

SPEAKERS

From University Magdeburg

Prof. Dr.-Ing. habil. Evangelos Tsotsas



holds the Chair of Thermal Process Engineering at the OVGU since 1994. He has a PhD (1985) and a Habilitation (1990) from University Karlsruhe, and he was a Senior Process Specialist at the Dow Chemical Company (1991 to 1994). Prof. Tsotsas is the editor of the five-volume book series Modern Drying Technology. Recipient of the Hosokawa Award for Innovation and the ProcessNet Award for Excellence in Drying Research, he is chairman of the German Working Party on Drying. The main focus of his work is on drying, and on particle formulation processes related to drying.

From Industry

Dr.-Ing. Lennart Fries

Nestlé R&D China Ltd., Beijing



studied Process Engineering at the TUHH and received his diploma in 2008. Afterwards he was research assistant at the SPE and obtained the doctoral degree in 2012 for his work on "Discrete particle modelling of a fluidized bed granulator", which was honoured with the Johannes-Möller-Award 2013. From 2012 until 2019 he was working as R&D Specialist and later as Key Project Manager in the Food Science and Technology Department at the Nestlé Research Center (NRC) in Lausanne. Since 2019 he is working as Group Leader Science and Technology Catalyzer in Nestlé R&D China Ltd. Beijing.

Dr.-Ing. Michael Jacob

Glatt Ingenieurtechnik GmbH, Weimar



is Head of the Process Engineering Department and member of the general management at Glatt Ingenieurtechnik GmbH. Dr. Jacob graduated at the OVGU in 1995 and since this time he worked for Glatt in many leading positions (Head of R&D and Head of Technology Center in Weimar). He obtained his doctoral degree at the OVGU in 2010 on "Experimental studies and modeling of processes in horizontal fluidized beds for spray granulation".

Prof. Dr.-Ing. Mirko Peglow

Pergande Group, Weißandt-Gölzau



graduated in Business Engineering with specialization Process and Energy Engineering at the University Magdeburg in 2000, where he obtained his PhD (2005) and was a Junior Professor (2008-2012). From 2012-2020 he was CEO and since 2020 he is executive partner of Pergande Group. Prof. Peglow is appointed member of the cluster and innovation council of the Ministry of Economics Affairs, Science and Digitalization of federal state Saxony-Anhalt, for which he also acts as chairman of the Hugo-Junkers-Innovation-Award. He is Honorary Professor at the University Magdeburg and Member of the Executive Committee of the Association of German Engineers (VDI) and Chairman of the Regional Advisory Board of the VDI.

Prof. Dr.-Ing. habil. Frank Kleine Jäger

BASF SE, Ludwigshafen



is currently Vice President "Solids Formulation and Handling" at BASF SE in Ludwigshafen. In this role, he manages the global R&D activities in this field of Solids and Film Processing ranging from development of new process technologies and optimization to trouble shooting and debottlenecking in BASF's global production plants. He is Chemical Engineer with Diploma and PhD degrees from RWTH Aachen University, Germany. He also received his Habilitation from RWTH Aachen in 2004. Since 2011 he holds a Professorship as apl. Prof. Dr.-Ing. at RWTH Aachen.

COURSE PROGRAM

Introduction to fluid-mechanical principles

- The fluidization principle, forms and applications of fluidized beds
- Minimum fluidization velocity (measurement and calculation)
- Operation limits, segregation, elutriation, scale-up rules and state diagrams
- Dimensioning of gas distributors
- **Practical fluidization experiments in the laboratory**

Local fluid mechanics

- Bubble development, growth and coalescence
- CFD modeling of the fluid mechanics
- DEM/CFD modeling of the fluid mechanics

Methods for the characterization of fluidized beds

- Particle velocity, concentration and moisture
- Particle attrition and mechanical strength
- Breakage behavior of granules and agglomerates
- **Practical particle characterization experiments in the laboratory**

Heat transfer in fluidized beds

- between fluid and particles
- between fluidized bed and internals
- Influence of backmixing and bubbles
- Cooling and heating of solids (batch, continuous)

Mass transfer in fluidized beds

- Fundamentals
- Drying of solids (batch, continuous)
- **Practical drying experiments in the laboratory**

Fundamentals of granulation and agglomeration

- Influence of material properties
- Processes and equipment for drying, rewetting and pressure agglomeration
- Adhesive forces and binding mechanisms

Fluidized bed spray granulation

- Fundamentals and micro-mechanisms
- Operation regime maps
- Influence of drying on granulation
- Processes, design options, equipment and scale-up
- Modeling of fluidized bed spray granulation (batch/continuous)
- **Practical granulation experiments in the laboratory**

Flowsheet simulation of complex solids processes

- Introduction
- Flowsheet simulation of continuous fluidized bed drying
- Steady-state and dynamic flowsheet simulation of continuous fluidized bed spray granulation and agglomeration
- Multi-scale simulation of fluidized bed granulation/agglomeration
- Vibrated fluidized bed drying - fundamentals, flow sheet simulation

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Start Monday, November 8th, 2021, 1:00 p.m.

End Thursday, November 11th, 2021, 3:00 p.m.



Information, venue and registration

www.tuhh.de/spe/fluidization-course

Hamburg University of Technology
Institute of Solids Process Engineering
and Particle Technology

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21073 Hamburg, Germany

Phone +49 40 42878 3239

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Course fee

1750 Euro (plus VAT if applicable)

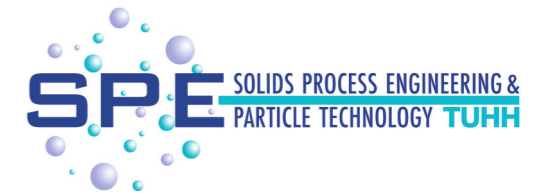
1225 Euro per person (plus VAT if applicable) in case of two or more simultaneous registrations from the same company

1100 Euro for PhD students (plus VAT if applicable)

The participation fee includes extensive course-ware (lecture and practical course material), refreshments, coffee and dinner at the third evening. Online participants will receive the course material before the start of the webinar. The course fee can be transferred after the official confirmation of participation by TuTech. Cancellations until October 24th, 2021 are free of charge. Thereafter, no refunding is possible, however, another participant can be nominated.

Two options of participation

Participants can attend the course on-site in Hamburg or online. The online version will be held via the video conference tool Zoom. The access data (link, personal password) to the webinar will be sent to you by email in good time before the start of the course.



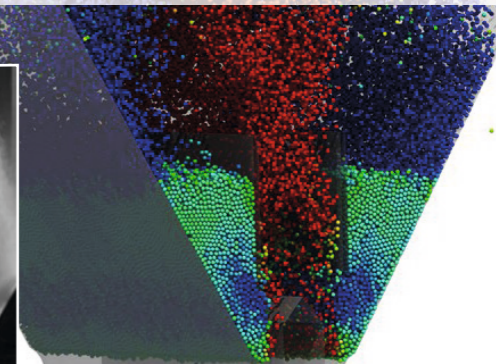
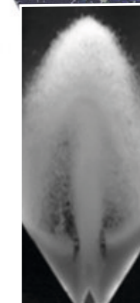
13th University Training Course Fluidization Technology

Fundamentals and Applications in Drying, Coating, Granulation and Agglomeration

November 8th - 11th, 2021
Hybrid (on-site in
Hamburg and online)

Organized by

Prof. Stefan Heinrich, Hamburg University of Technology
Institute of Solids Process Engineering and Particle Technology
Prof. Evangelos Tsotsas, Otto von Guericke University Magdeburg
Chair of Thermal Process Engineering



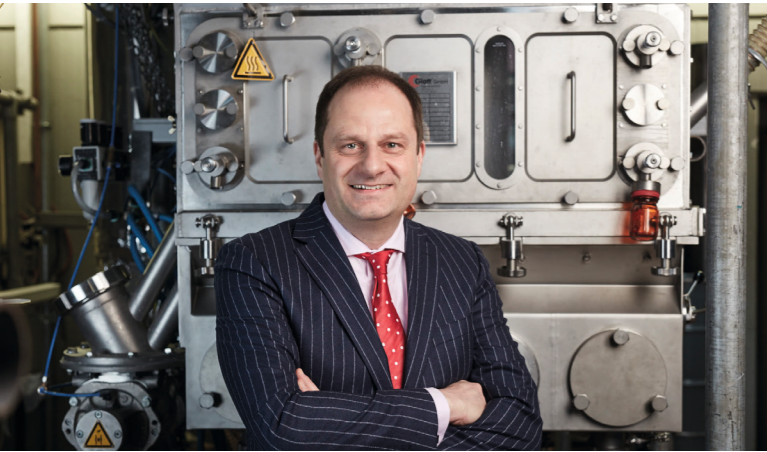
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TUHH
Hamburg University of Technology



TARGET AUDIENCE

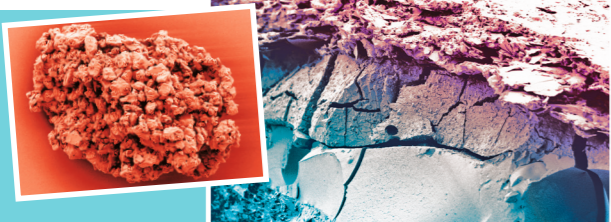
The course is designed for people from various backgrounds (engineers, chemists, food and pharmaceutical technologists) and with different levels of experience, who need to understand the fundamentals of applications of modern and efficient fluidized bed processes. The course language is English.



TOPIC

Fluidization technology has a tremendous economic importance in process engineering and is used for a wide range of physical and chemical processes like particle formulation, classification, drying, adsorption, heating and cooling of solids, combustion, pyrolysis, carbonization, gasification, calcination or gas-solid reactions.

In this course we focus on the drying as well as on the spray granulation, coating and agglomeration in fluidized beds. The particle formulation processes play an important role in the manufacturing of powder granules from liquid educts in the food, fine chemicals, biotechnological and pharmaceutical industries as dust-free and free-flowing particles with improved particle properties, like a defined particle size distribution, porosity or desired mechanical strength, can be produced in a process with intensive heat and mass transfer conditions and good solids mixing.

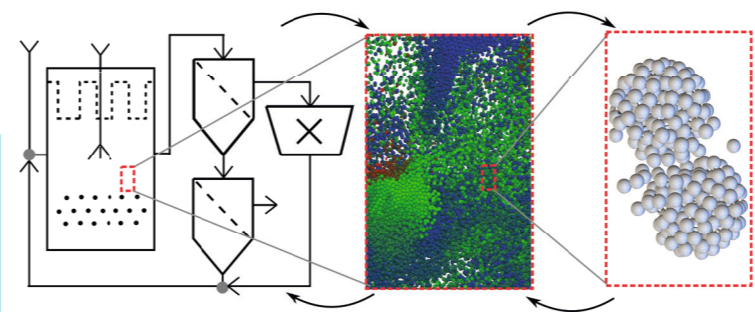
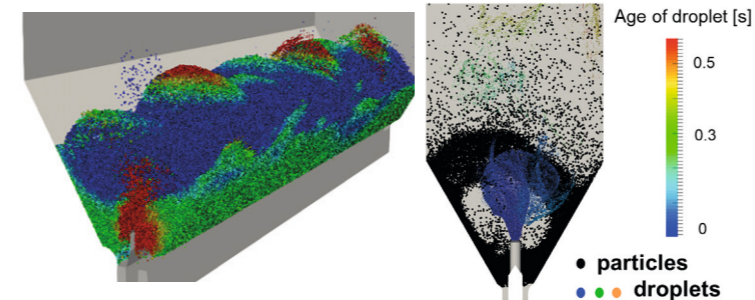
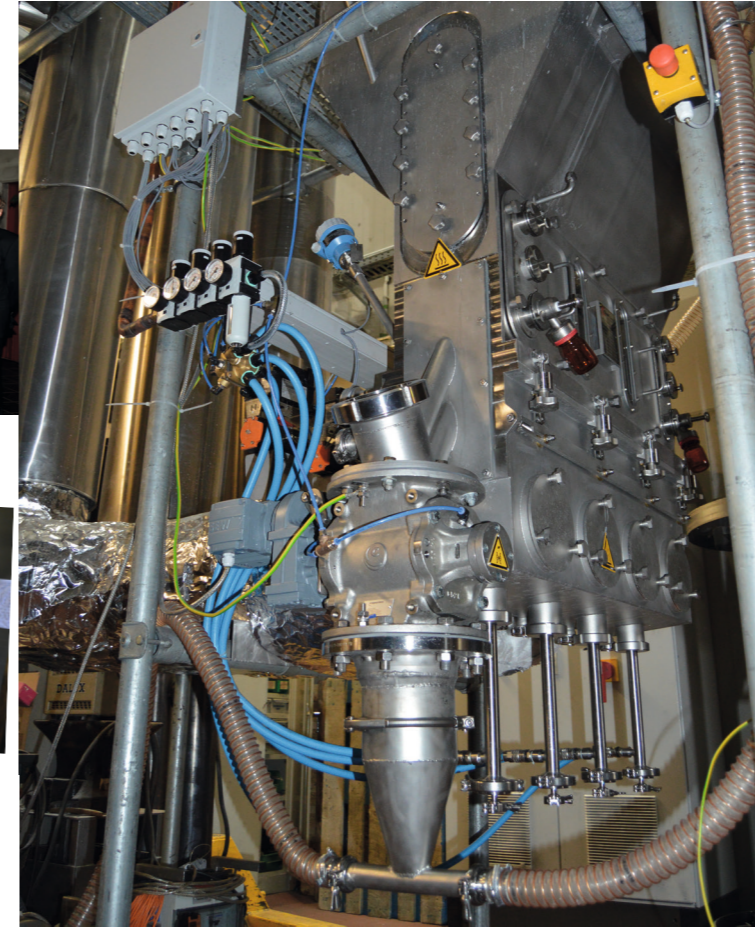
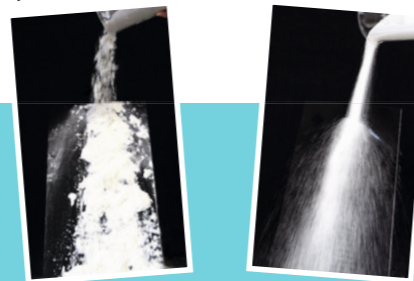


HANDS-ON TRAINING AND DEMONSTRATIONS



This course highlights the fundamentals and applications of various types and different scales of fluidized bed processes for drying, coating, granulation and agglomeration of particles with practical hints and extensive calculation examples. The focus is on fluid mechanics, mixing, heat and mass transfer and particle formulation mechanisms. Furthermore, actual applications as well as modern computational tools and measuring techniques are presented.

The knowledge transfer is supported by different experts from industry, who will present procedures and approaches used in plant construction and optimization, in operation of processes for chemical, food and pharmaceutical industry as well as novel measuring techniques. The hands-on trainings, demonstrations and tutorials offered during practical sessions will strengthen the learning experience.



SPEAKERS From Hamburg University of Technology



Prof. Dr.-Ing. habil. Dr. h.c. Stefan Heinrich

received his diploma in Process Engineering (1996) and a doctoral degree at the University Magdeburg (OVGU) in 2000. Following eight years as Assistant and Junior Professor at the OVGU and with a Habilitation (2006), he became full professor at the TUHH and director of the Institute of Solids Process Engineering and Particle Technology (SPE) in 2008. He is editor of the Elsevier journals "Advanced Powder Technology" and "Particology", coordinator of the DFG Priority programme 1679 on dynamic flowsheet simulation of solids processes and chairman of the German Working Party on Agglomeration and Bulk Solids Technology. For his research activities in fluidized bed spray granulation Prof. Heinrich received the DECHEMA-Prize 2015.



Prof. Dr.-Ing. Maksym Dosta

is Junior Professor for Multiscale Simulation of Granular Materials at TUHH. He graduated in computer science at Donetsk National Technical University and started his career at the Max-Planck Institute in Magdeburg. He received his doctoral degree at the TUHH in 2012 on flowsheet simulation of fluidized bed granulation processes. Main focus of his current research work is on development and implementation of complex simulation frameworks and multiscale process treatment of granular materials.



Dr.-Ing. Swantje Pietsch

studied Bioprocess Engineering at TUHH. In 2018 she obtained her doctoral degree in the field of spray coating in spouted beds under supervision of Prof. Heinrich. Her doctoral thesis with the title "Experimental and numerical investigations of three-dimensional prismatic spouted beds with liquid injection" was honoured with the Johannes-Möller-Award 2020. She continued her research at the SPE as a post-doc. Since 2020 she is working as Senior Engineer at the institute. Her research interests are in the field of particle formulation in fluidized and spouted beds as well as in numerical investigations of gas-solid processes.



Paul Kieckhefen, M.Sc.

is a PhD student at the SPE. He studied Process Engineering at TUHH and obtained a Master's degree with Distinction in 2018. He interned at BASF in the departments of Chemical and Process Engineering (2016) and Digitalization in Research & Development (2017). He performed research stays in the group of Prof. Pirker at the Johannes-Kepler University in Linz, Austria. His research interests comprise efficient simulation methods that describe multiphase flows, time-scale extrapolation methods and product-property prediction approaches using multi-scale simulations.

