



EFCE Event No. 767



## **13<sup>th</sup> European Congress of Chemical Engineering Future Directions in Product Design and Engineering**

20-23 September 2021

Product design is the formation, formulation, handling, manufacturing and characterization of complex multiphase products across all length scales from molecules to particles and complex materials and devices. The applications define the required product properties, which cover both classical fields of process technology in the chemical industry as well as new emerging fields of electronics, energy and environmental technologies, life sciences, pharmaceutical applications, fast-moving consumer goods, materials science & engineering, nanotechnology, photonic technologies and additive manufacturing. Unifying principles of product design are widely applicable to many different kinds of products including solid, liquid and even gaseous particles. The joint venture of chemical engineering with materials science in concert with the basic sciences opens new prospects for all involved disciplines. Innovative products with new and improved properties must be produced by sustainable process technologies. In a strong move towards digitalization, rigorous mathematical optimization methods based on predictive models for products, structures and processes catalyze new possibilities for true design of multiphase products, which is at the core of mesoscale science and technology.

The Erlangen Collaborative Research Centre 1411 on “Design of Particulate Products” and the EFCE Section on “Product Design and Engineering” jointly organize a satellite session on “Future Directions in Product Design and Engineering” as part of the 13<sup>th</sup> European Congress of Chemical Engineering, which takes place as a virtual event from 20-23 September 2021. During the session, experts will review the status quo of product design in different fields of application from industrial and academic perspectives. The format aims for intense discussion and exchange between the participants. A poster session and associated flash talks further elucidate the industrial and academic perspectives of product design.

Last minute posters can be submitted until 20 August. Further information and registration is available on the conference website of ECCE 13: <https://ecce-ecab2021.eu/>

### **Jointly organized by:**

**Erlangen CRC 1411**

**Design of Particulate Products**

Prof. Dr. Wolfgang Peukert

Dr. Johannes Walter

<https://www.crc1411.research.fau.eu/>

**European Federation of Chemical Engineering  
Section on “Product Design and Engineering”**

Dr. Stefan Kaufmann

Prof. Dr. Ulrich Bröckel

[https://efce.info/Section\\_PDE.html](https://efce.info/Section_PDE.html)

# Satellite Session Program • Days 1 & 2

## Monday • 20 September 2021

### Session 1: Property and Process Design

- 11:30 **Introduction by Session Chair**
- 11:35 **Design of Particulate Products – Status and Future Perspectives**  
Wolfgang Peukert • FAU • Germany  
Jens Uhlemann • Bayer SAS • France
- 12:15 **EFCE Excellence Award in Product Design and Engineering: Microscopic and macroscopic modeling of particle formation processes in spray fluidized beds**  
Christian Rieck • OVGU Magdeburg / Glatt Ingenieurtechnik GmbH Weimar • Germany
- 12:35 **Discussion Round**

### Session 2: Multidimensional Characterization

- 13:45 **Introduction by Session Chair**
- 13:50 **Sedimentation Analytics – A Versatile Tool for Multidimensional Particle Property Characterization**  
Johannes Walter • FAU • Germany
- 14:10 **Combining Novel Methodologies based on NMR Relaxometry and Gas Adsorption for Reliable Surface Area Assessment of Nanoporous Materials**  
Carola Schlumberger • FAU • Germany
- 14:30 **Multidimensional Characterization of Complex Anisotropic Plasmonic Particles**  
Uwe Frank • FAU • Germany
- 14:50 **Discussion Round**

## Tuesday • 21 September 2021

### Session 3: Structure Formation in Life Sciences

- 09:30 **Introduction by Session Chair**
- 09:35 **Adjustment and Exemplary Description of Distances Between API Nanoparticles in Granules**  
Martin Wewers • TU Braunschweig • Germany
- 09:55 **Colloidal Particles for Pickering Emulsion Stabilization Prepared via Antisolvent Precipitation of Lignin-Rich Cocoa Shell Extract**  
Bettina Wolf • University of Birmingham • UK
- 10:15 **Towards an Ontology-based Decision Support System for the Design of Emulsion based Cosmetic Products**  
Juliana Serna • Université de Lorraine • France
- 10:35 **Discussion Round**

### Session 4: Structure Formation in Pharma

- 11:00 **Introduction by Session Chair**
- 11:05 **Design of Particle Structures for Innovative Drug Products and Lithium Ion Batteries**  
Arno Kwade • TU Braunschweig • Germany
- 11:45 **Compaction Characterization of Active Pharmaceutical Ingredients – The Starting Point for Tablet Formulation Development**  
Edgar John • Novartis Pharma AG • Switzerland
- 12:05 **Product Design and Drug Release of PMMA-SiO<sub>2</sub> Composite Supraparticles for Dental Additive Manufacturing**  
Herbert Canziani • FAU • Germany
- 12:25 **Discussion Round**

### Poster Session: Future Directions in Product Design and Engineering

- 14:50 **Poster Flash Talks + Discussion**

# Satellite Session Program • Days 3 & 4

## Wednesday • 22 September 2021

### Session 5: Particle Formation and Modeling

- 10:50 **Introduction by Session Chair**
- 10:55 **Product Design in Continuous Crystallizers: Developments and Practice**  
Béatrice BISCANS • CNRS • France
- 11:35 **Automated Synthesis and Comprehensive Characterization of Precious Metal Alloy Nanoparticles**  
Nabi E. Traoré • FAU • Germany
- 11:55 **Design of Products Using Supercritical fluids**  
Željko Knez • University of Maribor • Slovenia
- 12:15 **Discussion Round**

### Session 6: Particle Classification

- 14:15 **Introduction by Session Chair**
- 14:20 **Development of 3D Printed Stationary Phases based on Glycidyl Methacrylate**  
Mariachiara Conti • University of Edinburgh • UK
- 14:40 **Chromatographic Separation and Comprehensive Characterization of Glutathione Stabilized Gold Nanoclusters**  
Lukas Gromotka • FAU • Germany
- 15:00 **Towards Efficient Chromatographic Processes for the Classification of Polymers and Nanoparticles**  
Malvina Supper • FAU • Germany
- 15:20 **Discussion Round**

## Thursday • 23 September 2021

### Session 7: Artificial Intelligence and Optimization

- 09:30 **Introduction by Session Chair**
- 09:35 **Artificial • Virtual or Real? AR/VR for Process Industry**  
Matt Godo • Siemens Digital Industries Software • USA
- 09:55 **Application of Machine Learning Methods in Mechanical Process Engineering**  
Carsten Schilde • TU Braunschweig • Germany
- 10:15 **Optimized Nanoparticle Synthesis in a Residence Time Reactor**  
Jana Dienstbier • FAU • Germany
- 10:35 **Discussion Round**

### Session 8: Sustainability

- 11:00 **Introduction by Session Chair**
- 11:05 **Microplastics – Challenges and Opportunities**  
Andreas Greiner • University of Bayreuth • Germany
- 11:25 **Green Bioprinting - Characterization of Thermophilic Microalgae for their Application as Natural Oxygen Producers in Regenerative Medicine**  
Felix Krujatz • TU Dresden • Germany
- 11:45 **Fibre Printing: New Possibilities for Fibre-based Materials and Devices by Additive Manufacturing**  
Frederic Kreplin • TU Darmstadt • Germany
- 12:05 **Synthetic (Electro) Methane. Is a Low Carbon Product?**  
Javier Fernández-González • University of Cantabria • Spain
- 12:25 **Discussion Round**