

EFCE SpotLight Talks

by the Working Parties
and Sections

from
15 November
to
25 November
2022

8 Webinars



EFCE

European Federation of Chemical Engineering

Welcome to the 4th SPOTLIGHT TALKS SERIES!

With great pleasure, we may declare, that during the previous two and half years, the Spotlight Talks have become one of the most significant and visible activities of the EFCE Working Parties and Sections. Originating in the pandemic, and initially intended only as a temporary substitution of the standard scientific events, they have proofed themselves as very vital forms and means for sharing and disseminating the latest knowledge in the chemical engineering science. It is very positive that for 2022 already two series were scheduled. The spring one was very successful, now the newly prepared autumn series is quickly approaching us. The scientific quality is again the primarily sought parameter.

This "Autumn" series proposes 8 webinars in which these Working Parties and the Sections are contributing: Food, Mechanics of Particulate Solids, Polymer Reaction Engineering, Static Electricity, Energy, Loss Prevention and Safety Promotion in the Process Industries, Process Intensification, Chemical Reaction Engineering, and Thermodynamics and Transport Properties.

Dear colleagues and the EFCE friends, do not hesitate to enter with us the enchanting world of the latest chemical engineering science provided to all of us by the autumn Spotlight Talks series. Many thanks to all "TALKERS", as well as to all of you who are deciding to join us.

- 15 Nov • 14:00 Plant proteins for future foods (*program coming soon*)
- 16 Nov • 14:00 Characterization and modelling of particulate solids flow for industrial processes
- 17 Nov • 15:00 Current research in polymer reaction engineering
- 21 Nov • 14:00 Electrostatics risks in industry: hazards due to electrostatic charges
- 22 Nov • 14:50 Safety and risk of energy transition
- 23 Nov • 16:00 Electrification of chemical processes and the chemical industry
- 24 Nov • 14:30 Sustainability and security of energy and associated critical supplies in challenging times
- 25 Nov • 09:30 Machine learning and data management for the estimation of fluid properties and phase equilibria

EFCE SpotLight Talks

Section on Food

15 November
2022

14:00 • 16:30

CEST

PLANT PROTEINS FOR FUTURE FOODS



Proteins play a crucial role in human diet and the demand for protein is increasing. In particular the importance of plant proteins in many different products is growing and innovation is continually ongoing to improve the functional properties and meet the expectations of consumers. It is also known that animal and plant proteins are structurally and functionally different, making the simple replacement in food products challenging. The scope of this webinar, comprising talks from academic and industrial speakers, is to highlight opportunities for improving protein functionality of plant proteins using different technological approaches.

PROGRAM

- 14:00 **Welcome and introduction**
Kemal Aganovic, German Institute of Food Technologies - DIL, Quakenbrück - Germany
Petr Kluson, EFCE Scientific Vice-President
- 14:10 **Plant proteins sources and technology: Potential applications and limitations**
Avi Shpigelman, Technion - Israel
- 14:40 **Extraction of Proteins from Green Plants and Selected Functional Properties**
Xiaoai Guo, DIL e.V, Quakenbrück - Germany
- 15:10 **Dry fractionation of plant protein concentrates suitable for extrusion applications**
Volker Lammers, DIL e.V, Quakenbrück - Germany
- 15:40 **Industry perspective on alternative proteins and technology**
Robert Mitchell, Bühler Group, Zurich - Switzerland
- 16:10 **Conclusion**
Kemal Aganovic, German Institute of Food Technologies - DIL, Quakenbrück - Germany

Registration

free of charge but mandatory

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EFCE SpotLight Talks

Working Party on
Mechanics of Particulate
Solids

16 November
2022

14:00 • 15:30

CET



CHARACTERIZATION AND MODELLING OF PARTICULATE SOLIDS FLOW FOR INDUSTRIAL PROCESSES

PROGRAM

- 14:00 **Welcome and introduction**
Diego Barletta, Chair of the WP on Mechanics of Particulate Solids, University of Salerno - Italy
Petr Kluson, EFCE Scientific Vice-President
- 14:10 **Characterization methods of powder flowability**
Pr Massimo Poletto, University of Salerno - Italy
- 14:40 **DEM modelling particulate solid processes – from model conceptualisation to industrial application**
Pr Jin Ooi, University of Edinburgh - UK
- 15:10 **Conclusion**
Diego Barletta, Chair of the WP on Mechanics of Particulate Solids, University of Salerno - Italy

Registration

free of charge but mandatory

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EFCE SpotLight Talks

Working Party on
Polymer Reaction Engineering

17 November
2022

15:00 • 18:00

CET

CURRENT RESEARCH IN POLYMER REACTION ENGINEERING



Polymer materials are present in everyday life, but also play an essential role in advancing sustainability. Thus, improving polymers but also polymerization processes is an essential task, which is tackled by the Polymer Reaction Engineering community. The application of modeling plays an important role in this context, as modeling does not only allow to enhance understanding of the investigated system, to improve process stability and reproducibility, but also do reduce necessary experiments.

This Spotlight Talk will highlight some of the current developments and research done in the polymer reaction engineering community of EFCE. This will be an opportunity to get an insight into the community for anyone new to the area and simultaneously strengthen the network of researchers already active.

PROGRAM

- 15:00 **Welcome and introduction**
Markus Busch, Chair WP on Polymer Reaction Engineering, TU Darmstadt - Germany
Petr Kluson, EFCE Scientific Vice-President
- 15:10 **Polymeric foams prepared by temperature induced phase separation: Experiments and Cahn-Hilliard models**
Juraj Kosek, UTC Prague - Czech Republic
- 15:40 **Model-based design of industrial polymer synthesis and recycling**
Dagmar D'hooge, Ghent University - Belgium
- 16:10 **Nonlinear model predictive control of industrial semibatch polymerisation reactors**
Peter Singstad, Cybernetica - Norway
- 16:40 **The tango in emulsion polymerization between reaction chemistry and process dynamics**
John Tsavalas, University of New Hampshire - United States
- 17:10 **Mass transfer limitations in multiphase emulsion polymerization**
Mariana Torres Aladro, Tim McKenna, University of Lyon, CNRS - France
- 17:40 **Panel discussion and final remarks**
Markus Busch, Chair WP on Polymer Reaction Engineering, TU Darmstadt - Germany
Kristina Zentel, Secretary WP on Polymer Reaction Engineering, TU Darmstadt - Germany

Registration

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EFCE SpotLight Talks

Working Party on
Static Electricity

21 November
2022

14:00 • 16:00

CET



ELECTROSTATICS RISKS IN INDUSTRY: Hazards due to Electrostatic Charges

Static Electricity is present in many industrial processes, very often unnoticed, until something happens surprisingly, normally a spark apparently coming from nowhere. In many situations this represents an unacceptable risk. In other occasions electrostatic charges make difficult material processing and handling or produce damages such as in the case of electronic components. Static Electricity is often misunderstood due to its complex nature. It is not easy to identify neither the generation process nor its dissipation or accumulation mechanisms.

In this Webinar we will focus on the risks of static electricity in industrial real situations. There are never enough lessons learned from incidents in industry. Francesco Restuccia will present the results of a huge report on electrostatic incidents in industry during a decade (2010-2020). Anders Thulin will describe a practical case of a dust explosion in a sulphur silo where a good knowledge of electrostatic processes was needed. And finally, Alexis Pey will focus on the charging of powders in vessels with flammable atmospheres, a common problem not well covered by standards.

PROGRAM

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|-------|---|
| 14:00 | Welcome and introduction
Pedro Llovera – Chair of the WP on Static Electricity
Giorgio Veronesi, EFCE President |
| 14:10 | Static Electricity Incident Review (2010-2020)
Francesco Restuccia, King’s College London, London - UK |
| 14:40 | Dust explosion in sulphur silo
Anders Thulin, ATC AB, Saltsjöbaden - Sweden |
| 15:10 | Charging powders in vessels with flammable vapour atmospheres: risks, measurements and modelling
Alexis Pey, Waalwijk - The Netherlands |
| 15:40 | Conclusion
Pedro Llovera, Energy Technological Institute, Polytechnic University of Valencia - Spain |

Registration

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EFCE SpotLight Talks

Working Party on Loss Prevention and Safety Promotion in the Process Industries

22 November
2022

14:50 • 17:15

CET

SAFETY AND RISK OF ENERGY TRANSITION

Global warming and climate change are nowadays proven by scientific evidence and the debate now is how we can invert the tendencies before the global surface temperature increase will become definitively out of control. The Green Deal sets the target of climate neutrality in Europe by 2050. The need of energy transition is further boosted by the ambitious middle term goals defined by the RePowerEU plan, adopted to manage energy security supply caused by the Ukraine war. The efforts of process safety experts should be addressed therefore in standardization and training of renewable energies stakeholders in order to ensure that the energy transition process will be lead in a safe way. The appearance of risk "spots" may be expected due to the local increase of risk due to new distribution networks of energy vectors. A trade-off among environmental impact and safety needs to be assessed and managed in the perspective of a sustainable transition to renewable.

World class experts in the field from different countries will provide you with a vision of new approaches, examples of good practice and advanced techniques, focusing on main challenges in the energy industry of the future:

- *understanding risks and challenges of renewable energies and developing resilience;*
- *identifying hazards of new energy carriers like hydrogen ad ammonia, novel process types and new technologies involved;*
- *management of risk and of risk trade-off in the transition to renewable energy sources.*

Participants from both academia and industry are very welcome.



PROGRAM

- 14:50 **Welcome and introduction**
Bruno Fabiano, Chair of Working Party on Loss Prevention - DICCA University of Genoa - Italy
Petr Kluson, EFCE Scientific Vice-President
- 15:00 **Process Safety challenges related to energy transition**
Maurizio Rigolio, Tecnimont, Milan - Italy
- 15:30 **New Hazards related to the energy transition**
Tjis Koerts EPSC - European Process Safety Centre c/o DECHEMA e.V. Frankfurt - Germany
- 16:00 **Risk management and trade-off in the energy transition framework**
Valerio Cozzani, University of Bologna - Italy
- 16:30 **Process industry safety challenges by new energy carriers/materials and new process types**
Hans J. Pasman and Edison Sripaul, MKOCPSC, Texas A&M University, TX - USA
- 17:00 **Discusion and Conclusion**
Bruno Fabiano, Chair of Working Party on Loss Prevention - DICCA University of Genoa - Italy

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free of charge but mandatory

EFCE SpotLight Talks

Working Parties on Process
Intensification and
Chemical Reaction Engineering

23 November
2022

16:00 • 18:30

CET



ELECTRIFICATION OF CHEMICAL PROCESSES AND THE CHEMICAL INDUSTRY

Electrification of the chemical industry represents a paradigm shift in chemical manufacturing and constitutes a decisive step towards partial decarbonization of the chemical industry. It is based on the use of electricity to carry out reaction, separation, purification and fluid transport processes, and provides the necessary utilities and equipment to that end. The scope of this webinar, comprising talks from industrial and academic speakers, is to highlight opportunities, niche applications, advantages and challenges of electrification of chemical processes and the chemical industry at large.

PROGRAM

- 16:00 **Welcome and introduction**
Georgios Stefanidis – Chair of the WP on Process Intensification
Olaf Hinrichsen – Chair of the WP on Chemical Reaction Engineering
Petr Kluson, EFCE Scientific Vice-President
- 16:10 **The electrification challenge requires them all - The obvious, and the next generation technologies"**
Dr. Thorsten Schultz, Evonik – Germany
- 16:40 **Fine Chemicals Production in a Carbon Neutral Economy: The Role of Electrification**
Dr. Dieter Foertsch, Bayer –Germany
- 17:10 **e-Refinery: towards sustainable production of bulk chemicals and fuels**
Prof. Ruud Van Ommen, TU Delft – The Netherlands
- 17:40 **Electrification of catalysts and chemical reactors**
Prof. Dion Vlachos, U. Delaware – USA
- 18:10 **Closing remarks**

Registration

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EFCE SpotLight Talks

Section on Energy

24 November
2022

14:30 • 16:30

CET

SUSTAINABILITY and SECURITY of ENERGY and ASSOCIATED CRITICAL SUPPLIES in CHALLENGING TIMES



Energy, along with other critical resources, is a cornerstone for our economy and daily life. In recent times, the sustainable and secure supply of energy in Europe and elsewhere has been facing significant challenges, following the events such as the global pandemic and regional conflicts, which have arisen against the pressing backdrop of climate change. There seems to be a greater need than ever for us to try to understand and assess the challenges and risks and to eventually develop effective mitigating strategies. The purpose of this session is to share ideas and research and promote discussions within our community to address the dual challenges of sustainability and security, either of energy supply alone or in connection with the other critical supplies such as food and water through the "nexus" relationships.

PROGRAM

- 14:30 **Welcome and introduction**
Fabrizio Bezzo – Past co-Chair of the Section on Energy
Petr Kluson, EFCE Scientific Vice-President
- 14:40 **Sustainability and security: measuring risk in fuel supply chains**
Colin Axon, Institute of Energy Futures, Brunel University London - UK
- 15:10 **Multiscale approach for resource exploitation towards energy security**
Mariano Martin, Department of Chemical Engineering, University of Salamanca - Spain
- 15:40 **The food-energy-land nexus of renewable energy powered indoor farming for localised food supply**
Aidong Yang, Department of Engineering Science, University of Oxford – UK
- 16:10 **Conclusion**
Fabrizio Bezzo, University of Padova – Italy

Registration

free of charge but mandatory

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EFCE SpotLight Talks

Working Party on Thermodynamics
and Transport Properties

25 November
2022

09:30 am • 12:30 pm

CET

MACHINE LEARNING and DATA MANAGEMENT for the ESTIMATION of FLUID PROPERTIES and PHASE EQUILIBRIA



The detailed knowledge of the thermophysical behaviour of fluids and complex molecules is essential in the design of chemical processes and in driving the transition to a low-carbon economy, as highlighted in the opinion paper recently published by the TTP WP "A view on the future of Applied Thermodynamics".

Machine Learning (ML) can play an important role in the management and prediction of data and in this session we will showcase the most recent examples of application of ML methods to the Thermodynamics and Transport Properties field. First, we will present a bench thermodynamics database for the training and validation of models. Then we will show how ML methods can be used in combination with physical models or in a purely data-driven mode for the prediction of mixture properties and flash calculations. Finally, we will explore how ML can assist thermodynamic models across different scales, such as in the parametrization of the PC-SAFT Equation of State or in the coarse grained molecular simulation of complex molecules.

PROGRAM

- 09:30 **Welcome and introduction**
Maria Grazia De Angelis - Chair of the WP on Thermodynamics and Transport Properties
Petr Kluson, EFCE Scientific Vice-President
- 09:40 **Benchmarking Equations of State using a Reference Database. A PC-SAFT Study**
Ilias Nikolaidis, Demokritos Institute, Athens - Greece
- 10:05 **Hybridizing Machine Learning and Physical Modeling of Mixtures**
Fabian Jirasek, TU Kaiserslauten - Germany
- 10:30 *Coffee break*
- 10:45 **PTFlash: A vectorized and parallel deep learning framework for two-phase flash calculation**
Jingang Qu, IFP Energies Nouvelles - France
- 11:10 **Predicting PC-SAFT pure component Parameters by machine learning based on molecular fingerprints**
Jonas Habicht, TU Dortmund - Germany
- 11:35 **Machine-Learning Methods to Facilitate Coarse-Grained Molecular Simulations**
Eleonora Ricci, Demokritos Institute, Athens - Greece
- 12:00 **Conclusive remarks**

Moderators:

Maria Grazia De Angelis (University of Edinburgh, UK)
Christoph Held (TU Dortmund, Germany)
Antoon ten Kate (Nouryon, NL)

Registration

free of charge but mandatory

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