



Programme

The Role of Catalysis for the Energy Transition

Petrochemistry Division

October 5 - 7, 2022, Ludwigshafen



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WELCOME

Dear ladies and gentlemen, the participants,

with great pleasure I welcome you, also in the name of the organizing committee and the board of the DGMK division of petrochemistry, the Industrial Chemistry division of the Società Chimica Italiana (SCI) and the ÖGEW to the 2022, 30th edition, of our petrochemistry conference.

After two years of online conferences we are very glad to meet you again in person and to provide you with a great opportunity for networking and scientific exchange, in addition to a splendid scientific conference programme.

We hope that you will enjoy this opportunity as much as we do and look forward to many lively discussions.

Last but not least I would like to thank BASF for hosting this year's conference in their wonderful Feierabendhaus in Ludwigshafen.

Prof. Dr. Dieter Vogt
Chairman DGMK-Division "Petrochemistry"

Scientific Programme Committee:

Dr. Michael Bender, BASF SE, Ludwigshafen

Dr. Holger Blanke, BP Europa SE, Bochum

Dr. Axel Göhrt, INEOS, Köln

Dr. Harald Häger, Evonik Performance Materials GmbH, Marl

Prof. Dr. Andreas Jess, Universität Bayreuth

Prof. Dr. Johannes A. Lercher, Technische Universität München

Dr. Mario Marchionna, Saipem S.p.A., San Donato Milanese

Prof. Dr. Jörg Sauer, Karlsruher Institute of Technology (KIT), Karlsruhe

Prof. Dr. Dieter Vogt, Technische Universität Dortmund

PROGRAMME OVERVIEW

Wednesday, October 5, 2022	
13.00 - 13.30	Opening and Welcome Address
13.30 - 15.45	Optimizing industrial catalytic processes I
15.45 - 16.15	Coffee Break
16.15 - 18.00	Optimizing industrial catalytic processes II
Thursday, October 6, 2022	
08.30 - 10.15	Catalysis in fuel production
10.15 - 10.45	Coffee Break
10.45 - 12.30	Catalytic production and utilization of hydrogen I
12.30 - 13.30	Lunch Break
13.30 - 15.15	Catalytic production and utilization of hydrogen II
15.15 - 16.45	Poster Session & Coffee
16.45 - 18.30	Catalytic Biomass
20.00	Conference Dinner

Friday, October 7, 2022

08.30 - 11.00	Innovative catalyst materials & processes I
11.00 - 11.30	Coffee Break
11.30 - 13.15	Innovative catalyst materials & processes II
13.15 - 13.25	Concluding Remarks and Conference Summary
13.25	Lunch Break

MEMBERS' MAGAZINE OF DGMK

EEK TECHNOLOGY & TRANSFORMATION OF FOSSIL AND GREEN ENERGIES.

Technical/scientific magazine of the energy industry.

With the technical/scientific magazine EEK you are always well informed about industry news, technical and scientific developments and events in the fields of exploration, production and storage of energy carriers such as petroleum, natural gas, hydrogen and geothermal use of the subsurface, refining and production application of natural gas and petroleum, petrochemistry, conversion of carbon carriers and standardisation. Subscription of the magazine is included in the membership fee!



WEDNESDAY, OCTOBER 5, 2022

OPENING AND WELCOME ADDRESS

13.00 h Dieter Vogt
Chairman DGMK-Division "Petrochemistry"

Welcome Speech

Katrin Friese
Vice President Process Catalysis R&D, BASF

OPTIMIZING INDUSTRIAL CATALYTIC PROCESSES I

Chairperson: Mario Marchionna

13.30 h **Keynote Lecture: Petrochemicals in the Refinery Network**

H. Blanke

BP Europa SE, Advanced Fuels Products Bochum

14.15 h **Efficient Direct-DME Synthesis; a BASF-Linde Joint Development**

H. Ahi¹, K. Braunsmann¹, M. G. Schwab¹, N. Bottke¹,
A. Behrens², A. Peschel²

¹BASF SE, ²Linde GmbH

14.45 h **Experimental and Simulation Studies of Methanol and DME Synthesis from CO₂-rich Syngas on Cu/ZnO/ZrO₂ Catalysts**

M. Herfet¹, B. Campos¹, K. Herrera Delgado¹,
M. Kind², S. Polierer¹, J. Sauer¹, L. Warmuth¹, S. Wild¹,
T. Zevaco¹, S. Pitter¹

Karlsruhe Institute of Technology - ¹Institute of Catalysis Research and Technology, ²Institute of Thermal Process Engineering

WEDNESDAY, OCTOBER 5, 2022

15.15 h **Preparation of Cu/Zn Based Catalyst Precursors - Importance of Thermodynamics and Seeding**
D. Guse¹, L. Warmuth², F. Kreißig¹, S. Pitter², M. Kind¹
¹Karlsruhe Institute of Technology, Institute of Thermal Process Engineering, ²Karlsruhe Institute of Technology, Institute of Catalysis Research and Technology

15.45 h **Coffee Break**

ANNOUNCEMENT



BE PART OF THE ENERGY

17 - 21 SEPTEMBER 2023

CALGARY | CANADA

OPTIMIZING INDUSTRIAL CATALYTIC PROCESSES II

Chairperson: Dieter Vogt

16.15 h **Keynote Lecture: Advanced Recycling in the Petrochemical Industry - Approaches and Challenges**

A. Göhrt

INEOS Manufacturing Deutschland GmbH, Köln

17.00 h **Investigating the Opposing Catalyst Compositions Required for Gas and Liquid Phase Selective Alkyne Hydrogenation**

J. Williams¹, K. Kley², N. Dummer¹, F. Schüth²,
G. Hutchings¹

¹Max Planck-Cardiff Centre on the Fundamentals of Heterogeneous Catalysis FUNCAT, Cardiff Catalysis Institute, School of Chemistry, Cardiff University, Cardiff, UK

²Max-Planck-Institut für Kohlenforschung, Mülheim an der Ruhr

17.30 h **Opportunities and Challenges in Industrial Selective Oxidation Processes**

K. Amakawa

BASF SE, Ludwigshafen, Germany

THURSDAY, OCTOBER 6, 2022

CATALYSIS IN FUEL PRODUCTION

Chairperson: Thomas Seidensticker

08.30 h **Keynote Lecture** Cobalt-Based Fischer-Tropsch
Synthesis: Evaluation of Effective Kinetics and
Pore Filling in Fixed-Bed Reactors

A. Jess

Universität Bayreuth

09.15 h **Production of Sustainable Transportation Fuels
and Chemicals via Catalytic Cracking**

L. Dorazio¹, J. Shi¹, J. Fu¹, CP Kelkar¹, M. J. Castaldi²,
Snehesh S. Ail², G. Chowdhury²

¹BASF Corporation, Iselin, NJ USA, ²The City College of New
York, New York City USA

09.45 h **Modular Power-to-X Concepts & Applications in
Europe**

T. Böltken

INERATEC GmbH, Karlsruhe

10.15 h **Coffee Break**

THURSDAY, OCTOBER 6, 2022

CATALYTIC PRODUCTION AND UTILIZATION OF HYDROGEN I

Chairperson: Michael Bender

10.45 h **Keynote Lecture: Some Aspects for Methanol and CO₂**

M. Vicari

BASF SE, Ludwigshafen

11.30 h **Methanol Steam Reforming at Low Temperatures Using Supported Homogeneous Catalysts - Catalyst Development and Reactor Design**

H. Junge¹, A. Agapova¹, C. H. Schwarz², A. Rehman², D. Neu², M. Haumann²

¹Leibniz-Institut für Katalyse, e. V., ²Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU), Lehrstuhl für Chemische Reaktionstechnik (CRT)

12.00 h **Engineering of Highly Active Indium-based Catalysts for the Hydrogenation of CO₂ to Methanol**

R. Baumgarten¹, H. Ahi², E. Frei², E. Fako², S. De², R. Naumann d'Alnoncourt¹, C. Boscagli³, S. Schunk³, F. Rosowski^{1,2}

¹BasCat - UniCat BASF JointLab, Technische Universität Berlin, ²BASF SE, Ludwigshafen, Germany, ³hte GmbH, Heidelberg, Germany

12.30 h **Lunch Break**

THURSDAY, OCTOBER 6, 2022

CATALYTIC PRODUCTION AND UTILIZATION OF HYDROGEN II

Chairperson: Enrico Tronconi

13.30 h **Keynote Lecture: Insights to the NH₃ Reforming Beyond the Catalyst**

E. Frei¹, N. Bottke¹, L. Karwacki², M. Schwab²,
M. Felischak³

¹BASF SE, RCC/PP, Ludwigshafen, ²BASF SE, G-CCP/MD,
Ludwigshafen, ³BASF SE, RCP/CD, Ludwigshafen

14.15 h **rWGS as a Key-step to Transform CO₂ into Valuable Products - Accelerated R&D Applying Advanced High Throughput Technology**

B. Mutz, C. Hauber, P. Kolb, M. Weber

hte GmbH - the high throughput experimentation company,
Heidelberg, Germany

14.45 h **High Throughput Catalyst Evaluation of Commercial Hydrogenation Catalysts for Processes with High Hydrogen-to-Feed Ratios**

E. Lorenz¹, T. Zimmermann¹, M. Dahlinger¹, J.

Haertle¹, A. Higelin¹, N. S. Govender²,

S. Teli², A. A. Almathami³

¹hte GmbH, Heidelberg, Germany ²Sipchem, Al Khobar,
Saudi Arabia, ³Prince Mohammed Bin Fahd University, Al
Khobar, Saudi Arabia

POSTER SESSION & COFFEE

Chairperson: Andreas Jess

15.15 h **Further information on page 15**

CATALYTIC BIOMASS

Chairperson: Harald Häger

16.45 h **Keynote Lecture: Homogeneous Catalysis for Feedstock Diversification: From Laboratory to Miniplant Scale**

F. Lehmann, N. Herrmann, J. Bianga, J. Vondran, T. Roth, T. Riemer, D. Vogt, T. Seidensticker
Laboratory for Industrial Chemistry, TU Dortmund University, Dortmund

17.30 h **Innovative Heterogeneous Catalysts for the Reduction of Levulinic Acid Derivatives to γ -Valerolactone and Consecutive Reduction Products**

R. Bacchiocchi¹, T. Tabanelli¹, D. Bianchi², F. Cavani¹
¹Dipartimento di Chimica Industriale "Toso Montanari",
Università di Bologna, ²Istituto Eni Donegani, Italy

18.00 h **Toward an Efficient, Continuous-flow, Production of GVL through a Catalytic Transfer Hydrogenation Processes with Ethanol in the Gas Phase**

T. Tabanelli¹, L. Conte¹, R. Bacchiocchi¹, E. Paone²,
N. Dimitratos¹, F. Mauriello², F. Cavani¹
¹Dipartimento di Chimica Industriale "Toso Montanari",
Università di Bologna, Bologna, Italy, ²Dipartimento DICEAM,
Università Mediterranea di Reggio Calabria, Reggio Calabria,
Italy

CONFERENCE DINNER

20.00 h Feierabendhaus der BASF
Wintergarten

INNOVATIVE CATALYST MATERIALS & PROCESSES I

Chairperson: Jörg Sauer

08.30 h **Keynote Lecture: Syngas to Higher Alcohols and Olefins**

M. Muhler

Ruhr-Universität Bochum

09.15 h **Keynote Lecture: Electrified Methane Steam Reforming via Resistive Heating of SiSiC Foams Washcoated with a Rh/Al₂O₃ Catalyst**

L. Zheng, M. Ambrosetti, F. Zaio, A. Beretta, G. Groppi, E. Tronconi

Laboratory of Catalysis and Catalytic Processes, Politecnico di Milano, Italy

10.00 h **High-throughput Technology in Electrochemistry**

A. Müller¹, F. Schneider¹, Florian. Huber¹, M. Dejmek¹, G. Wasserschaff¹, O. Püttmann¹, J. Fechtmann¹, D. Zahlmann¹, C. Hose¹, F. Eversheim¹, F. Huber¹, B. Hecker², D. Dogan², H. Tempel², R. Eichel², C. Kröger³, S. Haug³, Sef Coenen³, P. Löb⁴, C. Hofmann⁴, A. Ziogas⁴, H. Kost⁴

¹hte GmbH, Heidelberg, ²Forschungszentrum Jülich GmbH, Jülich, ³Deutsche Metrohm GmbH, ⁴Fraunhofer Institute for Microengineering and Microsystems IMM, Mainz

10.30 h **Activated Metal Foams - Attractiveness and Challenges in Industrial Hydrogenations**

J. Bauer¹, J. Metternich², R. Franke², M. Roos², H. W. Zanthoff²

¹Spark e-Fuels GmbH, Berlin, ²Evonik Operations GmbH, Marl

11.00h **Coffee Break**

INNOVATIVE CATALYST MATERIALS & PROCESSES II

Chairperson: Holger Blanke

11.30 h **Keynote Lecture: Supported Catalytically Active Liquid Metal Solutions (SCALMS) as Novel Materials for Dynamic Single Atom Catalysis**

N. Taccardi, M. Haumann, P. Wasserscheid
Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU)
Lehrstuhl für Chemische Reaktionstechnik (CRT)

12.15 h **Artificial Photosynthesis: The Role of Photocatalysis in the Energy Transition**

M. Tommasi¹, F. Conte¹, G. Ramis², I. Rossetti¹
¹Chemical Plants and Industrial Chemistry Group, Dip. Chimica, Università degli Studi di Milano, CNR-SCITEC and INSTM Unit Milano-Università, Italy, ²Dip. Ing. Chimica, Civile ed Ambientale, Università degli Studi di Genova and INSTM Unit Genova, Genoa, Italy

12.45 h **Aquivion® PFSA-based Spray-freeze Dried Composite Catalysts for the One-pot Domino Reaction from Furfural to γ -Valerolactone**

A. Allegri¹, C. Oldani², A. S. Cattaneo², A. Briigliadori³, I. Zanoni³, G. Fornasari¹, S. Albonetti^{1,3}
¹Department of Industrial Chemistry – University of Bologna, Bologna, Italy, ²Solvay Specialty Polymers SpA, Bollate, Italy
³National Research Council ISTE-CNR, Faenza, Italy

13.15 h **Concluding Remarks and Conference Summary**
Michael Bender

13.25 h **Lunch**

POSTERSESSION

Chairperson: Andreas Jess

HALL: FOYER NORTH

- 1 Enhancement of Fischer-Tropsch-Synthesis due to Periodical Draining of Wax-filled Catalyst Pores by Hydrogenolysis**
C. Unglaub, J. Thiessen, A. Jess
Universität Bayreuth
- 2 Accumulation of Higher Liquid Hydrocarbons in the Pores of a Cobalt Catalyst during the Initial Non-stationary Phase of Fixed-bed Fischer-Tropsch Synthesis**
L. Schurm, A. Jess
University Bayreuth
- 3 Modeling of Maritime Fuel Production by Fischer-Tropsch Synthesis with Plasma-based Syngas**
A. Herbers, C. Kern, A. Jess
University Bayreuth
- 4 Production of Anhydrous Formaldehyde with Co-generation of Hydrogen**
M. Kamienowska^{1,2}, K. Niedermeier², M. Bender¹,
Th. Wetzel²
¹BASF SE, Ludwigshafen, Germany, ²Karlsruhe Institute of
Technology, Karlsruhe, Germany
- 5 Hydrogenative Depolymerization of Polyurethanes Catalyzed by Manganese- and Ruthenium Pincer Complexes**
T. Schaub
BASF SE / CaRLa

6 Synthesis of Stable Zinc Oxide Based Catalysts for Carrying out Direct Dehydrogenation of Methanol to Obtain (a) Anhydrous Formaldehyde and (b) Highly Selective Hydrogen as By-product

A. Ghosh Chowdhury¹, D. Deutsch¹, U. Arnold¹, J. Sauer¹, M. Bender²

¹Institute of Catalysis Research and Technology (IKFT), Karlsruhe Institute of Technology (KIT), Eggenstein-Leopoldshafen, ²BASF SE, Ludwigshafen am Rhein, Germany

7 Selective Cobalt Catalyzed Synthesis of Acetaldehydedimethylacetale (AADMA)

K. A. Sheikh^{1,2}, T. A. Zevaco¹, J. Jelic¹, F. Studt¹, M. Bender²

¹Karlsruher Institut für Technologie (KIT), Eggenstein-Leopoldshafen, ²BASF SE, Ludwigshafen am Rhein, Germany

8 Optimization of the Oxidative Dehydrogenation of Methanol to Formaldehyde: A Combined Theoretical, Experimental and Simulative Approach

F. Eichner¹, P. Münzer¹, J. Jelic¹, S. Behrens¹, J. Sauer¹, F. Studt¹, M. Bender²

¹Karlsruhe Institute of Technology (KIT), Institute of Catalysis Research and Technology (IKFT), Eggenstein-Leopoldshafen, Germany, ²BASF SE, Ludwigshafen am Rhein, Germany

9 Catalyst Recycling by a Crystallisation of the Ethylene Carbonate-based Catalyst Phase in the Hydroformylation of 1 Octene

J. T. Vossen^{1,2}, N. Hülsken^{1,2}, A. J. Vorholt¹, W. Leitner^{1,2}

¹Max Planck Institute for Chemical Energy Conversion, Mülheim an der Ruhr, Germany, ²Institute for Technical and Macromolecular Chemistry, RWTH Aachen University, Aachen, Germany

10 Effect of Liquid-liquid Interfacial Area on Multiphase Catalysis

M. Schrimpf¹, K. E. Naße¹, A. J. Vorholt¹, W. Leitner²

¹Max Planck Institute for Chemical Energy Conversion, Mülheim an der Ruhr, Germany, ²Institute of Technical and Macromolecular Chemistry, RWTH Aachen University, Aachen, Germany

11 Intensified Production of 5-Hydroxymethylfurfural and Furfural from Biomass in Multiphase Systems

N. Thanheuser^{1,3}, J. Esteban², A. J. Vorholt¹, W. Leitner^{1,3}

¹Max Planck Institute for Chemical Energy Conversion, Mülheim an der Ruhr, Germany, ²Department of Chemical Engineering, The University of Manchester, Manchester, United Kingdom, ³Institut für Technische und Makromolekulare Chemie, RWTH Aachen, Aachen, Germany

12 Sodium Methoxide as a Low-cost Glycolysis Catalyst for Chemical Recycling of Post-consumer PET Waste

S. Javed, J. Fisse, D. Vogt

Laboratory of Industrial Chemistry, TU Dortmund University

13 Electronic Effect of Polymeric Stabilisers on the Catalytic Activity of Supported Au Nanoparticles for the Selective Oxidation of HMF

F. Liuzzi¹, A. Allegri^{1,2}, S. Scurti¹, N. Dimitratos^{1,2}, D. Caretti¹, S. Albonetti^{1,2}

¹Department of Industrial Chemistry "Toso Montanari", University of Bologna, ²CIRI-FRAME, University of Bologna, Bologna, Italy

14 Catalyst Recycling by a Self-Separation of the Product Phase in the Production of Formic Acid from Carbon Dioxide

K.R. Ehm^{1,2}, A. Nisters^{1,2}, A. J. Vorholt¹, W. Leitner^{1,2}

¹Department of Molecular Catalysis, Max Planck Institute for Chemical Energy Conversion, Mülheim an der Ruhr, Germany, ²Institute for Technical and Macromolecular Chemistry, RWTH Aachen University, Aachen, Germany

15 Semi-Hydrogenation of Poly-Unsaturated Fatty Acid Derivatives in Multiphase Catalysis for Chemical Feedstock Supply

M. Spiekermann, F. Lehmann, T. Seidensticker

Laboratory of Industrial Chemistry, TU Dortmund University, Dortmund, Germany

16 Opportunities and Potential of Electrocatalytic Energy Transition and Challenges in the Development of a new High-throughput Technology

D. Dogan, B. Hecker, H. Tempel, R.-A. Eichel

Institute of Energy and Climate Research (IEK-9) - Forschungszentrum Jülich GmbH

17 DME as a global Point-to-Point H₂ carrier: Process intensified DME Production - The INDIGO Technology

A. Schaadt, M. Semmel, O. Salem, C. Hebling

Fraunhofer Institute for Solar Energy Systems ISE, Freiburg, Germany

GUIDED TOUR OF BASF

Discover BASF - Visitor Center

Where can we find chemistry around us? And where and how is it created?

We will take you on an exciting tour into the world of BASF at our Ludwigshafen site. Our tour begins in the Visitor Center exhibition where we will talk about the innovative strength and vision of the BASF throughout its history. And, of course, we will look at products which we all encounter in everyday life. We will take you then on a special tour through the BASF's production site in Ludwigshafen. At around 39,000 employees, a good third of BASF's employees around the world work in Ludwigshafen. Many thousands of products for customers from almost all industries are manufactured in the 200 production plants at the site.

1. Tour: Wednesday, October 5, 2022, 10.00 - 12.00 h, (English)
2. Tour: Friday, October 7, 2022, 14.30 - 16.30 h, (German)



Meeting Point:
"Besucherzentrum"
(next to gate 2)

GENERAL INFORMATION

Venue

Feierabendhaus der BASF
Leuschnerstraße 47, 67063 Ludwigshafen am Rhein

Registration Desk

Opening Hours

Wednesday, October 5, 2022	12.00 h - 18.00 h
Thursday, October 6, 2022	08.00 h - 18.30 h
Friday, October 7, 2022	08.00 h - 13.00 h

Phone +49151 56005706

Conference Preprints

Lectures and posters presented at the DGMK-Conference are published in full length in the DGMK-Preprints. These publications are registered under ISBN-Numbers and ISSN-Number and are sold on the book market after the conference. The DGMK-Preprints will be given to each conference participant in a digital format upon registration at the conference desk.

Disclaimer

DGMK assumes no liability for loss or damage to items brought along.

Organiser

DGMK Deutsche Wissenschaftliche Gesellschaft für nachhaltige
Energieträger, Mobilität und Kohlenstoffkreisläufe e.V.
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... And take advantage of networking & exchange with a community of peers across the energy industry.

Your member benefits at a glance:

- Both print and online versions of the magazine EEK TECHNOLOGY & TRANSFORMATION OF FOSSIL AND GREEN ENERGIES
- Discounted participation fees at DGMK events and selected partner events
- Exchange opportunities in our network from science and industry
- Regular mailings regarding our attractive event calendar; Invitations to current workshops and conferences
- 50 percent discount on research reports and conference proceedings

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- Reduced membership fee
- Free access to annual conferences (if registered in time).
- Opportunity to connect with university researchers and potential employers
- Information on current topics and trends in research

Further information: www.dgmk.de



Save
the
Date

General Assembly of DGMK
November, 3, 2022, Hamburg