



## Advanced Course on Characterisation of Powders within Pharma, Food and Chemistry

Powder characterisation is an essential step for all aspects of powder technology. However, no single characterisation technique alone can be used to reliably characterise a powder. There is a need to use several complimentary methods in order to get a better understanding of particle properties necessary for a successful processing. In this 3-day course at Lund University and MAX IV a wide range of laboratory methods for characterisation of powders are highlighted together with the state-of-the-art synchrotron methods opening doors to new horizons for the characterisation of pharmaceuticals and other complex materials. The aim of the course is also to answer questions like “Which methods are useful to give me a better understanding of my powder related problems?”

### AIM

Successful performance of a powder for a specific application depends on the compatibility between the production process and a variety of powder characteristics. In this intensive course different qualified methods for characterisation of powders are presented and related to powder handling and functionality. The aim of the course is to provide participants with a better understanding of different techniques available today and in near future for characterization that opens for a needed further understanding and standardization of powders.

### COURSE OUTLINE

The course covers three full days of lectures and round table discussions. Participants will be divided in smaller groups and the round tables will focus on specific themes. This provides participants with an opportunity to deepen their knowledge in specific fields and to exchange experience with others from different areas of work. Participants will be asked to submit questions and their own problems prior to the start of the course. Their specific questions will be highlighted during the course.

#### Day 1

Size, shape, morphology and size distribution of powder particles:

- Introduction to size, shape and morphology – why important?
- Laser diffraction particle sizing

- Powder image analysis
- Electron microscopy techniques (e.g. SEM, TEM, X-ray powder diffraction, environmental SEM)

Material properties of powders:

- Energy-dispersive X-ray spectroscopy
- Calorimetric methods

The day ends with two *Round tables*: Particle size mapping and Electron microscopy, where also participants' cases will be discussed.

#### Day 2

Surface chemistry of powders:

- Introduction - why is the surface chemistry important for powders?
- The MAX IV facility
- Overview of different types of X-ray techniques
- Advantages of using synchrotron light compared with standard laboratory methods

Application examples of characterization of surface chemistry of powders:

- X-ray photoelectron spectroscopy (XPS/ESCA)
- Raman spectroscopy and Confocal imaging
- Time-of-Flight Secondary Ion Mass Spectrometry (TOF-SIMS)
- FT-IR spectroscopy: Attenuated Total Reflectance (ATR)



The second day will be held at the MAX IV laboratory. MAX IV is the first 4th generation synchrotron source in operation and with world-leading brilliance and flux. The facility will support a wide range of experimental techniques such as macromolecular and time resolved crystallography, synchrotron X-ray powder diffraction (SR-XRPD) and energy dispersive X-ray diffraction, small-angle X-ray scattering (SAXS) and 3D X-ray diffraction tomography, among others. The use of synchrotron radiation to address industrial problems is growing rapidly worldwide. The high brilliance of MAX IV is ideal for using X-ray scattering in the study of equilibrium and non-equilibrium dynamics in both soft and condensed materials. The high flux will improve energy and spatial resolution beyond those of current facilities.

The day ends with two **Round table** discussions "Characterization of surface chemistry of powders" and "From questions to results – how to cooperate with MAX IV?".

### Day 3

Flow properties of powders:

- Overview of different analytical techniques with focus on Mohr circle analysis
- A multivariate approach to characterise powders' rheological properties
- Particles in air - characterization of aerosolization properties
- Tomography – microstructure of powders

Reconstitution properties of powders:

- The powder bed and wetting properties
- The sessile drop technique applied on a powder bed
- Image analysis

### WHO SHOULD ATTEND?

This is an advanced course focused on powder characterization for academics and engineers. Persons from industry or academia that work with powder within production, R & D, QA or QC will benefit by participating in this course. University researchers will benefit from a deeper insight into real industrial problems.

### CONTACT

**For course information**, please contact Mirka Fahlander at Lund University Commissioned Education, Ph. +46-46-222 0777 or mirka.fahlander@education.lu.se

**For practical information**, please contact Andreas Bryngelson, Ph. +46-46-222 1460 or andreas.bryngelson@education.lu.se

### REGISTRATION

<https://dinkurs.se/44990>

### SCHEDULE AND FEE

October 18-20, 2017

The course will take place at Lund University and MAX IV. The course fee is SEK 16 600, excluding VAT. The course fee includes tuition, documentation, diploma, coffee, lunch and a dinner on Day 1.

The course will be held from 8.15 am to 5 pm on all days.

Registration deadline is September 11, 2017. Registration is binding. Substitution of participants is allowed at any time at no charge, however it is advisable that such should take place at the start of the course.

### LECTURERS

**Björn Bergenståhl**, professor in Food Technology at Lund University since 1998. For more than 15 years, he worked as researcher and section manager at YKI Institute for Surface Chemistry in Stockholm. He has a long-term experience in applied surface and colloid chemistry in industrial systems (chemical technical, paint, paper, mining, pharmaceutical and food industry) and on surface properties of solid systems obtained through drying. Another area of interest is the influence of the surface physics on the functional properties of industrial powders (wettability, dispersability and flowability).



**Anna Fureby**, PhD, Senior scientist and Group Manager at Life Science section, SP, Technical Research Institute of Sweden. Anna has a background from Department of Biotechnology at Lund University. She has almost 20 years' experience of formulation, microencapsulation, characterisation and innovation in powders for food, pharma and nutrition at YKI and SP in Stockholm.



**Reine Wallenberg**, professor in Solid State Chemistry since 2000, and director of nCHREM, the national centre for high-resolution electron microscopy at Lund University. He has more than 30 years of experience from materials characterisation, especially from micro- and nanoscale electron beam analysis techniques and related spectroscopy techniques (XEDS, EELS, electron diffraction). He has worked with materials

like complex oxides, nanoparticles, industrial and model catalysts, semiconductors, and polymer composites.

Other lecturers include **Lars Wadsö** (professor at the Division of Building Materials) and **Stephen Hall** (associate professor at division of Solid Mechanics) at Lund University. **Dr. Olivier Balmes** (researcher), **Marjolein Thunnissen** (Head of User Group) and **Magnus Larsson** (Industrial Liaison Officer) at MAX IV. **Jamie Clayton** (Operations Director at Freeman Technology), **Ulf Willén** (Global Sales Manager at Malvern Instruments) and **Sjoerd Sluimers** (Sympatec Nordic).



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