
April 29 – 30, 2025 | Marl, Germany

# Plasma, Catalysis and Thin Films for Conversion Processes

Plasma Technology has a large potential to support catalytic processes in two respects. Firstly, plasmas enable chemical processes with high activation energies and can be used for the conversion of gases or the modification of liquids. The inclusion of catalytic surfaces in such plasma-chemical processes can enhance their selectivity and/or efficiency. Secondly, plasma surface engineering makes the deposition and tailoring of dedicated catalytic layers possible. To bring plasma and catalyst together, we have to learn more about the correlation between basic mechanisms of plasma-surface interaction, their interplay and to explore the possibilities of new materials.

This international workshop aims to present the fundamentals of plasma and catalysis technology, in connection with emerging applications, such as gas cleaning, $CO_2$ conversion, plasma pyrolysis, nitrogen fixation and other chemical synthesis. Plasma processes for catalyst preparation will be the second topic. Thus, the workshop is addressed to catalysis and plasma experts, material specialists, process engineers, machine and component engineers, as well as decision-makers of the technology fields. Companies are encouraged to present their technical solutions in a digital conference booklet. PhD and postdoc researchers are encouraged to present their work as poster presentations.

## PROGRAM COMMITTEE

- **Annemie Bogaerts,** University of Antwerp, Belgium
- **Ronny Brandenburg**, Leibniz Institute for Plasma Science and Technology (INP), Germany
- **Robert Franke,** Evonik Operations GmbH, Germany
- **Andreas Schulz, Matthias Walker,** University of Stuttgart, Germany
- **Katrin Ferse**, EFDS, Germany

## ORGANIZER

*European Society of Thin Films*
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*Many thanks to the Program Committee and all authors for the preparation of the recent informative and inspiring program.*

# PLASMA, CATALYSIS & THIN FILMS FOR CONVERSION PROCESSES

## International Workshop

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# Program

*Subject to change without notice*

## Tuesday, April 29, 2025

**08:30 | Registration**

**09:00 | Opening**

### Session 1 | Introduction to Plasma Catalysis

*Moderation: Ronny Brandenburg, Leibniz INP, Germany*

09:15 | WS0101
**Kinetics in plasma catalysis; perspective of a catalysis engineer**
Leon Lefferts, University of Twente, Netherlands

09:45 | WS0102
**Plasma catalysis: Knowledge gaps towards creating real synergy**
Annemie Bogaerts, University of Antwerp, Belgium

10:15 | WS0103
**Plasma-catalysis: gas phase kinetics, transport and in situ characterization of surface modifications at the nanoscale**
Peter Bruggeman, University of Minnesota, USA

*10:45 | Coffee Break*

11:30 | WS0104
**Industrial view from the host**
**Title to be announced**
Jürgen Lang, Evonik Operations GmbH, Germany

### Session 2 | Plasma catalysis from the catalyst's point of view

*Moderation: Matthias Walker, University of Stuttgart, Germany*

12:00 | WS0201
**Development of catalysts for electrified processes utilizing ammonia as hydrogen carrier**
Tim Nitsche, Fraunhofer UMSICHT, Germany

12:20 | WS0202
**What should physicists active in plasma catalysis have in mind about what matters in thermo-catalysis**
Eric Gaigneaux, Molecular Chemistry, Materials and Catalysis (MOST), Belgium

*12:40 | Lunch Break*

13:40 | WS0203
**Consequences of non-thermal plasma stimulation on catalyst reactivity**
Jason Hicks, University of Notre Dame, USA

14:00 | WS0204
**Electrochemical PFAS degradation using boron-doped diamond electrodes made by plasma-enhanced chemical vapor deposition**
Robin Kupec, W&L Coating, Germany

14:20 | WS0205
**Plasma induced reactions of small molecules**
Boaxin Zhang, LIKAT, Leibniz-Institut für Katalyse, Germany

14:40 | WS0206
**Understanding NTP activated methanol synthesis and clean hydrogen production using in-situ methods.**
Chris Hardacre, Manchester University, United Kingdom

*15:00 | Coffee & **Poster Break I***

**Poster Session I | April 29, 2025 | 15:00 – 15:40 | workshop room & floor**

Visit the Posters and meet the authors to discuss recent research topics and new cooperations. The poster presenters are looking forward to discussions with you!

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## Session 3 | Plasma Gas Conversion

*Moderation: Andreas Schulz, University of Stuttgart, Germany*

15:40 | WS0301
**Plasma conversion technology: from fundamentals towards industry**
Ursel Fantz, Max Planck Institute for Plasma Physics, Germany

16:00 | WS0302
**From renewable energy to valuable chemicals: plasma catalysis innovations in power-to-X applications**
Jens Hofmann, MUEGGE GmbH, Germany

16:20 | WS0303
**Obtaining CO rich gas streams from $CO_2$ point-sources**
Christian Koch, enaDyne, Germany

16:40 | WS0304
**Advancements in Electron Beam and Plasma Technologies for Sustainable Conversion Processes**
Elizabeth von Hauff, Fraunhofer FEP, Germany

17:00 | WS0305
**Thermal arc heated plasma technology for high temperature processes**
Hamid Reza Yousefi, PlasmaAir AG, Germany

*17:30 End*

*19:00 Get-Together at Restaurant Lipper Hof*

**19:00 | Get-Together @ Restaurant**

**Hotel Restaurant Lipper-Hof |**
Lipper Weg 86, 45770 Marl

*In Registration Ticket included.*

## Wednesday, April 30, 2025

**09:00 – 12:00**
**Guided Tours | please choose one!**

**Tour A - Evonik – Chemistry Park in Marl**
*Lipper Weg 235, 45772 Marl | Information Center*
Presentation of production plants and infrastructure facilities at the chemistry park in Marl directly next to the event location

09:30 Meet at Information Center
10:00 – 11:30 | Guided Bus Tour
11:30 Back to event location

**Tour B – Fraunhofer UMSICHT**
Osterfelder Straße 3 | 46047 Oberhausen

Overview of the current main research areas at Fraunhofer UMSICHT, having the opportunity to take a behind-the-scenes look during a laboratory and pilot plant tour, and thus get an insight into the equipment, research and development opportunities.

08:00 | Meet in front of Feierabendhaus
08:15 | Bus transfer to Fraunhofer UMSICHT
09:00 | Arrival & Welcome
09:30 | Laboratory and pilot plant tour
10:30 | Discussion
11:00 | Tour back to Feierabendhaus

*12:00 | Lunch break at Event Location Feierabendhaus, Marl*

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**Session 4 | Plasma Catalysis Interactions & Applications**

*Moderation: Annemie Bogaerts, University of Antwerp, Belgium*

13:10 | WS0401
**Plasma-catalytic $CO_2$ methanation: results and scale-up potential**
Tony Murphy, CSIRO, Australia

13:30 | WS0402
**Stability of metal-organic frameworks in non-thermal atmospheric plasma**
Jan Benedikt, University Kiel, Germany

13:50 | WS0403
**Plasma-sorbent system for $CO_2$ capture and conversion**
Sirui Li , University of Eindhoven, Netherlands

*14:10 | Coffee & **Poster Break II***

15:00 | WS0404
**Process considerations for plasma-based nitrogen fixation**
Kevin Rouwenhorst, University of Twente, Netherlands

15:20 | WS0406
**Challenge plasma catalysis - does the plasma enhance catalysis or does the catalyst enhances the plasma?**
Achim von Keudell, Ruhr-Universität-Bochum, Germany

**15:40 | Round Table Discussion**

**What is needed to create real plasma-catalyst synergy?**
*Moderation: Ronny Brandenburg, Leibniz INP, Germany*

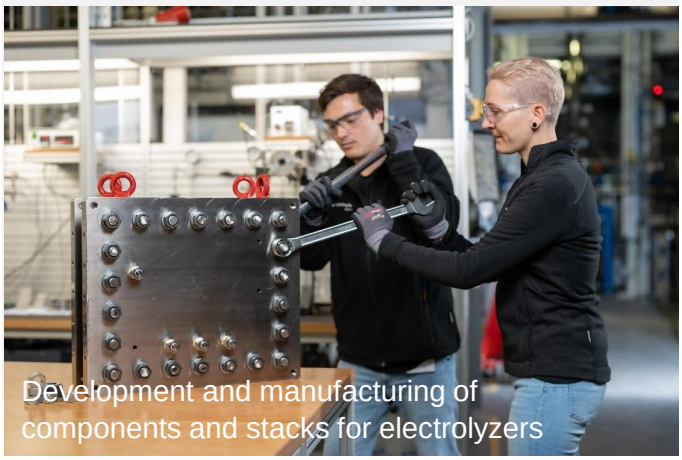
**16:30 | End of Workshop**

# Special Information

**Excursion to the Fraunhofer Institute for Environmental, Safety, and Energy Technology - UMSICHT, Oberhausen**

Fraunhofer UMSICHT is actively involved in shaping energy and raw materials management, focusing its research on four main areas: Carbon Management, Circular Economy, Green Hydrogen, and Local Energy Systems. Catalysis is an important cross-sectional technology that enables resource-efficient and energy-efficient production while reducing harmful emissions. Fraunhofer UMSICHT emphasizes electrocatalysis and heterogeneous thermal catalysis.

During the excursion, you will gain an overview of the current main research areas at Fraunhofer UMSICHT, have the opportunity to take a behind-the-scenes look during a laboratory and pilot plant tour, and thus get an insight into the equipment and research and development opportunities.



Development and manufacturing of components and stacks for electrolyzers

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EFDS

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# Poster Session

There is a lot of research and development activities around Plasma technologies and catalysis processes. You did not receive a talk? Use the chance and present a poster. This is a nice way to get in discussion with other colleagues. Two Poster Sessions will take place on Tuesday, April 29, 2025, at 14:40 as well as on Wednesday, April 30, 2025, at 14:10 in the afternoon. Posters will be visible over the whole event.

**PO001** | *Conversion of $O_2$ into CO by combined $CO_2$ plasma + heat exposure of carbon at low vacuum*
**E. J. Devid**, DIFFER, Netherlands

**PO002** | *$NO_x$ formation via electrically driven microwave plasma enhanced by heterogeneous catalysis*
**Jonas Gans**, DIFFER, Netherlands

**PO003** | *Microwave plasma-based dry reforming of methane: Showing the role of radical reactions in the afterglow*
**Lex Kuijpers**, DIFFER, Netherlands

**PO004** | *Elucidating the role of oxygen vacancies in plasma-catalysis*
**Joran Van Turnhout**, University of Antwerp and Eindhoven University of Technology, Netherlands

**PO005** | *Power Input of Pulsed Electron Beam Sustained Atmospheric Pressure Plasma for Gas Conversion*
**Lars Dincklage**, Fraunhofer FEP, Germany

**PO006** | *How to avoid catalyst deactivation by soot deposition.*
**Callie Ndayirinde**, PLASMANT, University of Antwerp, Belgium

**PO007** | *Methane oxidation inside a DBD reactor: Effect of catalysts*
**Abhinash Kumar Singh**, University of Easter Finland, Finland

**PO008** | *Single Wall Nanotube and Iron Nanoparticle Composite Synthesis via Steam Plasma Catalytic Pyrolysis of Methane*
**Jafar Fathi**, Institute of Plasma Physics of Czech Academy of Sciences, Czech Republic

**PO009** | *In situ analysis of Ce(IV)-MOFs during Plasma Treatment using XRD and XAS at ESRF*
**Alexander Quack**, Christian-Albrechts-Universität zu Kiel, Germany

**PO010** | *Synthesis of Carbon-Based Materials by Methane Pyrolysis in a Low-Current Gliding Arc Discharge*
**Yuan Tian**, University of Mons, Ghent University, Belgium

**PO011** | *Optimization of the reaction chamber of a microwave plasmalysis plant*
**Tanja Hasenjäger**, Esslingen University, Germany

**PO012** | *$CO_2$ Conversion in an Atmospheric Plasma Reactor with Integrated Oxygen-conductive Membranes*
**Katharina Wiegers**, University of Stuttgart, IGVP, Germany

**PO013** | *Upscaling of the 2.45 GHz IGVP microwave plasma torch to 915 MHz*
**Andreas Schulz**, University of Stuttgart, IGVP, Germany

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# Poster Session

**PO014 |** *Electron beam-ionized plasma with self-biased electrode: towards catalytic conversion*
**David Johannes Schreuder**, TU Dresden, Germany

**PO015** | *Towards an Electrical Model of Hybrid Discharge: Optimization of the Energy Delivery Network*
**Anthony Zschalig**, Fraunhofer Institute for Electron Beam and Plasma Technology FEP, Germany

**PO016 |** *Plasma assisted decentralised biomethanol production*
**Ronny Brandenburg**, Leibniz-Institute for Plasma Science and Technology (INP), Germany

Further posters will be added.


# Registration

**Link to Registration**

| Conference Tickets | Price* |
|---|---|
| Standard ticket \| early bird | 730 EUR |
| Standard ticket \| from March 15, 2025 | 830 EUR |
| Student ticket | 420 EUR |

The registration fee includes the participation of the chosen event, conference digital booklet, presentation download according to the approval of the speakers, coffee and lunch breaks as well as the Get-Together.
*Workshop fees are free of VAT according to §4 (22a) UStG (German value-added tax law).

The general terms and conditions of sale of EFDS apply (www.efds.org/en/agb).
Cancellations must be made in written form.

# Travelling

## Event Location

**Feierabendhaus Marl**
Germany Lipper Weg 201
45772 Marl, Germany
Phone:+49 2365 696 68-0
https://www.feierabendhaus-marl.de/de

## Hotel Recommendations

**Feierabendhaus Marl** * **Event Location**
Germany Lipper Weg 201
45772 Marl, Germany

Booking Mail to : hotel@evonik.com
Website: https://www.feierabendhaus-marl.de/de
Phone +49 2365-69668-0
*Please write an E-Mail for Hotel booking. The website is in german language only.*

**Hotel-Restaurant Lipper Hof**
***Location of Get-Together**
Lipper Weg 86,
45770 Marl, Germany

Booking Mail to : info@lipper-hof.de
Website: https://lipper-hof.com/
Phone: +49 23 65 – 3 59 15

**Montana Parkhotel Marl**
Eduard-Weitsch-Weg 2
45768 Marl, Germany

Booking Mail to: marl@montana-hotels.de
Website: https://www.montana-hotels.de/hotel/montana-hotel-marl/
Phone: +49 2365-102-0

Further Hotels and Pensions can be found at google maps and booking.com.