



Fraunhofer
UMSICHT



Virtual Colloquium on May 19, 2022

Electrochemical Cell Concepts Colloquium – E3C

Platform for interdisciplinary exchange
on electrochemical reactors

Electrochemical Cell Concepts Colloquium – E3C

Already for the third time, the “Electrochemical Cell Concepts Colloquium – E3C” is taking place, organized by the Fraunhofer UMSICHT. It was established to serve as a platform for the interdisciplinary exchange of innovations and scientific findings in the field of electrochemical reactors.

The colloquium is focused on the question which similarities and potential combinations the designs and characteristics of the different reactor types have in common. This includes non-flow and flow reactors – like batteries, flow batteries, fuel cells, electrolysis, electrosynthesis or electro dialysis cells.

Scientists from different fields of application can combine their expertise so that the technologies can benefit from each other's developments and innovations, in order to advance the overall state of research.

This interdisciplinary exchange on the design of electrochemical reactors is in this year divided into three sessions:

- Functional components
- CO₂ conversion and capture
- Characterization and optimization

Highlights in 2022:

- E3C will be accompanied again by Graphical Recording with an immediately graphical summary of the talks.
- A contribution will be published as mini papers in a conference proceeding with DOI via Fraunhofer-ePrints.
- The best oral presentation and the best poster will be honored with the E3C award.



We established the E3C to provide a non-profit platform for the interdisciplinary exchange on similarities and potential combinations of electrochemical reactors, to advance the overall state of research.”

Dr. Jan Girschik,
Organizer of the E3C

Organizer

Fraunhofer UMSICHT is a pioneer for a sustainable world. With our research in the areas of climate-neutral energy systems, resource-efficient processes and circular products, we make concrete contributions to achieving the 17 Sustainable Development Goals (SDGs) of the United Nations.

Competence of the department “Electrochemical Energy Storage”

We develop electrochemical energy storage systems for the demand-oriented provision of electricity. Our concepts contribute to the sector coupling of energy and production. We specialize in the development and manufacture of batteries and in the technological, economic and systemic evaluation of power-to-x technologies.

Organizational



Registration form

Registration and participation fee

Please register by May 16 using our online registration at s.fhg.de/E3C22-EN.

The participation fee is 60 €. A contingent of free tickets is available for students (presentation of a certificate of study is required). If this is exhausted, the reduced participation fee is 20 €. The fee will be charged by invoice. You will receive a confirmation of participation by e-mail. In case of non-participation without prior written cancellation (at least 1 week before the event), we will charge the full participation fee. Members of the UMSICHT Friends and Patrons Group attend the event free of charge (1 participant per company).

The event takes place online via Microsoft Teams. All you need to participate is an internet browser. You will receive the link to the virtual conference room by e-mail one day before the event.

Contact

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Program

Thursday, May 19, 2022

8:20 Opening

Dr. Jan Girschik, Prof. Dr. Christian Doetsch
Fraunhofer UMSICHT, Oberhausen, Germany

Keynote

8:30 Direct visualization of electrochemical reactions in operando flow-cell electrodes and novel flow-cell concepts for electrochemical CO₂ capture

Prof. Dr. Michael Aziz
Harvard University, Boston, USA

Session 1

Functional components

Chair: Dr. Michael Joemann, Fraunhofer UMSICHT, Oberhausen, Germany

9:20 Mass transport control in electrocatalysis using porous 3D structured electrodes

Nils Weber, Tobias Harhues
RWTH Aachen University, Aachen, Germany

9:40 Reducing the foot print of graphite composite bipolar plates

André Kayser
The hydrogen and fuel cell center ZBT GmbH, Duisburg, Germany

10:00 Mass transport to 3D printed porous electrodes

Dr. Luis F. Arenas
Clausthal University of Technology, Clausthal-Zellerfeld, Germany

10:20 COFFEE BREAK

Session 2

CO₂ conversion and capture

Chair: Prof. Dr. Ulf-Peter Apfel, Ruhr-Universität Bochum, Bochum, Germany

10:50 Coupling of electrochemical CO₂ conversion with CO₂ capture

Prof. Dr. David Vermaas
Technical University Delft, Delft, Netherlands

11:10 Industrial relevant CO₂ conversion of syngas in zero-gap electrolyzers

Lucas Hoof
Fraunhofer UMSICHT, Oberhausen, Germany

11:30 Recent advances and challenges in electrochemical CO₂ reduction processes

Prof. Dr. Tom Rufford
University of Queensland, Brisbane, Australia

11:50 Poster Pitch

Chair: Prof. Dr. Ulf-Peter Apfel, Ruhr-Universität Bochum, Bochum, Germany

12:00 LUNCH BREAK

Session 3 – Part I

Characterization and optimization

Chair: Prof. Dr. Julian Tornow, Ruhr West University of Applied Sciences, Bottrop, Germany

13:00 Electrosynthesis of hydrogen peroxide sustained by anodic oxygen generation for wastewater treatment

Dr. Oscar Miguel Cornejo Rojas
University of Guanajuato, Guanajuato, Mexico

13:20 Flex-E-cell: A modular and scalable electrochemical flow cell

Jonas Bäßler
RWTH Aachen University, Aachen, Germany

13:40 Tubular flow battery stacks – results and model based design

Prof. Dr. Thorsten Struckmann
Hamburg University of Applied Sciences, Hamburg, Germany

14:00 COFFEE BREAK

Session 3 – Part II

Characterization and optimization

Chair: Prof. Dr. Julian Tornow, Ruhr West University of Applied Sciences, Bottrop, Germany

14:20 Mechanical analysis and functional design optimization of PEM electrolyzer endplates by FEM simulation

Lukas Ritz
Jülich Research Centre, Jülich, Germany

14:40 Amperometric SoC, capacity, and SoH monitoring for flow battery electrolytes

Dr. Christian Stolze
Friedrich Schiller University, Jena, Germany

15:00 Modular operando cell for radiography analysis of gas diffusion electrodes in gas-consuming reactions

Hendrik Hoffmann
University of Bayreuth, Bayreuth, Germany

15:20 Summary and awards voting

15:30 END OF THE COLLOQUIUM