Revised 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
       Demo a: Agglomeration and sintering
          Nigel Somerville Roberts, NSR Innovations Ltd (formerly of Proctor and Gamble) and visiting researcher, University of Leeds
       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
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: Spouted bed
   Nigel Somerville Roberts, NSR Innovations Ltd (formerly of Proctor and Gamble) and visiting researcher, University of Leeds
   Demo f: Encapsulation and coating
   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
19:00 Course Dinner

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
<table>
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<tr>
<th>Time</th>
<th>Session Details</th>
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| 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 |