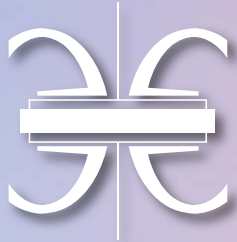


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Low-Temperature Fuel Cells, Electrolysers & H₂ Processing Fundamentals & Engineering Design



23rd Conference in Series
Exhibition, Tutorials, OEM Status, Grid Markets
2 – 5 July 2019
Lucerne, Switzerland


Chaired by

Prof. Hubert A. Gasteiger
Prof. Aliaksandr Bandarenka
TUM Technical University of Munich

Featuring

Hydrogen Fuel Cells (PEFC, HT-PEM, AFC, PAFC)
Direct Fuel & Microbial/Enzymatic Fuel Cells
Water Electrolysis (PEM, Alkaline) & CO₂ Reduction
H₂ Purification, Compression, Storage & Distribution

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- **H₂ Purification, Compression, Storage & Distribution**

Scope of the Forum

Recently, there has been remarkable progress in the wider commercialization of devices and technologies which use low-temperature FUEL CELLS and ELECTROLYZERS. These technologies are strongly linked to HYDROGEN and its PROCESSING – which will be featured at the EFCF 2019. The conference topics (given below) span the wide range of challenges, from FUNDAMENTAL understanding of the relevant materials as well as of the kinetics and mass/heat transport processes in operating cells, all the way to their implementation in real-world devices, requiring optimized ENGINEERING DESIGNS.

A Scientific Advisory Committee www.EFCF.com/SAC has been formed to evaluate and structure the technical programme. This panel exercises full scientific independence in all technical matters. All presented papers (oral & poster) will be collated in electronic proceedings available to registered participants. A final version with ISBN will be published in www.EFCF.com/Library. In addition, various other scientific publication possibilities are offered (see Publication Policy). All participants will also receive up-dated programmes of the conference and special events.

The 23rd Forum in series continues the tradition as a well recognized international event for science and industry in these fields. Although a European based event, participants from all continents contribute and attend. The Forum has evolved since 2013 to the largest international event and leading meeting place in Europe dedicated to Hydrogen FC. It is an excellent platform for scientists, engineers and manufactures to present recent technical progress, industrial achievements and inventions. New contacts are established in the unique networking events, which allow a fruitful exchange on technology and business.

Technical Status and Achievements: The following companies have presented in the previous EFCF editions:

Automotive OEM: Audi, BMW, Daimler, Fiat, Hyundai, Honda, Nissan, Renault, Toyota
 Electrolyser and Hydrogen Industry: AirLiquide, AREVA/Helion, Giner, Hydrogenics, IHT, ITM, Linde, NEL/Proton OnSite, Shell, Siemens

Technical Programme

www.EFCF.com/Conference

The three day technical conference will feature parallel lectures of invited and contributed papers and posters. Care will be taken by the Scientific Advisory Committee to ensure that all presentations are of consistent high quality, yet understandable for participants with limited exposure to the subjects.

The EFCF 2019 conference topics are set, but not limited to:

Fundamentals of low-temperature fuel cells

- Electrocatalysis of the oxygen reduction and the hydrogen oxidation reaction
- Membrane materials for acidic & alkaline fuel cell
- Design of membrane electrode assemblies (MEAs)
- Pt and Pt-free electrocatalysts
- Catalyst and MEA degradation mechanisms

Electrolysis and electrolysers

- Electrocatalysts for the oxygen and hydrogen evolution reactions
- Electrolysis in alkaline and acidic media
- CO₂ reduction to fuels and chemicals

Direct fuel cells

- Methanol and ethanol oxidation
- Glucose oxidation
- Microbial and enzymatic fuel cells and electrolysis
(see separate call www.I-MEEP.com)

Advanced diagnostics & modeling

- Transport characterization in porous transport layers
- Analysis of MEA degradation and evaluation of mitigation strategies
- Operando analysis
- Modeling of kinetics and transport

Applications and design of fuel cells, electrolysers and systems

- Design of MEAs and flow-fields for high current density operation
- Stack and stack component design and operation
- Stack and system characterization and integration
- Durability, lifetime, and LCA
- Balance of plant components for fuel cells and electrolysers
- Other pioneering applications and systems (sensors, etc.)

Hydrogen processing

- Purification and Compression
- Materials and devices for on-board and off-board storage
- Distribution and Fuelling
- Balance of plant components

Market and deployment

- Major regional & company demonstration and developments
- Early-market applications (fork lifts, etc.)
- Hydrogen vehicles and infrastructure, integration, testing, applications and markets
- Combined heat and power
- Portable devices
- Hydrogen economy models and scenarios competing technologies
- H₂FC assessment, applicability & education

Publication Policy

www.EFCF.com/PP, www.EFCF.com/Library

All oral and poster presentations are published in Electronic Proceedings distributed to the participants. As in previous years a limited number of contributions will be invited to be included in a Special Issue in the Journal "Fuel Cells – From Fundamentals to Systems" published by Wiley-VCH. The 2012 – 2017 selected papers have been published for reference: EFCF 2013 – Volume 14, Issue 5 pg 671–774; EFCF 2015 – Volume 16, Issue 4 pg 404 – 515 (www.EFCF.com/SI). The other contributions will be published as open access on-line publication with **ISBN 978-3-905592-24-5** on www.EFCF.com/Proceedings.

Authors who do not wish to be included in the ISBN web publication, e.g. due to publication elsewhere, can opt out and the copyright remains with the authors. Final Announcement, programme and registration details are distributed by letter post, email and on www.EFCF.com/FA in March 2019.

Abstract Submission

www.EFCF.com/AuthorCentre

Members of academic institutions, R&D organizations, engineering firms and industry are invited to submit contributions for oral or poster presentation at the EFCF 2019 featuring Low-Temperature Fuel Cells & Electrolysers and H₂ Processing. Papers must be submitted via the Author Centre by 30 November 2018.

The submission procedure is:

1. Download Abstract Template, Instructions & Samples from www.EFCF.com/Download
2. Upload your one-page abstracts at www.EFCF.com/Upload by **30 November 2018**
3. Receive notification about acceptance in February 2019. This obligates you to submit a full length manuscript by 30 April 2019, which is a condition to be scheduled as either an oral or poster in the final program.

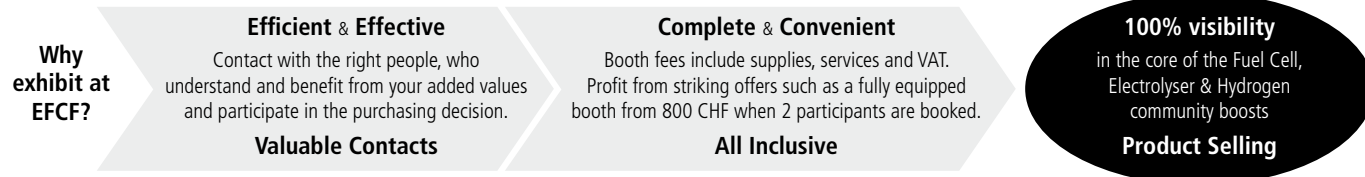
LATE CONTRIBUTIONS:

Become immediately a **New Author** and submit your abstract. Evaluation started and it will become more and more difficult to consider late uploads for the inclusion in the oral programme.

Please consult the time schedule for details of **privileges offered for early registration**. EFCF cannot provide financial support to authors of papers. Presenting authors are required to register for the forum and to pay the appropriate registration fee. **Attractive rebates** are offered for group registration (starting from 3 people), and exhibitors are entitled to up to a 55% rebate on conference fees, and may additionally profit from 'Early Bird' and loyalty discounts on booth fees. See below „Why exhibit at EFCF“ your products and services. For Frequently Asked Questions please visit www.EFCF.com/FAQ or email TUM@efcf.com.

Exhibition

www.EFCF.com/Exhibition registration on www.EFCF.com/ByB



Forum

Time Schedule and Events

www.EFCF.com/Schedule, www.EFCF.com/Events

30 November 2018		LATE CONTRIBUTION are still accepted: Become a New Author and www.EFCF.com/UPLOAD immediately
1 March 2019		Deadline for early registration privileges
15 March 2019		Final Announcement with definitive oral programme as well as up-to-date poster and exhibitor list
30 April 2019		Deadline for regular registration privileges and holding of convenient hotels
2 July 2019	11:00–16:00	Exhibition & poster set-up, 16:00 Opening of Exhibition and Registration, 18:00 “Welcome Reception”
	10:00–17:00	Tutorials: 1. EIS: Electrochemical Impedance Spectroscopy; 2. FC&H ₂ : Fuel Cells, Electrolyser & H ₂
3 July 2019	09:00–18:00	International and Industrial Overviews – Keynotes – Oral and Poster Sessions, Exhibition
	18:30	“Swiss Surprise Night”: An enjoyable exchange event with Swiss cuisine, folklore, culture and drinks
4 July 2019	09:00–18:00	Keynotes – Oral and Poster Sessions, Exhibition, Special Events such as Grid Symposium etc.
	19:30	“Dinner on the Lake”: Unique pleasure boat tour with music and picturesque scenery, an unforgettable networking event
5 July 2019	09:00–17:00	Oral and Poster Sessions – Plenary Keynotes, Exhibition, Schoenbein Medal Award, Closing Ceremony

Venue

www.EFCF.com/Lucerne

EFCF events are traditionally held at the Culture and Convention Centre Lucerne (KKL) in conjunction with the Fuel Cell, Electrolyser & H₂ Technology and Supplier Exhibition and the popular FC&H₂ Tutorial. An Electrochemical Impedance Spectroscopy (EIS) Tutorial and special Microbial Electrochemistry and Grid Service Markets events are additionally organised. The KKL conference centre is a well-known location on the picturesque waterfront of the Lake Lucerne, easy to reach by plane and train, and within a short walk from charming hotels and the historical town centre.

Fees

www.EFCF.com/Fee

- Students, trainees and unemployed persons etc. with valid identification 580 CHF incl. 7.7% VAT where applicable
- Members of government, universities, consultants etc. 1280 CHF incl. 7.7% VAT where applicable
- Members of industry and commerce (incl. 600 CHF donation for student support) 1880 CHF incl. 7.7% VAT where applicable
- Late charge for registrations from 01 March/01 May 2019/for On-Site registration 120/220/370 CHF incl. 7.7% VAT where applicable
- EIS Tutorial: Electrochemical Impedance Spectroscopy: Regular (ask for early bird & group rebate) 500 CHF incl. 7.7% VAT where applicable
For EFCF 2019 participants 350 CHF incl. 7.7% VAT where applicable
- FC&H₂ Tutorial: Fuel Cells & Hydrogen: Regular (ask for early bird & group rebate) 500 CHF incl. 7.7% VAT where applicable

One Swiss Franc (“CHF”) is valued at about 0.88 EURO, 1.03 US Dollar, 113 YEN, 6.87 CNY (Sep 2018). The fees include access to **conference** and **exhibition**, **conference proceedings** of the EFCF 2019, **conference bag**, **business lunches**, **refreshments**, **welcome reception** on Tuesday with wine and beer and the **Dinner on the Lake** on Thursday (pleasure boat trip on picturesque lake). Optional: Swiss Surprise on Wednesday (120 CHF pp). **Post conference access** to all allowed presentations and available ISBN proceedings back to 1994 is included.

Support: Excellent Student Support Fund www.EFCF.com/ESSF

The ESSF offers support to 3 students **providing first class scientific contributions** in the form of **free registration** and a **contribution towards accommodation**.

Researcher Support & Sponsorship www.EFCF.com/RSS

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Chairs of the Conference



Prof. Hubert A. Gasteiger

TUM
Technical University of Munich,
Germany

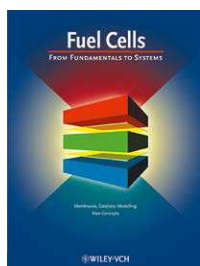
received his Ph.D. in Chemical Engineering from UC Berkeley (1993). After postdoctoral studies at the Lawrence Berkeley National Laboratory (1994–1995) and Ulm University (1996–1998), he joined the GM/Opel fuel cell program (Honeye Falls, USA) as Technical Manager (1999–2007), leading the development of catalysts and membrane electrode assemblies. In 2009 he held a Visiting Professorship at MIT, followed by his appointment as Chair of Technical Electrochemistry at the Technical University of Munich (2010), developing materials, electrode designs, and diagnostics for PEM fuel cells/electrolyzers and (post-)lithium ion batteries. He has published 160 refereed articles (h-index 67), 15 book chapters, 38 patent applications/patents, and was Editor-In-Chief for Wiley's Handbook of Fuel Cells (2003 and 2009). In 2004, he received the Klaus-Jürgen Vetter Award of the ISE and was promoted to GM Technical Fellow. He became ECS Fellow in 2011, and in 2012 he received the Eminent Visitor Award from the Catalysis Society of South Africa and the Grove Medal. Recently he received the Grahame Award (2015) and the Energy Technology Division Research Award (2017) of the ECS.



Prof. Aliksandr Bandarenka

TUM
Technical University of Munich,
Germany

conducts research in the area of the physics of energy conversion and storage. His main topics include the design and implementation of functional materials for fuel cells, batteries and supercapacitors through a better understanding and characterization of electrified interfaces. After obtaining his PhD in 2005 he was a postdoctoral researcher at the University of Twente in the Netherlands, and the Technical University of Denmark. In 2010, he became a group leader at the Center for Electrochemical Sciences (CES) at Ruhr University Bochum, Germany. Since 2014 he has been a W2 professor at the Department of Physics, Technical University of Munich. He has published 100 refereed articles and received the German National Ernst Haage Award (2016) for the research in the field of chemical energy conversion and the Hans-Jürgen Engell Award of the International Society of Electrochemistry (ISE Prize for Electrochemical Materials Science, 2013).

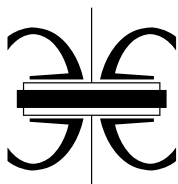


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EFCF²⁰¹⁹

Low-Temperature
Fuel Cells, Electrolyzers & H₂ Processing
2 – 5 July 2019, Lucerne, Switzerland

- This 23rd high-level international event offers an honest presentation of the state-of-the-art technology in beautiful Switzerland
- Up-to 300 technical contributions with full length manuscripts, available to download as Proceedings
- Modern conference facilities with top services, excellent food and refreshments
- Unique networking events: "Welcome Reception", "Swiss Surprise", and "Dinner on the Lake"
- Pleasant walking from hotels to conference centre

International Exhibition of fuel cell, electrolyser and hydrogen products and components. See www.EFCF.com/IMPRESSIONS