



Draft Programme

Fluid Bed Processing Wednesday 15 – Friday 17 May 2019

Wednesday 15 May 2019

09:00 *Registration and coffee*

09.30 **Welcome and housekeeping**

Dr Jim Bullock, iFormulate Ltd

09:40 **Introduction to fluid bed processing**

Professor Andrew Bayly, University of Leeds (formerly of Procter and Gamble)

- Overview and key features of fluid bed processing and key features
- Objectives of processing and how/where it is used
- Fluid bed designs – pros and cons
- What can happen if it goes wrong
- Introduction to the key scientific topics of the course

10:10 **Fluidisation basics**

Professor David York, University of Leeds (formerly of Procter and Gamble)

- Basics of fluidisation.
- Particle properties, disengagement zone, elutriation, pressure drops
- Includes a demonstration

11:10 *Coffee*

11.25 **Benefit of mass transfer in the fluid bed**

Professor Andrew Bayly, University of Leeds (formerly of Procter and Gamble)

- Drying and cooling operations
- The importance of particle properties and interactions with the fluid bed

12:05 **Particle agglomeration in fluid beds**

Dr Stephan Sternowsky, Neuhaus Neotec

- Examples which illustrate the science of agglomeration

12:45 *Lunch*

13.45 **Hands-on laboratory demonstration sessions**

(a) Fluidisation and Geldart Classifications: Soyeb Manga, University of Leeds

(b) Continuous operation: Professor David York, University of Leeds

(c) Particle mixing and separation: Umair Zafar, University of Leeds

(d) Pilot unit operation: Dr Stephan Sternowsky/Henning Falck, Neuhaus Neotec

(e) Agglomeration and sintering: Nigel Somerville Roberts, NSR Innovations Ltd (formerly of Procter and Gamble) and visiting researcher, University of Leeds

(f) Encapsulation, coating and spouted bed: Ben de Schepper, ProCept

15.40 *Tea*

15:55 **Spraying and coating in fluid bed drying**

Professor Nik Kapur, University of Leeds

- Mechanisms of wetting and spreading
- Impact of shape and liquid properties

16.35 **Importance of powder material properties in fluid beds**

Nigel Somerville Roberts, NSR Innovations Ltd (formerly of Procter and Gamble) and visiting researcher, University of Leeds

- Geldart classification
- Impact of size distribution, moisture and temperature
- Characterisation
- Causes and consequences of unintended agglomeration

17:05 **Particle engineering and characterisation of output particles**

Lieselotte de Smet, Xedev/ProCept

17:35 Q&A and wrap up

17:50 *End of day one*

19:00 *Course Dinner*

Thursday 16 May 2019

09:00 *Coffee*

09:15 **Welcome**

Dr Jim Bullock, iFormulate Ltd

09:20 **Basics of fluid bed design**

Nigel Somerville Roberts, NSR Innovations Ltd (formerly of Proctor and Gamble) and visiting researcher, University of Leeds Influence of shape, distributor plates, weirs, air distribution, static and vibratory beds

- Wurster design
- Continuous vs batch operation
- Cyclones, internal filters

10:00 **Basic modelling for fluid bed processing**

Dr Ali Hassanpour, University of Leeds

- DEM and CFD Models
- Heat balance

10:40 *Coffee*

10:55 **Hands-on laboratory demonstration sessions**

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12.40 *Lunch*

13:30 **Operation: start up and shut down and handling difficult materials**

David Smith, DJS Process Consulting Ltd

14:15 **Case Study Pharma 1 – Developing Fluid Bed Granulation High Potent Drug Products**

David O'Connell, PCI Pharma Services

- introduction to potent molecules
- overview of contained manufacturing facility
- specific contain equipment for fluid bed granulation
- case study of a challenging product.

14:55 **Case Study Food**

Speaker to be confirmed

- Encapsulation of flavours, use of Wurster type bed

15:35 *Tea*

15:55 **Case Studies Food – powder morphology and powder performance**

Tobias Kockel, Nestlé R&D Konolfingen, Switzerland

16:25 **Case Study Pharma 2 – Fluid Bed Processes in Pharmaceutical Coating and Granulation**

Conor Long, Almac

17:05 **Case studies of continuous and batch operation**

Henning Falck, Neuhaus Neotec

- Pros and cons of continuous vs batch

17:30 **Panel Discussion (all speakers): Future challenges and opportunities**

17:55 Q&A and wrap up

18:05 Drinks and poster reception

19.30 *End of day two*

Friday 17 May 2019

Innovation and New Horizons

09:00 *Coffee*

09:15 **Welcome**

Dr Jim Bullock, iFormulate Ltd

09:20 **Innovation Example 1 - Academic - Structured fluid beds: Towards more responsive processes**

Dr Victor Francia, Heriot-Watt University

10:00 **Instrumentation and Control: sensors, soft sensors and control loops**
Tobias Kockel, Nestlé R&D Konolfingen, Switzerland

10.40 Coffee

11:00 **Case Study: combining spray drying with a fluid bed**
Professor David York, University of Leeds and Nigel Somerville Roberts, NSR Innovations Ltd

11.40 **Innovation example 2 – Industry – High gravity fluid beds**
Prof. Dr. ir. Juray De Wilde, Université Catholique de Louvain (UCLouvain)

12:10 Troubleshooting and Q&A

13:00 Lunch

14:00 End of course