

Non-Thermal Plasmas for Sustainable Chemistry

785. WE-Heraeus-Seminar

23 – 27 April 2023

at the Physikzentrum Bad Honnef, Germany

**WILHELM UND ELSE
HERAEUS-STIFTUNG**



Program

Sunday, 23 April 2023

16:00 – 20:00 Registration

18:00 *BUFFET SUPPER and informal get-together*

19:30 – 19:35 Yiguang Ju **Welcome**

Keynote lecture

Chair: Achim von Keudell

19:35 – 20:35 Dirk-Uwe Sauer **Demand and technologies of energy storage technologies for a climate neutral world**

20:35 **Social time**

Monday, 24 April 2023

08:00 *BREAKFAST*

08:55 Scientific organizers **Welcome and announcements**

Session 1: Plasma chemistry

Chair: Hyun-Ha Kim

09:00 – 09:45 Sevetlana Starikovskaia **Plasmachemistry in pulsed nanosecond discharges: what changes at high electric fields and at high specific energy deposition**

09:45 – 10:30 Gerard Van Rooij **Non-thermal plasmas for sustainable chemistry**

10:30 – 11:00 *COFFEE BREAK*

Program

Monday, 24 April 2023

11:00 – 11:45 Achim von Keudell **In-liquid plasmas for electrolysis**
Replacement of K. Grosse

PANEL 1: Plasma chemistry

Chair Tony Murphy

11:45 – 12:30 **Panelists:**
Achim von Keudell, Gerard von Rooij, Svetlana Starikovskaia

12:30 – 12:40 **Conference Photo** (in the front of the lecture hall)

12:40 – 14:00 *LUNCH*

Session 2: Multiscale modeling and plasma-chemistry interaction

Chair: Tomohiro Nozaki

14:00 – 14:45 Annemie Bogaerts **Plasma for sustainable chemistry: A better understanding by modelling the plasma and plasma-catalyst interactions**

14:45 – 15:30 Bryan R. Goldsmith **Atomistic modeling of plasma-assisted catalysis: Opportunities and challenges**

15:30 – 16:00 *COFFEE BREAK*

16:00 – 16:45 Yiguang Ju **Plasma chemistry and thermal-chemical instability**
Replacement of Chuan Shi

PANEL 2: Plasma modeling and plasma-chemistry interaction

Chair: Tony Murphy

16:45 – 17:30 **Panelists:**
Annemie Bogaerts, Bryan R. Goldsmith, Yiguang Ju (or Chuan Shi)

17:30 – 17:45 Stefan Jorda **About the WE-Heraeus-Foundation**

18:30 *DINNER*

Program

Tuesday, 25 April 2023

08:00 *BREAKFAST*

08:55 Scientific organizers **Welcome and announcements**

Session 3: CO₂ and methane Conversion-1

Chair: Richard van de Sanden

09:00 – 09:45 Tomohiro Nozaki **In situ diagnostics of plasma catalytic conversion of CO₂: Identifying the synergistic pathways toward catalyst design**

09:45 – 10:30 Olivier Guaitella **Role of vibrational and electronic excited states for CO₂ conversion by plasma**

10:30 – 11:00 *COFFEE BREAK*

Session 4: CO₂ and methane Conversion-2

Chair: Annemie Bogaerts

11:00 – 11:45 Ronny Brandenburg **CO₂ splitting in dielectric barrier discharges: Prospects to increase CO formation**

11:45 – 12:30 Richard Van de Sanden **Non-thermal plasma conversion of CO₂, N₂/O₂ & CH₄**

12:30 – 14:00 *LUNCH*

Program

Tuesday, 25 April 2023

PANEL 3: CO₂ and methane Conversion-1

Chair: Bryan R. Goldsmith

14:00 – 14:45 **Panelists:**
Ronny Brandenburg, Olivier Guaitella, Tomohiro Nozaki,
Richard van de Sanden

Session 5: Chemical synthesis and bio-catalysts-1

Chair: Julia Bandow

14:45 – 15:30 Koichi Sasaki **Key species in plasma-aided ammonia synthesis: atomic nitrogen versus molecular nitrogen at vibrational excited states**

15:30 – 16:00 *COFFEE BREAK*

Co-chairs: Pia Pottkämper, Elizabeth Mercer, Chris Kondratowicz

16:00 – 17:00 **Poster flashes 1**

17:00 – 18:00 **Poster session 1**

18:30 *DINNER*

Program

Wednesday, 26 April 2023

08:00 *BREAKFAST*

08:55 Scientific organizers **Welcome and announcements**

Session 6: Chemical synthesis and bio-catalysts-1

Chair: Xin Tu

09:00 – 09:45 Hyun-Ha Kim **Sustainable nitrogen fixation using
spark discharge plasma for power-to-X**

09:45 – 10:30 Julia Bandow **Plasma-driven biocatalysis – from proof
of concept to improving performance**

10:30 – 11:00 *COFFEE BREAK*

Co-chairs: Steijn Verloedt, Yury Gorbanev, Yijie Xu

11:00 – 12:00 **Poster flashes 2**

12:00 – 13:00 **Poster session 2**

13:00 – 14:30 *LUNCH*

14:30 – 18:00 **Excursion** (Lead: Achim von Keudell)

18:00 – 18:30 Seminar organization committee meeting (best poster awards)

18:30 *HERAEUS DINNER*
(social event with cold & warm buffet with complimentary drinks)
and best poster presentation awards

Program

Thursday, 27 April 2023

07:30 *BREAKFAST*

08:25 Scientific organizers **Welcome and announcements**

Session 7: Plasma catalysis-1

Chair: Yiguang Ju

08:30 – 09:15 Xin Tu **Plasma catalysis: An emerging technology for sustainable production of fuels and chemicals**

09:15 – 10:00 Leon Lefferts **Using expertise in catalysis for understanding plasma-catalysis**

10:00 – 10:30 *COFFEE BREAK*

Session 8: Plasma catalysis-2

Chair: Koichi Sasaki

10:30 – 11:15 Tony Murphy **Chemical production by plasma catalysis for industrial processes**

11:15 – 12:00 Li Wang (*online*) **Plasma catalysis for CH₄/CO₂ conversion to alcohols**

PANEL 4: Plasma catalysis and priorities of research

Chair: Katharina Kohse-Höinghaus

12:00 – 12:45 **Panelists:**
Hyun-Ha Kim, Tony Murphy, Koichi Sasaki, Leon Lefferts, Xin Tu, Li Wang (*online*)

12:45 *LUNCH*

End of the seminar and departure

NO DINNER for participants leaving on Friday; however, a self-service breakfast will be provided on Friday morning