Revised Programme

Fluid Bed Processing
Wednesday 15 – Friday 17 May 2019

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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
Demo a: Pilot unit operation
Dr Stephan Sternowsky/Henning Falck, Neuhaus Neotec
Demo b: Fluidisation and Geldart Classifications
Soyeb Manga, University of Leeds
Demo c: Continuous operation
Professor David York, University of Leeds
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 Proctor 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**
- **Demo d: Particle mixing and separation**
  Umair Zafar, University of Leeds
- **Demo e: Agglomeration and sintering**
  Nigel Somerville Roberts, NSR Innovations Ltd (formerly of Proctor and Gamble) and visiting researcher, University of Leeds
- **Demo f: Encapsulation, coating and spouted bed**
  Veerle Timmerman and Lieselotte de Smet, ProCept

**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 1 - powder morphology and powder performance**
Tobias Kockel, Nestlé R&D Konolfingen, Switzerland

**15:25** *Tea*

**15:45** **Case Study Food 2 – powder morphology and powder performance**
Tobias Kockel, Nestlé R&D Konolfingen, Switzerland

**16:15** **Case Study Pharma 2 – Fluid Bed Processes in Pharmaceutical Coating and Granulation**
Conor Long, Almac

**16:55** **Case studies of continuous and batch operation**
Henning Falck, Neuhaus Neotec
- Pros and cons of continuous vs batch

**17:20** **Panel Discussion (all speakers): Future challenges and opportunities**

**17:45** Q&A and wrap up

**17:55** Drinks and poster reception

**19:20** *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