München, Inst. for Energy Systems, Garching/Germany,
(2) Forschungszentrum Jülich GmbH, IEK-1, Jülich/Germany

Electrochemical study of thin film perovskite electrodes for SOEC applications (B1313)
Mykhailo Pidburtyni, Haris Ansari, Viola Birss
Department of Chemistry, University of Calgary, Calgary/Canada

In Situ Surface Modification of the Cathode for CO2 Electrochemical Reduction in SOEC (B1314)
Wenqiang Zhang, Bo Yu*, Jing Chen
Inst. of Nuclear and New Energy Technology, Tsinghua University, Beijing/P. R. China

B14: Oxygen electrodes II

Nanostructured La0.6Sr0.4Co0.2Fe0.8O3−δ/Gd0.2Ce0.8O1.9 Composite Cathode for High Performance IT-SOFC (B1407)
Kazuyoshi Sato (1), Chizuru Iwata (1), Naokatsu Kannari (1), Hiyori Abe (2), (2) Joining and Welding Research Institute, Osaka University, Osaka/JAPAN,
(3) Inst. of Industrial Science, The Uni of Tokyo, Tokyo/JAPAN

Characterization of oxidized iron-copper coated 441-type ferritic stainless steel interconnect material (B1408)
Line Larby, Ulf Bexell, Carlos Bernuy-López, Niklas Norby, Mikael Stenström, Jörgen Westlin
Surface Research, Strategic Research, AB Sandvik Materials Technology, Sandviken/Sweden
Solid oxide electrolyzer cells prototype based on self-produced electrode supported tape cast cells and powder metallurgy (PM) interconnects: The CoSin Project (A1308)
M. Carmen Monterde (1,2,3), L. Bernadet (2), A. Rodriguez (1), J. Arcos (1), F. Ramos (4), J. A. Calero (1), E. Jimenez-Piquè (3), M. Torrell (2)
(1) AMES PM Technical Center, Barcelona/Spain, (2) IREC, Catalonia Inst. for Energy Research, Dept. Advanced Materials for Energy, Barcelona/Spain, (3) Universitat Politècnica de Catalunya (UPC-EEBE), Barcelona/Spain, (4) FAE, Barcelona/Spain

Energy and Exergy evaluation of a novel tri-generation system using Solid Oxide Fuel Cell (SOFC) and Humidification-dehumidification (HDH) desalination unit (A1309)
Hamid Reza Abbasi (2), Hossein Pourrahmani (1), Nazanin Chitgar (2), Jan Van herle (1)
(1) Group of Energy Materials (GEM), Ecole Polytechnique Federale de Lausanne (EPFL), Sion/Switzerland, (2) School of Mechanical Engineering, Iran Uni of Science and Technology, Tehran/Iran

Biogas-powered reversible SOC system (A1310)
Stephan Herrmann, Hartmut Spliethoff
Lehrstuhl für Energiesysteme, Technische Universität München (TUM), Garching/Germany

Modeling a residential SOFC – hybrid desiccant cooling system and system analysis priority on cooling ability and CO₂ emission (A1311)
Yulho Lee (1,2), Sungjin Park (1), Sanggyu Kang (2)
(1) Dept. of Mechanical and System Design Engineering, Seoul/Korea, (2) Mechanical Engineering, Gwangju Inst. of Science and Technology, Gwangju/Korea

Experimental and CFD analysis of hotbox heat management using extended pipes (A1312)
Israel Torres Pineda (1), Van-Tien Giap (2), Young Duk Lee (1,2), Young Sang Kim (1), Dong Keun Lee (1), Kook Young Ahn (1,2)
(1) Center for Clean Fuel and Power Generation, Korea Inst. of Machinery & Materials (KIMM), (2) Dept. of Environmental and Energy Mechanical Engineering, Uni of Science and Technology (UST), Daejeon/South Korea

Extension of catalyst lifetime for application of diesel-fueled pre-reforming in a commercial SOFC system (B1409)
Tobias Schiekel, Elmar Pohl; OWI Oel-Waerme-Institut gGmbH, Herzogenrath/Germany

Nanocrystalline La₀.₆Sr₀.₄CoO₃ - δ oxygen electrodes fabricated by spray pyrolysis for solid oxide cells operating at intermediate temperatures (B1410)
Bartosz Kamecki (1,2), Jakub Karczewski (2), Piotr Jasiński (1), Sebastian Molin (1)
(1) Faculty of Electronics, Telecommunications and Informatics, Gdansk/Poland, (2) Faculty of Applied Physics and Mathematics, Gdansk Uni of Technology, Gdansk/Poland

Water effect on the overpotential at low currents in a SOFC (B1411)
Samuel Koomson, Arthur Ebenezer, Choong-Gon Lee
Dept. of Chemical & Biological Eng., Hanbat National University, Daejeon/Korea

B15: Lifetime: Cells, components and interfaces

Analysis of H₂S related performance degradation and regeneration of Ni/YSZ and Ni/GDC SOFCs fueled with biomass gasifier product gas (B1507)
Gernot Pongratz (1), Vanja Subotic (1), Christoph Hochenuer (1), Andrés Anca-Couce (1), Robert Scharler (2)
(1) Inst. of Thermal Engineering, Graz Uni of Technology, Graz/Austria, (2) BEST – Bioenergy and Sustainable Technologies GmbH, Graz/Austria

Direct Usage of real biogas in SOFC (B1508)
S. R. Folt (1), H. Abbas (1), I.C. Vinke (1), R.-A. Eichel (1,2), L. G. J. de Haart (1)
(1) Inst. of Energy and Climate Research, Fundamental Electrochemistry (IEK-9), Forschungszentrum Jülich GmbH, Jülich/Germany, (2) Inst. of Physical Chemistry, RWTH Aachen University, Aachen/Germany

Towards stable SOEC operation: identification of degradation-inducing operating parameters and degradation minimization by interlayer variation (B1509)
Vanja Subotic (1,2), Shotoar Futamura (2), George F. Harrington (3,4), Junko Matsuda (3), Katsuya Natsukoshi (2), Kazunari Sasaki (2,3,4)
(1) Inst. of Thermal Engineering, Graz Uni of Technology, Graz/Austria, (2) Dept. of Hydrogen Energy Systems, Faculty of Engineering, Kyushu University, Fukuoka/Japan, (3) Center for Co-Evolutional Social Systems (CESS), Kyushu Uni Fukuoka/Japan, (4) Next-Generation Fuel Cell Research Center (NEXT-FC), Kyushu University, Fukuoka/Japan
A14: Proton Conducting Cells, Stacks and materials

Numerical analysis of current density distributions in a tubular protonic ceramic fuel cell (PCFC) considering gas partial pressures and temperature influences (A1407)
Kunpeng Li (1), Toshiki Kawamura (1), Atsuhito Ota (1), Takuto Araki (2), Yuji Okuyama (3)
(1) Graduate School of Engineering, Yokohama National University, Kanagawa/Japan,
(2) Faculty of Engineering, Yokohama National University, Kanagawa/Japan,
(3) Dept. of Environmental Robotics, Faculty of Engineering, Uni of Miyazaki, Miyazaki/Japan
Cycle analysis of a PCFC system for CH4·H2O fuel considering hole conduction and temperature dependence (A1408)
Atsuhito Ota (1), Kunpeng Li (1), Toshiki Kawamura (1), Masashi Morii (2), Takuto Araki (3)
(1) Graduate School of Engineering Science, Yokohama National University, Kanagawa/Japan,
(2) Central Research Inst. of Electric Power Industry, Kanagawa/Japan,
(3) Faculty of Engineering, Yokohama National University, Kanagawa/Japan

A15: Cell, stack & system modelling and optimization

Fault identification in the solid oxide fuel cell stack: Classification based and hybrid approaches (A1507)
Periasamy Vijay, M. O. Tade, Zongping Shao; Dept. of Chemical Engineering, Curtin Uni, Western Australia/Australia
Part-load Operations of Water-Cooled Solid Oxide Fuel Cell Stack (A1508)
Mungmuang Promseng (1), Yosuke Komatsu (1), Anna Sciazzo (1,2), Shozo Kaneko (1), Naoki Shikazono (1)
(1) Inst. of Industrial Science, The Uni of Tokyo, Tokyo/Japan,
(2) Dept. of Fundamental Research in Energy Engineering, AGH Uni of Science and Technology, 30093 Krakow/Poland
Modeling and characterization of an intermediate temperature solid oxide fuel cell stack (A1509)
J. Lesmayoux (1), A. Jaafar (1), C. Turpin (1), J. B. Jollys (2), J. Góss (3), M. Noponen (3)
(1) LAPLACE, Uni of Toulouse, CNRS, Toulouse/France,
(2) Safran Power Unit, Toulouse/France,
(3) Eucogen, Vantaa/Finland
Optimum Electrode Design for Nanostructured Infiltration of Solid Oxide Fuel Cells (A1510)
Shiwoo Lee (1,2), Tao Yang (1,2), Bo Guan (1), Beomtak Na (1), Jian Liu (1,2), Harry Abernathy (1,2),
Thomas Kalapos (1,2), Gregory Hackett (1)
(1) U.S. DOE National Energy Technology Laboratory, (2) Leidos Research Support Team, Morgantown/USA

Degradation monitoring and performance optimization of rSOC (B1510)
Benjamin Königshofer (1), Gernot Pongratz (1), Pavle Boškoski (2), Dani Jurčič, Vanja Subotić (1)
(1) Inst. of Thermal Engineering, Graz Uni of Technology, Graz/Austria,
(2) Jozef Stefan Institute, Ljubljana/Slovenia,
(3) Inst. for Electron Microscopy and Nanoanalysis, Graz Uni of Technology, Graz/Austria

Effect of Strontium Segregation on Electrochemical Impedance Spectra for La0.6Sr0.4Co0.2Fe0.8O3-δ Cathodes (B1511)
Hirofumi Sumi (1), Hongqian Wang (2), Scott A. Barnett (2)
(1) National Inst. of Advanced Industrial Science and Technology (AIST), Nagoya/Japan,
(2) Northwestern University, Illinois/USA

SOFC directly fed with ammonia: performance and durability for two anode microstructures (B1512)
Bertrand Morel (1), Nunzia Coppola (2), Thibault de Sorbier (3), Cesare Pianese (2), Luigi Maritato (2), Julie Mougin (1)
(1) Univ. Grenoble Alpes – CEA/LITEN, Grenoble Cedex 9/France,
(2) Dept. of Industrial Engineering, Uni of Salerno, Fisciano (SA)/Italy,
(3) TechnipFMC - Technip France, Courbevoie/France

B16: Lifetime: Interconnects and contact layers

Application of composite coatings as protection/contacting layers for metallic high-chromium-content SOFC interconnect material (B1607)
Viktor Sauchuk (1), Nikolai Trofimenko (1), Hartwig Mugl (1), Stefano Rothe (1), Jochen Schilm (1), Martin Andritschky (2), Michael Hiller (2), Mihails Kusnezoff (1)
(1) Fraunhofer IKT, Dresden/Germany,
(2) High Tech Coatings GmbH - a Mila Group company, Vorchdorf/Austria
Computational analysis of mass transfer limitation in porous electrodes of solid oxide electrochemical cell (A1511)
Marcin Blesznowski (1), Monika Jalowiecka (1,2), Wojciech Orlicz (2), Lukasz Makowski (2), Jakub Kupecki (1); (1) Dept. of High Temperature Electrochemical Processes (HiTEP), Inst. of Power Engineering, Warsaw/Poland, (2) Warsaw Uni of Technology, Faculty of Chemical & Process Engineering, Warsaw/Poland

Analysing the Impact of Electrode Materials and Microstructures on SOFC Stack and System Level Performance (A1512)
Lukas Wehrle (1), Yuqing Wang  (1,2), Aayan Banerjee (3), Paul Boldrin (3), Nigel P. Brandon (3), Olaf Deutschmann (1); (1) Karlsruhe Inst. of Technology (KIT), Karlsruhe/Germany, (2) National Key Lab. on Electromechanical Dynamic Control, Beijing Inst. of Technology, Beijing/China, (3) Imperial College London, Dept. of Earth Science and Engineering, London/UK

Towards model-based optimization of CGO/Ni anodes (A1513)
Philip Marmet (1), Lorenz Holzer (1), Thomas Holder (1), Jan G. Grolig (2), Andreas Mai (2), Joseph M. Brader (3); (1) Zurich Uni of Applied Sciences, Inst. of Computational Physics, Winterthur/Switzerland, (2) Hexis AG, Winterthur/Switzerland, (3) Uni of Fribourg, Dept. of Physics, Fribourg/Switzerland

Estimation of triple-phase boundary activity in LSCF-GDC cathode of solid oxide fuel cells (A1514)
Masashi Kishimoto (1), Shunya Hanai (1), Tomoki Kimura (1), Yuya Tanimura (1), Hiroshi Iwai (2), Hideo Yoshida (1); (1) Dept. of Aeronautics and Astronautics, Kyoto University, Nishikyo-ku Kyoto/Japan, (2) Dept. of Mechanical Engineering and Science, Kyoto University, Kyoto/Japan

Characteristics of a Planar SOFC With Load Variation (A1515)
Hiroyuki MISE (1), Masahiro Nakamura (2), Yua Tachikawa (1,3), Hiromichi Nakajima (1,3), Kohei Ito (1,3); (1) Dept. of Energy Conversion and Storage, Technical Uni of Denmark (DTU), Lyngby/Denmark, (2) Energy Materials Laboratory, Korea Inst. of Energy Research (KIER), Daejeon/Republic of Korea, (3) Dept. of Mechanical Engineering, Faculty of Engineering, Kyushu University, Fukuoka/Japan

Anode and electrolyte supported Solid Oxide Fuel Cells: experimentation and modelling (A1516)
Aiswarya Krishnakumar Padinjarethil (1), Fiammetta Rita Bianchi (2), Barbara Bosio (2), Anke Hagen (1); (1) Dept. of Energy Conversion and Storage, Technical Uni of Denmark (DTU), Lyngby/Denmark, (2) PERT-Dept. of Civil, Chemical and Environmental Engineering, Uni of Genoa, Genoa/Italy

Modeling and simulation of an H2 production system based on solid oxide electrolysis (A1517)
David Abad (1,2), Fernando Vega (1), Benito Navarrete (1); (1) Chemical and Environmental Engineering Department, School of Engineering, Uni of Seville, Seville/Spain, (2) National Hydrogen Center. Prolongación Fernando el Santo, Puertollano (Ciudad Real)/Spain

A16: System design & performance & BoP
High efficient SOFC system with CFY-stack module operated with gasified biomass - HieffBioPower - (A1607)
Stefan Megel (1), Jens Schnetter (1), Mihails Kusnezoff (1), Martin Hauth (2), Stefan Weissenstein (2), Michael Seidl (2), Christopher Sallai (2), Gerhard Weiß (3), Thomas Brunner (3), Ingwald Obenberger (3); (1) Fraunhofer IKTS, Dresden/Germany, (2) AVL List GmbH, Graz/Austria, (3) BIOS BIOENERGIESYSTEME GmbH, Graz/Austria

Design of a 10-kW SOFC Hot Box Module with Recirculation (A1608)
Maximilian Hauck (1), Sebastian Wilhelm (1), Stephan Herrmann (1), Felix Fischer (1), Jeremias Weinrich (2), M. Gaderer (2), Sebastian Fendt (1), Hartmut Stipliehoff (1); (1) Technical Uni of Munich, Chair of Energy Systems, Garching/Deutschland, (2) Technical Uni of Munich, Regenerative Energy Systems, Straubing/Deutschland

Consistent modeling and testing theory of high effectiveness heat exchange perfromance by means of Shannon 1948 entropy (A1609)
Jean-Paul Janssens (1), Michel Dubuissonne (2); (1) R&D BOSAL Energy Conversion Industry, Lummnen/Belgium, (2) BOSAL Energy Conversion Industry, Vianen/The Netherlands

Experimental and CFD analysis of hotbox heat management using extended pipes (A1610)
Israel Torres Pineda (1), Tien Giap Van (2), Young Sang Kim (1), Young Duk Lee (1,2); (1) Environental Systems Research Division, Korea Institute of Machinery & Materials, Daejeon/South Korea, (2) Department of Environmental and Energy Mechanical Engineering, University of Science and Technology (UST), Daejeon/South Korea

Online characterization of operational parameters in a SOFC-system with anode-exhaust gas recirculation by oxygen sensors (A1611)
Felix Schaefer (1), Sebastian Egger (1), Dietmar Steiner (1), Rüdiger-A. Eichel (2); (1) Robert Bosch GmbH, Renningen/Germany, (2) Institut für Energie- und Klimaforschung (IEK-9), Forschungszentrum Jülich, Jülich/Germany

Development of Reversible Electrolysis-Fuel Cell Stacks using 100 cm³ Anode-supported Flat-tubular cells (A1612)
Segi Byun, Sun-dong Kim, Tae Woo Kim, Yoonseok Choi, Doo Won Seo, Hyo Jung Hwang, Sang-Kuk Woo; Energy Materials Laboratory, Korea Inst. of Energy Research (KIER), Daejeon/Republic of Korea
At the time of print of this Final Announcement the following developers, material, measurement tool and component supplies as well as research institution had registered for the exhibition.

<table>
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<td><a href="http://www.eci.bosal.com">www.eci.bosal.com</a></td>
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United States
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ZAHNER-elektrik GmbH & Co. KG
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Germany
www.zahner.de

**EFCF 2021**
29 June – 2 July

**EFCF 2022**
14 – 17 June

**BOOK your BOOTH**
www.EFCF.com/ByB
Welcome Gathering
Tuesday, 20 October: 18:00, in the exhibition, ground floor: Meet old friends, find new contacts, and enjoy the splendid view of lake and historic town – a perfect start to the conference.

Swiss Surprise (optional, limited to 80 participants)
Wednesday, 21 October: 18:30, place to be announced. A special surprise is offered in an unusual place close to Lucerne: An enjoyable evening with Swissness, music, drinks, and dinner. Tickets are sold on a first-come-first-serve-basis for CHF 120 per person. During your on-line registration (www.EFCF.com/Registration) please select the option to purchase tickets in advance for you and your guests.

Dinner on the Lake
Thursday, 22 October: 19:30 Pier 6 („Brücke 6“) next to Congress Center: A very special pleasure-boat (flagship of the fleet) will take us on a tour of the lake past a magnificent landscape to the „Rutli“ glade, birthplace of Switzerland (1291). Enjoy the unique blend of music, drinks, and a candle-light dinner while gliding past beautiful scenery. Live music contributes to this unforgettable evening. This event is included in the registration fee. Please choose this option during your on-line registration on www.EFCF.com/Registration or use the registration form at www.EFCF.com/Download to purchase additional tickets for your guests (CHF 120 per person).

Entertainment for Accompanying Persons
During the European Full Cell Forum your guests and yourself have the possibility to explore the beautiful region of Lucerne together with an experienced local guide. Bucher Travel Inc. and the Lucerne Tourist Office are able to organize for you and your guests entertaining trips around local attractions. It is possible to take a tour of Lucerne visiting the medieval part of the city, followed by a tour of the picturesque surrounding area e.g. Mount Pilatus, the Glass Factory & Mount Stanserhorn, etc. The excursions are arranged locally on a daily basis depending on weather conditions and requests. To get more information about the programs and to book an activity, please visit www.EFCF.com — Registration — Spouse Programmes or contact in advance Bucher Travel Inc., booking@buchertravel.ch, +41 41 418 55 46 and/or visit www.luzern.com. The EFCF team can support you on-site at the registration desk in finding further offers and opportunities, except during the main registration time (Tuesday afternoon, Wednesday morning). Accompanying persons may participate in the „Swiss Surprise“ and „Dinner on the Lake“ for CHF 120.– per person as well as in the lunches on the terrace of the KKL. Please purchase guest tickets as long as they are available during your on-line registration. Additional lunch tickets are only sold on site until fully booked. The exhibitions can always be visited for free.

Tutorial Registration
The registration fee for either Tutorial (FC & H₂ or EIS) includes the lectures with documentation, business lunch, snacks, coffee, refreshments, and access to the exhibition and poster area. You can also register for a Tutorial without participating at the Scientific Conference. Please indicate your choice during the easy on-line registration at www.EFCF.com/Reg or download the registration form at www.EFCF.com/Download.

The tutorial fees are as follows:
FC & H₂ – Fuel Cells and Hydrogen Tutorial CHF 500.–
EIS – Electrochemical Impedance Spectroscopy Tutorial CHF 500.–
EIS Tutorial for EFCF 2020 Registered Participants CHF 350.–
All participants enjoy full conference privileges. Accompanying persons and guests are kindly asked to buy tickets for meals and social events at the registration desk. The following conference privileges are included in the conference package:

- Participation in the conferences, access to the poster and exhibition areas
- Access to on-line electronic proceedings, agenda and bag inserts
- Download rights after the conference at www.EFCF.com/Lib of
  - presentations accessible with author permission
  - proceedings from this year and former years
- Participation in all networking events:
  - Tuesday: Welcome Gathering with drinks and snacks
  - Thursday: Dinner on the Lake on the historical paddle wheel steamers
- Three business lunches (Wednesday to Friday)
- Refreshments during intermissions, breaks and goodbye close.

Not included:
Tutorials (can be booked separately), Swiss Surprise on Wednesday night (tickets to be ordered when registering for the conference www.EFCF.com/Registration), GSM 2020 symposium on European grid service Markets (21–22 October 2020, www.GridServiceMarkets.com, reduced fee for EFCF 2020 participants, to be booked during www.EFCF.com/Registration)
The following admission fees* apply: www.EFCF.com/Fee

**Students, Trainees, Unemployed**
Full-time students (age 26 or younger with valid identification) CHF 700.–

**Academic Staff, Government, Consultants**
CHF 1400.–

**Industry, Trade and Commerce**
Fuel cell developers, manufacturers and distributors pay an extra CHF 600.– to support the participation of students and trainees. This event provides an excellent platform for recruitment. Participants from industry and commerce benefit from the student support. CHF 2000.–

**Rebates**
Interesting rebates are possible for group reservation (one bill), for exhibitors (up to 55%) agreed long-term promotion activities and GSM 2020 attendees. Applications to be sent to forum@efcf.com
Surcharge on current fee* for Late Registration
Extra fee for late registration after 31 August 2020 CHF 100.–
Extra fee for on-site registration after 18 October 2020 CHF 250.–

**One-Day Tickets**
Registration includes full access to on-line conference proceedings and one Forum Agenda, as well as all conference privileges of the day, plus download of presentations accessible with author permission. Please register on-line at www.EFCF.com/Registration in advance, or at the registration desk (extra fees apply). CHF 700.–

**Tutorials**
FC & H₂ – Fuel Cells and Hydrogen Tutorial CHF 500.–
EIS – Electrochemical Impedance Spectroscopy Tutorial CHF 500.–
EIS Tutorial for EFCF & GSM 2020 Registered Participants CHF 350.–

Extra Ticket for Dinner on the Lake
Additional guests tickets for the „Dinner on the Lake“ evening event on Thursday are sold on a first-come-first-serve basis. Please order your guests tickets on-line at www.EFCF.com/Registration during your registration or ask on-site. CHF 120.–

**Swiss Surprise Night (optional)**
Tickets for the entertaining evening event „Swiss Surprise“ on Wednesday night are sold on a first-come-first-serve basis. Participation is limited to 80 persons and is not included in the conference fee. Please order your and your guests tickets on-line at www.EFCF.com/Registration during your registration or ask on-site. CHF 120.–

* Fees are incl. 7.7% VAT where applicable and valid from 1. July 2020. Early bird fees from before are then no longer valid.

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Register with no Risk or participate VIRTUALLY in case of no show due to Covid restrictions Reimbursement of the Fees

**Virtual Fees**

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<th>Category</th>
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<td>Students, Trainees, Unemployed</td>
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<td>Industry, Trade and Commerce</td>
<td>€ 200.–</td>
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<tr>
<td>EIS – Electrochemical Impedance Spectroscopy Tutorial</td>
<td>€ 200.–</td>
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<tr>
<td>EIS Tutorial for EFCF &amp; GSM 2020 Registered Participants</td>
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**Payment of the Registration Fee** www.EFCF.com/TaC

Bucher Travel Inc. handles all On-line conference registrations and hotel reservations. The registration fee can be paid by credit card or via bank transfer if sufficiently ahead of time. Payments are confirmed in writing, institutions and companies may request invoices for
registration of employees on company stationery. Please accept all bank charges related to the transfer expenses to your payment. All payments must be made in Swiss Francs (CHF). Foreign currency exchange rates for March 2020: 1 CHF ≈ 0.94 EUR ≈ 1.00 USD ≈ 112 JPY ≈ 0.79 GBP. Registrations are accepted as long as space is available.

Cancellation of Registration

Written cancellations of confirmed registrations should reach Bucher Travel Inc. before 20 September 2020. Fees already paid will be refunded, however a charge of CHF 300.– is applicable to cover administration expenses and the cost of the Electronic Proceedings that will be mailed to the registrant after the event. No refunds can be made for cancellations received after 20 September 2020. Withdrawing registrants will receive the Electronic Proceedings of the 2020 conference. Register with no risk: in case of no show due to Covid restrictions. Reimbursement of the Onsite-Fees.

Free Project Meeting Support Enquiry

Stakeholders interested in the free Organisational Support Service for their project, set-up, or other issue-meetings can get more information at www.EFCF.com/FPM or via email to forum@efcf.com.

Hotel Reservation

The hotel can also be booked On-line: www.EFCF.com/Registration Button „Hotels“. Bucher Travel Inc. handles all hotel bookings and will confirm the hotel reservations by email and send you information about Lucerne. Hotel expenses can be paid at the hotel to the hotel management.

If there are further needs contact Bucher Travel, booking@buchertravel.ch, Phone: +41 41 418 55 46 and/or visit alternative common hotel booking portals. The European Fuel Cell Forum is not responsible for hotel accommodations. Please make sure to book and register ONLY ONCE!

Lucerne (view video clip) www.EFCF.com/Lucerne

Lucerne is located in the heart of Switzerland on the Lake of Lucerne admired for its beauty and tranquillity. Nostalgic paddle wheel steamers connect the romantic town to charming sites. From there you may ascend picturesque „Mount Rigi“ and steep „Mount Pilatus“, or reach the high regions in the Alps of Switzerland. Cogwheel mountain trains, cable cars or aerial tramways take you past alpine scenery to breath-taking panoramic views of the Top of Switzerland. Most of the places can be reached between 1 – 3 hours travel.

Lucerne itself is built along the „Lake of Lucerne“ and the „Reuss River“, outflow of the lake. The medieval part is closest to the waterfront. Bridges connect both banks. The famous wooden „Kapellbrucke“ has been perfectly rebuilt by local artisan after total destruction by a catastrophic fire in 1993. Lucerne is located in the heart of Western Europe and is an ideal start location for further travels around the continent before or after the conference.
The event is endorsed by

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Travel Information

Swiss International Air Lines are proud to be the Official Carrier for the European Fuel Cell Forum, and is offering special Congress Fares to all participants. These Congress Fares offer reductions of up to 10% depending on the fare type, route, and space availability.

Congress Fares are valid on the entire SWISS route network for flights to Switzerland, including flights operated by partner airlines under an LX flight number. These fares are now bookable for the travel period 14 days prior to and 14 days after the event.

Only registered congress participants and exhibitors can take advantage of this offer. After successful on-line registration at www.EFCF.com/Registration your EVENTCODE will be provided for an easy and convenient booking through SWISS.com via the following link www.swiss.com/event Please enter your email address and the given EVENTCODE.

The special SWISS congress fares are marked with a white triangle. They may not necessarily be the lowest fare, but they offer greater flexibility in the event of rebooking or cancellation.

By car, train or bus:
The Gotthard trans-alpine autobahn and railway pass through Lucerne, and provide easy access by car, train or bus from north or south. Lucerne is ca. 1 hour from Zurich.

EFCF also offers info and support, if you would like to get picked up by a taxi or bus, preferable when you travel in groups, and/or intend to add a business or private trip possibly with accompanying persons, please send your requests to forum@efcf.com.

By airplane:
Zurich is the gateway for the European Fuel Cell Forum. Choose Zurich as your destination. The Official Carrier SWISS offers special conference rates for convenient direct flights to Zurich from all major locations. From Zurich airport you can take a direct train to Lucerne. The train station is below the airport terminal complex, and direct trains leave at 15 minutes past the hour. There are three more trains per hour that require easy changing in Zurich. The pleasant train journey takes a little over 1 hour. Most hotels are within walking distance from the Lucerne train station and the conference location at the KKL.

We hope you have a pleasant journey and we look forward to welcoming you in Lucerne!