



4th International Symposium on Pharmaceutical Engineering Research – SPhERe

15 – 17 September 2021

Final Programme

Version of 8th Sept 2021; all times are Central European Summer Time (CEST)

WEDNESDAY, 15 SEPTEMBER 2021

08:30 OPENING

Opening by Stephan Scholl, Conference Chair, TU Braunschweig

Welcome address by Angela Ittel, President of TU Braunschweig

08:45 KEYNOTE LECTURE

Continuous Pharmaceutical Processes – New applications – Old Challenges.

Gavin Halbert, University of Strathclyde & CMAC, Glasgow, UK

09:30 BIO BREAK

SESSION I: PROCESSES FOR BIOLOGICAL APIs

09:45 **INVITED LECTURE: Heterologous Production of Specialized Metabolites from Dandelion Latex.** *Boje Müller, Fraunhofer Institute for Molecular Biology and Applied Ecology IME, Münster, Germany*

10:10 **Recombinant Production of β -Lactoglobulin for a Potential Application in Pharmaceutical Research and Food Technology.** *S. Brune^{1,2,3,4}, G. Günther^{1,3}, E. Kempf^{2,4}, D. Jahn^{1,3}, R. Biedendieck^{1,3}*, R. Krull^{2,3,4}**

*¹Institute of Microbiology, TU Braunschweig, ²Institute of Biochemical Engineering, TU Braunschweig, ³Braunschweig Integrated Centre of Systems Biology (BRICS), TU Braunschweig, ⁴Center of Pharmaceutical Engineering, TU Braunschweig, *contributed equally*

10:25 **Advanced Process Analytical Technology in Combination with Process Modeling for Endpoint and Model Parameter Determination in Lyophilization Process Design and Optimization.** *A. Juckers¹, P. Knerr², F. Harms², J. Strube¹*

¹Clausthal University of Technology, ²Martin Christ Gefriertrocknungsanlagen GmbH

WEDNESDAY, 15 SEPTEMBER 2021 - CONTINUATION

- 10:40 **Design and Application of an Integrated and Automated Dosing System (ADOS) for DNA-Encoded Libraries (DELS).** *R. Dinter¹, J. Bobers¹, K. Götte², S. Willems², A. Brunschweiger², N. Kockmann¹*
¹Department of Chemical and Biochemical Engineering, Laboratory of Equipment Design, TU Dortmund, ²Faculty of Chemistry and Chemical Biology, Medicinal Chemistry, TU Dortmund
- 10:55 **Biosynthesis of the Anthranoid Scaffold in Plants.** *S. Nassar¹, B. Liu¹, L. Beerhues^{1,2}*
¹Institute for Pharmaceutical Biology, TU Braunschweig, ²Center of Pharmaceutical Engineering, TU Braunschweig
- 11:10 Discussion

11:15 BIO BREAK

SESSION II: PROCESSES FOR CHEMICAL APIs AND CONTINUOUS PROCESSING

- 11:30 **INVITED LECTURE: Conventional and Flow Synthesis of Antibiotic Carbene Silver Derivatives.** *Matthias Tacke, University College Dublin; Ireland*
- 11:55 **Nucleation and Crystal Growth of Alpha-Glycine.** *A. Cashmore^{1,2}, M. Haw¹, M. Lee³, J. Sefcik^{1,2}*
¹Department of Chemical and Process Engineering, University of Strathclyde, ²CMAC Future Manufacturing Research Hub, University of Strathclyde, ³GlaxoSmithKline
- 12:10 **The Rotating Disc Reactor – Mixing Characteristics of a Novel Reactor Concept.** *L. Jäger^{1,2}, N. Hofmann^{1,2}, S. Scholl^{1,2*}*
¹Institute for Chemical and Thermal Process Engineering, TU Braunschweig, ²Center of Pharmaceutical Engineering, TU Braunschweig
- 12:25 **Spherical Agglomeration of Benzoic Acid Using Membrane Emulsification.** *I. Lackowska¹, M. Dragosavac¹, B. Benyahia¹*
¹Loughborough University
- 12:40 **Process Concept for the Production of Solid Crystalline Suspension.** *P. da Igreja^{1,2}, J. Bartsch², M. Thommes²*
¹Invite GmbH, ²TU Dortmund – Solids Process Engineering
- 12:55 Discussion

13:00 LUNCH BREAK

WEDNESDAY, 15 SEPTEMBER 2021 - CONTINUATION

SESSION III: MISCELLANEOUS PROCESSES

- 14:00 **Digital Twin of mRNA-Based Vaccine – Batch and Continuous Manufacturing towards autonomous Operation for Improvements in Speed, Scale, Robustness, Flexibility.** *A. Schmidt¹, H. Helgers¹, F.L. Vetter¹, A. Juckers¹, J. Strube¹*
¹Clausthal University of Technology
- 14:15 **Imiquimod-loaded Nanocapsules Based on Oleic Acid for Dermal Application.** *E. Petrová¹, J. Zbytovská¹*
¹University of Chemistry and Technology Prague
- 14:30 **Validating the Cryopreservation of Tissue Engineered Constructs within Cryobags.** *S.-A. Barker^{1,2}, B. Glasmacher^{1,2,3}, O. Gryshkov^{1,2}*
¹Institute for Multiphase Processes, Leibniz University Hannover, ²Lower Saxony Centre for Biomedical Engineering, Implant Research and Development, ³Centre of Pharmaceutical Engineering Braunschweig
- 14:45 **Effect of Cryopreservation on the Integrity of Coaxial Alginate Capsules.** *D. Khayyat^{1,2}, B. Glasmacher^{1,2}, O. Gryshkov^{1,2}*
¹Institute for Multiphase Processes, Leibniz University Hannover, ²NIFE, Lower Saxony Centre for Biomedical Engineering, Implant Research and Development
- 15:00 **Accelerated Protein Production with Chinese Hamster Ovary Cells for Early (Pre-) Clinical Studies.** *M. Heine¹, S. Hebecker¹, H. Ziehr¹*
¹Fraunhofer Institute for Toxicology and Experimental Medicine (ITEM)
- 15:15 Discussion

15:20 BIO BREAK

POSTER SESSION

- 15:30 **Poster Session, Part I – Poster Introduction**
- 16:00 **Meet the Poster Authors**
- 17:00 **END OF DAY 1**

THURSDAY, 16 SEPTEMBER 2021

08:30 HIGHLIGHT LECTURE

Corona Vaccines: A Blueprint for Other Vaccine Developments?

Leander Grode, Vakzine Projekt Management GmbH, Hannover, Germany

09:15 BIO BREAK

SESSION IV: Solid Preparations

09:30 **INVITED LECTURE: Digital Health – Digital 2D/3D Printing of Personalized Medication.**
Markus Dachtler, DiHeSys GmbH, Schwaebisch Gmuend, Germany

09:55 **Basic 3D Design Concept for Individualized Dosage Forms Obtained from Tested Combinative Preparations.** *M. Tidau^{1,2}, A. Kwade^{1,2}, J.H. Finke^{1,2}*
¹Institute for Particle Technology, TU Braunschweig, ²Center of Pharmaceutical Engineering, TU Braunschweig

10:10 **Prediction of Powder Flow of Pharmaceutical Materials from Physical Particle Properties using Machine Learning.** *L. Pereira Diaz¹, C.J. Brown¹, A.J. Florence¹*
¹University of Strathclyde/ CMAC

10:25 **Thin-Film Coatings for Controlling the Adhesion of Small Pharmaceutical Particles.**
K. Lachmann¹, K.S. Rimpl¹, J.H. Finke^{1,2}, M. Thomas^{1,2}
¹Fraunhofer Institute for Surface Engineering and Thin Films IST, ²Center of Pharmaceutical Engineering, TU Braunschweig

10:40 **Process Modeling and Simulation of Direct Compression – an Agent-Based Approach.**
A.K. Schomberg^{1,2}, N.L. Martin^{2,3}, J.H. Finke^{1,2}, T.G. Abraham^{2,3}, C. Herrmann^{2,3}, A. Kwade^{1,2}
¹Institute for Particle Technology, TU Braunschweig, ²Center of Pharmaceutical Engineering, TU Braunschweig, ³Institute of Machine Tools and Production Technology (IWF), TU Braunschweig

10:55 Discussion

11:00 BIO BREAK

SESSION V: LIQUID PREPARATIONS

11:15 **INVITED LECTURE: Special Considerations on Biologics Drugs as Regards Formulation, Stability and Packaging Material Interactions.** *Karoline Bechtold-Peters, Novartis AG, Basel, Switzerland*

11:40 **High Concentration Protein Formulations – What Thermodynamic Approaches have to offer.** *C. Brandenbusch¹, L. Schäfer²*
¹TU Dortmund University, ²Ruhr University Bochum

11:55 **Processing of Niosomal Hybrid Nanoparticle Systems for Biomedical Applications.**
V. Maurer^{1,2}, A. Zarinwall^{1,2}, G. Garnweitner^{1,2}
¹Institute for Particle Technology, TU Braunschweig, ²Center of Pharmaceutical Engineering, TU Braunschweig

THURSDAY, 16 SEPTEMBER 2021 - CONTINUATION

- 12:10 **SDS Affects the Physicochemical Properties of PVA-Stabilized Solid Triglyceride Nanoparticles.** *N. Bauer^{1,2}, H. Bunjes^{1,2}*
¹Institute of Pharmaceutical Technology and Biopharmaceutics, TU Braunschweig, ²Center of Pharmaceutical Engineering, TU Braunschweig
- 12:25 **Innovative Cerosomes as Carriers for an Enhanced Dermatoses' Therapy.** *A. Vovesná¹, T. Mužíková¹, J. Zbytovská¹*
¹Faculty of Chemical Technology, University of Chemistry and Technology Prague
- 12:40 Discussion

12:45 LUNCH BREAK

SESSION VI: Formulation

- 13:45 **INVITED LECTURE: Physical Stability of ASD: Historical Examples and Shelf-Life Extrapolation.** *Frank Theil, AbbVie Deutschland GmbH & Co. KG, Ludwigshafen, Germany*
- 14:10 **Ibuprofen Amorphization by Post-Synthetic and Solvent-free Loading Methods into Tailored Silica Aerogels.** *A. Zarinwall^{1,2}, V. Maurer^{1,2}, J. Pierick^{1,2}, V. Oldhues^{1,2}, J.H. Finke^{1,2}, G. Garnweitner^{1,2}*
¹Institute of Particle Technology, TU Braunschweig, ²Center of Pharmaceutical Engineering, TU Braunschweig
- 14:25 **Liquid-Liquid Phase Separation in Pharmaceutical Formulation: The Main Cause for non-congruent Release?** *A. Danzer¹, A. Krummnow^{1,2}, K. Lehmkemper², S.O. Kyeremateng², M. Degenhardt², G. Sadowski¹*
¹Department of Biochemical and Chemical Engineering, Laboratory of Thermodynamics, TU Dortmund University, ²AbbVie Deutschland GmbH & Co. KG
- 14:40 **Embedding Solid Lipid Nanoparticles in Orodispersible Films – A Feasibility Study.** *D. Steiner^{1,2}, H. Bunjes^{1,2}*
¹Institute of Pharmaceutical Technology and Biopharmaceutics, TU Braunschweig. ²Center of Pharmaceutical Engineering, TU Braunschweig
- 14:55 **Novel Method for the Prediction of Lubricated Tablet Tensile Strength of Binary Mixtures.** *D. Puckhaber^{1,2}, J.H. Finke^{1,2}, S.R. Rane³, U. Zafar³, M. Juhnke³, E. John³, A. Kwade^{1,2}*
¹Institute for Particle Technology, TU Braunschweig, ²Center of Pharmaceutical Engineering, TU Braunschweig, ³Novartis Pharma AG
- 15:10 Discussion

15:15 BIO BREAK

POSTER SESSION

- 15:30 **Poster Introduction**
- 16:00 **Meet the Poster Authors**
- 17:00 **END OF DAY 2**

FRIDAY, 17 SEPTEMBER 2021

08:30 CAREER SESSION

Sebastian Döring, Lilian Labs GmbH, Braunschweig, Germany

Ulrike Krewer, Karlsruhe Institute of Technology, Karlsruhe, Germany

Miriam Pein-Hackelbusch, University of Applied Sciences and Arts OWL, Lemgo, Germany

10:00 BIO BREAK

SESSION VII: ANALYTICS, PAT

10:15 **INVITED LECTURE: In-line Spectroscopic Methods as Essential Part of PAT.**
Bernd Bleisteiner, Roland Seitz, Horiba Scientific, HORIBA Jobin Yvon GmbH, Oberursel, Germany

10:40 **VIS Spectra as Potential PAT for Measuring the Density of Compressed Materials.**
T. Lillotte, Pharmaceutical Technology, University of Bonn

11:00 **In-line UV-VIS Spectroscopy in Small Scale Extrusion as Process Analytical Technology during Early Stage Development of Amorphous Solid Dispersions.**
J. Winck¹, M. Daalman¹, M. Thommes¹
¹TU Dortmund University

11:15 **Digital Twin for the Production of Monoclonal Antibodies and Antibody Fragments by Integration of Process Analytical Technologies.** *H. Helgers¹, J. Strube¹*
¹Institute for Separation and Process Technology, Clausthal University of Technology

11:30 Discussion

11:35 EXTENDED BIO BREAK

EMERGING TOPIC SESSION

12:00 **Towards integrated Design, Optimization and Control in Biomanufacturing**
Maria Papathanasiou, Imperial College London, UK

12:25 **Artificial Intelligence in Drug Discovery – What is Realistic, what are Illusions?**
Andreas Bender, NUVISAN ICB GmbH, Berlin, Germany

12:50 BIO BREAK

SESSION VIII: MICROSYSTEMS

13:05 **INVITED LECTURE: Organ-on-Chip: Microphysiological in vitro Models Recapitulating Complex Human Tissues.** *Peter Loskill, Natural and Medical Sciences Institute at the University of Tübingen, Reutlingen, Germany*

13:30 **Microfluidic Human Cornea Model for in vivo Similar Drug Permeation Studies with Dynamic Dilution Profiles.** *V. Ledwig^{1,3}, T. Lorenz^{2,3}, A. Dietzel^{2,3}, S. Reichl^{1,3}*
¹Institute of Pharmaceutical Technology and Biopharmaceutics, TU Braunschweig, ²Institute of Microtechnology, TU Braunschweig, ³Center of Pharmaceutical Engineering, TU Braunschweig

FRIDAY, 17 SEPTEMBER 2021 - CONTINUATION

- 13:45 **Microgrippers for the Measurement of Pancreatic Islet Function: a Progress Report.**
E.-H. Früh^{1,3}, B. Gursky^{2,3}, K. Leester-Schädel^{2,3}, A. Dietzel^{2,3}, S. Bütetisch⁴, I. Rustenbeck^{1,3}
¹Institute of Pharmacology and Toxicology, TU Braunschweig, ²Institute of Microtechnology, TU Braunschweig, ³Center of Pharmaceutical Engineering, TU Braunschweig, ⁴Federal Institute of Metrology, PTB – Physikalisch-Technische-Bundesanstalt
- 14:00 **Fractionation of Microparticles at Re>1 using a Deterministic Lateral Displacement (DLD) Array.** *J. Kottmeier¹, M. Wullenweber^{2,3}, S. Blahout⁴, J. Hussong⁴, A. Kwade^{2,3}, A. Dietzel^{1,2}*
¹Institute for Microtechnology, TU Braunschweig, ²Center of Pharmaceutical Engineering, TU Braunschweig, ³Institute for Particle Technology, TU Braunschweig, ⁴Institute for Fluid Mechanics and Aerodynamics, TU Darmstadt
- 14:15 Discussion
- 14:20 **Remarks & Conclusions, Results of the Poster Voting**

SPhERe 2021 POSTER AWARD

FAREWELL

- 14:40 END OF CONFERENCE