



Provisional Programme

Fluid Bed Processing and Formulation Monday 11 – Wednesday 13 May 2020

Monday 11 May 2020

Basic Science and understanding

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
- Safety

11:15 *Coffee*

11:30 **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

12:10 **Particle agglomeration in fluid beds**

Dr Stephan Sternowsky, Neuhaus Neotec

- Examples which illustrate the science of agglomeration

12:50 *Lunch*

13:50 **Hands-on laboratory demonstration sessions**

Demo a: Agglomeration and sintering

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

Demo b: Fluidisation and Geldart classifications

Soyeb Manga, University of Leeds

Demo c: Continuous and batch operation

Professor David York, University of Leeds

15:35 *Tea*

15:50 **Fluid atomisation in fluid beds – basic science mechanisms**

Phil Threlfall-Holmes, TH Collaborative Innovation & Visiting Professor at the University of Leeds (formerly of AkzoNobel)

16:30 **Use and characteristics of twin fluid nozzles in fluid beds**

Stefan Gerstner, Schlick

17:00 **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

17:30 Q&A and wrap up

17:45 *End of day one*

19:00 *Course Dinner*

Tuesday 12 May 2020

Applications and case studies

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 Procter 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, separation and attrition

Professor David York, University of Leeds

Demo e: Spouted bed

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

Demo f: Encapsulation and coating

Veerle Timmerman, Xedev/ProCept

12:40 *Lunch*

13:30 **Fluid bed drying – mechanistic modelling and scale-up**

Ian Kemp, Consultant (previously GSK)

14:10 **How liquids spread, coat or agglomerate in fluid bed processing**

Professor Nik Kapur, University of Leeds

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

14:50 **Operation: start up and shut down and handling difficult materials**

David Smith, DJS Process Consulting Ltd (formerly of Procter and Gamble)

15:30 *Tea*

15:45 **Case studies of continuous and batch operation**

Henning Falck, Neuhaus Neotec

- Pros and cons of continuous vs batch

16:10 **Powder morphology and powder performance - case study food 1: three-in-one coffee mix**

Tobias Kockel, Nestlé R&D Konolfingen, Switzerland

16:35 **Particle engineering and characterisation of output particles**

Lieselotte de Smet, Xedev/ProCept

17:00 **Trouble shooting forum/expert consultation session, Q&A and networking drinks reception**

18:00 *End of day two*

Wednesday 13 May 2020

Applications and case studies cont.....

09:00 *Coffee*

09:15 **Welcome**

Dr Jim Bullock, iFormulate Ltd

09:20 **Powder morphology and powder performance - case study food 2: thicken-up clear**

Tobias Kockel, Nestlé R&D Konolfingen, Switzerland

09:50 **Case study – fluid bed granulation modelling and scale-up**

Ian Kemp, Consultant (previously GSK)

10:30 *Coffee*

10:45 **Case Study: particle coating and controlled release**

Barry Friend, Colorcon

11:25 **Case Study: combining spray drying with a fluid bed**

Professor David York, University of Leeds and Nigel Somerville Roberts, NSR Innovations Ltd

Expanding understanding and application of fluid beds

12:05 **Innovation example 1 - academic - structured fluid beds: towards more responsive processes**

Dr Victor Francia, Heriot-Watt University

12:45 *Lunch*

13:35 **Instrumentation and control: sensors, soft sensors and control loops**

Tobias Kockel, Nestlé R&D Konolfingen, Switzerland

14:15 **Innovation example 2 – industry – high gravity fluidized beds**

Prof. Dr. ir. Juray De Wilde, Université Catholique de Louvain (UCLouvain)

14:55 *Tea and end of course*