

# EFCE SpotLight Talks

by the Working Parties  
and Sections

from  
19 April  
to  
29 April  
2022

8 Webinars



EFCE

European Federation of Chemical Engineering

***Cordial welcome to the SPOTLIGHT TALKS 2022, organised by the European Federation of Chemical Engineering and already the third in the series.***

*In the two previous years these highly focused webinars significantly contributed to the dissemination and popularisation of the top chemical engineering science, in spite of the pandemic global circumstances. It is noteworthy these presentations, delivered by leading industrial and academic experts, attracted attention of more than 2000 members of the virtual chemical engineering audience. This year there are eight SPOTLIGHT TALKS summoned by seven EFCE Working Parties, and one EFCE Section, all scheduled at the end of April.*

*A typical SPOTLIGHT TALK webinar has an appearance of an on-line meeting, up to three hours long, with a limited number of talks on a targeted topic, delivered by outstanding experts and professionals of the field. The webinars are completely free to attend.*

*These Working Parties and the Section are contributing: CAPE, Crystallization, Drying, Education, High Pressure Technologies, Mixing, Multiphase Fluid Flow, Membrane Engineering.*

*No doubts, very inspiring and stimulating treatment of Chemical Engineering science issues could be expected! Do not miss the SPOTLIGHT TALKS 2022.*

- 19 April — Focus on current drying research within EFCE  
09:30
- 20 April — Population balance modeling in gas-liquid flows: a key to more reliable process design  
09:30
- 21 April — Impact of membrane engineering on the process engineering progresses  
09:30
- 26 April — Innovative Chemical Engineering Education  
09:30
- 26 April — Overcoming challenges in mixing processes with evolving rheology  
15:00
- 27 April — CAPE ideas for biomass uses  
09:30
- 27 April — Technology to improve conventional chemical engineering processes  
15:00
- 29 April — Role of crystallization in the production of battery materials and in battery recycling  
09:30

# EFCE Spotlight Talks

Working Party on Drying

19 April  
2022

09:30 am • 11:15 am

CEST

## Focus on current drying research within EFCE



*Drying is an essential physical unit operation that can be found in a lot of production processes within the chemical, pharmaceutical, and food sectors among others. It is usually considered that about 10 to 15% of the industrial energy consumption is due to drying operation. Besides being an energy intensive operation, drying can be crucial in terms of final product quality. This is why drying research remains an important field, with development related to the design of new or more efficient dryers, the better understanding of the relation between drying operating conditions and product quality, the reduction of the environmental impact, ... based on both experimental and modeling approaches.*

*The aim of this webinar is to highlight some of the research done in the drying field researchers within EFCE members. This will be the opportunity to strengthen the network of researchers active in drying, in view of the next European Drying Conference postponed to 2023. The provisional program was done taking care of gender balance.*

### PROGRAM

- 09:30      **Welcome and introduction**  
Angélique Léonard – Chair WP Drying, University of Liège - Belgium  
Jarka Glassey, EFCE Executive Vice-President
- 09:40      **Towards efficient drying of high-quality vegetable seed**  
Julia Veser, Wageningen University - The Netherlands
- 10:10      **Operational dimensioning of drum dryers and review of the desing parameters**  
Tibor Poós, Budapest University of Technology and Economics - Hungary
- 10:40      **Study of multiphase flow inside the anodic porous transport layer of PEM water electrolyzer based on Lattice Boltzmann and Pore Network Models**  
Supriya Bhaskaran, Otto-von-Guericke-Universität Magdeburg - Germany
- 11:10      **Conclusion**  
Angélique Léonard – Chair WP Drying, University of Liège - Belgium

**Registration**

*free of charge but mandatory*

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# EFCE Spotlight Talks

Working Party on  
Multiphase Fluid Flow

20 April  
2022

09:30 am • 12:30 pm

CEST

## Population Balance Modeling in Gas-Liquid Flows: A Key to More Reliable Process Design



*For a successful design of gas-liquid reactors such as aerated stirred tanks or bubble columns, a thorough understanding of the fluid mechanics of gas-liquid flows is essential. The mechanics of gas-liquid flow is profoundly dependent on the bubble size distribution: Depending on the bubbles size, their shape and rise velocity vary, which has a strong effect on buoyancy-driven flows and thus on gas hold-up, mixing, shear stress, residence time distribution, and mass transfer performance, which in turn can affect the yield and selectivity of chemical and biochemical reactions. Therefore, for designing climate-friendly and sustainable processes with low resource consumption and reduced emissions, the reliable predictability and control of bubble size distribution plays a key role. This Spotlight Talk will cover current developments and requirements for population balance modeling from both academic and industry perspectives. New experimental and numerical methods will be presented to inspire the next generation of Population Balance Models.*

### PROGRAM

- 09:30 **Welcome and introduction**  
Michael Schlüter – Chair WP Multiphase Fluid Flow, Hamburg University of Technology - Germany  
Jarka Glassey, EFCE Executive Vice-President
- 09:40 **Bubble size measurements and population balance modelling of bubbly flows: from lab cases to (more) industrial conditions**  
Frédéric Augier, IFP Energies Nouvelles, Lyon - France
- 10:10 **PBM for bubbly flows in industry – small-scale experiments & large-scale applications**  
Julia Hofinger, Sebastian Meinicke, Oliver Bey, Arne Hoffmann, Kai Ehrhardt  
BASF SE, Ludwigshafen – Germany
- 10:40 *Coffee break*
- 10:50 **Recent advances on bubbly flows modelling: population balances and large-eddy simulations**  
Antonio Buffo, Francesco Maniscalco, Mohsen Shiea, Marco Vanni, Daniele Marchisio  
Politecnico di Torino - Italy
- 11:20 **Experimental investigation of the heterogeneous regime in bubble columns: from the design of a new Doppler probe to bubble size distribution and velocity measurements**  
Martin Obligado, Alain Cartellier, University Grenoble Alpes - France
- 11:50 **Discussion**
- 12:30 **Final remarks and end of the Spotlight Talk**  
Michael Schlüter – Chair WP Multiphase Fluid Flow, Hamburg University of Technology - Germany

**Registration**

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# EFCE Spotlight Talks

Section on Membrane Engineering

21 April  
2022

09:30 am • 12:00 pm

CEST

## Impact of Membrane Engineering on the Process Engineering progresses



*The fast growing of membrane systems in industrial applications suggests the dissemination of last results at academic and industrial level, particularly in the areas of strategic interest. In this webinar, we will try to present the state of the art of well-established membrane operations and also new important opportunities. Exergy analyses for membrane units applied in desalination and in the ethylene process will be discussed. New metrics to compare the performance of membrane operations to conventional ones in the logic of process intensification will also be presented. The potential of membrane systems in the biofuel production and molecular dynamic simulations as tools to better control scaling issues inside membrane plants will be analyzed. Basic process control on membrane processes and how to assist feedback control strategies by the implementation of advanced logics and actions will be illustrated.*

### PROGRAM

- 09:30      **Welcome and introduction**  
Enrico Drioli – Chair of the Session on Membrane Engineering  
Petr Kluson, EFCE Scientific Vice-President
- 09:40      **Exergy analyses and new metrics to assess the role of membrane operations for a sustainable development**  
Alessandra Criscuoli, Istituto per la Tecnologia delle Membrane (CNR-ITM) - Italy
- 10:10      **CO<sub>2</sub> valorization through innovative membrane systems as a promising environmental pathway to biofuels.**  
Adele Brunetti, Istituto per la Tecnologia delle Membrane (CNR-ITM) - Italy
- 10:40      **Molecular simulations for scaling prediction: case of nucleation and growth**  
Elena Tocci, Istituto per la Tecnologia delle Membrane (CNR-ITM) - Italy
- 11:10      **Development of advanced control systems and proper tools for membrane processes**  
Marco Stoller, Università di Roma "La Sapienza" - Italy
- 11:40      **Conclusion**  
Enrico Drioli – Istituto per la Tecnologia delle Membrane (CNR-ITM) - Italy

**Registration**

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# EFCE Spotlight Talks

Working Party on Education

26 April  
2022

09:30 am • 12:00 pm

CEST

## Innovative Chemical Engineering Education



*Facing a changing world, the evolution of the chemical engineering profession, of learners and of teaching methodologies, chemical engineering programmes have to evolve to meet industrial and societal needs, as well as the challenges of ecological and energy transitions. Education is no longer limited to the acquisition of scientific and technical knowledge and their application to engineering analysis, design, practice or investigations. This is still necessary and must include new trends, but the development of professional competencies, such as ethics, critical thinking, creativity, team working or the capacity to make decision has now gained much more importance.*

*The webinar will share examples of innovative teaching methodologies and subjects promoting interdisciplinarity developed by the members of the Working Party Education of the European Federation of Chemical Engineering.*

### PROGRAM

- 09:30 **Welcome and introduction**  
Eric Schaer, Chair WP on Education, Lorraine University – France  
Petr Kluson, EFCE Scientific Vice-President
- 09:40 **Teaching professional ethics**  
Jarka Glassey, Newcastle University – United Kingdom
- 10:10 **Use of Capstone Project to promote interdisciplinarity**  
David Shallcross and Colin Scholes, University of Melbourne - Australia
- 10:40 **Importance of the work placement and its connection with research project**  
Cilian O’Suilleabhain and Sandra Lenihan, Munster Technological University - Ireland
- 11:10 **Demonstration of immersive tools for chemical engineering training**  
Tom Van Gerven, KU Leuven – The Netherlands
- 11:40 **Final remarks and panel discussion**  
Eric Schaer, Chair WP on Education

**Registration**

free of charge but mandatory

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# EFCE Spotlight Talks

Working Party on Mixing

26 April  
2022

15:00 • 17:20

CEST

## Overcoming challenges in mixing processes with evolving rheology



*Processes with evolving viscosity or rheology during product manufacturing are encountered readily in diverse industries, such as foods, personal care, pharmaceuticals, paints, lubricants, polymers and plastics. Rheology, and therefore apparent viscosity, can change during the manufacturing of such products due to the creation of complex microstructures and/or chemical reaction. Evolving rheology presents a number of challenges in mixing operations because it very often results in a change of flow regime, transitioning from turbulent to laminar or vice versa. This brings about a number of questions on the local flow behavior and mixing mechanisms of such systems and how equipment should be designed to accommodate for flow changes.*

*This webinar aims at addressing some of the challenges that can be experienced when mixing fluids with evolving rheology. In particular, we will look at why mixing in such systems can be so complex, how we can better understand the flow behavior through experiments and simulation, as well as the challenges associated with these methods, and what is the best way to design mixing equipment to ensure effective mixing.*

### PROGRAM

- 15:00     **Welcome and introduction**  
Joelle Aubin, Chair WP Mixing, University of Toulouse - France  
Jarka Glassey, EFCE Executive Vice-President
- 15:10     **Mixing challenges in the formulation of complex microstructured products**  
Prof Mark Simmons, University of Birmingham - United Kingdom
- 15:40     **Measuring mixing in viscous and evolving rheology fluids**  
Dr Tom Rodgers, University of Manchester - United Kingdom
- 16:10     **Simulations of viscous thixotropic liquids and the way they respond to agitation**  
Prof Jos Derksen, University of Aberdeen - United Kingdom
- 16:40     **Industrial Processes and Equipment to Handle Fluids with Complicated Rheology**  
Dave Dickey, Mixtech, USA
- 17:10     **Conclusion**  
Joelle Aubin, University of Toulouse - France  
Claudio Fonte, University of Manchester - United Kingdom

**Registration**

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# EFCE Spotlight Talks

Working Party on Computed Aided  
Process Engineering

27 April  
2022

09:30 am • 12:15 pm

CEST

## CAPE ideas for Biomass uses



*The global need for renewable sources, to achieve fossil fuels independence, led to consider biomasses for energy and chemicals production. This opened the way to the research of optimized processes that could be also convenient from economical and environmental points of view. In the presentations, some issues related to biorefineries concept and biomasses uses will be discussed, and critically analyzed.*

### PROGRAM

- 09:30 **Welcome and introduction**  
Prof. Giulia Bozzano, Politecnico di Milano - Italy  
Petr Kluson, EFCE Scientific Vice-President
- 09:40 **Process Research at Biorefinery-Scale and Process Design for Decentral Processing**  
Dr. Eng. Joern Viell, RWTH Aachen University - Germany
- 10:15 **Systematic process and bioproduct design towards integrated biorefineries**  
Mariano Martín, Universidad de Salamanca - Spain
- 10:50 **Challenging the XDEM Simulation Platform for Large Scale Biomass Furnaces**  
Prof. Bernhard Peters, University of Luxembourg - Luxembourg
- 11:25 **Uncertainty in techno-economic and sustainability assessment of Biorefineries**  
Nikolaus Vollmer and Gürkan Sin, DTU Chemical Engineering, Lyngby, Denmark
- 12:00 **Final remarks and panel discussion**  
Prof. Giulia Bozzano, Politecnico di Milano - Italy

**Registration**

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# EFCE Spotlight Talks

Working Party on High Pressure  
Technology

27 April  
2022

3:00 pm • 6:30 pm

CEST

## Technology to improve conventional chemical engineering processes



*Chemical engineering can provide the answers to the major challenges in developing sustainable processes. Pressure is a variable that allows the intensification of processes with compact equipment and with reaction media and solvents properties, which improve yield and selectivity, thereby simplifying downstream processing. Water and CO<sub>2</sub> are widely recognised as green solvents, in which pressure can provide enhanced solvent properties for CO<sub>2</sub> or in transforming water into a non-polar solvent. The constant improvement of pressurised technologies enables the goal of creating energy efficient processes. This webinar will present examples of high-pressure technologies that significantly improve the conventional processes used in chemical, food, and pharma sectors. As a result, they provide enhanced safety and quality of solvent-free products, which go beyond the requirements of more restrictive future legislation.*

### PROGRAM

- 15:00 **Welcome and introduction**  
María J Cocero, Chair WP on High Pressure Technology, Valladolid University – Spain  
Giorgio Veronesi, EFCE President
- 15:10 **Sterilization by supercritical CO<sub>2</sub>**  
Lourdes Calvo, Complutense University of Madrid - Spain
- 15:40 **Extraction of medicinal plants by high-pressure technologies**  
Erika Mária Vági, Budapest University of Technology and Economics - Hungary
- 16:10 **CPF Technology – application of CO<sub>2</sub> extracts in industrial product development**  
Sabine Grüner-Lempart, Weihenstephan-Triesdorf University, Germany
- 16:40 **High-pressure food processing**  
Carl Schaschke, University of the West of Scotland, United Kingdom
- 17:10 **Chemical Reaction Engineering for Sustainable Value Chains in the Chemical Industry**  
Thomas E. Müller, Ruhr University Bochum, Germany
- 17:40 **High-pressure technologies from a process engineering perspective**  
Luis Vaquerizo, Técnicas Reunidas - Spain
- 18:10 **Final remarks and panel discussion**  
María J Cocero, Chair WP on High Pressure Technology

**Registration**

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# EFCE Spotlight Talks

Working Party on Crystallization

29 April  
2022

09:30 am • 12:30 pm

CEST

## Role of crystallization in the production of battery materials and in battery recycling



*The global shift to renewable energy sources, to achieve fossil fuels independence, is leading to fast electrification and energy storage. It is estimated that more than one hundred giga-size factories need to be built to keep up with demand until 2030. Ideally, the industrial manufacturing of batteries should be sustainable, with low environmental impact, stable, competitive, and "smart", heavily relying on automation, digitalization, mathematical modelling, and machine learning. Crystallization and precipitation play a crucial role in this global challenge. Precipitation is, for example, employed to produce nickel-manganese-cobalt hydroxide, precursor of the popular NMC cathode material, crystallization is the key step in traditional and innovative battery recycling processes, as well as in sustainable processes where magnesium and lithium are extracted from saltwork brines. In five presentations these issues will be discussed and critically analyzed.*

### PROGRAM

- 09:30 **Welcome and introduction**  
Daniele Marchisio, Chair WP on Crystallization, Politecnico di Torino - Italy  
Giorgio Veronesi, EFCE President
- 09:40 **Role of crystallization/precipitation in battery material precursor production**  
Lukas Metzger, BASF - Germany
- 10:10 **Fractional crystallization of critical raw materials in the context of battery recycling**  
Béatrice Biscans, University of Toulouse - France
- 10:40 **Sustainability assessment of future battery recycling processes**  
Marja Rinne, Aalto University - Finland
- 11:10 **Use of novel process intermediates in the development of low temperature hydrometallurgical lithium battery cathode recycling/production methodologies**  
Sergio Carrillo, University College Dublin - Ireland
- 11:40 **Crystallization of Lithium for saltwork brines in the SEArcularmine project**  
Daniel Winter, Fraunhofer Institute ISE, Germany  
Andrea Cipollina, University of Palermo - Italy
- 12:10 **Final remarks and panel discussion**  
Daniele Marchisio, Chair WP on Crystallization

**Registration**

free of charge but mandatory

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