

ECCE AB 21 *virtual event*

Engineering the Future

20 – 23 September 2021 · Online Event

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13th European Congress of Chemical Engineering
6th European Congress of Applied Biotechnology

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Event no. 767



DECHEMA

Gesellschaft für Chemische Technik
und Biotechnologie e.V.

PLENARY LECTURES



From deterministic chaos in multiphase reactors to (total chaos in) politics
Jiří Drahoš, Senator of the Czech Parliament, Prague/CR



P. V. DANCKWERTS MEMORIAL LECTURE 2021
Practice and Science in Continuous Manufacturing of Pharmaceuticals
Michael Doherty, University of California, Santa Barbara CA/USA



Innovating through the global pandemic – from rapid reaction to long term optimisation across the clinical supply chain
Luisa Freitas Dos Santos, Vice President Global Clinical Supply Chain (R&D), GlaxoSmithKline plc., Brentford/UK; GSK Senior Fellow, UK Chair Fellows Council



Strategies to reduce CO₂ emissions in the chemical industry
Melanie Maas-Brunner, Chief Technology Officer, BASF SE Ludwigshafen/D



From Fragile to Resilient: Modernizing Data Strategy Underpinning Global Supply Chains
Emily Nguyen, Business Development, Palantir Technologies, New York/USA

KEYNOTE LECTURES

Benchmarking Uncertainty Quantification Methods for Property Prediction Models: Application to Group-Contribution Models

Adem Rosenkvist Nielsen Aouichaoui, Technical University of Denmark (DTU), Kgs. Lyngby/DK

Inducing heterologous protein overproduction in *P. putida*: A genetic toolbox to decipher metabolic burden

Ana Sofia Ortega Arbulu, Technische Universität München/D

Optimization-driven Modeling for Industry 4.0

Lorenz Biegler, Carnegie Mellon University, Pittsburgh/USA

Product design in continuous crystallizers: developments and practice

Béatrice Biscans, University of Toulouse/F

Integrating renewable energies for offshore methanol production

Mariasole Cipolletta, University of Bologna/I

Bioprocess intensification in a novel multiphase loop reactor

Philipp Demling, RWTH Aachen University/D

Data's Explosion and Digitalization: the Effect on Process Engineering's Education

Maurizio Fermeglia, University of Trieste/I

Design of particle structures for innovative drug products and lithium ion batteries

Arno Kwade, TU Braunschweig/D

Transport and reaction in packed beds: a deep learning augmented CFD workflow

Agnese Marcato, Politecnico di Torino/I

Valorization of plastic waste pyrolysis gases towards low C-footprint propylene monomer: A thermodynamic study

Francesca Martelli, Aristotle University of Thessaloniki/GR

The role of Direct Air Capture to enable a net-zero chemical industry

Marco Mazzotti, ETH Zürich/CH

Inside mycelium – synchrotron radiation and image processing to unveil the time-resolved three-dimensional growth of filamentous fungal pellets

Henri Müller, TU Munich, Freising/D

From single-gene translation to global resource competition – a dynamic translational model for Escherichia coli

Jan Müller, University of Stuttgart/D

Automated multi-objective optimisation of the oxidation of organic sulfides

Pia Müller, University of Leeds/UK

Modeling Tools for bioprocess monitoring and Control

Harini Narayanan; ETH Zurich/CH

Constructing Equivalent Electrical Circuits to Study the Dynamics of (Bio)chemical Systems

Sarang Sunil Nath, Technical University of Denmark (DTU), Kongens Lyngby/DK

Wood-based levulinic acid: Tackling challenges of biorefinery production

Lukas Polte, RWTH Aachen University/D

How to Reduce CO₂ Emissions of Steam Cracking Furnaces: The Million Dollar Question

Kevin M. Van Geem, Ghent University/B

Demonstration of immersive tools for chemical engineering training

Tom Van Gerven, KU Leuven/B

Decarbonization of the steel industry: interplay between electrification and carbon capture and storage

Lukas Weimann, Utrecht University/NL

TANDEM LECTURES

Design of Particulate Products – Status and Future Perspectives

W. Peukert, Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU), Erlangen/D

J. Uhlemann, Bayer SAS, Lyon/F

Development of a novel industrial process for stripping of carbon dioxide and ammonia from bioprocess waste water

Martin Lucke, Sulzer Chemtech AG, Winterthur/CH

Tuvshinjargal Otgonbayar, ETH Zurich/CH

Transfer Learning for Dynamic Bioprocess Predictive Modelling

Alexander Rogers, The University of Manchester/UK

Dongda Zhang, The University of Manchester/UK

MACBETH – A revolution in catalytic reaction technology

Frank Stenger, Evonik Operations GmbH, Hanau/D

Fausto Gallucci, Eindhoven University of Technology (TUE)/NL

Modularization in process industry enabling flexibility, sustainability and speed – status quo and future perspectives

Frank Stenger, Evonik Operations GmbH, Hanau/D

Sebastian Härtner, Merck KGaA, Darmstadt/D

Patrick Graf, Zeton BV, Enschede/NL

Monday, 20 September 2021

Chair														
9:30	OPENING / AWARDS CEREMONY													
10:15	Virtual Room 1	PLENARY LECTURE From deterministic chaos in multiphase reactors to (total chaos in) politics Jiří Drahoš, Senator of the Czech Parliament, Prague/CR												
11:15	Break													
	Virtual Room 1	Virtual Room 2	Virtual Room 3	Virtual Room 4	Virtual Room 5	Virtual Room 6	Virtual Room 7	Virtual Room 8	Virtual Room 9	Virtual Room 10	Virtual Room 11	Virtual Room 12	Virtual Room 13	Virtual Room 14
Chair														
11:30	Modelling Measurement & Process Control Biotechnology I	Modelling Measurement & Process Control Catalysis	Modelling Measurement & Process Control Safety	Separation technologies/ downstream processing Particles I	Separation technologies/ downstream processing Distillation I	Sustainable production, low carbon & circular (bio)economy, clean water C1 feedstocks I	Sustainable production, low carbon & circular (bio)economy, clean water Electrification pathways	Energy: Generation and storage, energy and chemical engineering¹ Hydrogen	Energy: Generation and storage, energy and chemical engineering¹ Electrical processes	Engineering processes & products Chemical Catalysis I	Future Directions in Product Design and Engineering² Property and Process Design	Biological Production Systems Protein production	Engineering processes & products Additive manufacturing/ materials for 3D printing	kjVI Youth Programme ³
12:45	Break													
Chair														
13:45	Modelling Measurement & Process Control Biotechnology II	Modelling Measurement & Process Control Parameters	Modelling Measurement & Process Control Operation control I	Separation technologies/ downstream processing Magnetic separations	Separation technologies/ downstream processing Distillation II	Sustainable production, low carbon & circular (bio)economy, clean water C1 feedstocks II	Sustainable production, low carbon & circular (bio)economy, clean water Recycling / waste utilisation I	Energy: Generation and storage, energy and chemical engineering¹ Energy storage	Energy: Generation and storage, energy and chemical engineering¹ Heat transfer	Engineering processes & products Chemical Catalysis II	Future Directions in Product Design and Engineering² Multidimensional Characterization	Biological Production Systems (Secondary) metabolites	Engineering processes & products Modular production I	kjVI Youth Programme ³
15:00	Break													
Chair														
15:15	Modelling Measurement & Process Control Biotechnology III	Modelling Measurement & Process Control Processing solids I	Modelling Measurement & Process Control Operation control II	Separation technologies/ downstream processing Particles II	Separation technologies/ downstream processing Electrical separations	Sustainable production, low carbon & circular (bio)economy, clean water C1 feedstocks III	Sustainable production, low carbon & circular (bio)economy, clean water Recycling/ waste utilisation II	Sustainable production, low carbon & circular (bio)economy, clean water Novel processes	Exhibitor Session	Engineering processes & products Chemical Catalysis III	Engineering processes & products Particle technology I	Biological Production Systems Eukaryotic systems	Engineering processes & products Modular production II	kjVI Youth Programme ³
16:30	Break													
Chair														
16:45	Virtual Room 1	PLENARY LECTURE Strategies to reduce CO ₂ emissions in the chemical industry Melanie Maas-Brunner, Chief Technology Officer, BASF SE Ludwigshafen/D												
17:50	End of Day 1													

¹ organized in cooperation with the EFCE Section on Energy

² organized by Erlangen Collaborative Research Centre 1411 on „Design of Particulate Products“ and EFCE Section on „Product Design and Engineering“

³ organized by the kjVI (creative young process engineers), the youth group of the German society for process and chemical engineering (VDI-GVC)

Tuesday, 21 September 2021

	Virtual Room 1	Virtual Room 2	Virtual Room 3	Virtual Room 4	Virtual Room 5	Virtual Room 6	Virtual Room 7	Virtual Room 8	Virtual Room 9	Virtual Room 10	Virtual Room 11	Virtual Room 12	Virtual Room 13	Virtual Room 14
Chair														
9:30	Modelling Measurement & Process Control Biotechnology IV	Modelling Measurement & Process Control AI in process modelling, design and operation I ¹	Modelling Measurement & Process Control Electrochemistry	Engineering processes & products Chemical Catalysis IV	Separation technologies/ downstream processing Gases I	Biological Production Systems Intercell I ³	Sustainable production, low carbon & circular (bio)economy, clean water Sustainable (food) processing – from innovation to commercialization ⁴	Sustainable production, low carbon & circular (bio)economy, clean water (Waste)water technologies I	Engineering processes & products Bioreactors/ Bioprocess Development I	Engineering processes & products Rheology	Exhibitor Session	Future Directions in Product Design and Engineering Structure Formation in Life Sciences ⁶	Engineering processes & products Particle technology I	kjVI Youth Programme⁸
10:45	Break													
Chair														
11:00	Modelling Measurement & Process Control Biotechnology V	Modelling Measurement & Process Control AI in process modelling, design and operation II ¹	Modelling Measurement & Process Control Operations control I	Engineering processes & products MACBETH Membranes And Catalysts Beyond Economic and Technological Hurdles I ²	Separation technologies/ downstream processing Distillation III	Biological Production Systems Intercell II ³	Sustainable production, low carbon & circular (bio)economy, clean water Sustainable food production I ⁵	Sustainable production, low carbon & circular (bio)economy, clean water (Waste)water technologies II	Engineering processes & products Bioreactors/ Bioprocess Development II	Engineering processes & products CFD	Energy: Generation and storage, energy and chemical engineering Power-to-X I ⁹	Future Directions in Product Design and Engineering Structure Formation in Pharma ⁶	Engineering processes & products Multidimensional particle properties – characterization and processing technology ⁷	kjVI Youth Programme⁸
12:35	Break													
Chair														
13:30	Virtual Room 1	PLENARY LECTURE From Fragile to Resilient: Modernizing Data Strategy Underpinning Global Supply Chains Emily Nguyen, Business Development, Palantir Technologies, New York/USA												
14:35	Break													
Chair														
14:50	Modelling Measurement & Process Control Biotechnology VI	Modelling Measurement & Process Control CFD	Modelling Measurement & Process Control Operations control II	Engineering processes & products MACBETH Membranes And Catalysts Beyond Economic and Technological Hurdles II ²	Separation technologies/ downstream processing Gases II	Biological Production Systems Systems biology	Sustainable production, low carbon & circular (bio)economy, clean water Sustainable food production II ⁵	Sustainable production, low carbon & circular (bio)economy, clean water (Waste)water technologies III	Engineering processes & products Bioreactors/ Bioprocess Development III	Engineering processes & products Fluidic Processes I	Energy: Generation and storage, energy and chemical engineering Decarbonisation and energy efficiency ⁹	Future Directions in Product Design and Engineering Posters and discussions ⁶	Engineering processes & products Particle technology II	kjVI Youth Programme⁸
16:05	Break													
Chair														
16:20	Modelling Measurement & Process Control Biotechnology VII		Modelling Measurement & Process Control Quantification control		Separation technologies/ downstream processing Direct air capture	Biological Production Systems Cyanobacteria & microalgae	Sustainable production, low carbon & circular (bio)economy, clean water Food production	Sustainable production, low carbon & circular (bio)economy, clean water (Waste)water technologies IV	Engineering processes & products Bioreactors/ Bioprocess Development IV	Engineering processes & products Fluidic Processes II	Energy: Generation and storage, energy and chemical engineering Power-to-X II ⁹	Engineering processes & products Process and plant design	Engineering processes & products Particle technology III	kjVI Youth Programme⁸
17:35	End of day 2													

¹ organized by KEEN Project and ProcessNet Subject Division Process and Plant Engineering

² organized by the European MACBETH project

³ organized by SPP 2170

⁴ organized by EIT Food

⁵ organized by DIL Deutsches Institut für Lebensmitteltechnik e.V.

⁶ organized by Erlangen Collaborative Research Centre 1411 on “Design of Particulate Products” and EFCE Section on “Product Design and Engineering”

⁷ organized by DFG-Schwerpunktprogramm SPP 2045

⁸ organized by the kjVI (creative young process engineers), the youth group of the German society for process and chemical engineering (VDI-GVC)

⁹ organized in cooperation with the EFCE Section on Energy

Wednesday, 22 September 2021

Chair														
9:30	Virtual Room 1	PLENARY LECTURE Innovating through the global pandemic – from rapid reaction to long term optimisation across the clinical supply chain Luisa Freitas Dos Santos, Vice President Global Clinical Supply Chain (R&D), GlaxoSmithKline plc., Brentford/UK, GSK Senior Fellow, UK Chair Fellows Council												
10:35	Break													
	Virtual Room 1	Virtual Room 2	Virtual Room 3	Virtual Room 4	Virtual Room 5	Virtual Room 6	Virtual Room 7	Virtual Room 8	Virtual Room 9	Virtual Room 10	Virtual Room 11	Virtual Room 12	Virtual Room 13	Virtual Room 14
Chair														
10:50	Modelling Measurement & Process Control Structure-properties relationships	Modelling Measurement & Process Control Sensors & measurement I	Modelling Measurement & Process Control Fluid dynamics I	Separation technologies/ downstream processing Adsorption I	Separation technologies/ downstream processing Membrane Engineering I ¹	Sustainable production, low carbon & circular (bio)economy, clean water Electro-biotechnological processes I ²	Engineering processes & products Scale-up	Sustainable production, low carbon & circular (bio)economy, clean water Bio-based products I	Quality by Design ³	Energy: Generation and storage, energy and chemical engineering Power-to-X III ⁶	Engineering processes & products Multiphase systems I	Future Directions in Product Design and Engineering Particle Formation and Modeling ⁴	Engineering processes & products New materials	kjVI Youth Programme ⁵
12:25	Break													
12:40	Virtual Room 1	ChemCar Competition												
Chair														
14:15	Modelling Measurement & Process Control Particles I	Modelling Measurement & Process Control Sensors & measurement II	Modelling Measurement & Process Control Fluid dynamics II	Separation technologies/ downstream processing Adsorption II	Separation technologies/ downstream processing Membrane Engineering II ¹	Sustainable production, low carbon & circular (bio)economy, clean water Electro-biotechnological processes II ²	Sustainable production, low carbon & circular (bio)economy, clean water Algae	Sustainable production, low carbon & circular (bio)economy, clean water Bio-based products II	Engineering processes & products Bioreactors/ Bioprocess Development V	Energy: Generation and storage, energy and chemical engineering Reducing CO ₂ ⁶	Engineering processes & products Multiphase systems II	Future Directions in Product Design and Engineering Particle classification ⁴	Engineering processes & products Fluidic Processes III	kjVI Youth Programme ⁵
15:30	Break													
Chair														
15:45	Modelling Measurement & Process Control Particles II	Modelling Measurement & Process Control Reactions	Modelling Measurement & Process Control Fluid dynamics III	Separation technologies/ downstream processing Adsorption III	Separation technologies/ downstream processing Membranes I	Sustainable production, low carbon & circular (bio)economy, clean water Electrochemistry	Sustainable production, low carbon & circular (bio)economy, clean water C1-feedstock IV	Sustainable production, low carbon & circular (bio)economy, clean water Bio-based products III	Engineering processes & products Bioreactors/ Bioprocess Development VI	Biological Production Systems Structures & shapes	Engineering processes & products Process analytics	Engineering processes & products Process and plant design I	Engineering processes & products Fluidic Processes IV	kjVI Youth Programme ⁵
17:00	Break													
Chair														
17:15	Virtual Room 1	Science Slam												
18:15	End of day 3													

¹ organized by the EFCE Section on Membrane Engineering

² organized by the DECHEMA Biotechnology working group on Electrobiotechnology

³ organized by the EFCE working party Quality by Design

⁴ organized by Erlangen Collaborative Research Centre 1411 on „Design of Particulate Products“ and EFCE Section on „Product Design and Engineering“

⁵ organized by the kjVI (creative young process engineers), the youth group of the German society for process and chemical engineering (VDI-GVC)

⁶ organized in cooperation with the EFCE Section on Energy

Thursday, 23 September 2021

	Virtual Room 1	Virtual Room 2	Virtual Room 3	Virtual Room 4	Virtual Room 5	Virtual Room 6	Virtual Room 7	Virtual Room 8	Virtual Room 9	Virtual Room 10	Virtual Room 11	Virtual Room 12	Virtual Room 13	Virtual Room 14
Chair														
9:30	Modelling Measurement & Process Control Biotechnology VIII	Modelling Measurement & Process Control CAPE IW: Envisioning the Future of Digitalization I ⁴	Separation technologies/ downstream processing Chromatography	Separation technologies/ downstream processing Membranes II		Sustainable production, low carbon & circular (bio)economy, clean water C1 Feedstocks V	Engineering processes & products Biotechnology	Preparing for the future CHARMING I ²	Engineering processes & products Processes and Fundamentals of Reactive Multiphase Flows I ³	Future Directions in Product Design and Engineering Artificial Intelligence and Optimisation ⁵	Engineering processes & products Process intensification I ⁶	Engineering processes & products Process analytics I	Engineering processes & products Foam formation and management in thermal separations I ⁷	kjVI Youth Programme ⁸
10:45	Break													
Chair														
11:00	Modelling Measurement & Process Control Biotechnology IX	Modelling Measurement & Process Control CAPE IW: Envisioning the Future of Digitalization II ⁴	Separation technologies/ downstream processing Digitalization	Separation technologies/ downstream processing Membranes III	Engineering processes & products Bioreactors/ Bioprocess Development VII	Sustainable production, low carbon & circular (bio)economy, clean water BioBall – Utilizing Residual Materials in the Metropolitan Area: Closing the Loop ¹	Engineering processes & products Biocatalysis I	Preparing for the future CHARMING II ²	Engineering processes & products Processes and Fundamentals of Reactive Multiphase Flows II ³	Future Directions in Product Design and Engineering Sustainability ⁵	Engineering processes & products Process intensification II ⁶	Engineering processes & products Bioprocess analytics	Engineering processes & products Foam formation and management in thermal separations II ⁷	kjVI Youth Programme ⁸
12:35	Break													
Chair														
13:30	Modelling Measurement & Process Control Biotechnology X	Modelling Measurement & Process Control CAPE IW: Envisioning the Future of Digitalization III ⁴	Separation technologies/ downstream processing Filtration & mixing	Separation technologies/ downstream processing Biotechnology applications	Engineering processes & products Bioreactors/ Bioprocess VIII	Sustainable production, low carbon & circular (bio)economy, clean water Biorefineries I	Engineering processes & products Biocatalysis II	Preparing for the future Novel ways of education and training I	Engineering processes & products Processes and Fundamentals of Reactive Multiphase Flows III ³	Engineering processes & products Process and plant design II	Engineering processes & products Process intensification III ⁶	Engineering processes & products Process analytics II	Engineering processes & products Foam formation and management in thermal separations III ⁷	kjVI Youth Programme ⁸
14:45	Break													
Chair														
15:00	Modelling Measurement & Process Control Particles & granules	Modelling Measurement & Process Control Processing solids II	Separation technologies/ downstream processing Crystallization	Separation technologies/ downstream processing Films	Engineering processes & products Bioreactors/ Bioprocess Development IX	Sustainable production, low carbon & circular (bio)economy, clean water Biorefineries II	Engineering processes & products Biocatalysis III	Preparing for the future Novel ways of education and training II	Engineering processes & products Processes and Fundamentals of Reactive Multiphase Flows IV ³	Engineering processes & products Process and plant design III	Engineering processes & products Process intensification IV ⁶	Engineering processes & products Process analytics III	Engineering processes & products Fluidic processes V	kjVI Youth Programme ⁸
16:15	Break													
Chair														
16:35	Virtual Room 1	PLENARY LECTURE P. V. Danckwerts Memorial Lecture 2021 Practice and Science in Continuous Manufacturing of Pharmaceuticals Michael Doherty, University of California, Santa Barbara CA/USA												
17:35	Closure													
17:45	End of the conference													

¹ organized by Christina Andreeßen, Jochen Michels, DECHEMA e.V.; Dorit Lehr, Thomas Bayer, Provdadis Hochschule

² organized by the CHARMING Project - the European Training Network for Immersive Learning

³ organized by the EFCE Working Party „Multiphase Fluid Flow“, the ProcessNet Subject Division „Multiphase Flows“ and InPROMPT

⁴ organized by the EFCE working party Computer Aided Process Engineering - CAPE

⁵ organized by Erlangen Collaborative Research Centre 1411 on „Design of Particulate Products“ and EFCE Section on „Product Design and Engineering“

⁶ organized by EFCE Working Party on Process Intensification

⁷ organized by Wanted Technologies, an initiative of ProcessNet

⁸ organized by the kjVI (creative young process engineers), the youth group of the German society for process and chemical engineering (VDI-GVC)

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