TECHNISCHE UNIVERSITÄT DRESDEN

HZDR
HELMHOLTZ ZENTRUM DRESDEN ROSSENDORF

GLS-16

16th INTERNATIONAL CONFERENCE
on Gas–Liquid and Gas–Liquid–Solid Reactor Engineering

2 – 5 September 2024
Dresden, Germany

CONFERENCE PROGRAM

www.gls16.org

LOCAL HOSTING AND ORGANIZATION BY

Helmholtz-Zentrum Dresden-Rossendorf (HZDR)
www.hzdr.de

HZDR HELMHOLTZ ZENTRUM DRESDEN ROSSENDORF

TUD Dresden University of Technology
www.tu-dresden.de

TECHNISCHE UNIVERSITÄT DRESDEN

Conference Secretariat & Contact
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E-Mail: info@gls16.org
www.kit-group.org/offices/dresden/

K.I.T. Dresden

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Helmholtz-Zentrum Dresden-Rossendorf, Germany

Markus Schubert
Technische Universität Dresden, Germany

Martin Sommerfeld
Otto-von-Guericke-Universität Magdeburg, Germany

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- Arturo Macchi, University of Ottawa, Canada
- Subhasish Mitra, University of Newcastle, Australia
- Alissa Park, Columbia University, USA
- Vivek V. Ranade, Queen's University Belfast, UK
- Shantanu Roy, Indian Institute of Technology Delhi, India
- Jose Teixeira, Universidade do Minho, Portugal
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- Sara Marchini
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- Heike Schlessiger
- Annett Kliem

CONTENTS

WELCOME

Dear Friends and Colleagues,

It is a pleasure to welcome you to the 16th International Conference on Gas–Liquid and Gas–Liquid–Solid Reactor Engineering (GLS-16) in Dresden, the capital of the Free State of Saxony in the heart of Europe!

GLS-16 is hosted by the Helmholtz-Zentrum Dresden-Rossendorf and the Technische Universität Dresden. It continues the success story of previous GLS conferences in Columbus (1992), Cambridge (1995), Kanazawa (1997), Delft (1999), Melbourne (2001), Vancouver (2003), Strasbourg (2005), New Delhi (2007), Montreal (2009), Braga (2011), Seoul (2013), New York (2015), Brussels (2017), Guilin (2019), and Ottawa (2022). We are delighted that so many experts and young scientists from all over the world have once again come together to discuss the latest advances in multiphase reactors and processes and we are grateful for your contributions to a truly rich technical programme of the conference!

The Scientific Committee and the local organisers of GLS-16 have done a great job to make this event a true success. Please enjoy a good time with fruitful discussions, new ideas and partners for cooperation and breathe in the spirit of this beautiful city that welcomes you with all its cultural, architectural and natural attractions and beauties.

Uwe Hampel, Markus Schubert, Martin Sommerfeld
Chairs

Michael Schlüter

Institute of Multiphase Flows, Hamburg University of Technology, Hamburg, Germany

Talk: **The journey of reacting species through multiphase reactors: From Eulerian to Lagrangian view**
PL 1, Tuesday, 3 September, 2024, 9:00 - 9:45

Michael Schlüter studied Process Engineering at the University of Bremen and received is PhD at the Institute of Environmental Process Engineering. After his habilitation in the field of multiscale transport phenomena in multiphase flows he changed to the Hamburg University of Technology where he owns the chair of „Fluid Mechanics for Multiphase Systems“ and is head of the Institute of Multiphase Flows. He serves as coordinator of the DFG Priority Program „Reactive Bubble Columns“ and is chair of the Working Party „Multiphase Fluid Flow“ in the European Federation of Chemical Engineering. Since May 2023 he is Spokesperson of the DFG Collaborative Research Center 1615 “SMART Reactors”. His research interest is primarily in the field of multiscale transport phenomena in chemical and bioprocess engineering, reactor development, design and scaleup.

PLENARY SPEAKER

Kevin Galvin

ARC Centre of Excellence for Enabling Eco-Efficient Beneficiation of Minerals, University of Newcastle, Callaghan, NSW Australia

Talk: **Geometry matters – how inclination shifts the drift flux and the process**
PL2, Wednesday, 4 September, 2024, 09:00 – 09:45

Kevin Galvin is the inventor of the Reflux™ Classifier, a novel fluidized bed used in gravity separation of fine particles. With over 240 installations around the world, the technology has been used to beneficiate iron ore, mineral sands, potash, chromite, spodumene, manganese and other base metal oxides. New innovative systems incorporating gas bubbles are emerging including the Reflux Flotation Cell and CoarseAIR through collaboration with FLSmidth. Kevin Galvin obtained his PhD from Imperial College and is a Laureate Professor at the University of Newcastle, Australia. He is a Fellow of the Australian Academy of Science and Australian Academy of Technology and Engineering and previous recipient of numerous awards including the Antoine Gaudin Award in mineral processing. He is Director of the ARC Centre of Excellence for Enabling Eco-Efficient Beneficiation of Minerals.

Vivek Ranade

University of Limerick, Bernal Chair Professor of Process Engineering at Bernal Institute, Limerick, Ireland

Talk: **Hydrodynamic cavitation for intensifying multiphase processes: State of the art, challenges, and path forward**
PL3, Thursday, 5 September, 2024, 9:00 - 9:45

Vivek Ranade is a Bernal Chair Professor of Process Engineering at Bernal Institute, University of Limerick, Ireland. He leads 'Multiphase Reactors and Process Intensification' group. Vivek and his group use experiments, computational flow modelling, population balance models and machine learning to generate new insights in multiphase flows, multiphase reactors, and process intensification. The group is developing novel fluidic devices, intensified processes and 'factory in a box' platforms for decentralised manufacturing, personalised products, responsible resource usage, decarbonisation as well as mitigation and valorisation of waste.

SPONSORS & PARTNERS

The Organizing Committee would like to thank our sponsors and exhibitors for the support of the conference!
Our exhibitors look forward to seeing you at their stands in the conference foyer during the breaks!

EXHIBITORS

A2 Photonic Sensors
Grenoble, France

C3 Prozess- und Analysentechnik GmbH
Haar b. München, Germany

Fink Chem+Tec GmbH
Leinfelden-Echterdingen, Germany

HZDR Innovation GmbH
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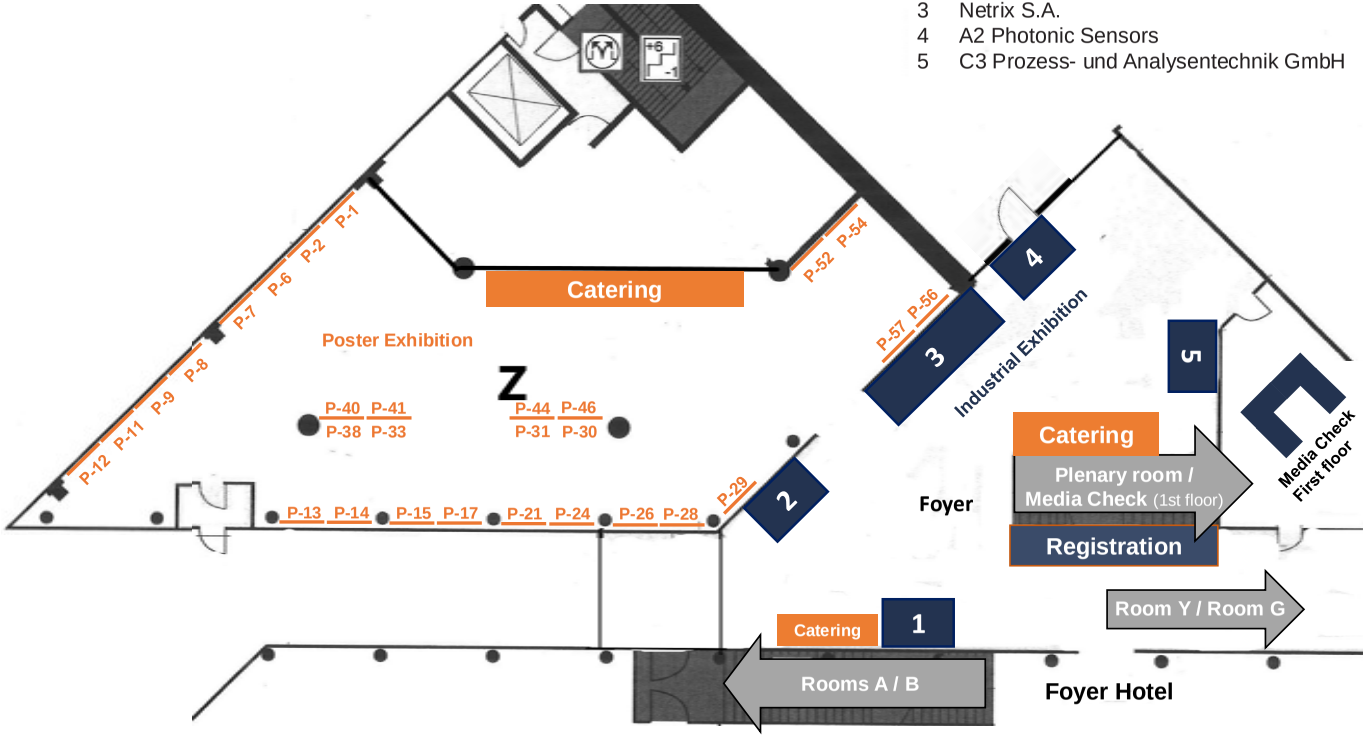
Bonn, Germany

Industry and Poster Exhibition

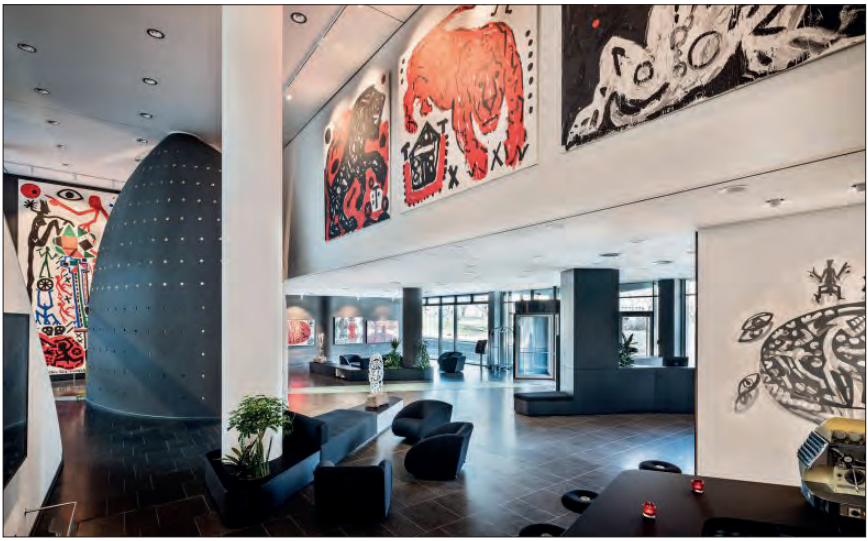
Ground Floor - Foyer & Room Z

Booth Nb.	Exhibitor
1	HZDR Innovations GmbH
2	Fink Chem+Tec GmbH
3	Netrix S.A.
4	A2 Photonic Sensors
5	C3 Prozess- und Analysentechnik GmbH



The meeting will be held at the Penck Hotel Dresden, situated just a 10-minute walk from the city centre and Dresden's historic Old Town.

Penck Hotel Dresden
Ostra-Allee 33
01067 Dresden
Germany



GOOD TO KNOW

ABSTRACTS OF GLS-16

Each registered delegate will receive a USB flash drive during registration.

BANKING AND CURRENCY EXCHANGE

Euro is the official currency. Opening times differ from one bank to the next, with most open weekdays from 9 am to 4 pm. Most bank branches have cash machines (ATMs) that allow you to withdraw cash and get bank statements 24 hours/day.

CERTIFICATE OF ATTENDANCE

The certificate of attendance will be sent electronically to all delegates after the end of GLS-16.

COFFEE BREAKS AND LUNCHES

During all morning and afternoon breaks, coffee, tea, and refreshments will be served in the conference foyer and room Z. Here is also a light lunch provided.

DISCLAIMER

The organizers are not liable for damages and/or losses of any kind which may be incurred by the conference delegates or by any other individuals accompanying them, both during the official activities as well as going to/from the conference. Delegates are responsible for their own safety and belongings.

EMERGENCY TELEPHONE NUMBERS

Calls to 112 are free of charge and can be made from a landline, pay phone or mobile phone, even without a SIM card. Dialling the number will direct you to an operator who will notify the appropriate service, typically the local fire and rescue service. It can be used for any life-threatening situation, including serious medical problems, fire-related incidents, crimes and life-threatening situations. You can also call an ambulance through this number. In addition to German, calls can be answered in English.

HEALTH AND SAFETY

If you feel ill and to prevent the spread of infection, we urge you to get tested. Broadband tests are available at the registration desk. The health of all congress participants and staff should come first!

INTERNET

Public Wi-Fi is available for the participants of the GLS-16 conference free of charge. Please take the Wi-Fi access code from the information at the registration desk.

NAME BADGE

Conference badges need to be picked up onsite at the registration desk upon arrival.
All participants must wear the badge visibly at any time on-site at the venue.

OFFICIAL LANGUAGE

The conference language is English.

REGISTRATION OPENING HOURS

Monday,	2 September, 2024	16:00 - 20:00
Tuesday,	3 September, 2024	07:45 - 18:30
Wednesday,	4 September, 2024	08:00 - 17:30
Thursday,	5 September, 2024	08:00 - 18:00

SPEAKER INFORMATION

Please check date, time and room of your contribution at the scientific program. Please prepare your presentations in MS Powerpoint (.ppt or .pptx), Adobe Acrobat (pdf), format 16:9. Please take care that special fonts/characters and videos are properly integrated.
Bring a copy of your presentation on a USB flash drive to the media check as early as possible, at the latest 2 hours in advance of your session so that it can be uploaded onto the central computer system to ensure a smooth change over between speakers. A technician will be available to assist you with the upload.
It is not possible to use your own notebook or any other file format for the presentations.

Media Check Opening hours:

Monday,	2 September, 2024	16:30 - 18:30
Tuesday,	3 September, 2024	07:45 - 18:30
Wednesday,	4 September, 2024	08:00 - 17:30
Thursday,	5 September, 2024	08:00 - 15:30

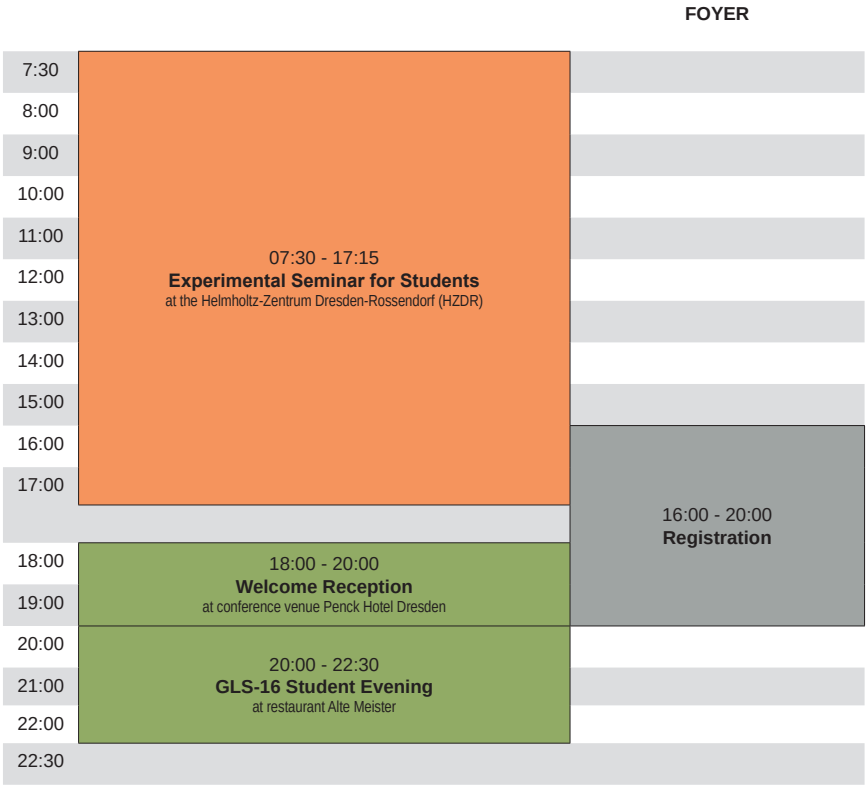
POSTER SESSION

The poster session with beer and pretzels will take place on Tuesday, September 03, 2024 from 18:00 - 19:30 in the exhibition area. Authors are asked to be present at their poster during the poster session for discussions.
The posters remain on their poster board throughout the entire conference.

TIME ZONE

The time zone in Germany is Central European Summer Time (UTC+02:00) at the time of the conference.

SCHEDULE – MONDAY, 2 SEPTEMBER, 2024



GLS-16 conference topics

T1	**Fluid dynamics and heat and mass transfer in multiphase systems**
T2	**Granular materials processing and fluidized bed reactors**
T3	**Measurement and data analysis techniques for multiphase systems, reactor dynamics and control**
T4	**Microfluidic reactors and microsystems**
T5	**Multiphase computational fluid dynamics**
T6	**Multi-scale modelling of multiphase chemical reactors**
T7	**Process intensification in multiphase chemical reactors**
T8	**Reaction mechanisms and kinetics of multiphase reactions**
T9	**Scale-up of multiphase reactors**
T10	**Electrolysis and other electrochemical processes**
T11	**Froth flotation**
T12	**Wastewater treatment and bioprocesses**
T13	**Carbon dioxide capture and gas cleaning**
T14	**Fine bubbles**

SCHEDULE – TUESDAY, 3 SEPTEMBER, 2024

	KUNSTHALLE	ROOM A	ROOM B	ROOM Y	ROOM G
8:30	Opening				
9:00	09:00 - 09:45 **Plenary Lecture 1:** The journey of reacting species through multiphase reactors: From Eulerian to Lagrangian view (room: Kunsthalle)				
9:30	Break to change				
10:00	10:00 - 10:40 **T1-1** Fluid dynamics and heat and mass transfer in multiphase systems 1	10:00 - 10:40 **T2-1** Granular materials processing and fluidized bed reactors 1	10:00 - 10:40 **T7-1** Process intensification in multiphase chemical reactors 1	10:00 - 10:40 **T8-1** Reaction mechanisms and kinetics of multiphase reactions 1	10:00 - 10:40 **T4-1** Microfluidic reactors and microsystems 1
10:30	Coffee Break and Exhibition Viewing				
11:00	11:10 - 12:30 **T1-2** Fluid dynamics and heat and mass transfer in multiphase systems 2	11:10 - 12:30 **T2-2** Granular materials processing and fluidized bed reactors 2	11:10 - 12:30 **T7-2** Process intensification in multiphase chemical reactors 2	11:10 - 12:30 **T8-2** Reaction mechanisms and kinetics of multiphase reactions 2	11:10 - 12:30 **T4-2** Microfluidic reactors and microsystems 2
11:30					
12:00					
12:30	Lunch Break & Exhibition Viewing				
13:00					
13:30	13:30 - 14:00 **ISP** – Industry-Sponsors' Pitch				
14:00	Break to change				
14:30	14:10 - 15:30 **T1-3** Fluid dynamics and heat and mass transfer in multiphase systems 3	14:10 - 15:30 **T5-1** Multiphase computational fluid dynamics 1	14:10 - 15:30 **T3-1** Measurement and data analysis techniques for multiphase systems, reactor dynamics and control 1	14:10 - 15:30 **T10-1** Electrolysis and other electrochemical processes 1	14:10 - 15:30 **T4-3** Microfluidic reactors and microsystems 3
15:00					
15:30	Coffee Break and Exhibition Viewing				
16:00	16:00 - 17:40 **T1-4** Fluid dynamics and heat and mass transfer in multiphase systems 4	16:00 - 17:40 **T5-2** Multiphase computational fluid dynamics 2	16:00 - 17:40 **T3-2** Measurement and data analysis techniques for multiphase systems, reactor dynamics and control 2	16:00 - 17:20 **T10-2** Electrolysis and other electrochemical processes 2	16:00 - 17:20 **T6-1** Multi-scale modelling of multiphase chemical reactors 1
16:30					
17:00					
17:30					
18:00	18:00 - 19:30 **Poster Session** (exhibition area)	18:00 - 19:00 **Meeting of the GLS Scientific Committee** (room: D)			
19:00					
19:30					
20:00					
21.00					
22.00					

SCHEDULE – WEDNESDAY, 4 SEPTEMBER, 2024

	KUNSTHALLE	ROOM A	ROOM B	ROOM Y	ROOM G
8:30					
9:00	09:00 - 09:45 **Plenary Lecture 2:** Geometry matters – how inclination shifts the drift flux and the process (room: Kunsthalle)				
9:30	Break to change				
10:00	10:00 - 10:40 **T1-5** Fluid dynamics and heat and mass transfer in multiphase systems 5	10:00 - 10:40 **T6-2** Multi-scale modelling of multiphase chemical reactors 2	10:00 - 10:40 **T11-1** Froth flotation 1	10:00 - 10:40 **T13-1** Carbon dioxide capture and gas cleaning 1	10:00 - 10:40 **T12-1** Wastewater treatment and bioprocesses 1
10:30	Coffee Break and Exhibition Viewing				
11:00	11:10 - 12:30 **T1-6** Fluid dynamics and heat and mass transfer in multiphase systems 6	11:10 - 12:30 **T6-3** Multi-scale modelling of multiphase chemical reactors 3	11:10 - 12:30 **T11-2** Froth flotation 2	11:10 - 12:30 **T13-2** Carbon dioxide capture and gas cleaning 2	11:10 - 12:30 **T12-2** Wastewater treatment and bioprocesses 2
11:30					
12:00					
12:30	Lunch Break & Exhibition Viewing				
13:00					
13:30	13:30 - 15:30 **T1-7** Fluid dynamics and heat and mass transfer in multiphase systems 7	13:30 - 15:30 **T5-3** Multiphase computational fluid dynamics 3	13:30 - 15:30 **T2-3** Granular materials processing and fluidized bed reactors 3	13:30 - 15:30 **T3-3** Measurement and data analysis techniques for multiphase systems, reactor dynamics and control 3	13:30 - 15:30 **T7-3** Process intensification in multiphase chemical reactors 3
14:00					
14:30					
15:00					
15:30	Coffee Break and Exhibition Viewing				
16:00	16:00 - 17:20 **T1-8** Fluid dynamics and heat and mass transfer in multiphase systems 8	16:00 - 17:20 **T5-4** Multiphase computational fluid dynamics 4	16:00 - 17:00 **T13-3** Carbon dioxide capture and gas cleaning 3	16:00 - 17:20 **T3-4** Measurement and data analysis techniques for multiphase systems, reactor dynamics and control 4	
16:30					
17:00					
17:30					
18:00					
19:00	19:00 - 23:00 **Conference Dinner** at boat August der Starke of the Dresden Steamship Company				
19:30					
20:00					
21.00					
22.00					
23:00					

SCHEDULE – THURSDAY, 5 SEPTEMBER, 2024

	KUNSTHALLE	ROOM A	ROOM B	ROOM Y	ROOM G
8:30					
9:00	09:00 - 09:45 **Plenary Lecture 3:** Hydrodynamic cavitation for intensifying multiphase processes: State of the art, challenges, and path forward (room: Kunsthalle)				
9:30	Break to change				
10:00	10:00 - 10:40 **T2-4** Granular materials processing and fluidized bed reactors 4	10:00 - 10:40 **T7-4** Process intensification in multiphase chemical reactors 4	10:00 - 10:40 **T9-1** Scale-up of multiphase reactors 1	10:00 - 10:40 **T6-4** Multi-scale modelling of multiphase chemical reactors 4	10:00 - 10:40 **T14-1** Fine bubbles 1
10:30	Coffee Break and Exhibition Viewing				
11:00	11:10 - 12:30 **T2-5** Granular materials processing and fluidized bed reactors 5	11:10 - 12:30 **T7-5** Process intensification in multiphase chemical reactors 5	11:10 - 12:30 **T5-6** Multiphase computational fluid dynamics 5	11:10 - 12:10 **T6-5** Multi-scale modelling of multiphase chemical reactors 5	11:10 - 12:30 **T14-2** Fine bubbles 2
11:30					
12:00					
12:30	Lunch Break & Exhibition Viewing				
13:00					
13:30	13:30 - 15:10 **T1-9** Fluid dynamics and heat and mass transfer in multiphase systems 9	13:30 - 15:10 **T5-6** Multiphase computational fluid dynamics 6	13:30 - 15:10 **T3-5** Measurement and data analysis techniques for multiphase systems, reactor dynamics and control 5	13:30 - 14:50 **T9-2** Scale-up of multiphase reactors 2	
14:00					
14:30					
15:00	Break to change rooms				
15:30	15:20 - 16:00 **Awardees' Presentations**				
16:00	**Closing**				
16:30					
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22:00					
23:00					

SCHEDULE – FRIDAY, 6 SEPTEMBER, 2024

8:30		
9:00		08:30 - 18:00 **Post Conference Tour 2** Excursion HZDR and Tour to Pillnitz and Saxon Switzerland
10:00	09:00 - 18:00 **Post Conference Tour 1** Pillnitz, Königstein and Saxon Switzerland	
11:00		
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21:00		


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2 SEPTEMBER, 2024

7:30 – 17:15 **HZDR**

SEMINAR 1 **EXPERIMENTAL SEMINAR FOR STUDENTS**

07:30	**Start registration for experimental seminar participants at foyer of Penck Hotel Dresden**
08:05	**Start by bus at conference Penck Hotel Dresden**
09:40	**Visits of DRESDYN, TOPFLOW(+)**
10:40	**Experimental seminar: 1st part**
12:25	**Lunch break**
13:40	**Visits of DRESDYN, TOPFLOW(+)**
14:45	**Experimental seminar: 2nd part**
16:30	**Departure from HZDR**
17:15	**Arrival at the conference hotel**

16:00 – 20:00 **FOYER**

REGISTRATION **REGISTRATION & MEDIA CHECK OPEN FROM 16:00**

18:00 – 20:00 **FOYER AND EXHIBITION AREA**

SO1 **WELCOME RECEPTION, SEE PG. 69**

20:00 – 22:30 **RESTAURANT ALTE MEISTER**

SO2 **GLS-16 STUDENT EVENING, SEE PG. 69**

3 SEPTEMBER, 2024

8:45 – 9:00 **KUNSTHALLE**

OPENING **CONFERENCE OPENING**

9:00 – 9:45 **KUNSTHALLE**

PL1 **PLENARY LECTURE BY MICHAEL SCHLÜTER**

Chair: Uwe Hampel (Helmholtz-Zentrum Dresden-Rossendorf, Dresden)

9:00 **PL1-1** **The journey of reacting species through multiphase reactors: From Eulerian to Lagrangian view**

M. Schlüter[1]

[1]Hamburg University of Technology, Institute of Multiphase Flows, Hamburg, Germany

9:45 – 10:00

BREAK **BREAK TO CHANGE ROOMS**

10:00 – 10:40 **KUNSTHALLE**

T1-1 **FLUID DYNAMICS AND HEAT AND MASS TRANSFER IN MULTIPHASE SYSTEMS 1**

Chair: Elisabetta Brunazzi (University of Pisa, Italy)

10:00 **T1-1-1** **Assessment of axial gas dispersion coefficients in bubble column reactors**

S. Marchini[1,3], A. Bieberle[3], V. Caggia[4], E. Brunazzi[4], M. Schubert[1], U. Hampel[2,3]

[1]Technische Universität Dresden, Chair of Chemical Process Engineering, Dresden, Germany; [2]Technische Universität Dresden, Chair of Imaging Techniques in Energy and Process Engineering, Dresden, Germany; [3]Helmholtz-Zentrum Dresden-Rossendorf, Institut of Fluid Dynamics, Dresden, Germany; [4]University of Pisa, Department of Civil and Industrial Engineering, Pisa, Italy

10:20 **T1-1-2** **Bubble plume hydrodynamics in complex fluids**

E. Simon[1], A. Khalfaoui[1], A. Cockx[1], **A. Liné**[1]

[1]Université de Toulouse, Toulouse Biotechnology Institute, Toulouse, France

10:00 – 10:40 **ROOM A**

T2-1 **GRANULAR MATERIALS PROCESSING AND FLUIDIZED BED REACTORS 1**

Chair: Subhasish Mitra (University of Newcastle, Australia)

10:00 **T2-1-1** **DEM based CNN model for predicting particle positions of binary particles in a rotating drum**

A. Yadav[1], T. N. Papapetrou[2], M. Schubert[3,2], G. Lecrivain[2]

[1]Indian Institute of Technology Jammu, Department of Chemical Engineering, Jammu, India; [2]Helmholtz-Zentrum Dresden-Rossendorf, Institute of Fluid Dynamics, Dresden, Germany; [3]Technische Universität Dresden, Chair of Chemical Process Engineering, Dresden, Germany

10:20 **T2-1-2** **CO_2 adsorption in a solid sorbent in a fluidised bed**

P. Goel[1], S. S. Rabha[1]

[1]Indian Institute of Technology Madras, Department of Chemical Engineering, Chennai, India

10:00 – 10:40 **ROOM B**

T7-1 **PROCESS INTENSIFICATION IN MULTIPHASE CHEMICAL REACTORS 1**

Chair: Yong Luo (Beijing University of Chemical Technology, China)

10:00 **T7-1-1** **Enhancement of liquid-side mass transfer in a falling film reactor by surface structure modification**

A. Düll[1], A. Cros-Le Lagadec[1], N. Hauns[1], T. Häber[2], O. Deutschmann[1, 2]

[1]Karlsruhe Institute of Technology, Institute for Chemical Technology and Polymer Chemistry, Karlsruhe, Germany; [2]Karlsruhe Institute of Technology, Institute of Catalysis Research and Technology, Eggenstein-Leopoldshafen, Germany

10:20 **T7-1-2** **Experimental and computational investigations of hydrodynamic cavitation for micropollutant removal**

A. Kumar[1], Y. Huaccallo Aguilar[1], S. F. Reinecke[1], M. Meier[2], W. Ding[1], U. Hampel[1,3]

[1]CLEWATEC, Helmholtz-Zentrum Dresden-Rossendorf, Institute of Fluid Dynamics, Dresden, Germany; [2]AIR LIQUIDE Forschung und Entwicklung GmbH, Frankfurt, Germany, [3]Technische Universität Dresden, Chair of Imaging Techniques in Energy and Process Engineering, Dresden, Germany

10:00 – 10:40 **ROOM Y**

T8-1 **REACTION MECHANISMS AND KINETICS OF MULTIPHASE REACTIONS 1**

Chair: Tapio Salmi (Åbo Akademi, Turku, Finland)

10:00 **T8-1-1** **A kinetic analysis of SO_2 reactive-absorption in ammonia-based solutions**

D. Flagiello[1], F. Di Natale[1], I. Sebastiani[2], F. Nava[2], A. Milicia[2], A. Lancia[1], A. Erto[1]

[1]Università di Napoli Federico II, Department of Chemical, Materials and Production Engineering, Napoli, Italy, [2]Ballestra SpA, Milan, Italy

10:20 **T8-1-2** **Modelling of gas-liquid and gas-liquid-solid reactors for water treatment chemicals - from ferrous sulfate to ferric sulfate**

M. L'Huissier[1], J. Wärnå[1], T. Salmi[1]

[1]Åbo Akademi, Technische Chemie und Reaktionstechnik (TKR), Turku/Åbo, Finland

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10:00 – 10:40 **ROOM G**

T4-1 **MICROFLUIDIC REACTORS AND MICROSYSTEMS 1**

Chair: Helene Chaumat (Toulouse INP-LGC, France)

10:00 **T4-1-1** **Preparation of thin-coated solid-in-water-in-oil droplets in a symmetric Y-junction**

X. Jiang[1], B. Zhou[2], **Z. Deng**[1]

[1]Southeast University, School of Energy and Environment, Nanjing, China, [2]Suzhou University of Science and Technology, School of Environmental Science and Engineering, Suzhou, China

10:20 **T4-1-2** **Investigation on asymmetric splitting behavior of droplets through T-junction with different-length branches**

Y. Zhang[1], P. Li[1], B. Zhou[2], X. Liu[1,3]

[1]Southeast University, Key Laboratory of Energy Thermal Conversion and Control, Ministry of Education, School of Energy and Environment, Nanjing, China, [2]Suzhou University of Science and Technology, Jiangsu Key Laboratory of Micro and Nano Heat Fluid Flow Technology and Energy Application, School of Environmental Science and Engineering, Suzhou, China, [3]Yangzhou University, College of Electrical, Energy and Power Engineering, Yangzhou, China

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10:40 – 11:10

BREAK **COFFEE BREAK & EXHIBITION VIEWING**

11:10 – 12:30 **KUNSTHALLE**

T1-2 **FLUID DYNAMICS AND HEAT AND MASS TRANSFER IN MULTIPHASE SYSTEMS 2**

Chair: Elisabetta Brunazzi (University of Pisa, Italy)

11:10 T1-2-1 **Experimental determination of liquid-side mass transfer coefficients in sandwich packings in the preloading zone and above the loading point**

P. Franke[1], O. Devasthali[1], M. Schubert[2,3], U. Hampel[3,4], E. Y. Kenig[1]

[1]Paderborn University, Chair of Fluid Process Engineering, Paderborn, Germany, [2]Technische Universität Dresden, Chair of Chemical Process Engineering, Dresden, Germany, [3]Helmholtz-Zentrum Dresden-Rossendorf, Institute of Fluid Dynamics, Dresden, Germany, [4]Technische Universität Dresden, Chair of Imaging Techniques in Energy and Process Engineering, Dresden, Germany

11:30 T1-2-2 **Application of triply periodic minimal surfaces (TPMS) on the design of new reactive distillation column packings**

G. Homem Alves Cesar Ribeiro[1], D. Rouzineau[1], M. Meyer[1]

[1]Université de Toulouse, CNRS, INPT, UPS, Laboratoire de Génie Chimique, Toulouse, France

11:50 T1-2-3 **Estimation of efficiency loss for stationary and moving structured packing columns using the hydrodynamic analogy approach**

T. Ehlert[1], T. Mamedov[2], M. Schubert[2,3], E. Y. Kenig[1]

[1]Paderborn University, Chair of Fluid Process Engineering, Paderborn, Germany, [2]Helmholtz-Zentrum Dresden-Rossendorf, Institute of Fluid Dynamics, Dresden, Germany, 3Technische Universität Dresden, Chair of Transport Processes at Interfaces, Dresden, Germany

12:10 T1-2-4 **Mass transfer of single rising CO_2 bubbles in surfactant presence**

H. F. Hosen[1], J. Solsvik[1]

[1]NTNU – Norwegian University of Science and Technology, Department of Chemical Engineering, Trondheim, Norway

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11:10 – 12:30 **ROOM A**

T2-2 **GRANULAR MATERIALS PROCESSING AND FLUIDIZED BED REACTORS 2**

Chair: Subhasish Mitra (University of Newcastle, Australia)

11:10 T2-2-1 **Fluidization of wet particles: Flow, heat and mass transfer**

Q. Xu[1], X. Guan[1], N. Yang[1]

[1]Chinese Academy of Sciences, Institute of Process Engineering, Beijing, China

11:30 **T2-2-2** **CFD-DEM modelling of fluidized bed dryer with non-uniform moisture-coated solids**

M. Nadda[1], A. Banaeizadeh[2], P. Avilala[3], S. Roy[4], A. Yadav[1]
[1]Indian Institute of Technology Jammu, Department of Chemical Engineering, Jammu, India; [2]Altair Engineering, CA, United States of America; [3]Altair Engineering, Bengaluru, India; [4]Birla Institute of Technology Mesra, Department of Chemical Engineering, Ranchi, India

11:50 **T2-2-3** **Investigating binary granular mixing in a rotating drum using ultrafast X-ray computed tomography**

T. N. Papapetrou[1,2], M. Bieberle[1], F. Barthel[1], U. Hampel[1,2], G. Lecrivain[1]
[1]Helmholtz-Zentrum Dresden-Rossendorf, Institute of Fluid Dynamics, Dresden, Germany; [2]Technische Universität Dresden, Chair of Imaging Techniques in Energy and Process Engineering, Dresden, Germany

12:10 **T2-2-4** **Precision mist injection strategy for enhanced stability in oscillating bubbling fluidized beds**

A.A. Sarbanha[1], S. Vogel[2], S.M. Taghavi[1], M. Schubert[2], F. Larachi[1]
[1]Laval University, Chemical Engineering Department, Québec, Canada; [2]Technische Universität Dresden, Chair of Chemical Process Engineering, Dresden, Germany

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11:10 – 12:30 **ROOM B**

T7-2 **PROCESS INTENSIFICATION IN MULTIPHASE CHEMICAL REACTORS 2**

Chair: Yong Luo (Beijing University of Chemical Technology, China)

11:10 **T7-2-1** **Process intensification by additive manufacturing strategies for power-to-X conversion application: Case studies**

M. Safdar[1,2], M. Safdar[3], B. Dorneanu[1], H.A. García[1]
[1]BTU Cottbus-Senftenberg, Prozess- und Anlagentechnik, Cottbus, Germany; [2]GCUF, Department of Chemical Engineering Technology, Faisalabad, Pakistan; [3]McGill University, Department of Mechanical Engineering, Montreal, Canada

11:30 **T7-2-2** **Numerical analysis of gas inlet configuration of a static mixer based plug flow reactor**

L. Wang[1], Y. Peng[1], Y. Xu[1], Y. Qian[3,2], X. Yang[2], Q. Lin[1]
[1]East China University of Science and Technology, State Environmental Protection Key Laboratory of Environmental Risk Assessment and Control on Chemical Process, Shanghai, China; [2]East China University of Science and Technology, Shanghai Engineering Laboratory of Lean Operational Technologies for Industrial Water System, Shanghai, China; [3]McWong Environmental Technology Company Limited, Shanghai, China

11:50	**T7-2-3**	**Process intensification with gas-liquid membrane dispersion and development of microbubble column reactor** **B. Xie**[1], W. Liu[1], Y. Gao[1], J. Zhang[1] [1]Tsinghua University, Department of Chemical Engineering, Beijing, China
12:10	**T7-2-4**	**Continuous protein crystallization under oscillatory flow mixing** **F. Castro**[1], A. Ferreira[2], F. Rocha[2], J. A. Teixeira[1] [1]University of Minho, Department of Biological Engineering, Braga, Portugal; [2]University of Porto, Faculty of Engineering, Department of Chemical Engineering, Porto, Portugal

11:10 – 12:30 **ROOM Y**

T8-2 **REACTION MECHANISMS AND KINETICS OF MULTIPHASE REACTIONS 2**

Chair: Tapio Salmi (Åbo Akademi, Turku, Finland)

11:10	**T8-2-1**	**Detailed study on reaction characteristics of the Fischer-Tropsch synthesis based on spatially resolved concentration profiles** **J. H. Mettke**[1], S. Hilbig[1], E. Reichelt[1], M. Jahn[1] [1]Fraunhofer IKTS, Energy and Process Engineering, Dresden, Germany
11:30	**T8-2-2**	**Development of a parallel screening gas-liquid-solid reactor system for kinetic, mass transfer and flow studies** **G. Araujo Barahona**[1], K. Eränen[1], M. Ciamarella[1], J. Garcia Serna[2], V. Russo[3], D. Murzin[1], T. Salmi[1] [1]Åbo Akademi, Technische Chemie und Reaktionstechnik (TKR), Turku/Åbo, Finland; [2]Universidad de Valladolid, Valladolid, Spain; [3]Università di Napoli Federico II, Napoli, Italy
11:50	**T8-2-3**	**Influence of temperature and residence time on hydrothermal carbonization of digested sewage sludge** **R. Slezak**[1], S. Ledakowicz[1], W. Kaminski[1], M. Imbierowicz[1] [1]Lodz University of Technology, Lodz, Poland
12:10	**T8-2-4**	**Optimizing cycle stability of potassium carbonate as a thermochemical energy storage material in a three-phase suspension reactor** **L. Schmieder**[1], V. Nigitz[1], G. Wedl[1], F. Winter[1] [1]TU Wien, Institute of Chemical, Environmental and Bioscience Engineering, Vienna, Austria

11:10 – 12:30 **ROOM G**

T4-2 **MICROFLUIDIC REACTORS AND MICROSYSTEMS 2**

Chair: Helene Chaumat (Toulouse INP-LGC, France)

11:10 **T4-2-1** **Droplet-based microfluidic reactors monitoring biomarker levels for clinical diagnostic**

X. Zhao[1], X. Peng[1], L. Baraban[1]

[1]Helmholtz-Zentrum Dresden-Rossendorf, Department of Nano-Microsystems for Life Sciences, Dresden, Germany

11:30 **T4-2-2** **Effect of bubble generation and movement on electrochemical benzyl alcohol oxidation and hydrogen evolution reactions in microchannel**

X. Liu[1], **K. Wang**[1], G. Luo[1]

[1]Tsinghua University, The State Key Laboratory of Chemical Engineering, Department of Chemical Engineering, Beijing, China

11:50 **T4-2-3** **Gas-liquid microflows for reaction process intensification**

G. Luo

Tsinghua University, Chemical Engineering, Beijing, China

12:10 **T4-2-4** **The role of reactant contact modes in droplet-based microfluidics**

J. Korukonda[1], S. Pushpavanam[1]

[1]Indian Institute of Technology Madras, Chemical Engineering, Chennai, India

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12:30 – 13:30

BREAK **LUNCH BREAK & EXHIBITION VIEWING**

13:30 – 14:00 **KUNSTHALLE**

ISP **INDUSTRY SPONSORS' PITCH**

14:00 – 14:10

BREAK **BREAK TO CHANGE ROOMS**

14:10 – 15:30 **KUNSTHALLE**

T1-3 **FLUID DYNAMICS AND HEAT AND MASS TRANSFER IN MULTIPHASE SYSTEMS 3**

Chair: Gilles Hébrard (TBI INSA Toulouse, France)

14:10 **T1-3-1** **Concurrent 2-phase flow within a „bubble-cap“ geometry**

R. Biswas[1], A. Macchi[2], K. Terasaka[3], **A. A. Donaldson**[1]

[1]Dalhousie University, Process Engineering and Applied Science, Halifax, Canada; [2]University of Ottawa, Chemical and Biological Engineering, Ottawa, Canada; [3]Keio University, Applied Chemistry, Yokohama, Japan

14:30 **T1-3-2** **New concept for flow regime identification applied to electrical resistance tomography data in a bubble column**

S. Nedeltchev[1], M. W. Hlawitschka[2]

[1]Polish Academy of Sciences, Institute of Chemical Engineering, Gliwice, Poland; [2]Johannes Kepler University, Institute of Process Engineering, Linz, Austria

14:50 **T1-3-3** **Dynamic behavior of a single bubble in the turbulent chamber**

X. Li[1], Y. Bao[1], Z. Cai[1], Z. Gao[1]

[1]Beijing University of Chemical Technology, State Key Laboratory of Chemical Resource Engineering, Beijing, China

15:10 **T1-3-4** **Breakup probability of bubbles interacting with vortex-ring**

T. Semlerova[1,2], V. Harrandt[1], J. Havlica[1], M. Zednikova[1,2]

[1]Czech Academy of Sciences, Institute of Chemical Process Fundamentals, Research Group of Multiphase Reactors, Prague, Czech Republic; [2]University of Chemistry and Technology, Department of Chemical Engineering, Prague, Czech Republic

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14:10 – 15:30 **ROOM A**

T5-1 **MULTIPHASE COMPUTATIONAL FLUID DYNAMICS 1**

Chair: Jochen Fröhlich (Technische Universität Dresden, Germany)

14:10 **T5-1-1** **Large eddy simulation of bubble column bubbly flow including the effects of SGS turbulent diffusion and added mass stress forces on momentum and mass transfer**

S. Long[1], X. Yang[1], J. Yang[2], M. Sommerfeld[3], W. Shi[4]

[1]University of Nottingham Ningbo China, Department of Mechanical, Materials and Manufacturing Engineering, Ningbo, China; [2]University of Hull, School of Natural Sciences, Hull, United Kingdom; [3]Otto-von-Guericke-Universität Magdeburg, Faculty of Process and Systems Engineering, Magdeburg, Germany; [4]Huaqiao University, Mechanical Engineering, Xiamen, China

14:30 **T5-1-2** **A phase field method for surfactant-laden multiphase flows with different solubility**

U. Bau[1], A. Roccon[2], F. Zonta[1], A. Soldati[1]

[1]TU Wien, Institute of Fluid Mechanics and Heat Transfer, Vienna, Austria; [2]University of Udine, Dipartimento Politecnico di Ingegneria e Architettura, Udine, Italy

14:50 **T5-1-3** **Solutal Marangoni flow around a growing hydrogen bubble: An immersed boundary simulation study**

F. Khalighi[1], Y. Tang[1,2], N. G. Deen[1,2], B. Vreman[1,3]

[1]Eindhoven University of Technology, Mechanical Engineering, Eindhoven, The Netherlands; [2]Eindhoven University of Technology, Eindhoven Institute for Renewable Energy Systems (EIRES), Eindhoven, The Netherlands; [3]Nobian Industrial Chemicals, Amersfoort, The Netherlands

15:10 **T5-1-4** **Lagrangian stochastic and PDF Eulerian modeling for liquid-gas-particles flows**

F. Baraglia[1], J. Laviéville[1], N. Mérigoux[1], O. Simonin[2]

[1]EDF R&D, Mécanique des Fluides, Energie et Environnement, Chatou, France; [2]Université de Toulouse, CNRS, INPT, UPS, Institut de Mécanique des Fluides de Toulouse, Toulouse, France

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14:10 – 15:30 **ROOM B**

T3-1 **MEASUREMENT AND DATA ANALYSIS TECHNIQUES FOR MULTIPHASE SYSTEMS, REACTOR DYNAMICS AND CONTROL 1**

Chair: Uwe Hampel (Helmholtz-Zentrum Dresden-Rossendorf, Germany)

14:10 **T3-1-1** **Magnetic resonance imaging for 3D-printed structured packings**

H. S. Rennebaum[1], A. Dobschall[2], S. Benders[1], M. Skiborowski[2], A. Penn[1]

[1]Hamburg University of Technology, Institute of Process Imaging, Hamburg, Germany; [2]Hamburg University of Technology, Institute of Process Systems Engineering, Hamburg, Germany

14:30 **T3-1-2** **A conductivity-based flow imaging sensor for the investigation of liquid flow dynamics in stationary and moving separation columns packed with Mellapak 250Y**

T. Mamedov[1], E. Schleicher[1], F. D. Dias[1], M. Schubert[1,2], T. Ehlert[3], E. Y. Kenig[3], U. Hampel[1,4]

[1]Helmholtz-Zentrum Dresden-Rossendorf, Institute of Fluid Dynamics, Dresden, Germany; [2]Technische Universität Dresden, Chair of Chemical Process Engineering, Dresden, Germany; [3]Paderborn University, Chair of Fluid Process Engineering, Paderborn, Germany; [4]Technische Universität Dresden, Chair of Imaging Techniques in Energy and Process Engineering, Dresden, Germany

14:50 **T3-1-3** **Determination of the wake structures behind a rising bubble by means of 4D-PTV**

F. Kexel[1], J. Nissen[2], M. Hoffmann[1], M. Schlüter[1], A. von Kameke[2], R. Uphoff[2], E. Steuwe[2]

[1]Hamburg University of Technology, Institute of Multiphase Flows, Hamburg, Germany; [2]Hamburg University of Applied Science, Heinrich Blasius Institut, Hamburg, Germany

15:10 **T3-1-4** **Falling film reactors studied using magnetic resonance velocimetry**

G. C. Saliba[1], J. G. Korvink[1], J. J. Brandner[1]

[1]Karlsruhe Institute of Technology, Institute of Microstructure Technology, Eggenstein-Leopoldshafen, Germany

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14:10 – 15:30 **ROOM Y**

T10-1 **ELECTROLYSIS AND OTHER ELECTROCHEMICAL PROCESSES 1**

Chair: Kerstin Eckert (Helmholtz-Zentrum Dresden-Rossendorf, Germany)

14:10 **T10-1-1** **Flow optimized membraneless alkaline water electrolysis**

H. Rox[1], K. Schoppmann[2], J. Gatter[3,4], E. Frense[2], X. Yang[1], F. Rüdiger[2], J. Fröhlich[2], K. Eckert[1,4]

[1]Helmholtz-Zentrum Dresden-Rossendorf, Institute of Fluid Dynamics, Dresden, Germany; [2]Technische Universität Dresden, Chair of Fluid Mechanics, Dresden, Germany; [3]Technische Universität Dresden, Hydrogen Lab, School of Engineering, Dresden, Germany; [4]Technische Universität Dresden, Chair of Transport Processes at Interfaces, Dresden, Germany

14:30 **T10-1-2** **The study of deformable bubble growth resulting from a gas-producing electrode reaction using direct numerical simulation**
D. E.A. van den Eertwegh[1], J. A. Kuipers[1,2], M. W. Baltussen[1,2]
[1]Eindhoven University of Technology, Department of Chemical Engineering and Chemistry, Eindhoven, The Netherlands; [2]Eindhoven University of Technology, Eindhoven Institute for Renewable Energy Systems (EIRES), Eindhoven, The Netherlands

14:50 **T10-1-3** **Membrane-less electrolyzers for green hydrogen production**
M. Torkian[1], P. Van de Velde[1], B. Scheid[1], B. Haut[1]
[1]Université Libre de Bruxelles, Transfers, Interfaces and Processes (TIPs), Brussels, Belgium

15:10 **T10-1-4** **Hydrogen bubble behavior on model wire electrodes**
P. Van de Velde[1], M. Torkian[1], B. Scheid[1], B. Haut[1]
[1]Université Libre de Bruxelles, Transfers, Interfaces and Processes (TIPs), Brussels, Belgium

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14:10 – 15:30 **ROOM G**

T4-3 **MICROFLUIDIC REACTORS AND MICROSYSTEMS 3**

Chair: Alain Liné (Toulouse Biotechnology Institute, France)

14:10 **T4-3-1** **Methods of supervised learning to advance gas-liquid flow regime prediction in micro-structured reactors**
S. Haase[1,2], H. May[2], M. Schubert[2]
[1]HTWD University of Applied Science, Chair of Process Engineering, Dresden, Germany; [2]Technische Universität Dresden, Chair of Chemical Process Engineering, Dresden, Germany

14:30 **T4-3-2** **Droplet dynamics in a locally constricted microchannel at low Reynolds number**
R. Kumar[2], S. Kurella[1], A. Atta[1,2]
[1]Indian Institute of Technology Kharagpur, Chemical Engineering, Kharagpur, India; [2]Indian Institute of Technology Kharagpur, Advanced Technology Development Centre, Kharagpur, India

14:50 **T4-3-3** **Hydrodynamic studies on gas-liquid flows in splitting distributors for parallel microchannels**
B. Moorthy[1], K. Gupta[1], **V. M. Rajesh**[1]
[1]Shiv Nadar Institution of Eminence (Deemed to be University), Chemical Engineering, Gautam Budh Nagar, India

15:10 **T4-3-4** **A flow system based on gas-liquid reactor for precise detection of the NMR parameters with NMR hyperpolarization**
J. Yang[1], S. Lehmkuhl[1], P. Wang[1], J. G. Korvink[1], J. J. Brandner[1]
[1]Karlsruhe Institute of Technology, Institute of Microstructure Technologie, Karlsruhe, Germany

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15:30 – 16:00
BREAK **COFFEE BREAK & EXHIBITION VIEWING**

16:00 – 17:40 **KUNSTHALLE**
T1-4 **FLUID DYNAMICS AND HEAT AND MASS TRANSFER IN MULTIPHASE SYSTEMS 4**
Chair: Arnaud Cockx (Université de Toulouse, France)

16:00 **T1-4-1** **Breakup of bubbles and droplets in jet-stirred homogeneous and isotropic turbulence**
L. E. Beckedorff[1], G. C. A. Caridi[1], A. Soldati[1]
[1]TU Wien, Institute of Fluid Mechanics and Heat Transfer, Vienna, Austria

16:20 **T1-4-2** **Wake gas fraction analysis with wire-mesh sensor (WMS) in vertical gas-liquid slug flow**
C. C. Rodrigues[1], P. A. Maldonado[1], E. N. dos Santos[1], M. A. Marcelino Neto[1], A. Liné[2], R. E. M. Morales[1]
[1]Federal University of Technology Paraná (UTFPR), Multiphase Flow Research Center, Curitiba, Brazil; [2]Institut National des Sciences Appliquées (INSA Toulouse), CNRS/INRAE/Toulouse Biotechnology Institute, Toulouse, France

16:40 **T1-4-3** **Gas-phase distribution in a bubble column: An experimental study using X-ray tomography, shadowgraphy and pressure sensors**
Y. Zhang[1,2], **L. M. Portela**[1]
[1]Delft University of Technology, Department of Chemical Engineering, Delft, The Netherlands; [2]University of Copenhagen, Food Science, Copenhagen, Denmark

17:00 **T1-4-4** **Understanding bubble induced changes in dominant flow structure and its role on particle detachment in a confined cavity channel flow system**
M. M. Hoque[1], G. Evans[1], S. Mitra[1]
[1]University of Newcastle, ARC Centre of Excellence for Eco-efficient Beneficiation of Minerals, Newcastle, Australia

17:20 **T1-4-5** **Combination of wall and lift force on ellipsoidal single bubbles rising close to a vertical wall**
L. Wang[1], H. Hessenkemper[1], D. Lucas[1]
[1]Helmholtz-Zentrum Dresden-Rossendorf, Institute of Fluid Dynamics, Dresden, Germany

16:00 – 17:40 **ROOM A**

T5-2 **MULTIPHASE COMPUTATIONAL FLUID DYNAMICS 2**

Chair: Martin Sommerfeld (Otto-von-Guericke-Universität Magdeburg, Germany)

16:00 **T5-2-1** **Eulerian multi-fluid simulations of bed-scale liquid distribution generated by cylindrical particles in a packed bed**

R. S. Gulia[1], D. Saxena[1], F. Augier[2], Y. Haroun[2], V. V. Buwa[1]

[1]Indian Institute of Technology, Department of Chemical Engineering, New Delhi, India; [2]IFP Energies Nouvelles, Solaize, France

16:20 **T5-2-2** **Simulation of primary and secondary breakup in metal melt gas atomization**

D. Thuy[1], J. Remmers[2,4], N. G. Deen[1,3], G. Finotello[1,3]

[1]Eindhoven University of Technology, Power and Flow Group, Eindhoven, The Netherlands; [2]Eindhoven University of Technology, Mechanics of Materials Group, Eindhoven, The Netherlands; [3]Eindhoven University of Technology, Eindhoven Institute for Renewable Energy Systems (EIRES), Eindhoven, The Netherlands; [4]Eindhoven University of Technology, Eindhoven Artificial Intelligence Systems Institute (EAISI), Eindhoven, The Netherlands

16:40 **T5-2-3** **Modelling and simulation of micro-structured bubble columns with a wire mesh**

R. Subburaj[1], Y. Tang[1,2], N. G. Deen[1,2]

[1]Eindhoven University of Technology, Mechanical Engineering, Eindhoven, The Netherlands; [2]Eindhoven University of Technology, Eindhoven Institute for Renewable Energy Systems (EIRES), Eindhoven, The Netherlands

17:00 **T5-2-4** **Euler-Euler simulation of a bubble column flow up to high gas fraction**

M. Draw[1,2], R. Rzehak[1]

[1]Helmholtz-Zentrum Dresden-Rossendorf, Institute of Fluid Dynamics, Dresden, Germany; [2]Technische Universität Dresden, Chair of Transport Processes at Interfaces, Dresden, Germany

17:20 **T5-2-5** **Modelling interfacial mass transfer for application to gas-liquid and liquid-liquid Taylor flow within capillaries**

M. A. Hussain[1], R. Gupta[1,2]

[1]Indian Institute of Technology Guwahati, Department of Chemical Engineering, Guwahati, India; [2]Indian Institute of Technology Guwahati, Center for Nanotechnology, Guwahati, India

16:00 – 17:40 **ROOM B**

T3-2 **MEASUREMENT AND DATA ANALYSIS TECHNIQUES FOR MULTIPHASE SYSTEMS, REACTOR DYNAMICS AND CONTROL 2**

Chair: Chao Tan (Tianjin University, China)

16:00 **T3-2-1** **Fluid dynamics investigations in a biotechnical foaming system**

M. C. Hofmann[1], F. Breit[1], E. von Harbou[1], H.-J. Bart[2]

[1]Rheinland-Pfälzische Technische Universität, Laboratory of Reaction and Fluid Process Engineering, Kaiserslautern, Germany; [2]Rheinland-Pfälzische Technische Universität, Fluidverfahrenstechnik, Kaiserslautern, Germany

16:20 **T3-2-2** **Quantitative effect of electrolytes on interfacial area in a bubble column**

R. Volger[1], E. C. Wagner[2], C. Haringa[1]

[1]Delft University of Technology, Department of Biotechnology, Delft, The Netherlands; [2]Delft University of Technology, Department of Chemical Engineering, Delft, The Netherlands

16:40 **T3-2-3** **Validation of phase fraction models for conductive wire-mesh sensors in three-phase systems**

V. P. Tholan[1,2], S. Heitkam[1,2], E. Schleicher[2], K. Eckert[1,2]

[1]Technische Universität Dresden, Chair of Transport Processes at Interfaces, Dresden, Germany; [2]Helmholtz-Zentrum Dresden-Rossendorf, Institute of Fluid Dynamics, Dresden, Germany

17:00 **T3-2-4** **High-speed planar X-ray tomography in granular silo flows**

M. A. Hanif[1], D. van der Meer[1], F. Barthel[2], D. Maza[3]

[1]University of Twente, Physics of Fluids Group, Enschede, The Netherlands; [2]Helmholtz-Zentrum Dresden-Rossendorf, Institute of Fluid Dynamics, Dresden, Germany; [3]University of Navarra, Department of Physics and Applied Mathematics, Pamplona, Spain

17:20 **T3-2-5** **Gas bubble tracking in dense bubbly swarms using ultrafast electron beam X-ray computed tomography**

D. Windisch[1], A. Bieberle[2], U. Hampel[1,2]

[1]Technische Universität Dresden, Chair of Imaging Techniques in Energy and Process Engineering, Dresden, Germany; [2]Helmholtz-Zentrum Dresden-Rossendorf, Institute of Fluid Dynamics, Dresden, Germany

16:00 – 17:20 **ROOM Y**

T10-2 **ELECTROLYSIS AND OTHER ELECTROCHEMICAL PROCESSES 2**

Chair: Kerstin Eckert (Helmholtz-Zentrum Dresden-Rossendorf, Germany)

16:00 **T10-2-1** **Effects of the boundary conditions at the gas-liquid interface on single hydrogen bubble growth in alkaline water electrolysis**

F. Khalighi[1], Y. Tang[1,2], N. G. Deen[1,2], B. Vreman[1,3]

[1]Eindhoven University of Technology, Power and Flow Group, Department of Mechanical Engineering, Eindhoven, The Netherlands; [2]Eindhoven University of Technology, Eindhoven Institute for Renewable Energy Systems (EIRES), Eindhoven, The Netherlands; [3]Nobian Industrial Chemicals, Amersfoort, The Netherlands

16:20 **T10-2-2** **The gas hold-up feature in a 1.2 m tall alkaline electrolytic cell: A critical limit for the increase of current density**

B. Liu[1], H. Zhang[1], Z. J. Chen[1], Q. Yang[1]

[1]East China University of Science and Technology, Shanghai, China

16:40 **T10-2-3** **Coalescence-induced late departure of bubbles improves water electrolysis efficiency**

T. Wu[1], B. Liu[1], Y. Fang[1], Q. Yang[1]

[1]East China University of Science and Technology, Shanghai, China

17:00 **T10-2-4** **Study of growth and dissolution of oxygen bubbles by optical methods**

H. Dai[1,2], X. Yang[1,2], K. Schwarzenberger[1,2], J. Heinrich[1,2], K. Eckert[1,2]

[1]Technische Universität Dresden, Chair of Transport Processes at Interfaces, Dresden, Germany; [2]Helmholtz-Zentrum Dresden-Rossendorf, Institute of Fluid Dynamics, Dresden, Germany

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16:00 – 17:20 **ROOM G**

T6-1 **MULTI-SCALE MODELLING OF MULTIPHASE CHEMICAL REACTORS 1**

Chair: Rajesh K. Upadhyay (Indian Institute of Technology (BHU), Varanasi, India)

16:00 **T6-1-1** **Computational fluid dynamics modelling of co-precipitated nickel-cobalt-manganese (NCM) mixed hydroxide production in a continuous stirrer tank reactor**

D. Kumar

Curtin University, Western Australia School of Mines, Perth, Australia

16:20 **T6-1-2** **Ni doping intensified redox kinetics of Fe-Zr oxygen carriers for chemical looping CO_2 conversion**

Y. Fan[1], B. Jin[1], Y. Lv[1], Z. Liang[1]

[1]Hunan University, College of Chemistry and Chemical Engineering, Changsha, China

16:40 **T6-1-3** **Continuous packed bed technology in sugar oxidation**
M. Hachhach[1], V. Russo[2,1], K. Eränen[1], D. Murzin[1], I. Simakova[1], T. Salmi[1]
[1]Åbo Akademi, Turku/Åbo, Finland; [2]Università di Napoli Federico II, Napoli, Italy

17:00 **T6-1-4** **Modelling of continuous synthesis of porous silica particles using gaseous CO_2**
C. A. Shukla[1], **R. P. Moghadam**[1], V. V. Ranade[1]
[1]University of Limerick, Bernal Institute, Department of Chemical Sciences, Limerick, Ireland

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18:00 – 19:00 **MEETING ROOM D**
MEETING OF THE GLS SCIENTIFIC COMMITTEE

18:00 – 19:30 **ROOM Z**
P **POSTER SESSION**

P-1 **Integration of heat storage in high-temperature processes using liquid metals as heat transfer fluids**
M. Zehnder[1], F. Müller-Trefzer[1], T. Wetzel[1,2], **K. Niedermeier**[1]
[1]Karlsruhe Institute of Technology, Institute for Thermal Energy Technology and Safety, Eggenstein-Leopoldshafen, Germany; [2]Karlsruhe Institute of Technology, Institute of Thermal Process Engineering, Karlsruhe, Germany

P-2 **Generation of ultra-fine bubbles by poor-solvating air-dissolved ethanol with high-speed shaking**
H. Hirase[1], J. M. Braack[3], **K. Terasaka**[2], S. Fujioka[2]
[1]Keio University, School of Science for Open and Environmental Systems, Graduate School of Science and Technology, Yokohama, Japan; [2]Keio University, Department of Applied Chemistry, Faculty of Science and Technology, Yokohama, Japan; [3]Hamburg University of Technology, Institute of Multiphase Flows, Hamburg, Germany

P-6 **Determination of decomposition rates of epoxy resins for carbon fiber reinforced composites with sub- and supercritical water based on a shrinking core model**
K. Höfs[1], M. Schubert[1]
[1]Technische Universität Dresden, Chair of Chemical Process Engineering, Dresden, Germany

P-7 **Effects of storage temperature and solute composition on temporal change of number concentration of ultra-fine bubbles in aqueous solution**

R. Shindo[1], **K. Terasaka**[2], K. Kobayashi[3], A. Nioh[3], S. Fujioka[2]

[1]Keio University, The Center for Science of Environment and Energy, School of Science for Open and Environmental Systems, Graduate School of Science and Technology, Yokohama, Japan; [2]Keio University, Department of Applied Chemistry, Faculty of Science and Technology, Yokohama, Japan; [3]Pola Chemical Industries, Inc., Frontier Research Center, Yokohama, Japan

P-8 **CO_2/SO_2 marine emissions reduction: CO_2 mitigation via capture and chemical conversion to methanol and SO_2 seawater scrubbing**

I. Iliuta[1], F. Larachi[1], M. Schubert[2], E. Y. Kenig[3]

[1]Laval University, Chemical Engineering Department, Québec, Canada; [2]Technische Universität Dresden, Chair of Transport Processes at Interfaces, Dresden, Germany; [3]Paderborn University, Chair of Fluid Process Engineering, Paderborn, Germany

P-9 **Melting and solidification detection of molten salt by three-dimensional high-temperature electrical resistance tomography (3D-*ht*ERT)**

S. Segawa[1], A. A. Luthfie[1,2], P. A. Sejati[1,3], M. Ogawa[4], Y. A.K. Prayitno[1,5], N. Saito[4], M. Takei[1]

[1]Chiba University, Department of Mechanical Engineering, Graduate School of Science and Engineering, Chiba, Japan; [2]Mercu Buana University, Department of Mechanical Engineering, Faculty of Engineering, Jakarta, Indonesia; [3]Universitas Gadjah Mada, Department of Electrical Engineering and Informatics, Vocational College, Yogyakarta, Indonesia; [4]Kyushu University, Department of Material Science and Engineering, Faculty of Engineering, Fukuoka, Japan [5]Universitas Gadjah Mada, Department of Mechanical Engineering, Vocational College, Yogyakarta, Indonesia

P-11 **Effects of operating factors on internal circulation flow in liquid-liquid slug flow in a mini-channel**

A. Hirata[1], **S. Fujioka**[2], K. Terasaka[3]

[1]Keio University, Graduate School of Science and Technology, Yokohama, Japan; [2]Keio University, Department of Applied Chemistry, Yokohama, Japan; [3]Keio University, Department of Applied Chemistry, Yokohama, Japan

P-12 **Development of compact device to measure the rheological properties of non-Newtonian fluids by using a pressure difference**

D. Funayama[1], N. Ikeda[1,2], **S. Fujioka**[3], K. Terasaka[3]

[1]Keio University, Graduate School of Science and Technology, Yokohama, Japan; [2]Kewpie Corporation, Research and Development Division, Tokyo, Japan; [3]Keio University, Department of Applied Chemistry, Yokohama, Japan

P-13 **Optimization of oscillation conditions when using the Oscillatory Baffled Reactor for mixing in highly viscous fluids or gas absorption**

Y. Yagi[1], **S. Fujioka**[2], T. Horie[3], K. Terasaka[2]

[1]Keio University, Graduate School of Science and Technology, Yokohama, Japan; [2]Keio University, Department of Applied Chemistry, Yokohama, Japan; [3]Osaka Public University, Department of Chemical Engineering, Osaka, Japan

P-14 **Radiographic measurements of bubble flows through surface-functionalised foams**

T. Lappan[1,2], G. Jiao[1,2], J. Heinrich[1,2], P. Trtik[3], N. Shevchenko[1], K. Eckert[1,2], S. Eckert[1]

[1]Helmholtz-Zentrum Dresden-Rossendorf, Institute of Fluid Dynamics, Dresden, Germany; [2]Technische Universität Dresden, Chair of Transport Processes at Interfaces, Dresden, Germany; [3]Paul Scherrer Institut, Laboratory for Neutron Scattering and Imaging, Villigen PSI, Switzerland

P-15 **In-situ measurement of chemical species concentration in bubbly flows using fiber optical probe**

R. Kipping[1], H. Kryk[1], U. Hampel[1,2]

[1]Helmholtz-Zentrum Dresden-Rossendorf, Institute of Fluid Dynamics, Dresden, Germany; [2]Technische Universität Dresden, Chair of Imaging Techniques in Energy and Process Engineering, Dresden, Germany

P-17 **Dynamic simulation and optimization of commercial Fischer-Tropsch iron-based catalyst synthesis slurry bubble column reactor**

Y. Zhao[1], Y. Bu[1], B. Du[1], R. Tong[1], R. Yang[1], Z. Men[1]

[1]National Institute of Clean-and-Low-Carbon Energy, Beijing, China

P-21 **Turbulence-assisted shear controllable synthesis of Ag nanoparticles using a counter swirling impinging jet flow reactor**

J. Lu[1], Y. Guo[1], X. Yang[1], J. Li[2]

[1]University of Nottingham Ningbo China, Ningbo, China; [2]Chinese Academy of Sciences, Shanghai Advanced Research Institute, Shanghai, China

P-24 **Numerical simulations of mass transfer in slurry bubble columns: Investigating particle effect using a CFD-PBM model**

X. Shen[1], H. Zhang[1,2], **T. Wang**[1]

[1]Tsinghua University, Department of Chemical Engineering, Beijing, China; [2]Chinese Academy of Sciences, Institute of Process Engineering, Beijing, China

P-26 **The use of EIT and ECT for monitoring industrial reactors using LSTM networks with self-attention layer**

G. Kłosowski[1], T. Rymarczyk[2], M. Oleszek[3], K. Niderla[2]

[1]Lublin University of Technology, Faculty of Management, Lublin, Poland; [2]WSEI University, Institute of Computer Science and Innovative Technologies, Lublin, Poland; [3]Netrix S.A., Research & Development Center, Lublin, Poland

P-28 **Modeling reaction mixing pumps**

Y. Mayer[1], S.-S. Ashrafmansouri[1,2], S. Eberweiser[1], O. Bey[3], E. von Harbou[1]

[1]Rheinland-Pfälzische Technische Universität, Department of Mechanical and Process Engineering, Laboratory of Reaction and Fluid Process Engineering, Kaiserslautern, Germany; [2]University of Larestan, Department of Chemical Engineering, Lar, Iran; [3]BASF SE, Ludwigshafen, Germany

P-29 **Novel experimental set-up for studies of microscopic transport phenomena at gas-liquid interfaces**

S. Takagi[1], L. Kursula[2], F. Kexel[2], M. Hoffmann[2], K. Terasaka[3], M. Schlüter[2]

[1]Keio University, School of Science for Open and Environmental Systems, Graduate School of Science and Technology, Yokohama, Japan; [2]Hamburg University of Technology, Institute of Multiphase Flows, Hamburg, Germany; [3]Keio University, Department of Applied Chemistry, Faculty of Science and Technology, Yokohama, Japan

P-30 **Multimodal ultrasonic tomograph for analysis of multiphase industrial processes**

B. Baran[1], M. Gołąbek[1], S. Dejnek[1], D. Wójcik[1,2], T. Rymarczyk[1,2]

[1]Netrix S.A., Research and Development Center, Lublin, Poland; [2]WSEI University, Faculty of Transport and Computer Science, Lublin, Poland

P-31 **Dynamic behaviour of particles with different properties in a novel bidirectional swirling flow field**

X. Li[1,2], R. Tribess[2], M. Sommerfeld[2]

[1]China University of Mining and Technology, School of Chemical Engineering and Technology, Xuzhou, China; [2]Otto-von-Guericke-Universität Magdeburg, Multiphase Flow Systems, Institute for Process Engineering, Halle (Saale), Germany

P-33 **Droplet-fiber interactions using DEM and VOF methods**

W. Zhang[1], I. Roghair[1], M. van Sint Annaland[1]

[1]Eindhoven University of Technology, Chemical Process Intensification, Eindhoven, The Netherlands

P-38 **Process intensification: Continuous synthesis of nitrosyl sulfuric acid in a rotating packed bed reactor**

Z.-Y. Tang[1,2], L.-H. Wang[1,2], H.-L. Liao[1,2], X. Zhang[1,2], H.-K. Zou[1,2], Y. Luo[1,2], J.-F. Chen[1,2]

[1]Beijing University of Chemical Technology, State Key Laboratory of Organic-Inorganic Composites, Beijing, China; [2]Beijing University of Chemical Technology, Ministry of Education for High Gravity Engineering and Technology, Beijing, China

P-40 **Implementation of an automatic foam control system in the Low Shear Agitated and Aerated Bioreactor**

R. R. Rosa[1], A. M.R. Prata[1]

[1]University of São Paulo, Department of Biotechnology, Lorena, Brazil

P-41 **Experiments and modeling of bubble coalescence and rebound in the presence of surfactant**

Q. Liu[1,2], **X. Guan**[1,2], N. Yang[1,2]

[1]Institute of Process Engineering, Chinese Academy of Sciences, State Key Laboratory of Multiphase Complex Systems, Beijing, China; [2]University of Chinese Academy of Sciences, Beijing, China

P-44 **Proton exchange membrane water electrolysis at high current densities: Response time and gas-water distribution**

J. H. Bai[1], X. Guan[1], N. Yang[1]

[1]Chinese Academy of Sciences, Institute of Process Engineering, Beijing, China

P-46 **Biphasic absorbent of 2-dimethylethylenediamine-sulfolane-H_2O for CO_2 capture with high CO_2 cyclic capacity and low energy consumption**

S. Hong[1], M. Xiao[1], **H. Gao**[1], Z. Liang[1]

[1]Hunan University, Changsha, China

P-52 **Hydrodynamic characteristics and mass transfer performance in a micro-packed bed reactor**

W. Liu[1], B. Xie[1], J. Zhang[1]

[1]Tsinghua University, Department of Chemical Engineering, Beijing, China

P-54 **A pulsed-bed adsorber for noble metals refining in hydrometallurgical processes**

L.P. Di Bonito[1,2], A. Di Colandrea[1], A. Parisi[1], A. Lancia[1], **F. Di Natale**[1]

[1]Università di Napoli Federico II, Dipartimento di Ingegneria Chimica, dei Materiali e della Produzione Industriale, Napoli, Italy; [2]Università della Campania Luigi Vanvitelli, Dipartimento di Matematica e Fisica, Caserta, Italy

P-56 **Experiment and modeling of bubble and drop breakages in turbulent flows**

L. Zhang[1,2], Z.-F. Huang[1,2], L.-C. Han[1,2], H.-A. Luo[1,2]

[1]National & Local United Engineering Research Centre for Chemical Process Simulation and Intensification, Xiangtan, China; [2]Xiangtan University, School of Chemical Engineering, Xiangtan, China

P-57 **Modeling of nanoparticle synthesis and trapping at the interface of an aqueous two-phase systems**

J. Korukonda[1], S. Pushpavanam[1]

[1]Indian Institute of Technology Madras, Chemical Engineering, Chennai, India

4 SEPTEMBER, 2024

9:00 – 9:45 **KUNSTHALLE**

PL2 **PLENARY LECTURE BY KEVIN GALVIN**

Chair: Martin Sommerfeld (Otto-von-Guericke-Universität Magdeburg, Germany)

9:00 **PL2-1** **Geometry matters – how inclination shifts the drift flux and the process**

K. Galvin
University of Newcastle, Newcastle Institute for Energy and Resources, Callaghan, Australia

9:45 – 10:00

BREAK **BREAK TO CHANGE ROOMS**

10:00 – 10:40 **KUNSTHALLE**

T1-5 **FLUID DYNAMICS AND HEAT AND MASS TRANSFER IN MULTIPHASE SYSTEMS 5**

Chair: Adam A. Donaldson (Dalhousie University, Halifax, Canada)

10:00 **T1-5-1** **Separation of micron-particle in rising Taylor bubbles**

R. Maestri[1], F. Bürkle[2], L. Büttner[2], J. Czarske[2], U. Hampel[1,3], G. Lecrivain[1]
[1]Helmholtz-Zentrum Dresden-Rossendorf, Institute of Fluid Dynamics, Dresden, Germany; [2]Technische Universität Dresden, Chair of Measurement and Sensor System Technique, Dresden, Germany; [3]Technische Universität Dresden, Chair of Imaging Techniques in Energy and Process Engineering, Dresden, Germany

10:20 **T1-5-2** **Stirred tank reactor hydrodynamics**

A. Žák[1], P. Kavka[1], T. Moucha[1]
[1]University of Chemistry and Technology, Chemical Engineering, Prague, Czech Republic

10:00 – 10:40 **ROOM A**

T6-2 **MULTI-SCALE MODELLING OF MULTIPHASE CHEMICAL REACTORS 2**

Chair: Tomas Moucha (University of Chemistry and Technology Prague, Czech Republic)

10:00 **T6-2-1** **A coupled statistical and computational fluid dynamics methodology for describing the fluid dynamics in large-diameter bubble columns**

N. Varallo[1], R. Mereu[1], G. Besagni[1]

[1]Politecnico di Milano, Department of Energy, Milan, Italy

10:20 **T6-2-2** **Particle Resolved-Computational Fluid Dynamics integrated with Flow MRI for modeling packed beds of catalyst support pellets**

S. S. Tiwari[1], S. V. Elgersma[2,3], C. M. Guedon[4], G. J. Wells[5], A. J. Sederman[3], M. D. Mantle[3], R. Venkatesan[1], L. F. Gladden[3]

[1]Shell India Markets Pvt. Ltd., Bengaluru, India; [2]Shell International Petroleum Co. Ltd., London, United Kingdom; [3]University of Cambridge, Magnetic Resonance Research Centre, Department of Chemical Engineering & Biotechnology, Cambridge, United Kingdom; [4]Shell Global Solutions International B.V., Amsterdam, The Netherlands; [5]Shell Catalysts & Technologies US LP, Houston, United States of America

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10:00 – 10:40 **ROOM B**

T11-1 **FROTH FLOTATION 1**

Chair: Sascha Heitkam (Helmholtz-Zentrum Dresden-Rossendorf, Germany)

10:00 **T11-1-1** **Influence of background turbulence on collision rates in flotation cells: A DNS investigation**

B. Tiedemann[1], H. Pervez[2], K. Eckert[2], J. Fröhlich[1]

[1]Technische Universität Dresden, Chair of Fluid Mechanics, Dresden, Germany; [2]Technische Universität Dresden, Chair of Transport Processes at Interfaces, Dresden, Germany

10:20 **T11-1-2** **A new model for collision rates in flotation**

B. Tiedemann[1], M. Kreuseler[1], J. Fröhlich[1]

[1]Technische Universität Dresden, Chair of Fluid Mechanics, Dresden, Germany

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10:00 – 10:40 **ROOM Y**

T13-1 **CARBON DIOXIDE CAPTURE AND GAS CLEANING 1**

Chair: Domenico Flagiello (University of Naples, Italy)

10:00 **T13-1-1** **Computational and experimental investigations of hydrodynamics and CO_2 adsorption in multistage fluidized beds**

H. Jose[1], S. S. Rabha[1]

[1]Indian Institute of Technology Madras, Chemical Engineering, Chennai, India

10:20 **T13-1-2** **Efficient metal oxyhydroxides-hybridized carbon nanotube catalysts for enhanced amine regeneration of CO_2 capture: From experimental to calculations verifications**

J. Xiong[1], Q. Sun[1], M. Xiao[1], **H. Gao**[1], Z. Liang[1]

[1]Hunan University, Changsha, China

10:00 – 10:40 **ROOM G**

T12-1 **WASTEWATER TREATMENT AND BIOPROCESSES 1**

Chair: Sebastian Reinecke (Helmholtz-Zentrum Dresden-Rossendorf, Germany)

10:00 **T12-1-1** **Air driven bioreactors for power to gas conversion**

M. W. Hlawitschka[1], F. Klapal[1]

[1]Johannes Kepler University, Institute of Process Engineering, Linz, Austria

10:20 **T12-1-2** **Exploring the impact of proteins on oxygen mass transfer and bubble size distribution in gas-liquid bioreactors: An experimental investigation**

B. Sanogo[1], A. Essid[1], A. Marcati[1], **C. Vial**[1], G. D. Martínez Carvajal[1]

[1]Université Clermont Auvergne, Clermont Auvergne INP, Institut Pascal, Clermont-Ferrand, France

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10:40 – 11:10

BREAK **COFFEE BREAK & EXHIBITION VIEWING**

11:10 – 12:30 **KUNSTHALLE**

T1-6 **FLUID DYNAMICS AND HEAT AND MASS TRANSFER IN MULTIPHASE SYSTEMS 6**

Chair: Adam A. Donaldson (Dalhousie University, Halifax, Canada)

11:10 **T1-6-1** **Viscosity influence on oxygen mass transfer and gas bubble size distribution in 200 L reactor**

E. O. Willer[1], J. J. Victoria[1], J. M. Woodley[1]

[1]Technical University of Denmark, Department of Chemical and Biochemical Engineering, Kongens Lyngby, Denmark

11:30 **T1-6-2** **Effect of counter-current liquid flow rate on the mass transfer in a bubble column**

P. Kováts[1], K. Zähringer[1]

[1]Otto-von-Guericke-Universität Magdeburg, Lehrstuhl für Strömungsmechanik und Strömungstechnik, Magdeburg, Germany

11:50 **T1-6-3** **Hydrodynamics and particle trapping by ceramic foams above catalytic fixed bed reactors**

F. Augier[1], E. Agostini[1,2], R. Rousset[1], M. Bouras[1], G. Boccardo[2], D. Marchisio[2], Y. Haroun[1]

[1]IFP Energies Nouvelles, Solaize, France; [2]Politecnico di Torino, Dipartimento di Scienza Applicata e Tecnologia, Torino, Italy

12:10 **T1-6-4** **On the influence of wake structures on chemical reactions at Taylor bubbles**

F. Kexel[1], A. von Kameke[2], M. Hoffmann[1], M. Schlüter[1]

[1]Hamburg University of Technology, Institute of Multiphase Flows, Hamburg, Germany; [2]Hamburg University of Applied Science, Heinrich Blasius Institut, Hamburg, Germany

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11:10 – 12:30 **ROOM A**

T6-3 **MULTI-SCALE MODELLING OF MULTIPHASE CHEMICAL REACTORS 3**

Chair: Tomas Moucha (University of Chemistry and Technology Prague, Czech Republic)

11:10 **T6-3-1** **Carbonation of epoxides in three-phase system: From kinetics to reactor technology**

W. Pérez Sena[1], F. Ciccarelli[1], V. Russo[2], M. DiSerio[2], S. Leveneur[3], J. Wärnå[1], A. Medina[1], T. Salmi[1]

[1]Åbo Akademi, Technische Chemie und Reaktionstechnik (TKR), Turku/Åbo, Finland; [2]Università di Napoli Federico II, Scienze Chimiche, Napoli, Italy; [3]INSA Rouen, LSPC, Rouen, France

11:30 **T6-3-2** **Methane dry reforming in a microwave heating-assisted dense fluidized bed**

M. Mokhtari[1], J. Shabanian[1], **J. Chaouki**[1]
[1]Polytechnique Montreal, Department of Chemical Engineering, Montreal, Canada

11:50 **T6-3-3** **A new drag model for CFD modeling of bubble columns with surfactant**

Q. Liu[1,2], J. Zhang[1], **X. Guan**[1,2], N. Yang[1,2]
[1]Institute of Process Engineering, Chinese Academy of Sciences, State Key Laboratory of Multiphase Complex Systems, Beijing, China; [2]University of Chinese Academy of Sciences, Beijing, China

12:10 **T6-3-4** **Modelling oxygen mass transfer in surfactant solutions considering hydrodynamics and physico-chemical phenomena**

G. Lebrun[1], G. Hébrard[1], N. Dietrich[1]
[1]Université de Toulouse, Toulouse Biotechnology Institute (TBI), CNRS, INRAE, INSA, Toulouse, France

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11:10 – 12:30 **ROOM B**

T11-2 **FROTH FLOTATION 2**

Chair: Sascha Heitkam (Helmholtz-Zentrum Dresden-Rossendorf, Germany)

11:10 **T11-2-1** **Froth growth dynamics in presence of a rising bubble plume: Effect of surfactant and gas superficial velocity**

A. Zakari[1], P. Ireland[1], G. Evans[1], S. Mitra[1]
[1]University of Newcastle, Chemical Engineering, Newcastle, Australia

11:30 **T11-2-2** **Effect of gas flux and counter-current washing on the rejection of hydrophilic particles in a REFLUX flotation cell**

B. Wright[1], K. Galvin[1], M. Firouzi[1]
[1]University of Newcastle, Newcastle Institute for Energy and Resources, Newcastle, Australia

11:50 **T11-2-3** **Ionic flotation of zinc and iron in rectangular bubble column: Hydrodynamic and kinetic studies.**

O. Tigri[1], A. Essadki[1]
[1]Hassan II University, Chemical Engineering, Casablanca, Morocco

12:10 **T11-2-4** **Experimental investigation of the bubbly downcomer flow in a pressurized pneumatic flotation cell**

T. Zürner[1], J. Gatter[1], H. Rox[1], K. Eckert[1,2]
[1]Helmholtz-Zentrum Dresden-Rossendorf, Institute of Fluid Dynamics, Dresden, Germany; [2]Technische Universität Dresden, Chair of Transport Processes at Interfaces, Dresden, Germany

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11:10 – 12:30 **ROOM Y**

T13-2 **CARBON DIOXIDE CAPTURE AND GAS CLEANING 2**

Chair: Domenico Flagiello (University of Naples, Italy)

11:10 T13-2-1 **Determination of the enhancment factor for the absorption of sulphur dioxide into sodium chlorite aqueous solutions**

D. Ricchiari[1], D. Flagiello[1], F. Di Natale[1], A. Erto[1], L. Amato[2], A. Lancia[1]

[1]Università di Napoli Federico II, Department of Chemical, Materials and Production Engineering, Napoli, Italy; [2]Boldrocchi Group S.r.l, Biassono, Italy

11:30 T13-2-2 **Oxidative stability of blends of 1-Amino-2-propanol and tertiary amine for CO_2 capture**

Q. Liu[1], M. Xiao[1], H. Gao[1], Z. Liang[1]

[1]Hunan University, College of Chemistry and Chemical Engineering, Changsha, China

11:50 T13-2-3 **Enhancement of the catalytic membrane for CO_2 desorption in amine-based solutions**

K. Yang[1], L. Yu[1], Y. M. Deng[1], H. L. Liu[1], T. Lan[1]

[1]Beijing Institute of Technology, School of Chemistry and Chemical Engineering, Beijing, China

12:10 T13-2-4 **Low-energy consuming electrochemical CO_2 desorption driven by the PCET reaction for an amine system**

F. Zhao[1], H. L. Liu[1], T. Lan[1]

[1]Beijing Institute of Technology, School of Chemistry and Chemical Engineering, Beijing, China

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11:10 – 12:30 **ROOM G**

T12-2 **WASTEWATER TREATMENT AND BIOPROCESSES 2**

Chair: Sebastian Reinecke (Helmholtz-Zentrum Dresden-Rossendorf, Germany)

11:10 T12-2-1 **CFD simulation and experimental validation of a continuous electrocoagulation process used to remove an azo dye from textile wastewater**

S. Kouzbour[1], N. Najid[1], A. Ait Elmahjoub[1], Y. Stiriba[2], B. Gourich[1,4], C. Vial[3], M. Chaker Necibi[4]

[1]Hassan II University, Chemical Engineering/Higher School of Technology, Casablanca, Morocco; [2]Universitat Rovira i Virgili, Mechanical Engineering/Chemical Engineering School, Tarragone, Spain; [3]Université Clermont Auvergne, Institut Pascal/Polutech, Clermont-Ferrand, France; [4]Mohammed VI Polytechnic University, International Water Research Institute, Ben Guerir, Morocco

11:30 **T12-2-2** **Modelling of biological methanation by CFD and 1D model in an industrial bubble column**
A. Cockx[1], **V. Ngu**[1], B. Casale[1], J. Morchain[1]
[1]Université de Toulouse, INSA, Toulouse, France

11:50 **T12-2-3** **Simulation of gas-liquid hydrodynamics in large scale bio-reactors using CFD-based compartment models**
J. Le Nepvou De Carfort[1], T. Pinto[2], U. Krühne[1]
[1]Technical University of Denmark, Department of Chemical and Biochemical Engineering, Kongens Lyngby, Denmark; [2]UNIBIO A/S, R&D Department, Roskilde, Denmark

12:10 **T12-2-4** **Impact of outgassing on dye degradation in jet cavitation**
J.-A. Nöpel[1], J. Fröhlich[1], F. Rüdiger[1]
[1]Technische Universität Dresden, Chair of Fluid Mechanics, Dresden, Germany

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12:30 – 13:30
BREAK **LUNCH BREAK & EXHIBITION VIEWING**

13:30 – 15:30 **KUNSTHALLE**
T1-7 **FLUID DYNAMICS AND HEAT AND MASS TRANSFER IN MULTIPHASE SYSTEMS 7**
Chair: Stoyan N. Nedeltchev (Polish Academy of Sciences, Gliwice, Poland)

13:30 **T1-7-1** **Lifetime of a single bubble at different liquid surfaces**
H. Li[1], Y. Fei[1], **H. Z. Li**[1]
[1]University of Lorraine, CNRS, LRGP, Nancy, France

13:50 **T1-7-2** **Experimental and numerical analysis of the bubble size distribution in a coalescence-inhibited sparged stirred tank**
F. Maluta[1], F. Alberini[1], A. Paglianti[1], G. Montante[1]
[1]University of Bologna, Department of Industrial Chemistry, Bologna, Italy

14:10 **T1-7-3** **Copper sulphate as thermochemical material in a continuous three-phase stirred tank reactor for thermochemical energy storage**
G. Wedl[1], L. Schmieder[1], F. Winter[1]
[1]TU Wien, Institute of Chemical, Environmental and Bioscience Engineering, Wien, Austria

14:30 **T1-7-4** **Experimental characterization of a reverse jet scrubber for gas/liquid absorption**
P. Giustacori[1], E. Brunazzi[1]
[1]University of Pisa, Department of Civil and Industrial Engineering, Pisa, Italy

14:50 **T1-7-5** **Interplay of pore size distribution and precipitation during the drying of porous media**

D. R. Rieder[1,2], E. A.J.F. Peters[1], J. A. Kuipers[1]

[1]Eindhoven University of Technology, Department of Chemical Engineering and Chemistry, Eindhoven, The Netherlands; [2]Eindhoven University of Technology, Department of Mechanical Engineering, Eindhoven, The Netherlands

15:10 **T1-7-6** **Experiments and CFD simulations for hydrodynamic studies of viscous gas-liquid & gas-liquid-solid flow in a slurry bubble column**

P. Tyagi[1], V. Kumar[1]

[1]Indian Institute of Technology Roorkee, Chemical Engineering, Roorkee, India

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13:30 – 15:30 **ROOM A**

T5-3 **MULTIPHASE COMPUTATIONAL FLUID DYNAMICS 3**

Chair: Dirk Lucas (Helmholtz-Zentrum Dresden-Rossendorf, Germany)

13:30 **T5-3-1** **3D CFD modeling of gas-liquid flow in an ammonia-phosphoric acid solution: Impact of rotational speed on bubbles distributions**

S. Elmisaoui[1], M. Hamou[1], L. Khamar[1], J.-M. Ghidaglia[1]

[1]Mohammed VI Polytechnic University, College of Computing, Ben Guerir, Morocco

13:50 **T5-3-2** **Numerical modelling of spreading dynamics of a single molten droplet impingement on a solid surface of different inclinations**

R. Chowdhury[1,4], G. Evans[1,4], T. Honeyands[1,4], B. J. Monaghan[2,4], D. Scimone[3], S. Mitra[1,4]

[1]University of Newcastle, College of Engineering, Callaghan, Australia; [2]University of Wollongong, School of Mechanical, Materials and Mechatronics Engineering, Wollongong, Australia; [3]BlueScope Steel, Port Kembla, Australia; [4]University of Wollongong, ARC Research Hub for Australian Steel Manufacturing, Wollongong, Australia

14:10 **T5-3-3** **Numerical simulation of gas-liquid flow on fixed valve trays**

P. Wiedemann[1], R. Meller[1], B. Krull[1], M. Schubert[1,2], U. Hampel[1,3]

[1]Helmholtz-Zentrum Dresden-Rossendorf, Institute of Fluid Dynamics, Dresden, Germany; [2]Technische Universität Dresden, Chair of Chemical Process Engineering, Dresden, Germany; [3]Technische Universität Dresden, Chair of Imaging Techniques in Energy and Process Engineering, Dresden, Germany

14:30 **T5-3-4** **Collision and adhesion rates of small solid particles with freely rising and deformable bubbles in laminar flow**

X. Li[1,2], R. Tribess[2], M. Sommerfeld[2]
[1]China University of Mining and Technology, School of Chemical Engineering and Technology, Xuzhou, China; [2]Otto-von-Guericke-Universität Magdeburg, Multiphase Flow Systems (MPS), Institute for Process Engineering, Halle (Saale), Germany

14:50 **T5-3-5** **Effect of particles on coaxial bubble-pair coalescence in a slurry bubble column**

Y. Liao
Helmholtz-Zentrum Dresden-Rossendorf, Institute of Fluid Dynamics, Dresden, Germany

15:10 **T5-3-6** **Numerical modelling of bubble shape and drag based on the coupling of PID controller and FT method**

H. Zhang[1], H. Yan[1], J. Xiao[2], L. Liu[1]
[1]Central South University, School of Energy Science and Engineering, Changsha, China; [2]Changsha University of Science and Technology, College of Energy and Power Engineering, Changsha, China

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13:30 – 15:30 **ROOM B**

T2-3 **GRANULAR MATERIALS PROCESSING AND FLUIDIZED BED REACTORS 3**

Chair: Swapna Rabha (Indian Institute of Technology Madras, Chennai, India)

13:30 **T2-3-1** **Experimental investigation of a laboratory-scale circulating fluidized bed riser with Geldart's group B particle**

T. Tribedi[1], H. J. Pant[3], P. Tiwari[1], R. K. Upadhyay[2]
[1]Indian Institute of Technology Guwahati, Department of Chemical Engineering, Guwahati, India; [2]Indian Institute of Technology (BHU), Department of Chemical Engineering and Technology, Varanasi, India; [3]Bhabha Atomic Research Centre, Isotope and Radiation Application Division, Mumbai, India

13:50 **T2-3-2** **CFD-DEM simulations of bubble formation dynamics in bi-dispersed gas-solids fluidized bed**

P. Das[1], V. V. Buwa[1]
[1]Indian Institute of Technology Delhi, Chemical Engineering, New Delhi, India

14:10 **T2-3-3** **Powder mixing for fine particle recycling – An X-ray tomography study**

A. M. Baecke[1], S. Boden[1], M. Bieberle[1], A. Renno[2], U. Hampel[1,3], G. Lecrivain[3]

[1]Helmholtz-Zentrum Dresden-Rossendorf, Institute of Fluid Dynamics, Dresden, Germany; [2]Helmholtz-Zentrum Dresden-Rossendorf, Helmholtz Institute Freiberg for Resource Technology, Freiberg, Germany; [3]Technische Universität Dresden, Chair of Imaging Techniques in Energy and Process Engineering, Dresden, Germany

14:30 **T2-3-4** **Oily wastewater treatment using CNT absorbent in a three-phases circulating fluidized bed**

S.W. Kim

Korea National University of Transportation, Chungju, Republic of Korea

14:50 **T2-3-5** **Influence of solid mass ratio on expansion behavior of inclination-augmented binary solid-liquid fluidized bed**

P. Puhan[2], A. K. Mukherjee[3], A. Atta[1,2]

[1]Indian Institute of Technology Kharagpur, Department of Chemical Engineering, Kharagpur, India; [2]Indian Institute of Technology Kharagpur, Advanced Technology Development Centre, Kharagpur, India; [3]Tata Steel Limited, Raw Materials Research Group, Jamshedpur, India

15:10 **T2-3-6** **Recent development and industrial application on (gas)-liquid-solid fluidization technology**

Y. Shao[1], J. Zhu[2]

[1]University of Nottingham Ningbo China, Nottingham Ningbo China Beacons of Excellence Research and Innovation Institute, Ningbo, China; [2]Western University, Department of Chemical and Biochemical Engineering, London, Canada

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13:30 – 15:30 **ROOM Y**

T3-3 **MEASUREMENT AND DATA ANALYSIS TECHNIQUES FOR MULTIPHASE SYSTEMS, REACTOR DYNAMICS AND CONTROL 3**

Chair: Marco Da Silva (Johannes Kepler University Linz, Austria)

13:30 **T3-3-1** **Characterization of gas-liquid maldistribution in monolith reactors with assessment of an innovative distributor**

M.R. Do Nascimento Arrais[1], A. Devatine[1], C. Julcour[1], A.-M. Billet[1], H. Chaumat[1]

[1]Université de Toulouse, CNRS, INPT, UPS, Laboratoire de Génie Chimique, Toulouse, France

13:50 **T3-3-2** **An MRI investigation of trickle flow in trickle beds of spherocylindrical particles**

A. Fathiganjehlou[1], N. Romijn[1], E. A.J.F. Peters[1], K. Buist[1], M. W. Baltussen[1], J. A. Kuipers[1]

[1]Eindhoven University of Technology, Department of Chemical Engineering and Chemistry, Eindhoven, The Netherlands

14:10 **T3-3-3** **Electrical resistance tomography measurements of transport of liquid pulses in a packed bed**

D. Saxena[1], V. V. Buwa[1]

[1]Indian Institute of Technology Delhi, Chemical Engineering, New Delhi, India

14:30 **T3-3-4** **An experimental investigation on radial bubble size distributions in a laboratory scale foam column**

L. Knüpfer[1,2], R. Götzelt[1], K. Eckert[1,2], S. Heitkam[1,2]

[1]Technische Universität Dresden, Chair of Transport Processes at Interfaces, Dresden, Germany; [2]Helmholtz-Zentrum Dresden-Rossendorf, Institute of Fluid Dynamics, Dresden, Germany

14:50 **T3-3-5** **Acoustic tomographic temperature monitoring of the dense phase in fluidized bed**

Y. Bao[1], Z. Shi[1], J. Jia[2], F. Dong[1], C. Tan[1]

[1]Tianjin University, Tianjin Key Laboratory of Process Measurement and Control, School of Electrical and Information Engineering, Tianjin, China; [2]University of Edinburgh, Agile Tomography Group, School of Engineering, Institute for Digital Communications, Edinburgh, United Kingdom

15:10 **T3-3-6** **Optimized CNN image analysis for multi-phase processes using synthetic data**

C. F. Weibel[1], M. C. Hofmann[1], C. Garth[2], H.-J. Bart[3], E. von Harbou[1]

[1]Rheinland-Pfälzische Technische Universität, Laboratory of Reaction and Fluid Process Engineering, Kaiserslautern, Germany; [2]Rheinland-Pfälzische Technische Universität, Scientific Visualization Lab, Kaiserslautern, Germany; [3]Rheinland-Pfälzische Technische Universität, Fluidverfahrenstechnik, Kaiserslautern, Germany

13:30 – 15:30 **ROOM G**

T7-3 **PROCESS INTENSIFICATION IN MULTIPHASE CHEMICAL REACTORS 3**

Chair: Vivek V. Ranade (University of Limerick, Ireland)

13:30 **T7-3-1** **Evaluation of the direct scalability of G-L segmented flow in the Stacked Multi-Channel Reactor (SMCR®): Hydrodynamics and intensification of a demanding aldehyde oxidation**

M. dos Santos[1,2], L. Vanoye[1], F. Bornette[1], E. Tioni[2], R. Philippe[1], C. de Bellefon[1]

[1]CP2M, Villeurbanne, France; [2]Processium, Villeurbanne, France

13:50 **T7-3-2** **Intensification of solid-liquid suspension performance in dual-shaft eccentric mixer**

S. Wang[1], P. Liu[1], C. Tao[1], Y. Wang[2], Z. Liu[1]

[1]Chongqing University, School of Chemistry and Chemical Engineering, Chongqing, China; [2]Tsinghua University, Department of Chemical Engineering, Beijing, China

14:10 **T7-3-3** **Multiscale modelling of intensified turbulent shear control on synthesis of mesoporous micro/nano silicon oxide particles in a continuous multistage Rankine vortex flow reactor**

Y. Guo[1], J. Lu[1], B. Theaker[1], J. Yang[2], X. Yang[1]

[1]University of Nottingham Ningbo China, Ningbo, China; [2]University of Hull, Hull, United Kingdom

14:30 **T7-3-4** **Gas-liquid mass transfer in an oscillatory flow fixed and fluidized bed reactor**

F. Almeida[1], J. A. Teixeira[2], F. Rocha[1], A. Ferreira[1], F. Castro[1]

[1]University of Porto, Faculty of Engineering, Laboratory for Process Engineering, Environment, Biotechnology and Energy, Porto, Portugal; [2]University Braga, Faculty of Engineering, Centre of Chemical and Biological Engineering, Braga, Portugal

14:50 **T7-3-5** **Turbulent gas-liquid mixing and separation with helical static elements**

J. A. Murillo Rincon[1], F. Alberini[1], F. Maluta[1], A. Paglianti[1], G. Montante[1]

[1]Alma Mater Studiorum - Università di Bologna, Dipartimento di Chimica Industriale, Bologna, Italy

15:10 **T7-3-6** **Manganese oxides formation during oxidative removal of dissolved Mn(II) by aeration process in bubble column: Influencing factors and performance analysis**

S. Kouzbour[1], A. Ait Elmahjoub[1], N. Najid[1], B. Gourich[1,2], C. Vial[3], Y. Stiriba[4], A. Cockx[5], M. Chaker Necibi[2], N. Roche[2], A. Elmidaoui[2]

[1]Hassan II University, Laboratory of Process and Environmental Engineering, Higher School of Technology, Casablanca, Morocco; [2]Mohammed VI Polytechnic University, International Water Research Institute, Ben Guerir, Morocco; [3]Clermont Auvergne University, Clermont Auvergne INP, Institut Pascal, Clermont-Ferrand, France; [4]Universitat Rovira i Virgili, Departament d'Enginyeria Mecanica, ETSEQ, Tarragona, Spain; [5]Université de Toulouse, TBI, CNRS, INRAE, INSA, Toulouse, France

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15:30 – 16:00
BREAK **COFFEE BREAK & EXHIBITION VIEWING**

16:00 – 17:20 **KUNSTHALLE**
T1-8 **FLUID DYNAMICS AND HEAT AND MASS TRANSFER IN MULTIPHASE SYSTEMS 8**

Chair: Stoyan N. Nedeltchev (Polish Academy of Sciences, Gliwice, Poland)

16:00 **T1-8-1** **Investigating liquid velocity characteristics at the wall of the Limerick bubble column**

S. Bhowmick[1], H. E. Van den Akker[1]

[1]University of Limerick, Bernal Institute, School of Engineering, Limerick, Ireland

16:20 **T1-8-2** **Effect of coalescing and non coalescing water organic mixtures on hydrodynamics in a bubble column: Experimental studies and spectral analysis**

A. Essadki

Hassan II University, Casablanca, Morocco

16:40 **T1-8-3** **Surfactant effect on bubble deformation and breakup after interaction with vortex structure**

M. Zednikova[1,2], T. Semlerova[1,2], S. Orvalho[1], V. Penkavova[1], J. Havlica[1], J. Tihon[1]

[1]Czech Academy of Sciences, Institute of Chemical Process Fundamentals, Prague, Czech Republic; [2]University of Chemistry and Technology, Department of Chemical Engineering, Prague, Czech Republic

17:00 **T1-8-4** **Development of a validated model for mass transfer in bubble column**

M. Terentyak[1,2], S. Orvalho[1], A. Žák[2], T. Moucha[2], M. Zedniková[1,2]
[1]Czech Academy of Sciences, Institute of Chemical Process Fundamentals, Prague, Czech Republic; [2]University of Chemistry and Technology, Prague, Czech Republic

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16:00 – 17:20 **ROOM A**

T5-4 **MULTIPHASE COMPUTATIONAL FLUID DYNAMICS 4**

Chair: Dirk Lucas (Helmholtz-Zentrum Dresden-Rossendorf, Germany)

16:00 **T5-4-1** **Collection of fine spherical particles by spherical and deformed rigid bubbles: The effect of particle density**

M. Sommerfeld[1], M. A. Taborda[1]
[1]Otto-von-Guericke-Universität Magdeburg, Multiphase Flow Systems, Institute for Process Engineering, Halle (Saale), Germany

16:20 **T5-4-2** **Large eddy simulation of bubble columns with vertical tube internals**

Z. Li[1], X. Guan[1], N. Yang[1]
[1]Chinese Academy of Sciences, Institute of Process Engineering, Beijing, China

16:40 **T5-4-3** **Structure-resolved volume-of-fluid simulations of gas-liquid flow through monoliths**

A. S. Ambekar[1,2], F. E. Peters[1], O. Hinrichsen[2], V. V. Buwa[3], J. A. Kuipers[1]
[1]Eindhoven University of Technology, Multiphase Reactors Group, Department of Chemical Engineering and Chemistry, Eindhoven, The Netherlands; [2]Technical University of Munich, Department of Chemistry, TUM School of Natural Sciences and Catalysis Research Center, Munich, Germany; [3]Indian Institute of Technology Delhi, Department of Chemical Engineering, New Delhi, India

17:00 **T5-4-4** **CFD modeling for mass transfer study for viscous gas-liquid flows in a liquid-phase slurry bubble column involved in methanol/DME synthesis via syngas**

P. Tyagi[1], S. Singh[2], V. Kumar[1], K. K. Pant[1]
[1]Indian Institute of Technology Roorkee, Chemical Engineering, Roorkee, India; [2]Indian Institute of Technology Roorkee, Biosciences and Bioengineering, Roorkee, India

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16:00 – 17:00 **ROOM B**

T13-3 **CARBON DIOXIDE CAPTURE AND GAS CLEANING 3**

Chair: Xiaogang Yang (University of Nottingham Ningbo China, China)

16:00 **T13-3-1** **Experimental testing of alkaline suspensions for closed-loop marine SO_2 scrubber simulation**

A. Cammarota[1], A. Cante[1], J. Heiszwolf[2], C. Perez Guijarro[2], R. Solimene[1], L. van den Brekel[3], **F. Scala**[4]

[1]Consiglio Nazionale delle Ricerche, STEMS, Napoli, Italy; [2]Lhoist Recherche et Développement, Nivelles, Belgium; [3]Nedmag B.V., Veendam, The Netherlands; [4]Università di Napoli Federico II, DICMAPI, Napoli, Italy

16:20 **T13-3-2** **Mechanism of catalytic CO_2 desorption in biphase DEEA-AEEA solution**

T. Lan[1], S. Wang[1], H. L. Liu[1]

[1]Beijing Institute of Technology, School of Chemistry and Chemical Engineering, Beijing, China

16:40 **T13-3-3** **Experimental and computational study on thermal degradation of tertiary amines for CO_2 capture**

T. Luo[1], **M. Xiao**[1], H. Gao[1], Z. Liang[1]

[1]Hunan University, College of Chemistry and Chemical Engineering, Changsha, China

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16:00 – 17:20 **ROOM Y**

T3-4 **MEASUREMENT AND DATA ANALYSIS TECHNIQUES FOR MULTIPHASE SYSTEMS, REACTOR DYNAMICS AND CONTROL 4**

Chair: Marco Da Silva (Johannes Kepler University Linz, Austria)

16:00 **T3-4-1** **Experimental characterization of liquid spreading and imbibition on a porous substrate: Effect of substrate inclination angle and physical properties**

R. S. Gulia[1], R. Tiwari[1], V. V. Buwa[1]

[1]Indian Institute of Technology Delhi, Department of Chemical Engineering, New Delhi, India

16:20 **T3-4-2** **Machine learning to process data from innovative sensor for gas-liquid flow characterization in millimeter-scale channels**

H. Chaumat[1], A. Devatine[1], A.-M. Billet[1], M.R. Do Nascimento Arrais[1], R. Ouaret[1]

[1]Université de Toulouse, Laboratoire de Génie Chimique, Toulouse, France

16:40	**T3-4-3**	**3D bubble shape reconstruction from 2D imagery using CNNs** **D. Orij**[1], I. Roghair[1], M. van Sint Annaland[1] [1]Eindhoven University of Technology, Department of Chemical Engineering and Chemistry, Eindhoven, The Netherlands
17:00	**T3-4-4**	**A Physics Informed Neural Network approach for deriving fluid flow fields from temperature distribution** **C. Zhang**[1,2], C. Li[1], X. Li[1], M. Ye[1], Z. Liu[1] [1]Chinese Academy of Sciences, Dalian Institute of Chemical Physics, Dalian, China; [2]University of Chinese Academy of Sciences, Beijing, China

18:45 – 23:00
SO3 **GLS-16 CONFERENCE DINNER**
at boat "August der Starke", see pg. 70

5 SEPTEMBER, 2024

9:00 – 9:45 **KUNSTHALLE**

PL3 **PLENARY LECTURE BY VIVEK RANADE**

Chair: Markus Schubert (Technische Universität Dresden, Germany)

9:00 **PL3-1** **Hydrodynamic cavitation for intensifying multiphase processes: State of the art, challenges, and path forward**

Vivek V. Ranade
University of Limerick, Bernal Chair Professor of Process Engineering at Bernal Institute, Limerick, Ireland

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9:45 – 10:00

BREAK **BREAK TO CHANGE ROOMS**

10:00 – 10:40 **KUNSTHALLE**

T2-4 **GRANULAR MATERIALS PROCESSING AND FLUIDIZED BED REACTORS 4**

Chair: Ning Yang (Chinese Academy of Sciences, Beijing, China)

10:00 **T2-4-1** **Determining correlations for the hydrodynamics of spouted bubbling fluidized beds using CFD & ANNs**

R. Ramesh[1], S. G. Roy[1], M. M. Reddy[1], J. T. Padding[1], W. de Jong[1], E. M. Moghaddam[2], B. Hardy[1,3], R. Ansart[3], O. Simonin[3], B. Esgandari[4], S. Schneiderbauer[4]
[1]Delft University of Technology, Department of Process & Energy, Delft, The Netherlands; [2]G.I. Dynamics, Schiphol, The Netherlands; [3]Institut de Mécanique des Fluides de Toulouse (IMFT), Toulouse, France; [4]Johannes Kepler University, Department of Particulate Flow Modelling, Linz, Austria

10:20 **T2-4-2** **Evolution of gas-solid binary fluidized bed using radiotracer based techniques**

V. R. Khernar[1], R. Kumari[1], H. J. Pant[2], R. K. Upadhyay[1]
[1]Indian Institute of Technology (BHU), Department of Chemical Engineering and Technology, Varanasi, India; [2]Bhabha Atomic Research Centre, Isotope and Radiation Application Division, Mumbai, India

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10:00 – 10:40 **ROOM A**

T7-4 **PROCESS INTENSIFICATION IN MULTIPHASE CHEMICAL REACTORS 4**

Chair: Markus Schubert (Technische Universität Dresden, Germany)

10:00 **T7-4-1** **Removal and concentration of air ultra-fine bubbles in ultra-pure water by filtration**

E. Omata[1], **K. Terasaka**[2], S. Fujioka[2]

[1]Keio University, The Center for Science of Environment and Energy, School of Science for Open and Environmental Systems, Graduate School of Science and Technology, Yokohama, Japan; [2]Keio University, Department of Applied Chemistry, Faculty of Science and Technology, Yokohama, Japan

10:20 **T7-4-2** **Gas-liquid mass transfer enhancement by Raney Ni particles in a rotating packed bed**

L. Zheng[1,2], Z.-X. Fan[1,2], Z.-L. Li[1,2], C.-J. Zhou[1,2], L.-H. Wang[1,2], Y. Luo[1, 2], J.-F. Chen[1,2]

[1]State Key Laboratory of Organic-Inorganic Composites, Beijing University of Chemical Technology, Beijing, China; [2]Research Center of the Ministry of Education for High Gravity Engineering and Technology, Beijing University of Chemical Technology, Beijing, China

10:00 – 10:40 **ROOM B**

T9-1 **SCALE-UP OF MULTIPHASE REACTORS 1**

Chair: Véronique Roig (Institut de Mécanique des Fluides de Toulouse, France)

10:00 **T9-1-1** **CFD simulations of bubble column reactors fitted with vertical tube internals**

G. C. DSouza[1], A. Prakash[1], C. Zhang[2]

[1]Western University, Department of Chemical and Biochemical Engineering, London, Canada; [2]Western University, Department of Mechanical and Materials Engineering, London, Canada

10:20 **T9-1-2** **Method and practice for increasing the production capacity of commercial Fischer-Tropsch synthesis slurry bubble column reactor**

Q. Chen[1], **Y. Zhao**[1], Q. Lin[1], Y. Bu[1], B. Du[1], R. Yang[1], Z. Men[1]

[1]National Institute of Clean-and-Low-Carbon Energy, Beijing, China

10:00 – 10:40 **ROOM Y**

T6-4 **MULTI-SCALE MODELLING OF MULTIPHASE CHEMICAL REACTORS 4**

Chair: Aniket S. Ambekar (Eindhoven University of Technology, The Netherlands)

10:00 **T6-4-1** **Modelling of a multiphase liquid-liquid reaction system: Epoxidation of vegetable oils in continuous reactors under transient and stationary conditions**

T. Cogliano[1,2], V. Russo[2], R. Tesser[2,1], K. Eränen[1], T. Salmi[1]

[1]Åbo Akademi, Technische Chemie und Reaktionstechnik (TKR), Turku/Åbo, Finland; [2]Università di Napoli Federico II, Chemical Sciences, Napoli, Italy

10:20 **T6-4-2** **Application and parameterization of a 1D multifluid population balance model for gas-liquid processes**

F. Breit[1], C. F. Weibel[1], E. von Harbou[1]

[1]Rheinland-Pfälzische Technische Universität, Laboratory of Reaction and Fluid Process Engineering, Kaiserslautern, Germany

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10:00 – 10:40 **ROOM G**

T14-1 **FINE BUBBLES 1**

Chair: Christophe Vial (Université Clermont Auvergne, Aubiere, France)

10:00 **T14-1-1** **Molecular dynamics of bubble nucleation and growth in Newtonian liquids**

Z. Li[1,2], Z. Cai[1,2], Z. Gao[1,2], J. Derksen[3]

[1]Beijing University of Chemical Technology, Beijing Advanced Innovation Center for Soft Matter Science and Engineering, Beijing, China; [2]Beijing University of Chemical Technology, State Key Laboratory of Chemical Resource Engineering, Beijing, China; [3]University of Aberdeen, School of Engineering, Aberdeen, United Kingdom

10:20 **T14-1-2** **Surface functionalization of industrial materials via PECVD and its influence on oxygen nucleation**

J. Heinrich[1,2], K. Schwarzenberger[1,2], X. Yang[1,2], K. Eckert[1,2]

[1]Helmholtz-Zentrum Dresden-Rossendorf, Institute of Fluid Dynamics, Dresden, Germany; [2]Technische Universität Dresden, Chair of Transport Processes at Interfaces, Dresden, Germany

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10:40 – 11:10

BREAK **COFFEE BREAK & EXHIBITION VIEWING**

11:10 – 12:30 **KUNSTHALLE**

T2-5 **GRANULAR MATERIALS PROCESSING AND FLUIDIZED BED REACTORS 5**

Chair: Ning Yang (Chinese Academy of Sciences, Beijing, China)

11:10 **T2-5-1** **Particle aggregation and breakage by population balance modelling in a fluidized bed**

S. Goel[1,2], S. Roy[1], S. Bhatia[2]

[1]Indian Institute of Technology Delhi, UQ-IITD Academy of Research (UQIDAR), New Delhi, India; [2]University of Queensland Brisbane, UQ-IITD Academy of Research (UQIDAR), Brisbane, Australia

11:30 **T2-5-2** **Comparison of modelling approaches for liquid fluidized beds**

A. Bernad Serra[1], F. Khamitov[1], V. Alopaeus[1]

[1]Aalto University, Department of Chemical and Metallurgical Engineering, Espoo, Finland

11:50 **T2-5-3** **Bubble dynamics in a fluidized bed: An experimental study using X-ray tomography**

S. M. Podber[1], E. C. Wagner[1], **L. M. Portela**[1]

[1]Delft University of Technology, Department of Chemical Engineering, Section of Transport Phenomena, Delft, The Netherlands

12:10 **T2-5-4** **Experimental and CFD study of pulsed fluidized bed**

Y. Haroun[1], A. Cloupet[1], A.-H. Ahmadi-Motlagh[1], C. Podio[1]

[1]IFP Energies Nouvelles, Chemical Engineering and Technology Departement, Solaize, France

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11:10 – 12:30 **ROOM A**

T7-5 **PROCESS INTENSIFICATION IN MULTIPHASE CHEMICAL REACTORS 5**

Chair: Markus Schubert (Technische Universität Dresden, Germany)

11:10 **T7-5-1** **Flow behavior of microbubble swarm in a HiGee-aided bubble column reactor**

L.-H. Wang[1,2], H.-L. Liao[1,2], L. Zheng[1,2], L. Jiang[1,2], Y. Luo[1,2], B.-C. Sun[1,2], J.-F. Chen[1,2]

[1]Beijing University of Chemical Technology, State Key Laboratory of Organic-Inorganic Composites, Beijing, China; [2]Beijing University of Chemical Technology, Ministry of Education for High Gravity Engineering and Technology, Beijing, China

11:30 **T7-5-2** **Enhanced biomimetic conversion of CO_2 to $CaCO_3$ using encapsulated Bovine Erythrocyte Carbonic Anhydrase (BCA) enzyme within various zeolites**

O. Yuksel Orhan[1], O. Tekin[1], N. Ulus[1]

[1]Hacettepe University, Chemical Engineering Department, Ankara, Turkey

11:50 **T7-5-3** **Investigation of controlled bubble formation on multiple orifices using acoustic pressure modulation**

J. Schäfer[1], F. Ristau[1], S. F. Reinecke[1], U. Hampel[1,2]

[1]Helmholtz-Zentrum Dresden-Rossendorf, Institute of Fluid Dynamics, Dresden, Germany; [2]Technische Universität Dresden, Chair of Imaging Techniques in Energy and Process Engineering, Dresden, Germany

12:10 **T7-5-4** **Addressing clogging in fluidic oscillators operated as continuous crystallisers**

A. V. Ganjare[1], K. Madane[1], V. V. Ranade[1]

[1]University of Limerick, Bernal Institute, Limerick, Ireland

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11:10 – 12:30 **ROOM B**

T5-5 **MULTIPHASE COMPUTATIONAL FLUID DYNAMICS 5**

Chair: Daniele Marchisio (Politecnico di Torino, Italy)

11:10 **T5-5-1** **Gas separation efficiency study in ebullated bed hydroprocessor**

K. Evans[1], J. Haelssig[1], A. A. Donaldson[2], A. Macchi[1]

[1]University of Ottawa, Department of Chemical and Biological Engineering, Ottawa, Canada; [2]Dalhousie University, Department of Process Engineering and Applied Science, Halifax, Canada

11:30 **T5-5-2** **Design and optimizing the liquid distributor of a rotating packed bed by the analysis of liquid flow behavior**

H.-L. Liao[1,2], H.-X. Yu[1,2], Z.-X. Fan[1,2], Y. Luo[1,2], C.-H. Li[3], H.-K. Zou[1,2], J.-F. Chen[1,2]

[1]Beijing University of Chemical Technology, State Key Laboratory of Organic-Inorganic Composites, Beijing, China; [2]Beijing University of Chemical Technology, Research Center of the Ministry of Education for High Gravity Engineering and Technology, Beijing, China; [3]Quzhou Innovation Institution for Chemical Engineering and Materials, Quzhou, China

11:50 **T5-5-3** **A coupled Local Front Reconstruction and Immersed Boundary Method for simulating 3D multiphase flows with contact line dynamics in complex geometries**

T. J.A. Janssen[1], C. García Llamas[1], D. R. Rieder[1], J. A. Kuipers[1], M. W. Baltussen[1]

[1]Eindhoven University of Technology, Department of Chemical Engineering and Chemistry, Eindhoven, The Netherlands

12:10 **T5-5-4** **Eulerian simulations of liquid-phase mixing in a basic oxygen furnace (BOF): Effect of top blowing**

S. Biswas[1], **V. V. Buwa**[1], V. Singh[2]

[1]Indian Institute of Technology Delhi, Chemical Engineering, New Delhi, India; [2]Tata Steel Limited, Technology and R&D, Jamshedpur, India

11:10 – 12:10 **ROOM Y**

T6-5 **MULTI-SCALE MODELLING OF MULTIPHASE CHEMICAL REACTORS 5**

Chair: Aniket S. Ambekar (Eindhoven University of Technology, The Netherlands)

11:10 **T6-5-2** **Development and validation of a 1D gas-liquid model for dissolved Mn(II) removal by oxidation process in a square bubble column**

S. Kouzbour[1], B. Gourich[2,5], A. Cockx[3], **Y. Stiriba**[4]

[1]Hassan II University, Higher School of Technology, Casablanca, Morocco; [2]Hassan II University, Higher School of Technology, Casablanca, Morocco; [3]Université de Toulouse, INSA, Toulouse, France; [4]Universitat Rovira i Virgili, Departament d'Enginyeria Mecanica, ETSEQ, Tarragona, Spain; [5]Mohammed VI Polytechnic University, International Water Research Institute, Ben Guerir, Morocco

11:30 **T6-5-3** **CFD-Deep Neural Network (DNN) model of a slurry phase reactor for vacuum residue hydrocracking**

P. Mishra[1], A. Yadav[1]

[1]Indian Institute of Technology Jammu, Department of Chemical Engineering, Jammu, India

11:50 **T6-5-4** **Design and reliability of two fixed-bed catalyst test rigs for methanol-to-olefins reaction**

M. Seifert[1], L. A. Haufe[1], J. J. Weigand[1]

[1]Technische Universität Dresden, School of Science, Faculty of Chemistry and Food Chemistry, Dresden, Germany

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11:10 – 12:30 **ROOM G**

T14-2 **FINE BUBBLES 2**

Chair: Christophe Vial (Université Clermont Auvergne, Aubiere, France)

11:10 **T14-2-1** **Reduction of ultra-fine bubble number concentration in water transport with a pipeline**

K. Nakajima[1], H. Sasaki[2], **K. Terasaka**[2], A. A. Donaldson[3,1], S. Harada[1,3], S. Fujioka[2]

[1]Keio University, School of Science for Open and Environmental Systems, Graduate School of Science and Technology, Yokohama, Japan; [2]Keio University, Department of Applied Chemistry, Faculty of Science and Technology, Yokohama, Japan; [3]Dalhousie University, Department of Process Engineering and Applied Science, Halifax, Canada

11:30 **T14-2-2** **Experimental study of microscopic mass transfer phenomena of single fine bubbles**

L. Kursula[1], S. Takagi[2], Z. Percin[3], F. Kexel[1], P. Bubenheim[3], M. Hoffmann[1], A. Liese[3], K. Terasaka[4], M. Schlüter[1]

[1]Hamburg University of Technology, Institute of Multiphase Flows, Hamburg, Germany; [2]Keio University, School of Science for Open and Environmental Systems, Graduate School of Science and Technology, Yokohama, Japan; [3]Hamburg University of Technology, Institute of Technical Biocatalysis, Hamburg, Germany; [4]Keio University, Department of Applied Chemistry, Faculty of Science and Technology, Yokohama, Japan

11:50 **T14-2-3** **Modeling the dynamics of an ultrasound contrast agent near a deformable wall using Kelvin impulse**

A. Shambhu[1], S. Pushpavanam[1]

[1]Indian Institute of Technology Madras, Chemical Engineering, Chennai, India

12:10 **T14-2-4** **Numerical simulations of gas bubble growth on surfaces in oversaturated solutions**

Y. Han[1], M. Huang[1,2], G. Mutschke[1], K. Eckert[1]

[1]Helmholtz-Zentrum Dresden-Rossendorf, Institute of Fluid Dynamics, Dresden, Germany; [2]Beijing University of Chemical Technology, State Key Laboratory of Organic−Inorganic Composites, Beijing, China

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12:30 – 13:30
BREAK **LUNCH BREAK & EXHIBITION VIEWING**

13:30 – 15:10 **KUNSTHALLE**
T1-9 **FLUID DYNAMICS AND HEAT AND MASS TRANSFER IN MULTIPHASE SYSTEMS 9**

Chair: Niels Deen (Eindhoven University of Technology, The Netherlands)

13:30 **T1-9-1** **New approach for prediction of gas holdups in a bubble column operated with aqueous solutions of alcohols at ambient conditions**

S. Nedeltchev[1], S. Marchini[2,3], M. Schubert[2], U. Hampel[3,4]

[1]Polish Academy of Sciences, Institute of Chemical Engineering, Gliwice, Poland; [2]Technische Universität Dresden, Chair of Chemical Process Engineering, Dresden, Germany; [3]Helmholtz-Zentrum Dresden-Rossendorf, Institute of Fluid Dynamics, Dresden, Germany; [4]Technische Universität Dresden, Chair of Imaging Techniques in Energy and Process Engineering, Dresden, Germany

13:50 **T1-9-2** **Modelling of dynamic bubble deformation and breakup in T-junction channel flow**

E. Frense[1], F. Rüdiger[1], J. Fröhlich[1]
[1]Technische Universität Dresden, Chair of Fluid Mechanics, Dresden, Germany

14:10 **T1-9-3** **Transport and deposit of oxygen in the wake of an inertial bubble rising in a thin-gap cell**

V. Roig[1], F. Felis[2], S. Cazin[3], N. Dietrich[4], A.-M. Billet[5], K. Loubière[6]
[1]INP Toulouse, Institut de Mécanique des Fluides de Toulouse, Toulouse, France; [2]Fédération Fermat, Toulouse, France; [3]CNRS, Institut de Mécanique des Fluides de Toulouse, Toulouse, France; [4]INSA Toulouse, TBI, Toulouse, France; [5]INP Toulouse, LGC, Toulouse, France; [6]CNRS, LGC, Toulouse, France

14:30 **T1-9-4** **Identification of the main flow regime boundaries in a bubble column operated with foaming systems based on both information theory and statistics**

S. Nedeltchev[1], S. Marchini[2,3], M. Schubert[2], H. Kryk[3], U. Hampel[3,4]
[1]Polish Academy of Sciences, Institute of Chemical Engineering, Gliwice, Poland; [2]Technische Universität Dresden, Chair of Chemical Process Engineering, Dresden, Germany; [3]Helmholtz-Zentrum Dresden-Rossendorf, Institute of Fluid Dynamics, Dresden, Germany; [4]Technische Universität Dresden, Chair of Imaging Techniques in Energy and Process Engineering, Dresden, Germany

14:50 **T1-9-5** **Identification of the local isotropic turbulence conditions in bubble columns based on various important parameters from different theories**

S. Nedeltchev
Polish Academy of Sciences, Institute of Chemical Engineering, Gliwice, Poland

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13:30 – 15:10 **ROOM A**

T5-6 **MULTIPHASE COMPUTATIONAL FLUID DYNAMICS 6**

Chair: Mark W. Hlawitschka (Johannes Kepler Universität Linz, Austria)

13:30 **T5-6-1** **Euler-Lagrangian modeling of bubbly flows in alkaline water electrolysis system**

A. Li[1], Y. Tang[1,2], N. G. Deen[1,2], B. Vreman[1,3]
[1]Eindhoven University of Technology, Department of Mechanical Engineering, Eindhoven, The Netherlands; [2]Eindhoven University of Technology, Eindhoven Institute for Renewable Energy Systems (EIRES), Eindhoven, The Netherlands; [3]Nobian Industrial Chemicals, Amersfoort, The Netherlands

13:50 **T5-6-2** **Lattice Boltzmann simulation of the O_2 removal in anode porous transport layer of proton exchange membrane water electrolyser**

J. Zhang[1], X. Guan[1,2], N. Yang[1,2]

[1]Chinese Academy of Sciences, Institute of Process Engineering, State Key Laboratory of Multiphase Complex Systems, Beijing, China; [2]University of Chinese Academy of Sciences, School of Chemical Engineering, Beijing, China

14:10 **T5-6-3** **Three-dimensional CFD simulation of two-phase flow and electric field in an alkaline electrolyzer**

J. H. Bai[1], X. Guan[1], N. Yang[1]

[1]Chinese Academy of Sciences, Institute of Process Engineering, Beijing, China

14:30 **T5-6-4** **Numerical simulation and mixing characterization of Taylor bubble flows in coiled flow inverters**

O. Mierka[1], R. Münster[1], J. Surkamp[2], N. Kockmann[2], S. Turek[1]

[1]TU Dortmund University, Department of Mathematics, Chair of Applied Mathematics and Numerics, Dortmund, Germany; [2]TU Dortmund University, Department of Biochemical and Chemical Engineering, Chair of Equipment Design, Dortmund, Germany

14:50 **T5-6-5** **Modelling the fine and ultrafine particles to charged droplet interactions in a wet electrostatic scrubber**

A. Parisi[1], M. Alessio[2], F. Di Natale[1]

[1]Università di Napoli Federico II, Department of Chemical, Materials and Production Engineering, Napoli, Italy; [2]Vessel Technical Services (VTS) S.r.l., Quarto (NA), Italy

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13:30 – 15:10 **ROOM B**

T3-5 **MEASUREMENT AND DATA ANALYSIS TECHNIQUES FOR MULTIPHASE SYSTEMS, REACTOR DYNAMICS AND CONTROL 5**

Chair: Ragna Kipping (Helmholtz-Zentrum Dresden-Rossendorf, Germany)

13:30 **T3-5-1** **WMS based experimental analysis of slug-churn flow in a vertical pipe (160 mm i.d. and 42 meters long)**

M. A. Chekroun[1], M. Yassine[1], M. Rodriguez[2], R. Laborde[2], O. C. Ozturk[2], **A. Liné**[1]

[1]Université de Toulouse, Toulouse Biotechnology Institute, Toulouse, France; [2]CERG, Le Pont De Claix, France

13:50 **T3-5-2** **Analysis of unstable bubble void fraction at upstream of joint in the vertical gas-liquid two-phase flow by Multiple-current Voltage with Machine Learning (MCV-ML)**

Y. A.K. Prayitno[1], F. Yang[1], D. Saito[1], P. A. Sejati[1], M. Takei[1]

[1]Chiba University, Department of Mechanical Engineering, Graduate School of Science and Engineering, Chiba, Japan

14:10 **T3-5-3** **Electrical impedance probe for void fraction measurement in a jet loop reactor**

L. Lauritsch[1], F. Klapal[2], M. W. Hlawitschka[2], E. dos Santos[3], **M. Da Silva**[1]

[1]Johannes Kepler University, Institute of Measurement Technology, Linz, Austria; [2]Johannes Kepler University, Institute of Process Engineering, Linz, Austria; [3]Federal University of Technology Paraná (UTFPR), Multiphase Flow Research Center, Curitiba, Brazil

14:30 **T3-5-4** **Distributed fiber optic sensor as a new tool to monitor bubble column reactors**

G. H. Weber[1,2], Y. Schick[1], **M. Da Silva**[1], C. Martelli[2], M. W. Hlawitschka[3]

[1]Johannes Kepler University, Institute of Measurement Technology, Linz, Austria; [2]Graduate Program in Electrical and Computer Engineering, Federal University of Technology – Parana, Curitiba, Brazil; [3]Johannes Kepler University, Institute of Process Engineering, Linz, Austria

14:50 **T3-5-5** **4D spatiotemporal investigation of molten salt solid fraction transition during crystallization process due to salt addition by 3D-high temperature Electrical Resistance Tomography (3D-*ht*ERT)**

A. A. Luthfie[1,2], S. Segawa[1], Y. A.K. Prayitno[1,3], P. A. Sejati[1,4], N. Saito[5], M. Takei[1]

[1]Chiba University, Department of Mechanical Engineering, Chiba, Japan; [2]Mercu Buana University, Department of Mechanical Engineering, Jakarta, Indonesia; [3]Universitas Gadjah Mada, Department of Mechanical Engineering, Yogyakarta, Indonesia; [4]Universitas Gadjah Mada, Department of Electrical Engineering and Informatics, Yogyakarta, Indonesia; [5]Kyushu University, Department of Materials, Fukuoka, Japan

13:30 – 14:50 **ROOM Y**

T9-2 **SCALE-UP OF MULTIPHASE REACTORS 2**

Chair: Koichi Terasaka (Keio University, Yokohama, Japan)

13:30 T9-2-1 **Scale-up of stirred hydrogenation reactors for bio-based feedstocks**

M. Labusch[1], W. Keller[1]

[1]EKATO Rühr- und Mischtechnik GmbH, Research and Development, Schopfheim, Germany

13:50 T9-2-2 **Scale-up analogy of packed bed methane steam reforming for hydrogen production using tri-metallic Ni-Co-La/Al_2O_3 catalyst**

A. Baudh[1], R. Sharma[2], S. Sharma[1], R. K. Upadhyay[1]

[1]Indian Institute of Technology (BHU), Department of Chemical Engineering and Technology, Varanasi, India; [2]Gas Authority of India Ltd (GAIL), R & D Section Chemical, Noida, India

14:10 T9-2-3 **Flow regimes in aerated vessels with standard and a modified impeller**

M. Vecer[1], **K. Wichterle**[1], A. Zak[2], T. Moucha[2]

[1]VSB Technical University of Ostrava, Centre of Chemical Engineering, Ostrava, Czech Republic; [2]The University of Chemistry and Technology, Department of Chemical Engineering, Prague, Czech Republic

14:30 T9-2-4 **Effect of viscosity on the behavior of bubbly systems: From the bubble formation at one orifice to the flow regime in bubble columns**

S. Orvalho[1], M. C. Ruzicka[1], M. Zednikova[1], P. Basarova[2]

[1]Czech Academy of Sciences, Institute of Chemical Process Fundamentals, Research Group of Multiphase Reactors, Prague, Czech Republic; [2]University of Chemistry and Technology, Department of Chemical Engineering, Prague, Czech Republic

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15:10 – 15:20

BREAK **BREAK TO CHANGE ROOMS**

15:20 – 15:50 **KUNSTHALLE**

AW **AWARDEES' PRESENTATIONS & CLOSING**

Chair: Uwe Hampel (Helmholtz-Zentrum Dresden-Rossendorf, Germany)

15:25 **GLS-16 Award for Outstanding Doctoral Thesis**

15:35 **GLS-16 Young Researcher Award**

15:50 **Announcement GLS-17**

16:00 **Closing**

6 SEPTEMBER, 2024

8:25 – 18:00

SO5 **POST CONFERENCE TOUR 2: EXCURSION HZDR AND TOUR TO PILLNITZ AND SAXON SWITZERLAND**

MEETING TIME / POINT:

08:25 **In the lobby of the Penck Hotel Dresden**
see page 71 Social program
Visit of TOPFLOW - Transient Two Phase FlowTest Facility
Visit of DRESDYN - The DREsden Sodium facility for DYNamo and thermohydraulic studies
Tour to Saxon Switzerland

8:45 – 18:00

SO4 **POST CONFERENCE TOUR 1: PILLNITZ, KÖNIGSTEIN AND SAXON SWITZERLAND**

MEETING TIME / POINT:

08:45 **In the lobby of the Penck Hotel Dresden**
see page 70, Social program
Tour to Pillnitz, Saxon Switzerland and Königstein

Welcome Reception

It has become a nice and proven tradition that all participants, speakers and exhibitors celebrate a reunion together on the evening before the conference starts.

We invite everyone to celebrate the opening of the GLS-16 with a cool drink and snacks, to see colleagues again or to make new contacts.

Meeting Time:	Monday, 2 September, 2024 I 18:00 - 20:00
Meeting Place:	Exhibition area of Penck Hotel Dresden

GLS-16 Student Evening

Exclusive Evening Just for Students and PhD Students

Are you ready to mix and mingle with the brightest minds of our conference community? We're thrilled to invite all students and PhD students to a special evening designed just for you. Hosted in the heart of the city, just a few minutes from the conference hotel, this event promises an unforgettable experience where you can connect with peers in a relaxed and fun setting.

This evening is a fantastic opportunity to meet and network with fellow young researchers and enthusiasts in your field.

What's in store?	• Engaging pub quiz to challenge your wits • A variety of fun activities for everyone • Complimentary drinks and snacks
Date / Time:	Monday, 2 September, 20:00 - 22:30 (after the experimental seminar and welcome reception)
Meeting Time / Point:	19:45 in the hotel lobby of the Penck Hotel Dresden
Location:	Alte Meister – Café & Restaurant
Address:	Theaterplatz 1a, 01067 Dresden

Only with pre-registration.

SOCIAL PROGRAM

GLS-16 Conference Dinner

After two intense conference days and before the last day dawns, it's time to celebrate!
The conference dinner starts at the foot of Brühl's Terrace, the „Balcony of Europe" from the Baroque era. Down on the banks of the terrace, you board the Saloon ship "August der Starke" of the Dresden Steamship Company. In around 2 hours, you will travel up the River Elbe to the summer residence of the Saxon royal family, Pillnitz Palace and Park.
Your journey takes you past the imposing palaces on the banks of the Elbe, the listed Hosterwitz waterworks, the „Blue Wonder" bridge in Loschwitz, one of Dresden's landmarks, and the old fishermen's church „Maria am Wasser" to the grand staircase at Pillnitz moated castle. Here, Far Eastern and late Baroque European architecture merge with Chinese elements of the 18th century to form a unique ensemble.
Dinner with Saxon specialties will be served on board. On the return journey, the brightly lit silhouette of the old town becomes an impressive experience before you arrive back on the terraced riverbank and can end the evening with short walks to your accommodation.

Meeting Time:	Wednesday, 4 September, 2024 I 19:00 - 23:00
Meeting time / Meeting point:	18:45 at Terrassenufer / Augustusbrücke, 01067 Dresden

Post Conference Tour 1: Pillnitz, Königstein and Saxon Switzerland

The bus will past the impressive castles on the Elbe and stop for a short visit and photo at Pillnitz Castle, the unique ensemble of architecture and garden design, embedded in the vineyards of the Elbe Valley.

After 1 hour we will reach the highlands, also called „Saxon Switzerland". The famous nature highlights such as the Barbarine rock and the Schrammsteine have inspired artists like Caspar David Friedrich and Richard Wagner. On our stop at the world-famous Bastei where on the highest cliff of the Elbe sandstone highlands you will be treated to a breathtaking view of the Elbe Valley and surrounding rock formations. The Lilienstein and Königstein mesas are seemingly close enough to touch.

Seats have been reserved for lunch in the Bastei Restaurant with a phantastic view.

Our next stop is the Königstein Fortress, one of the largest fortresses in Europe, with its casemates, barracks and deep sandstone wells. It has served many different purposes over the centuries, such as for military reasons, as a retreat for Saxon sovereigns, as a safe place to keep treasures as well as a prison. Since Königstein is so beautifully located, it has also been the place where the Saxon royal court held numerous festivities.

On your way back to Dresden you can see again the three castles at the Elbe hillside, a perfect ending to your excursion.

The tours end around 6:00 pm, so you can have a look for a nice dinner location after the tour.

Date / Time	Friday, 6 September, 2024 I 09:00 - 18:00
Meeting Time / Meeting Point	08:45 in the lobby of Penck Hotel Dresden
Costs	99 EUR per Person, only with prior booking, please ask at the registration desk for free places. Price includes bus, entrance tickets for Pillnitz and Königstein, guide, plate meal for lunch, entrance fees. Drinks for lunch are NOT included.

Please note that it is a full day tour and it is NOT possible to end the tour earlier, as destinations are NOT in the center of Dresden!

Post Conference Tour 2:

Excursion HZDR and Tour to Pillnitz and Saxon Switzerland

In the morning, the bus will take you to the Helmholtz-Zentrum Dresden-Rossendorf (HZDR). Here you will have the opportunity to visit the thermohydraulic test facilities.
The coach will then take you to the so-called Saxon Switzerland. You will have lunch in the Bastei restaurant with its fantastic views. After lunch, you will have time to enjoy the breathtaking view of the Elbe Valley and the surrounding rock formations such as the Barbarine Rocks and the Schrammsteine.
Our next stop is Pillnitz Palace, a unique ensemble of architecture and garden design, nestled in the vineyards of the Elbe Valley. The guide will lead you through the castle park before the coach takes you past the impressive Elbe castles back to Dresden.

Date / Time	Friday, 6 September, 2024 I 08:30 - 18:00
Meeting Time / Meeting Point	08:25 in the lobby of Penck Hotel Dresden
Costs / Registration	99 EUR per Person, only with prior booking, please ask at the registration desk for free places. Price includes bus, guide, plate meal for lunch, entrance fees. Drinks for lunch are NOT included.

Please note that it is a full day tour and it is NOT possible to end the tour earlier, as the research center and the other destinations are NOT in the center of Dresden!

INDEX

INDEX

INDEX

INDEX

INDEX

H

INDEX

INDEX

INDEX

INDEX

INDEX

M

INDEX

INDEX

INDEX

INDEX

S

INDEX

INDEX

INDEX

NOTES

IMPRINT

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Responsibility in terms of content

Uwe Hampel

General Chair, Helmholtz-Zentrum Dresden-Rossendorf (HZDR), Institute of Fluid Dynamics, Dresden, Germany

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Page 011: Penck Hotel Dresden

Page 018: Bastei | Sylvio Dittrich

	2 Sept., 2024	3 September, 2024		4 September, 2024		5 September, 2024		6 September, 2024		
		Kunsthalle	ROOM A, B, Y, G, D	Kunsthalle	ROOM A, B, Y, G	Kunsthalle	ROOM A, B, Y, G			
7:30	07:30 - 17:15 **Experimental Seminar for Students**									7:30
8:30		**Opening**								8:30
9:00		09:00 - 09:45 **PL1**		09:00 - 09:45 **PL2**		09:00 - 09:50 **PL3**			08:30 - 18:00 **Post Conference Tour 2** Excursion HZDR and Tour to Pillnitz and Saxon Switzerland	9:00
9:30								09:00 - 18:00 **Post Conference Tour 1** Pillnitz, Königstein and Saxon Switzerland		9:30
10:00		10:00 - 10:40 **Oral Session** **T1-1 | T2-1 | T7-1 | T8-1 | T4-1**		10:00 - 10:40 **Oral Session** **T1-5 | T6-2 | T11-1 | T13-1 | T12-1**		10:00 - 10:40 **Oral Session** **T2-4 | T7-4 | T9-1 | T6-4 | T14-1**				10:00
10:30		Coffee Break and Exhibition Viewing								10:30
11:00		11:10 - 12:30 **Oral Session** **T1-2 | T2-2 | T7-2 | T8-2 | T4-2**		11:10 - 12:30 **Oral Session** **T1-6 | T6-3 | T11-2 | T13-2 | T12-2**		11:10 - 12:30 **Oral Session** **T2-5 | T7-5 | T5-5 | T6-5 | T14-2**				11:00
11:30										11:30
12:00										12:00
12:30		Lunch Break & Exhibition Viewing								12:30
13:00										13:00
13:30		13:30 - 14:00 **ISP**		13:30 - 15:30 **Oral Session** **T1-7 | T5-3 | T2-3 | T3-3 | T7-3**		13:30 - 15:10 **Oral Session** **T1-9 | T5-6 | T3-5 | T9-2**				13:30
14:00		14:10 - 15:30 **Oral Session** **T1-3 | T5-1 | T3-1 | T10-1 | T4-3**								14:00
15:00						Break to change rooms				15:00
15:30		Coffee Break and Exhibition Viewing				15:20 - 16:00 **Awards**				15:30
16:00	16:00 - 20:00 **Registration**	16:00 - 17:40 **Oral Session** **T1-4 | T5-2 | T3-2 | T10-2 | T6-1**		16:00 - 17:20 **Oral Session** **T1-8 | T5-4 | T13-3 | T3-4**		**Closing**				16:00
17:30										17:30
18:00	18:00 - 20:00 **Welcome Reception**	18:00 - 19:30 **Poster Session** (exhibition area)	**Meeting of the GLS Scientific Committee**							18:00
19:00										19:00
20:00	20:00 - 22:30 **Student Evening**			19:00 - 23:00 **Conference Dinner**						20:00
21:00										21:00

T1 Fluid dynamics and heat and mass transfer in multiphase systems | **T2** Granular materials processing and fluidized bed reactors | **T3** Measurement and data analysis techniques for multiphase systems, reactor dynamics and control | **T4** Microfluidic reactors and microsystems | **T5** Multiphase computational fluid dynamics | **T6** Multi-scale modelling of multi-phase chemical reactors | **T7** Process intensification in multiphase chemical reactors | **T8** Reaction mechanisms and kinetics of multiphase reactions | **T9** Scale-up of multiphase reactors | **T10** Electrolysis and other electrochemical processes | **T11** Froth flotation | **T12** Wastewater treatment and bioprocesses | **T13** Carbon dioxide capture and gas cleaning | **T14** Fine bubbles