

NEW

TTC TECHNOLOGY TRAINING CENTER

Workshop:

PARTICLE ENGINEERING ACROSS THE LENGTH SCALE

24 – 26 October 2017



WHY PARTICIPATE

There is a significant industrial potential of particle technology. In nearly all industries particulate systems are in use to manufacture high quality materials and products. The range covers fine chemicals, food and pharma as well as performance materials.

Depending on the application different material or product properties are required. To fulfill such demands various processing options are available both in lab and industrial scale.

The workshop focuses on engineering issues along the value chain of particulate systems passing the complete range of particle sizes from nanometer, micrometer scale, up to comparable coarse products in millimeter scale.

A detailed introduction in processing option for powder and grain synthesis, particle enlargement and functionalization of particle systems will be given. Starting from theoretical process engineering basics and characterization methods for dry product forms, the workshop will also handle practical applications to demonstrate the potential of the technology portfolio.

With this newly designed workshop we introduce this topic to our attendees combining high level expertise from the academic field, from industry and also from Glatt's own knowledge base.

Besides lectures we also use hands-on demonstrations in the lab.

WHO MAY ATTEND

We kindly invite all interested employees from industry and academic institutions who are interested in particle technology in gaining know-how and practical experience. This workshop covers all industries due to the generic approach.

Typically, staff from industry, process and product development and research will get most out of the workshop.



PROGRAM

TUESDAY, 24 OCTOBER 2017

12:00 Snack buffet and LogIn (conference room)

INTRODUCTION, THEORETICAL BACKGROUNDS OF PARTICLE TECHNOLOGY FROM NANO TO MACRO

12:45 Introduction. [Michael Jacob](#)

13:00 **Particle engineering options for value added product forms.**
Explaining the basic processing principles for particle engineering. Particle enlargement principles like agglomeration and spray granulation will be introduced as well as spray coating options to customize particle functionality. Discussing the differences of batch and continuous processing. Outlining the advantages and benefits of each setup in respect to installation, operation and product properties.
[Michael Jacob](#)

13:45 **Powder synthesis and thermal powder treatment.**
Explaining the basic processing principles for powder synthesis. Powder formation options will be introduced. Innovation approaches like core-shell or synthesis of doped materials will be explained in detail. Additional downstream processing options like dispersion or granulation will be discussed.
[Lars Leidolph](#)

14:30 **Coffee break**

15:00 **Agglomeration and spray granulation processing options.**
Explanation of growth principles of powder agglomeration and spray granulation. Calculation and simulation methods for both processes. Analyzing key aspects such as sticking criteria, agglomeration regime maps and population balance modeling. [Stefan Heinrich](#)

16:00 **Coating and surface modification of dry product forms.**
The effect of process conditions on coating quality and product structure. Outlining how various ambient influences impact the final results and characteristics of the treated particles. [Evangelos Tsotsas](#)

17:00 Transfer to hotel

19:00 **Workshop dinner**

WEDNESDAY, 25 OCTOBER 2017

CHARACTERIZATION OF PARTICLE SYSTEMS AND PROCESS ENGINEERING ASPECTS

- 09:00 **Characterization of particle systems - the physical view.** Physical characterization of particle systems. Analyzing particle size and shape by sieving, laser and optical approach. Determining the physical properties of bulk material such as dynamic vapor sorption (DVS), moisture and density. Additional analysis of particle morphology by computer tomography or picture analysis will be discussed.
[Evangelos Tsotsas](#)
- 09:30 **Characterization of particle systems - the chemical view.** Chemical and mineralogical characterization of particle systems. Analyzing powder and particle composition as well as crystal structure. The complex evaluation of innovative materials will be discussed. [Lars Leidolph](#)
- 10:00 **Drying processes - from single droplet to porous structures.** Drying technology is widely used to manufacture dry product forms. Various drying principles and processing options will be discussed and compared with respect to product quality and product structure. [Evangelos Tsotsas](#)
- 10:30 **Product design - a hierarchical approach.** Introduction to state-of-the-art particle engineering methods. Simulation methods and various solutions for process visualization such as Discrete Elements Modeling (DEM), flow-sheet simulation and multi-scale-modeling will be presented. Case studies will demonstrate the potential of hierarchically designed materials.
[Stefan Heinrich](#)
- 11:15 **Coffee break**

PRACTICAL SESSION I – PROCESSING OPTIONS

Clean-state inspection of test equipment to be used.
Explaining all the technical features of the various equipment scales

- 11:45 **Powder synthesis** - APPtech
- 12:15 **Spray granulation and agglomeration** – ProCell spouted bed system and GFG & AGT fluidized bed systems.
- 12:45 **Functional coating and tableting** – GFC & GPCG fluidized bed systems
- 13:15 **Lunch**

PRACTICAL SESSION II – PROCESSING OPTIONS

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| 14:15 | Powder synthesis – from liquid to powder from nano to sub-micron. Continuous powder synthesis using APPtech. Demonstration of thermal powder synthesis based on liquid raw materials in pilot scale system (practical demonstration). |
| 15:00 | Fluidized bed spray granulation – Batch and continuous fluidized bed spray granulation processes. Studying spray granulation processes in a lab scale system (practical demonstration). Comparing batch versus continuous processing. |
| 15:45 | Coffee break |
| 16:15 | Fluidized bed agglomeration – Batch and continuous fluidized bed agglomeration processes. Studying agglomeration processes in a lab scale system (practical demonstration). Comparing batch versus continuous processing. |
| 17:00 | Transfer to hotel |
| 18:00 | City tour and Workshop dinner |

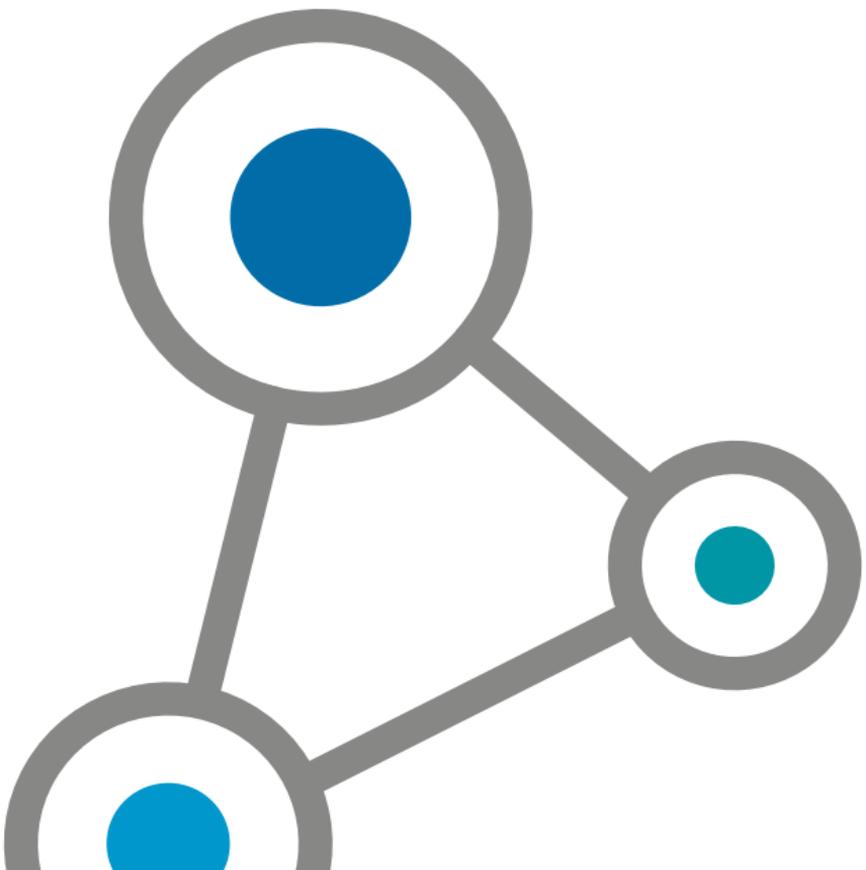
THURSDAY, 26 OCTOBER 2017

CASE STUDIES

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| 09:00 | High performance functionalized particle systems. Explanation of the potential of functionalized particle systems for development of high performance materials. Various process options will be introduced. Ingolf Vogt |
| 09:30 | High selectivity adsorbents for gas separation applications. Introduction to high performance adsorbents for separation applications. Discussion of material related issues and production principles. Case studies of final applications are included. Kristin Gleichmann |
| 10:00 | Innovative ceramic materials. Case studies comparing different processing options and principles for high performance ceramic materials. Powder synthesis, core-shell and granulation will be covered. Michael Jacob |
| 10:30 | Coffee break |
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PRACTICAL SESSION III

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| 10:45 | Hot-melt granulation – from melt to compact granules. Practical demonstration of hot-melt spray granulation using continuous fluidized bed technology. Explanation of technical features and equipment required for hot-melt processing. |
| 11:15 | Film coating – modify application behaviour of solid product forms. Practical demonstration of spray coating using fluidized and spouted bed technology. Discussing coating materials available for improved storage, reduced hygroscopicity, target release, sustained release and customized product behaviour. Explanation of top-spray as well as bottom-spray coating applying the Wurster principle. |
| 11:45 | Analytics - practical measurement of material properties. Evaluation and comparison of product properties of samples produced during the practical sessions. Demonstration of the analytical equipment. |
| 12:15 | Evaluating the product properties and quality parameters of the samples produced during the workshop. Discussing the results of the various processes demonstrated during the workshop and comparing the outcomes.
Michael Jacob, Lars Leidolph |
| 12:45 | Summary and Snack buffet |
| 13:15 | Transfer to station or hotel |
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SPEAKERS

Dr. Kristin Gleichmann

Chemiewerk Bad Köstritz GmbH, Germany

Prof. Dr.-Ing. habil. Stefan Heinrich

Technische Universität Hamburg-Harburg, Germany

Dr. Michael Jacob

Glatt Ingenieurtechnik GmbH, Germany

Dr. Lars Leidolph

Glatt Ingenieurtechnik GmbH, Germany

Prof. Dr.-Ing. habil. Evangelos Tsotsas

Otto-von-Guericke Universität Magdeburg, Germany

Dr. Ingolf Vogt

IKTS Hermsdorf, Germany

MODERATION

Dr. Michael Jacob, Glatt Ingenieurtechnik GmbH, Germany

DETAILS

- >> The participation fee is € 1490,- (exclusive of VAT).
- >> This fee includes participation, accompanying course notes, daytime catering and dinner. Any other expenses are to be borne by the attendee.
- >> Free attendance granted to a limited number of students.
- >> Participation is limited. Registrations will be confirmed on a first come first serve basis.
- >> Courses taking place in Germany are subject to Value Added Tax (VAT).
- >> Each participant will receive a certificate of attendance at the end of the course.
- >> **Registration deadline: 07 September 2017**

ORGANIZATON

TTC - Technology Training Center

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LOCATION

Glatt Ingenieurtechnik GmbH

Nordstrasse 12

99427 Weimar, Deutschland

For further information or online registration please visit us on

www.ttc-binzen.de

REGISTRATION

Workshop:

PARTICLE DESIGN ACROSS THE LENGTH SCALE

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Name

Company

Dept.

Function

Address

Phone

Fax

E-mail

Yes, I want to receive information about future TTC workshops.

Signature

Accomodation required from

Check-in day:

Check-out day: _____ = _____ nights

(Approx. 124,00 €/night incl. breakfast)



Technology Training Center

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