DECHEMA

VDI

PROGRAMME

7 – 9 May 2018
Festung Marienberg, Würzburg/Germany

Jahrestreffen Reaktionstechnik 2018

Annual Meeting on Reaction Engineering

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PROCESSNET
EINE INITIATIVE VON DECHEMA UND VDI-GVC

GENERAL INFORMATION

VENUE

Tagungszentrum
Festung Marienberg
97082 Würzburg

BOOK OF ABSTRACTS

Book of Abstracts (lectures and posters) is available online for participants of the meeting "Jahrestreffen Reaktionstechnik 2018": **www.processnet.org/REAKT2018_BOA**

SOCIAL PROGRAMME

Tuesday, 8 May 2018

19:00 Guided City Tour
Meeting point: Vierröhrenbrunnen (next to Würzburg town hall)

20:00 Conference Dinner at Bürgerspital Weinstuben Würzburg
Address: Theaterstr. 19, in the city centre of Würzburg.

The ticket also includes the one hour guided city tour with the famous Würzburg night guards prior to the dinner.

Wednesday, 9 May 2018

14:30 Guided tour to the „Nanoparticle Kitchen" at Fraunhofer ISC
Address: Fraunhofer-Institut für Silicatforschung, Neunerpl. 2, 97082 Würzburg
Parking facilities at Parkplatz Talavera

The tour is free of charge. Please register in advance. Deadline for registration is 7 May 2018. Maximum capacity is 40 people (2 groups á 20)

Suitable for everybody interested in upscaling nanomaterial syntheses to prototype scale. The tour at Fraunhofer ISC will give a flavour on "The Nanoparticle Kitchen" (www.partikel.fraunhofer.de). At the institute there is an open access infrastructure available for production of high quality (multi-)functional nanoparticles on a pilot scale. A unique down-stream processing tool will be presented and novel particle systems produced in this "Kitchen" will be shown.

OFFICE HOURS CONFERENCE DESK

Monday, 7 May 2018	09:00 – 21:00
Tuesday, 8 May 2018	08:00 – 18:00
Wednesday, 9 May 2018	08:00 – 14:30

CONTACT

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Chemical Reaction Engineering for Supercritical Hydrothermal Synthesis
Prof. Dr. Tadafumi Adschiri, Tohoku University, Japan

Formation of functional nanostructure particles with the spray drying process
Prof. Dr. Leon Gradon, Warsaw University of Technology, Poland

Scalable gas-phase synthesis of functional nanoparticles
Prof. Dr. Christof Schulz, University Duisburg-Essen/D

From Idea to Process – Reaction Engineering Aspects in Process Development
Prof. Dr. Horst Werner Zanthoff, Evonik Technology & Infrastructure GmbH/D

SCIENTIFIC COMMITTEE

Prof. David W. Agar	TU Dortmund
Dr. Jonathan Bloh	DECHEMA-Forschungsinstitut (DFI), Frankfurt am Main
Prof. Markus Busch	TU Darmstadt
Prof. Roland Dittmeyer	Karlsruhe Institute of Technology (KIT), Karlsruhe
Dr. Kai Erhardt	BASF SE, Ludwigshafen
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Prof. Jörg Sauer	Karlsruhe Institute of Technology (KIT), Karlsruhe
Prof. Thomas Turek	TU Clausthal
Dr. Olaf Wachsen	CLARIANT Produkte Deutschland GmbH, Frankfurt am Main
Prof. Alfred Weber	TU Clausthal
Dr. Dirk Ziegenbalg	University of Stuttgart

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Clariant is a globally leading specialty chemicals company, based in Muttenz near Basel/Switzerland. On 31 December 2016 the company employed a total workforce of 17 442. In the financial year 2016, Clariant recorded sales of CHF 5.847 billion for its continuing businesses. The company reports in four business areas: Care Chemicals, Catalysis, Natural Resources, and Plastics & Coatings. Clariant's corporate strategy is based on five pillars: focus on innovation through R&D, add value with sustainability, reposition portfolio, intensify growth, and increase profitability.

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High Pressure Engineering

TOP Industrie manufactures high pressure equipment for research labs worldwide; HP valves, autoclaves, reactors, pilots, compressors for liquid or gas and HP syringe pumps. Our expertise: fine chemistry, polymers, petrochemistry, catalysis; corrosion studies, static or SCC; rock mechanics, EOR, core analysis, geochemistry; supercritical fluids, phases equilibria, PVT, VLE; testing benches.

EXHIBITORS

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Since its foundation in 1981, HIDEN Analytical has been one of the world's leading companies in providing high-performance solutions for scientific analysis and industrial process control. Our thermogravimetric analyzer systems open up completely new possibilities for the user when investigating gas/solid state reactions. Our Quadrupole-MS are used in the investigation of vacuum, gas phase, surface and plasma processes and have a worldwide reputation for their precision and performance.

30 JAHRE mi DEUTSCHLAND

Since more than 55 years, Micromeritics is dedicated to applying our expertise to create quality, accessible, material characterization instruments to advance the speed of innovation and improve the products that touch each of our lives.

Celebrate with us the 30th anniversary of our German subsidiary! Visit our German homepage http://www.micromeritics.de we will surprise you with several great offers to commemorate this occasion.

In addition to traditional fields such as surface and pore characterization through physical, chemical and vapor sorption as well as mercury porosimetry and different density parameters, Micromeritics offers the broadest range of technologies for the determination of particle size and shape. We are also a competent contact for our customers in the areas of powder handling, micro-reactors and pilot plants.

Magritek is leader in the design, manufacture and supply of benchtop NMR spectroscopy instruments. We will present the Spinsolve, a revolutionary multinuclear NMR benchtop spectrometer with a low weight of about 50 kg, which offers the highest sensitivity, resolution and stability. Spinsolve systems allow to quantify and identify sample composition, confirm reaction completions and determine molecular structure. The Spinsolve family comes with models at 43 MHz, 60 MHz and 80 MHz that are ideal for chemists in academia and industry.

The Premex Reactor GmbH has 40 years of experience in batch-, multiple- and contireactor construction. We conceive, design and develop an entire world of reactor technologies. For example: batch reactors, semi-batch reactors (gas- and/or fluid inflow), continuous through-flow reactors (continuous for one or more reagents), internal-recycle reactors (implementation of kinetic studies in the gas-, fluid- or pulp phase), rotation-basket reactors (for kinetic applications and/or ageing studies).

Measuring technologies and analytical instruments, contract analyzes and method developments for comprehensive characterization of dispersions, powders and porous solids: particle size 0.01 – 3500 µm and particle shape, BET surface area and pore size distribution, chemisorption and temperature programmed reaction, breakthrough sorption experiments, porosity, density, zeta potential and stability of original dispersions, drying characteristics of coatings, water vapor sorption.

REACNOSTICS is modeling, constructing and building chemical research reactors for the spatially resolved investigation of catalytic processes. Our methodology comprises simulations and operando measurements of concentration & temperature profiles in combination with spectroscopic catalyst characterization.

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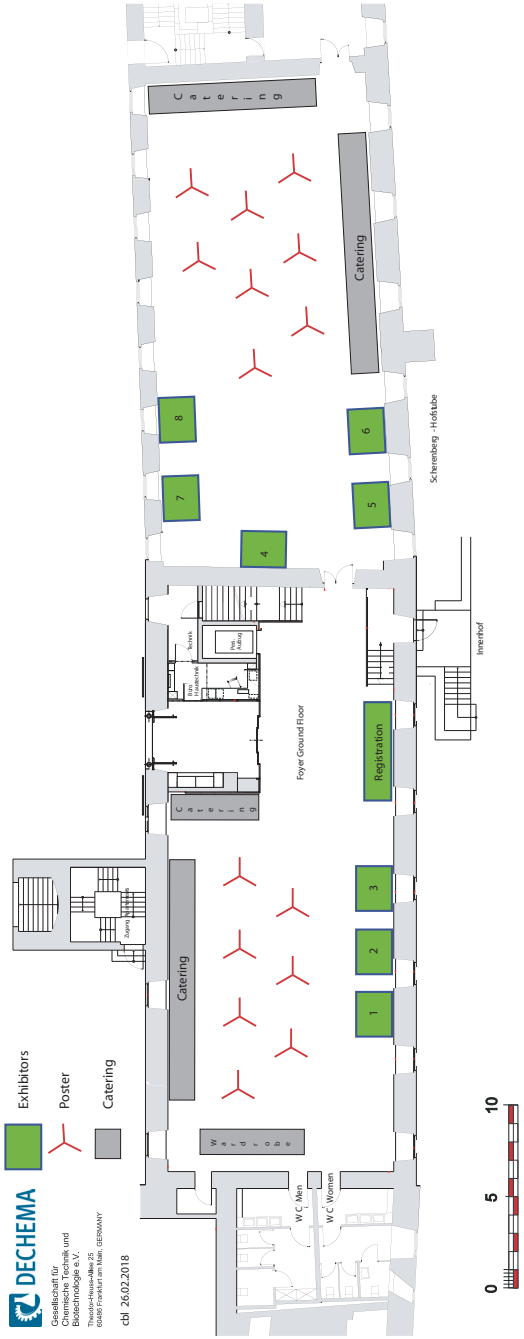

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5 SIMA-tec GmbH
6 Quantachrome GmbH & Co. KG
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8 premex reactor GmbH

Monday, 7 May 2018	
12:00	Registration and Lunch
Chair:	*Klemm*
13:00	**Welcome and Awarding of „Hanns-Hofmann-Prize“**
13:10	**Plenary Lecture** Adschiri
Chair:	*Haas*
14:00	Türk
14:25	Schindler
14:50	Mandel
15:15	Coffee Break in Exhibition Area
Chair:	*Turek*
15:45	Pokhrel
16:10	Krewer
16:35	Schröder
17:00	**Short Presentations by the Research Fellows**
17:20	**General Meeting / Mitgliederversammlung der Fachgruppe Reaktionstechnik**
Chair:	*Ziegenbalg*
18:15	**Short Presentations by the Exhibitors**
18:45	**Short Introduction of Poster Programme**
19:00 – 21:00	**Poster Party**

Tuesday, 8 May 2018	
Chair:	*Weber*
09:00	**Plenary Lecture** Gradon
09:50	Martinez
10:15	Wegner
10:40	Coffee Break in Exhibition Area
Chair:	*Agar*
11:10	Kreitz
11:35	Albert
12:00	Kiewidt
12:25	Bloh
12:50	Lunch Break in Exhibition Area
Chair:	*Dittmeyer*
14:00	Kuhn
14:25	Maier
14:50	Bremer
15:15	Matthischke
15:40	Coffee Break and Poster Discussions
Chair:	*Haas*
17:00 – 17:50	**Plenary Lecture** Schulz
19:00 – 23:00	**Conference Dinner** Guided City Tour with Würzburg Night Guards and Dinner at Bürgerspital Weinstuben

Wednesday, 9 May 2018	
Chair:	*Wachsen*
09:00	**Lecture by the winner of „Hanns-Hofmann-Prize“**
09:25	von Seckendorff
09:50	Greiner
10:15	Penn
10:40	Coffee Break in Exhibition Area
Chair:	*Sauer*
11:10	**Best Poster Awards**
11:20	Kaiser
11:45	Mack
12:10	Pflug
Chair:	*Sauer*
12:35	**Plenary Lecture** Zanthoff
13:25	**Closing**
13:30	Lunch in Exhibition Area
14:30	**Guided Tour at Fraunhofer ISC**
15:30	End of the meeting

Monday, 7 May 2018

Conference Room: Wolfskeel

12:00 **Registration and Lunch**

Session Chair: E. Klemm, University of Stuttgart

13:00 **Welcome and Awarding of “Hanns-Hofmann-Prize”**

13:10 PLENARY LECTURE
Chemical Reaction Engineering for Supercritical Hydrothermal Synthesis Process
T. Adschiri, Tohoku University/J

Session Chair: K.-H. Haas, Fraunhofer ISC, Würzburg

14:00 **Continuous Hydrothermal Synthesis (CHTS) of CeO_2 Nanoparticles in Supercritical Water**
C. Schüßler, M. Türk, KIT, Institut für Technische Thermodynamik und Kältetechnik/D

14:25 **Development of a continuous process to synthesize Cu/ZnO nanoparticles as catalyst for the syngas conversion**
C. Schindler, G. Kolb, M. Maskos, Fraunhofer ICT-IMM/D

14:50 **Functional nanoparticles and supraparticles – synthesis methods and potential applications**
K. Mandel, Fraunhofer ISC/D

15:15 Coffee Break in Exhibition Area

Session Chair: T. Turek, TU Clausthal

15:45 **Flame aerosol chemistry for designing energy storage materials**
S. Pokhrel[1], F. Meierhofer[1], H. Li[1], U. Fritsching[1], L. Mädler[1], M. Gockeln[2], R. Kun[2],
[1] Department of Production Engineering, University of Bremen/D, [2] Fraunhofer Institute for Manufacturing Technology and Advanced Materials/D

16:10 **Multiscale Modeling of Reactors with Reactive Surface Film Growth at the Example of Li-Ion Battery**
U. Krewer, F. Röder, TU Braunschweig/D

16:35 **Better Insight with In-situ Measurements into Reaction and Transport Processes in Next-Generation Batteries**
C. Pompe, D. Stock, D. Schröder, Justus-Liebig-University Giessen/D

17:00 **Short Presentations by the Research Fellows**

17:20 **General Meeting – Mitgliederversammlung der Fachgruppe Reaktionstechnik**

Session Chair: D. Ziegenbalg, University of Stuttgart

18:15 **Short Presentations by the Exhibitors**

18:45 **Short Introduction of Poster Programme**

19:00 **Poster Party with Beer and Snacks** (19:00 – 21:00)

Tuesday, 8 May 2018

Conference Room: Wolfskeel

Session Chair: A. Weber, TU Clausthal

09:00 **PLENARY LECTURE**
Formation of nanostructured functional particles with the spray-drying method
L. Gradon, Warsaw University of Technology/P

09:50 **One step aerosol synthesis of various supported metal catalyst particles with tuneable pore sizes, defined metal crystallite sizes and different loadings**
A. Martinez Arias[1], A. Weber[2], [1] TU Clausthal, Institut für Mechanische Verfahrenstechnik/D, [2] TU Clausthal/D

10:15 **Production of catalysts by flame synthesis**
K. Wegner, ETH Zürich/CH

10:40 Coffee Break in Exhibition Area

Session Chair: D. Agar, TU Dortmund

11:10 **Dynamic methanation of CO_2 - Effect of concentration forcing**
B. Kreitz[1], G. Wehinger[2] ,T. Turek[2], 1 Clausthal University of Technology, Institute of Chemical and Electrochemical Process Engineering/D, [2] Clausthal University of Technology, Institute of Chemical and Electrochemical Process Engineering/D

11:35 **Optimization of catalysts for a dynamic methanol synthesis process**
P. Schühle, J. Albert, P. Wasserscheid, University Erlangen-Nürnberg/D

12:00 **Are monolithic catalytic sponges ready for the application scale? An analysis of trade-offs and design guidelines**
L. Kiewidt[1], J. Thöming[2], [1] Wageningen University/NL, [2] University of Bremen/D

12:25 **Photocatalyst-Coated Wireless Light Emitters for Efficient Up-Scaling of Photocatalytic Processes**
B. O. Burek[1], A. Sutor[2], J. Z. Bloh[1], [1] DECHEMA-Forschungsinstitut/D, [2] University for Health Sciences, Medical Informatics and Technology GmbH/A

12:50 Lunch Break in Exhibition Area

Session Chair: R. Dittmeyer, Karlsruhe Institute of Technology (KIT)

14:00 **Novel structured porous reactors for the scale-up of liquid-liquid reactions**
A. Potdar, L. Thomassen, S. Kuhn, KU Leuven/B

LECTURE PROGRAMME

Tuesday, 8 May 2018

Conference Room: Wolfskeel

14:25 **Advanced Microreactor Design for Continuous Multiphase Reactions Using 3D-Printing**
M. C. Maier[1,2], E. Slama[3],B. Gutmann[1,6],R. Lebl[1,6], S. Pfanner[4],M. Schwentenwein[5], C. O. Kappe[1,6], H. Gruber-Woelfler[1,2], [1] Center for Continuous Flow Synthesis and Processing (CC FLOW), Research Center Pharmaceutical Engineering GmbH (RCPE), Graz/A, [2] Institute of Process and Particle Engineering, Graz University of Technology, Graz/A, [3] Research Center Pharmaceutical Engineering GmbH (RCPE), Graz/A, [4] Anton Paar GmbH, Graz/A, [5] Lithoz GmbH, Vienna/A, [6] Institute of Chemistry, University of Graz/A

14:50 **Dynamic Stabilization of Exothermic Fixed-Bed Reactors: New Operation Modes for Power-To-Gas Processes**
J. Bremer, K. Sundmacher, Max Planck Institut für Dynamik komplexer technischer Systeme/D

15:15 **The recirculation of product gas to enhance the unsteady operation window of fixed-bed reactors**
S. Matthischke[1], S. Rönsch[1], R. Güttel[2], [1] Deutsches Biomasseforschungszentrum gemeinnützige GmbH/D, [2] Universität Ulm, Institut für Chemieingenieurwesen/D

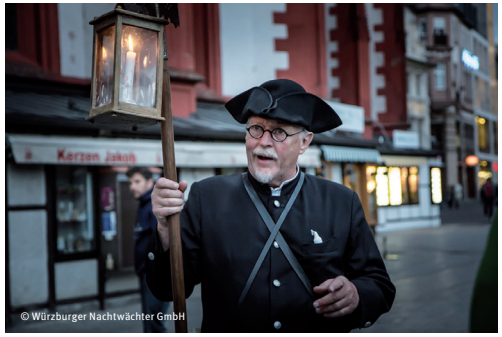
15:40 Coffee Break and Poster Discussions in Exhibition Area

Session Chair: K.-H. Haas, Fraunhofer ISC, Würzburg

17:00 **PLENARY LECTURE**
Scalable gas-phase synthesis of functional nanoparticles
C. Schulz, Universität Duisburg-Essen/D

19:00 **Guided City Tour**
Meeting point: Vierröhrenbrunnen (next to Würzburg town hall)

20:00 **Conference Dinner at Bürgerspital Weinstuben Würzburg**
Address: Theaterstr. 19, Würzburg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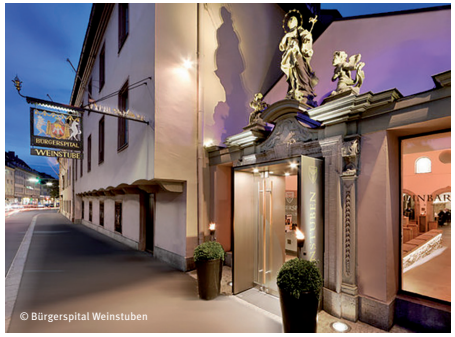
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Wednesday, 9 May 2018

Conference Room: Wolfskeel

Session Chair: O. Wachsen, Clariant Produkte (Deutschland) GmbH

09:00 **Lecture by the winner of the "Hanns-Hoffmann-Prize"**

09:25 **Shape Matters – A Detailed CFD Study on the Influence of Shape used in Fixed-Bed Reactors**
J. von Seckendorff[1], N. Szesni[2], R. Fischer[2], O. Hinrichsen[1], [1] Technische Universität München/D, [2] Clariant Produkte (Deutschland) GmbH/D

09:50 **Tomography based simulation of reactive flow at the micro-scale: Particulate filters with wall integrated catalyst**
R. Greiner[1],T. Prill[2], O. Iliev[2], B. van Setten[3], M. Votsmeier[1], [1] TU Darmstadt/Umicore/D, [2] Fraunhofer ITWM/D, [3] Umicore/D

10:15 **Real-time magnetic resonance imaging of gas-solid fluidization**
A. Penn[1], K. Pruessmann[1], C. Müller[2], [1] Laboratory of Energy Science and Engineering, ETH Zürich and Institute for Biomedical Engineering, University of Zürich/CH, [2] Laboratory of Energy Science and Engineering, ETH Zürich/CH

10:40 Coffee Break and Poster Discussions in Exhibition Area

Session Chair: J. Sauer, Karlsruhe Institute of Technology (KIT)

11:10 **Best Poster Awards**

11:20 **From Carbon Dioxide To Methyl Formate- A Novel Process Concept**
T. Kaiser[1], M. Scott[2], C. Westhues[2] , G. Franciò[2], Walter Leitner[2], Andreas Jupke[1], [1] RWTH Aachen University - Fluid Process Engineering (AVT.FVT)/D, [2] RWTH Aachen University, Institut für Technische und Makromolekulare Chemie (ITMC)/D

11:45 **Biobased Acrylonitrile from Lactic Acid**
D. Mack, S. Schätzle, Y. Traa, E. Klemm, Universität Stuttgart, Institut für Technische Chemie/D

12:10 **Relating Processability and Product Properties to Reaction Conditions for the LDPE Synthesis**
K. Pflug, M. Busch, TU Darmstadt/D

12:35 PLENARY LECTURE
From Idea to Process – Reaction Engineering Aspects in Process Development
H.-W. Zanthoff, Evonik Technology Infrastructure GmbH/D

13:25 **Closing**

13:30 Lunch in Exhibition Area

14:30 **Guided tour to the „Nanoparticle Kitchen" at Fraunhofer ISC**

15:30 End of the meeting

IN SITU MEASUREMENT TECHNIQUES

P01 **Microwave-based in operando measurements of the thermal stability and the catalytic activity of supported ionic liquid catalysts during the selective hydrogenation of 1,3-butadiene**
M. Anke[1], M. Hämmerle[2], R. Moos[2], A. Jess[3], [1] Department of Chemical Engineering, Department of Functional Materials, University of Bayreuth, Bayreuth/D, [2] Department of Functional Materials, University of Bayreuth, Bayreuth/D, [3] Department of Chemical Engineering, University of Bayreuth, Bayreuth/D

P02 **Mixing Time Scale Determination via Heat Flux Profile Analysis Using a Reaction Calorimeter**
F. Reichmann[1], Y. Jirmann[1], N. Kockmann[1], [1] TU Dortmund, Arbeitsgruppe Apparatedesign, Dortmund/D

P03 **Continuous process with advanced process control for the synthesis of highly explosive liquids and intermediates**
D. Boskovic[1], T. Klahn[2], S. Panic[2], A. Mendl[2], T. Tuercke[2], [1] Fraunhofer Institut für Chemische Technologie (ICT), Pfinztal/D, [2] Fraunhofer Institute for Chemical Technology ICT, Pfinztal/D

P04 **In-situ Measuring Techniques for Microreactors up to 150 bars and 400 °C**
G. Rinke, A. Ewinger, A. Urban, R. Dittmeyer, Karlsruhe Institute of Technology (KIT), Eggenstein-Leopoldshafen/D

P05 **Solvothermal reactor for the in situ monitoring of particle formation with spectroscopic and analytical techniques**
H. Embrechts, W. Peukert, M. Distaso, FAU Erlangen-Nürnberg/D

P06 **An in-situ FTIR and Raman study of the metal-organic framework MIL-53(Al) formation pathway under solvothermal conditions**
H. Embrechts, FAU Erlangen-Nürnberg, Lehrstuhl für Feststoff- und Grenzflächenverfahrens-technik/D

P07 **Contactless kinetic measurement in droplets via Raman spectroscopy**
T. Klement, Hochschule Mannheim / Institut für chemische Verfahrenstechnik, Mannheim/D

P08 **Mass-Transport or Kinetic Limitation? The Determination of the Second Damköhler Number using in-situ Spectroscopy in a Liquid/Liquid Biphasic Reactor**
A. Ohligschläger, RWTH Aachen University, ITMC / Germany

NEW REACTOR CONCEPTS

P09 **Results of a heterogeneous catalyzed gas/liquid oxidation performed in an innovative tubular reactor**
T. Leonhardt[1], A. Zogg[2], C. Hutter[3], J. Jeisy[4], W. Riedl[1], [1] University of Applied Sciences and Arts Northwestern Switzerland FHNW, School of Life Sciences, Muttenz/CH, [2] Novartis AG, Basel/CH, [3] F. Hoffmann-La Roche AG, Basel/CH, [4] F. Hoffmann-La Roche AG - Pensionär, Pfeffingen/CH

P10 **Development of quaternary metal/metal oxide catalysts as micro-structured wall catalysts for "Power-to-Gas" applications through combinatorial High-Throughput Screening**
M. Pfeifer[1], T. Schwarz[1], K. Stöwe[1], [1] Technische Universität Chemnitz, Chemnitz/D

POSTER PROGRAMME

P11 **Gas drying using supported ionic liquids**
F. Radakovitsch[1], F. Heym[1], A. Jess[1], [1] Universität Bayreuth/D

P12 **Merging Technologies within the ROMEO Project - Application of Novel Reactor Systems**
P. Wolf[1], M. Haumann[1], B. Schichtel[2], R. Fehrmann[3], A. Riisager[3], J. Marinkovic[3], [1] Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU), Erlangen/D, [2] Linde AG, Pullach/D, [3] Technical University of Denmark, Copenhagen/DK

P13 **Decentral LNG Production based on Process Intensification with Microchannel Reactors**
S. Farsi[1], O. Görke[1], P. Pfeifer[1], R. Dittmeyer[1], [1] Karlsruhe Institute of Technology (KIT), Eggenstein-Leopoldshafen/D

P14 **Influence of microstructured static mixers on gas/liquid mass transfer in a narrow rectangular channel**
L. Sengen[1], F. Herbstritt[2], J. Heck[2], M. Grünewald[1], [1] Ruhr-Universität Bochum/Lehrstuhl Fluidverfahrenstechnik, Bochum/D, [2] Ehrfeld Mikrotechnik GmbH, Wendelsheim/D

P15 **Characterization of a modular, scalable millistructured plate reactor**
A. Rave[1], R. Kuwertz[2], G. Fieg[1], J. Heck[2], [1] Technische Universität Hamburg-Harburg, Institut für Prozess- und Anlagentechnik, Hamburg/D, [2] Ehrfeld Mikrotechnik GmbH, Wendelsheim/D

P16 **New applied reactor concepts as enabler for homogeneous catalyzed reactions**
H. Warmeling[1], A. Vorholt[2], [1] TU Dortmund, Dortmund/D, [2] TU Dortmund, Lehrstuhl für Technische Chemie, Dortmund/D

P17 **Analysis of Membrane Reactors for Integrated Coupling of Oxidative and Thermal Dehydrogenation of Propane**
A. Brune[1], T. Wollf[2], A. Seidel-Morgenstern[1], C. Hamel[3], [1] Otto-von-Guericke-Universität Magdeburg, Magdeburg/D, [2] Max Planck Institute for Dynamics of Complex Technical Systems, Magdeburg/D, [3] Otto-von-Guericke-Universität Magdeburg und Hochschule Anhalt Köthen, Magdeburg/D

P18 **Benzyl alcohol oxidation in aqueous solution catalyzed by AuPd nanoparticles with batch and continuous-flow reactor**
B. Peng[1], I. Rieth[2], M. Grünewald[2], M. Muhler[3], [1] Ruhr-Universität Bochum/D, [2] Chair of Fluid Process Engineering, Ruhr-University Bochum/D, [3] Laboratory of Industrial Chemistry, Ruhr-University Bochum/D

P19 **Dehydrogenation of perhydro-benzyltoluene as LOHC in a microstructured membrane reactor with fixed bed – an experimental demonstration**
A. Wunsch[1], A. Fomina[1], P. Pfeifer[1], [1] KIT IMVT, Eggenstein-Leopoldshafen/D

P20 **Modularer Rohrwendelreaktor mit enger Verweilzeitverteilung für die Prozessentwicklung und Produktion**
W. Krieger[1], M. Schmalenberg[1], N. Kockmann[1], [1] TU Dortmund, Arbeitsgruppe Apparate-design, Dortmund/D

P21 **New Reactor designs for heterogeneous photocatalytic reactions**
F. Guba[1], D. Ziegenbalg[2], [1] Universität Stuttgart, Stuttgart-Vaihingen/D, [2] University of Stuttgart - Institute of Chemical Technology, Stuttgart/D

P22 **Holistic Study of the Photon Efficiency in Photo Microreactors**
M. Sender[1], B. Wriedt[1], D. Ziegenbalg[1], [1] Universität Stuttgart, Institut für Technische Chemie, Stuttgart/D

P23 **Heterogeneous reactive extraction with structured packings: laboratory experiments and scale-up**
F. Schwering[1], D. Schnitzler[1], F. Klotter[1], U. Hoffmann[2], T. Turek[2], U. Kunz[2], [1] INEOS Solvents Germany GmbH, Moers/D, [2] Institut für Chemische und Elektrochemische Verfahrenstechnik, TU Clausthal, Clausthal-Zellerfeld/D

P24 **Ceramic Microreactors for Continuous Hydrothermal Synthesis (cHTS)**
A. Medesi[1], T. Hanemann[2], [1] Karlsruher Institut für Technologie (KIT), Eggenstein-Leopoldshafen/D, [2] Karlsruhe Institute of Technology (KIT), Karlsruhe/D

P25 **Additively Manufactured Catalyst Support Structures with Adjustable Flow Field Characteristics**
S. Trunk, G. Do, W. Schwieger H. Freund, Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU), Lehrstuhl für Chemische Reaktionstechnik/D

PROCESSES

P26 **Investigations of the integrated reaction and catalyst separation for the homogeneously catalyzed reductive amination on miniplant scale**
K. Kuennemann[1], D. Vogt[1], J. Dreimann[1], [1] TU Dortmund, Lehrstuhl für Technische Chemie, Dortmund/D

P27 **Process development for the sustainable production of valuable products from CO_2**
M. Jahn[1], M. Schaller[1], G. Herz[1], E. Reichelt[1], [1] Fraunhofer IKTS, Dresden/D

P28 **Fischer-Tropsch to higher alcohols – In-situ XRD studies on iron-based catalysts**
M. Schaller[1], E. Reichelt[1], N. Fischer2, M. Jahn[1], M. Claeys[2], [1] Fraunhofer IKTS, Dresden/D [2] Catalysis Institute and c*change (DST-NRF Centre of Excellence in Catalysis), University of Cape Town/ZA

P29 **Energy and resource efficient production of flouroalkenes in high temperature microreactors**
K. Mierdel[1], T. Gerdes[1], A. Jess[2], A. Schmidt[3], K. Hintzer[4], [1] Lehrstuhl Werkstoffverarbeitung, Universität Bayreuth/D, [2] Lehrstuhl für Chemische Verfahrenstechnik, Universität Bayreuth/D, [3] InVerTec (Institut für Innovative Verfahrenstechnik), Bayreuth/D, [4] 3M, Dyneon GmbH, Burgkirchen/D

P30 **Design of a Pilot-Plant for Semi-Batch Polymerization with Emphasis on Educational Aspects and Safety Concepts**
S. Eller[1], W. Pauer[1], G. Luinstra[1], [1] University of Hamburg, Institute of Technical and Macromolecular Chemistry, Hamburg/D

P31 **Selective partial oxidation via the BrOx cycle**
M. Wiesehahn[1], D. Agar[1], J. Rebordinos[1], [1] TU Dortmund, Lehrstuhl für Chemische Verfahrens-technik, Dortmund/D

P32 **Hydrophobic Ionic Liquids as bifunctional catalysts for olefin epoxidation**
B. Zehner[1], J. Schäffer[1], W. Korth[1], A. Jess[1], M. Cokaja[2], [1] Universität Bayreuth/D, [2] TUM Campus Straubing, München/D

P33 **Experimental investigation of local product concentration at Taylor bubbles in reactive systems using Laser Induced Fluorescence**
S. Kastens[1], M. Hoffmann[1], M. Schlüter[1], [1] Institute of Multiphase Flows, Hamburg University of Technology, Hamburg/D

P34 **Continuous Synthesis of Quantum Dots and Inline Process Analytics**
C. Schindler[1], R. Sperling[1], M. Maskos[1], [1] Fraunhofer ICT-IMM, Mainz/D

P35 **New Model System for Coating Processes in a Fluidized Bed Reactor Using Polyvinylpyrrolidone and Glucose**
D. Wong[1], A. Wirsching[1], A. Reinbeck[1], S. Müller[1], H. Moritz[1], W. Pauer[1], [1] Universität Hamburg/D

P36 **Process Design for the Production of Oxymethylene Ether**
C. Gierlich[1], I. Delidovich[1], R. Palkovits[1], [1] ITMC, RWTH Aachen University, Aachen/D

P37 **Pervaporation for Product isolation in Methyl acetate Synthesis**
D. Painer, Susanne Lux, Matthäus Siebenhofer, Graz University of Technology, Graz/A

P38 **Electrochemical Production of Formic Acid / Formate by low temperature H_2O,CO_2-Coelectrolysis**
A. Löwe[1], M. Stoll[1], D. Kopljar[1], F. Bienen[2], N. Wagner[2], E. Klemm[1]; [1] University of Stuttgart – Institute of Chemical Technology, Stuttgart/D; [2] D LR - German Aerospace Center, Stuttgart/D

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M. Aigner[1], D. Roth[1], A. Jupke[1], [1] RWTH Aachen University - Fluid Process Engineering (AVT. FVT), Aachen/D

P40 **Kinetics of the methoxycarbonylation of long-chain olefins and sustainable oleo chemicals in thermomorphic solvent systems**
S. Kirschtowski[1], A. Brune[2], M. Gerlach[2], A. Seidel-Morgenstern[1], C. Hamel[3], [1] Otto von Guericke University, Institute of Process Engineering/Max Planck Institute for Dynamics of Complex Technical Systems, Magdeburg/D, [2] Otto von Guericke University, Institute of Process Engineering, Magdeburg/D, [3] Anhalt University of Applied Sciences, Processing Engineering, Köthen/D

P41 **Kinetic investigation of the selective n-Butane oxidation to Maleic Anhydride in an isothermal milli-structured fixed-bed reactor**
M. Müller[1], G. Mestl[2], T. Turek[1], [1] TU Clausthal - Institute for Chemical and Electrochemical Process Engineering, Clausthal-Zellerfeld/D, [2] Clariant Produkte Deutschland GmbH, Bruckmühl/D

P42 **Enzymatic Catalysis of Prebiotic Galacto-Oligosaccharides: Mechanistic Model Development for Enzymes of Different Origins**
I. Mueller[1], G. Kiedorf[2], S. Kirschtowski[3], A. Seidel-Morgenstern[3], C. Hamel[1], [1] Anhalt University of Applied Sciences, Dept. Applied Biosciences and Process Engineering, Koethen (Anhalt)/D, [2] Max Planck Institute for Dynamics of Complex Technical Systems, Magdeburg/D, [3] Otto von Guericke University, Institute of Process Engineering, Magdeburg/D

P43 **DoE based Parameter Screening for Biphasic Esterification**
A. Toth[1], S. Lux[1], M. Siebenhofer[1], [1] Graz University of Technology, Institute of Chemical Engineering and Environmental Technology, Graz/A

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R. Behrens[1], E. von Harbou[1], H. Hasse[1], G. Lloyd-Jones[2], A. Jones[2], [1] University of Kaiserslautern/D, [2] The University of Edinburgh/UK

P45 **Hydrogenation of LOHC material – kinetic effects and impact of isomeric mixtures**
A. Leinweber[1], K. Müller[1], W. Arlt[1], [1] Institute for Separation Science and Technology, Friedrich-Alexander-University, Erlangen/D

P46 **Kinetic Study of Leuco-Indigo Carmine Oxidation in Microreactors**
W. Krieger[1], N. Kockmann[1], [1] TU Dortmund, Arbeitsgruppe Apparatedesign, Dortmund/D

P47 **Identification of the kinetics of the alkaline methanol electro-oxidation reaction by dynamic methods**
T. Haisch[1], F. Kubannek[1], U. Krewer[1], [1] TU Braunschweig, Institut für Energie- und Systemverfahrenstechnik, Braunschweig/D

P48 **Transient CO_2 methanation on a nickel catalyst**
G. Tauer[1], J. Schmitt[1], C. Kern[1], A. Jess[1], [1] Lehrstuhl für Chemische Verfahrenstechnik, Universität Bayreuth, Bayreuth/D

P49 **Transport versus kinetics: Gradient-free investigation of the SILP catalyzed water-gas shift reaction**
V. Strobel[1], M. Haumann[1], [1] Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU), Lehrstuhl für chemische Reaktionstechnik (CRT), Erlangen/D

P50 **Production of glycerol carbonate using the thermomorphic properties of glycerol and cyclic carbonates**
J. Esteban[1], A. Vorholt[1], [1] Max-Planck-Institut für Chemische Energiekonversion, Mülheim an der Ruhr/D

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P51 **Heterogeneous modeling approach for gas-limited reactions in an inclined rotating fixed bed reactor with stratified flow**
R. Timaeus[1], M. Schubert[1], U. Hampel[1], [1] Helmholtz-Zentrum Dresden-Rossendorf, Dresden/D

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E. Cremer[1], M. Grünewald[1], [1] Ruhr-Universität Bochum/Lehrstuhl für Fluidverfahrenstechnik, Bochum/D

P53 **Adsorption refrigeration process – Influence of competing material parameters on process performance**
M. Scherle[1], L. Träger[2], B. Etzold[2], U. Nieken[1], [1] University of Stuttgart - Institute of Chemical Process Engineering, Stuttgart/D, [2] TU Darmstadt, Ernst-Berl-Institut für Technische und Makromolekulare Chemie, Darmstadt/D

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A. Hilfer[1], M. Busch[1], [1] TU Darmstadt/D

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P. Peikert[1], K. Pflug[1], M. Busch[1], [1] TU Darmstadt/D

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G. Wehinger[1], S. Kolaczkowski[2], D. Beton[3], R. Kolvenbach[3], L. Torkuhl[3], [1] TU Clausthal, Clausthal-Zellerfeld/D, [2] Department of Chemical Engineering, University of Bath/UK, [3] Alantum Europe GmbH, Munich/D

P57 **Modeling of Hydrocarbon Accumulation Inside the Catalyst Pores during Fischer-Tropsch Synthesis**
S. Rößler[1], C. Kern[1], A. Jess[1], [1] Department of Chemical Engineering, University of Bayreuth/D

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R. Rzehak[1], M. Krauß[2], S. Haase[3], R. Lange[3], [1] Helmholtz-Zentrum Dresden - Rossendorf, Dresden/D, [2] Helmholtz-Zentrum Dresden - Rossendorf / Technische Universität Dresden/D, [3] Technische Universität Dresden/D

P59 **Hydrogenation of aqueous sugar solutions from renewable resources: Selection of a suitable reactor concept**
C. Kirstein[1], C. Glotzbach[2], T. Turek[1], [1] TU Clausthal - Institute for Chemical and Electrochemical Process Engineering, Clausthal-Zellerfeld/D, [2] ThyssenKrupp Industrial Solutions AG, Dortmund/D

P60 **The effect of correlated kinetic parameters on (bio)chemical reaction networks**
R. Schenkendorf[1], X. Xie[1], U. Krewer[1], [1] TU Braunschweig, Institut für Energie- und Systemverfahrenstechnik, Braunschweig/D

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K. Schafner[1], [1] TU Clausthal - Institute of Chemical and Electrochemical Process Engineering / Ulm University - Institute of Chemical Engineering, Clausthal-Zellerfeld/D

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D. Hirche[1], F. Birkholz[1], O. Hinrichsen[1], [1] Technische Universität München, Garching b. München/D

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P. Donaubauer[1], L. Schmalhorst[1], O. Hinrichsen[1], [1] Technische Universität München, Garching b. München/D

P64 **Macroscopic Analysis of Oxygen Reduction in porous Gas-Diffusion Electrodes: Comparison of stationary and dynamic modeling**
D. Franzen[1], M. Röhe[2], B. Ellendorff[1], F. Kubannek[2], U. Krewer[2], T. Turek[1], [1] TU Clausthal - Institute of Chemical and Electrochemical Process Engineering, Clausthal-Zellerfeld/D, [2] Institute of Energy and Process Systems Engineering, TU Braunschweig, Braunschweig/D

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J. Friedland[1], D. Meyer[1], M. Gässler[1], R. Güttel[1], [1] Universität Ulm, Institut für Chemieingenieurwesen, Ulm/D

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M. Klinger[1], A. Stute[2], M. Meuresch[2], A. Jupke[1], [1] RWTH Aachen University - Fluid Process Engineering (AVT.FVT), Aachen/D, [2] Covestro Deutschland AG, Leverkusen/D

P67 **Rotor-stator spinning disc reactor: CFD simulation of the heat transfer**
J. Kleiner[1], B. Münch[1], F. Rößler[1], J. Fernengel[1], F. Habla[1], O. Hinrichsen[1], [1] Technische Universität München, Garching b. München/D

P68 **Experimental and Simulative Dynamic Analysis of the Oxygen Reduction Reaction at Porous Gas Diffusion Electrodes**
M. Röhe[1], F. Kubannek[1], U. Krewer[1], [1] TU Braunschweig, Institut für Energie- und Systemverfahrenstechnik, Braunschweig/D

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A. Pietschak[1], H. Freund[1], [1] Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU), Lehrstuhl für Chemische Reaktionstechnik, Erlangen/D

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J. Fernengel[1], O. Hinrichsen[1], [1] Technische Universität München, Garching b. München/D

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A. Gradel[1], T. Plessing[1], A. Jess[2], R. Honke[1], [1] Hochschule für angewandte Wissenschaften Hof/D, [2] Department of Chemical Engineering, University of Bayreuth/D

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J. Poissonnier[1], M. Pelckmans[2], F. Van Waes[3], K. Moonen[3], B. Sels[2], J. Thybaut[1], G. Marin[1], [1] Ghent University, Gent/B, [2] KU Leuven/B, [3] Eastman Chemical Company, Gent/B

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A. Attari Moghaddam[1], I. Iqbal Cheema[1], U. Krewer[1], [1] TU Braunschweig, Institut für Energie- und Systemverfahrenstechnik, Braunschweig/D

P74 **Optical imaging and detailed CFD simulations of the Fischer-Tropsch Synthesis in a milli-structured fixed-bed reactor**
M. Klee[1], G. Wehinger[1], T. Turek[1], [1] Clausthal University of Technology, Institute of Chemical and Electrochemical Process Engineering, Clausthal-Zellerfeld/D

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I. Bogatykh, Thomas Osterland, Hochschule Augsburg/D

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J. Maußner[1], C. Dreiser[2], O. Wachsen[2], H. Freund[1], [1] Friedrich-Alexander Universität Erlangen-Nürnberg, Lehrstuhl für Chemische Reaktionstechnik/D, [2] Clariant Produkte (Deutschland) GmbH, Group Process Technolog/D

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E. Borukhovich, T. Helmig, I. Wlokas, A. Markus Kempf, University Duisburg-Essen/D

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P. Wollny[1], H. Wiggers[1], A. Kempf[1], I. Wlokas[1], F. Strappaveccia[2], E. Ghedini[2], [1] University of Duisburg-Essen/D, [2] University of Bologna/I

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T. Prill, O. Iliev, Fraunhofer ITWM, Kaiserslautern/D

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K. Girod[1], K. Breitkreuz[1], S. Schlüter[1], K. Girod[1], S. Kaluza[1], [1] Fraunhofer UMSICHT, Oberhausen/D

P81 **Advances in Dynamic Energy Storage through Microstructured Fischer-Tropsch Reactors**
M. Loewert[1], P. Pfeifer[2], [1] Karlsruher Institut für Technologie (KIT), Eggenstein-Leopoldshafen/D, [2] KIT, IMVT, Eggenstein-Leopoldshafen/D

P82 **Selective methanation of CO over a Ru-γAl_2O_3 catalyst**
P. Garbis[1], [1] Universität Bayreuth/D

P83 **Ni/MgO catalysts for CO_2 methanation**
A. Loder[1], S. Lux[1], G. Baldauf-Sommerbauer[1], M. Siebenhofer[1], [1] Institute of Chemical Engineering and Environmental Technology, University of Technology Graz, Graz/A

P84 **Process Integration for Decentralized Power-to-Fuel Conversion Based on Fischer-Tropsch Synthesis**
H. Kirsch[1], C. Sun[1], J. Schwab[1], P. Pfeifer[1], R. Dittmeyer[1], [1] Karlsruhe Institute of Technology (KIT), Eggenstein-Leopoldshafen/D

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M. Schöpp[1], T. Heydt[1], D. Born[2], M. Votsmeier[2], A. Drochner[1], B. Etzold[1], [1] Technische Universität Darmstadt, Darmstadt/D, [2] Umicore, Hanau-Wolfgang/D

P86 **Development of copper-based water-gas shift catalysts for application in exhaust gas catalysis**
T. Janke[1], J. Simböck[1], R. Palkovits[1], [1] Institut für Technische und Makromolekulare Chemie, RWTH Aachen University, Aachen/D

P87 **Catalytic Conversion of Carbon Dioxide with Solar Hydrogen to Hydrocarbons under Supercritical Conditions**
L. Beißwenger[1], S. Schultheis[1], A. Drochner[1], B. Etzold[1], H. Vogel[1], [1] TU Darmstadt, Ernst-Berl-Institut für Technische und Makromolekulare Chemie, Darmstadt/D

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M. Felischak[1], A. Seidel-Morgenstern[2], C. Hamel[3], [1] Otto-von-Guericke-Universität Magdeburg, Magdeburg/D, [2] Otto-von-Guericke-Universität Magdeburg/Max-Planck-Institut für Dynamik komplexer technischer Systeme, Magdeburg/D, [3] Anhalt University of Applied Sciences, Köthen/D

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A. Grafschafter[1], D. Painer[1], M. Siebenhofer[1], [1] Graz University of Technology, Institute of Chemical Engineering and Environmental Technology, Graz/A

P90 **CO and CO_2 methanation on Co@SiO_2 and Co@silicalite-1 core-shell catalysts**
J. Ilsemann[1], A. Straß[2], L. Kiewidt[3], M. Bäumer[1], J. Thöming[4], R. Güttel[2], [1] University of Bremen - Institute of Applied and Physical Chemistry (IAPC), Bremen/D, [2] Ulm University - Institute of Chemical Engineering, Ulm/D, [3] Wageningen University - Biobased Chemistry and Technology, Wageningen/NL, [4] University of Bremen - Institute of Chemical Engineering - Recovery and Recycling, Bremen/D

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M. Seitz[1], M. Wickenheisser[1], A. Engelhardt[1], T. Stam-Creutz[1], J. Welscher[2], W. Schwieger[2], [1] Hochschule Merseburg, Merseburg/D, [2] Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU), Erlangen/D

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C. Heßelmann[1], [1] Lehrstuhl für Chemische Reaktiontechnik der Universität Erlangen-Nürnberg, Erlangen/D

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Y. Louven[1], K. Schute[1], R. Palkovits[1], [1] ITMC RWTH Aachen, Aachen/D

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J. Hardwick[1], S. Yunes[1], P. Wommack[1], J. Exley[1], [1] Particulate Systems, Division of Micromeritics Instrument Corp., Norcross, GA/USA

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Hualiang Zuo[1], Vera Meynen[2], Prof. Elias Klemm[1]; [1] University of Stuttgart - Institute of Chemical Technology, Stuttgart/D; [2] University of Antwerp, Antwerp/B

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V. Bon[1], H. Miura[1], I. Senkovska[1], S. Ehrling[1], S. Watanabe[2], M. Ohba[3], S. Kaskel[1]; [1] Technische Universität Dresden/D, [2] Kyoto University, Department of Chemical Engineering, Kyoto/J, [3] Kyushu University, Fukuoka/J

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J. Albert[1], A. Bukowski[2], [1] Universität Erlangen-Nürnberg, Erlangen/D, [2] FAU Erlangen-Nürnberg, Erlangen/D

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L. Kreft[1], A. Weber[1], S. Beuermann[2], J. Melcher[3], P. Wierach[3], [1] Institute of Particle Technology, Clausthal University of Technology, Clausthal-Zellerfeld/D, [2] Institute of Technical Chemistry, Clausthal University of Technology, Clausthal-Zellerfeld/D, [3] Institute of Composite Structures and Adaptive Systems, German Aerospace Center DLR, Braunschweig/D

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M. Koj[1], T. Gimpel[2], P. Haug[1], W. Schade[3], T. Turek[1], [1] Institute of Chemical and Electrochemical Process Engineering, Clausthal University of Technology, Clausthal-Zellerfeld/D, [2] EFZ, Clausthal University of Technology, EnergieCampus, Goslar/D, [3] Clausthal University of Technology and Fraunhofer Heinrich Hertz Institute, EnergieCampus, Goslar/D

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H. Steldinger[1], J. Gläsel[1], B. Etzold[1], [1] Technische Universität Darmstadt/D

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L. Träger[1], M. Scherle[2], J. Gläsel[1], U. Nieken[2], B. Etzold[1], [1] Technische Universität Darmstadt, Ernst Berl-Institut für Technische und Makromolekulare Chemie, Darmstadt/D, [2] Universität Stuttgart, Institut für Chemische Verfahrenstechnik, Stuttgart/D

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M. Seipenbusch[1], F. Weis[2], G. Kasper[2], [1] ParteQ GmbH, Kuppenheim/D, [2] Karlsruhe Institute of Technology (KIT), Karlsruhe/D

P103 **Hierarchically layered bifunctional catalysts for efficient one stage synthesis of DME from synthesis gas in micro structured reactors: Part II: Modelling and catalytic testing**
G. Baracchini[1], W. Ding[1], S. Lee[1], M. Klumpp[1], A. Machoke[2], W. Schwieger[2], R. Dittmeyer[1], [1] Karlsruhe Institute of Technology (KIT), Eggenstein-Leopoldshafen/D, [2] Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU), Erlangen/D

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C. Herfurth[1], N. Shah[1], A. Lieske[1], [1] Fraunhofer Institute for Applied Polymer Research IAP, Potsdam-Golm/D

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M. Shaban[1], J. Poostforooshan[1], A. Weber[1], [1] TU Clausthal, Clausthal-Zellerfeld/D

P106 **Hierarchically layered bifunctional catalysts for efficient one stage synthesis of DME from synthesis gas in micro structured reactors: Part I: Project overview and preparation of core@shell catalysts**
M. Klumpp[1], G. Baracchini[1], S. Lee[1], S. Reuß[2], A. Machoke[2], J. Thormann[1], W. Ding[1], R. Dittmeyer[1], W. Schwieger[2], [1] Karlsruhe Institute of Technology (KIT), Eggenstein-Leopoldshafen/D, [2] Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU), Erlangen/D

P107 **Gas-phase synthesis of carbon nitride-polymer composites**
J. Poostforooshan[1], M. Shaban[1], A. Weber[1], [1] TU Clausthal, Clausthal-Zellerfeld/D

P108 **Modification of the mechanical stability of nanoparticle agglomerates by a versatile aerosol coating process**
M. Bierwirth[1], P. Post[1], A. Weber[1], [1] Institute of Particle Technology, Clausthal University of Technology, Clausthal/D

P109 **Reduction of metal powder in a fluidized bed reactor using a dielectric barrier discharge reactor**
M. Bierwirth[1], A. Weber[1], [1] Institute of Particle Technology, Clausthal University of Technology, Clausthal/D

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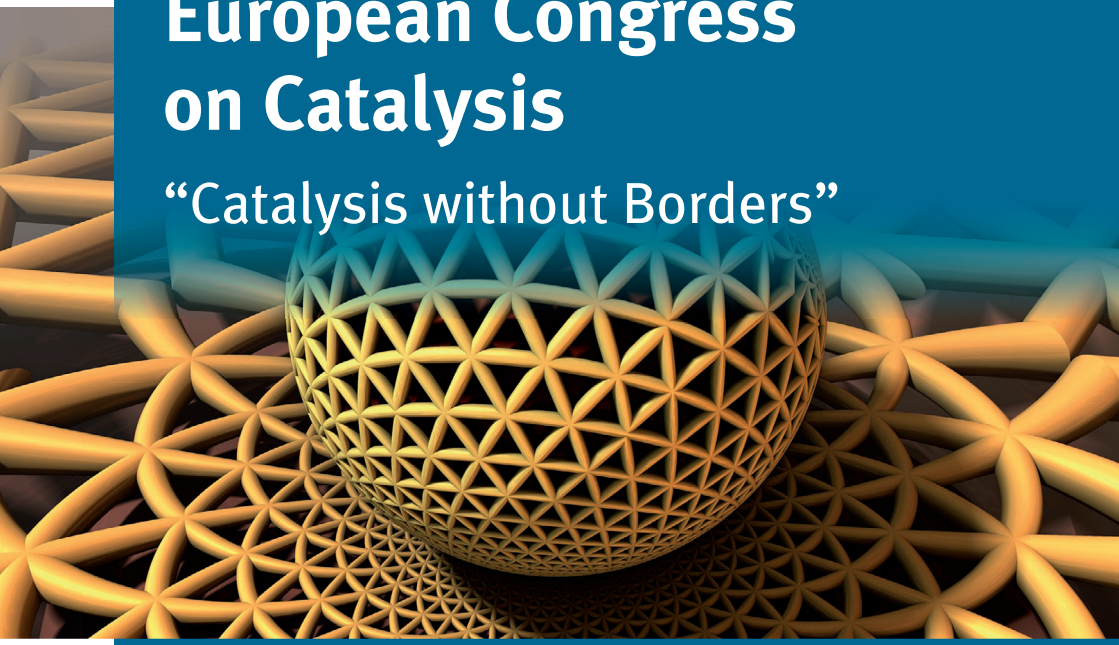

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