



The  
University  
Of  
Sheffield.

# 8th International Granulation Workshop

Sheffield, UK, June 2017

*Granulation Course: 26<sup>th</sup> - 27<sup>th</sup> June*

*Granulation Conference: 28<sup>th</sup> - 30<sup>th</sup> June*

## 8th International Granulation Workshop, Sheffield, UK

Course: 26<sup>th</sup>-27<sup>th</sup> June 2017

Conference: 28<sup>th</sup>-30<sup>th</sup> June 2017

Granulation and agglomeration technology is a popular topic and of growing interest for industry - and, therefore, academia - as it is such a key process in the manufacture of many solid products. Growing interest in the field has led to the development of International Granulation Workshop, which has become the one of the world's largest forum for industry and academia to share and discuss recent developments in this complex and evolving field.

The 8<sup>th</sup> edition of this workshop will take place in 2017 in Sheffield, United Kingdom. It will consist of two parts: a 2-day hands-on Course to serve as an introduction to agglomeration technologies, hosted by some of the world's leading experts in granulation in industry and academia, followed by a 3-day scientific conference, during which cutting-edge research in the field will be presented. The workshop will cover a variety of important topics and will offer a platform for participants to present their latest results, to discuss ideas and to establish new collaborations.

In addition to being a platform for interaction between industry and academia, we also strive to make the workshop a prime venue for professional networking, with a friendly atmosphere and social events included in the conference program.

We look forward to welcoming you to Sheffield in 2017,

Prof. Agba Salman  
Prof. Stefan Palzer  
Prof. Mike Hounslow

## Plenary Speakers

Prof. Jim Litster: "Back to the future - eight years on" *The University of Sheffield, UK*

Prof. Dr. Stefan Heinrich: "Multiscale simulation of fluidized bed spray granulation" *Hamburg University of Technology, Germany*

Dr. Liz Meehan: "The role of materials science in pharmaceutical powder processing" *AstraZeneca, UK*

Prof. Karen Hapgood: "Future directions in pharmaceutical particle processing research" *Monash University, Australia*

Prof. Frank Kleine Jäger: "Design of Functional Chemistry by Granulation Technologies" *BASF, Germany*

Prof. Stefan Palzer: "Quo vadis particle technology?" *Nestlé Switzerland*

## Granulation Course

26<sup>th</sup>-27<sup>th</sup> June 2017

Prior to the Conference there will be a 2 day Granulation Course, led by experts from the food, detergent and pharmaceutical industries. This course is designed for you if *you work in industrial granulation or are a PhD student*. At the course you will get hands-on granulation experience and knowledge from renowned experts in the field.

### Topics:

- Product and Process Design.
- Elements of granulation technology – wet granulation regime map.
- Understanding granule formation: Mechanisms in agglomeration – mechanisms of size enlargement, effects of liquid distribution, binder selection, control of granule size.
- Equipment for granulation, including: low and high shear mixers, fluid bed granulators, roller compaction, tableting, extrusion and spheronisation.
- Continuous and batch granulation.
- Finished product characterization; Key finished particle properties will be investigated.

## Scientific Committee

Prof. Hans Kuipers, Technical University of Eindhoven, The Netherlands

Prof. Frank Kleine Jaeger, BASF, Germany

Prof. Satoru Watano, Osaka Prefecture University, Japan

Prof. Khashayar Saleh, Université de Technologie de Compiègne, France

Prof. Mojtaba Ghadiri, University of Leeds, UK

Prof. Karen Hapgood, Monash University, Australia

Dr. Gabriele M.H. Meesters, DSM, The Netherlands

Prof. David York, University of Leeds, UK

Prof. Jim Michaels, University of Delaware, USA

Prof. Gavin Walker, University of Limerick, Ireland

Prof. Mike Adams, University of Birmingham, UK

Prof. Peter Kleinebudde, Heinrich-Heine-University Duesseldorf, Germany

Dr. Ingela N. Björn, AstraZeneca, Sweden

Prof. Frantisek Stepanek, Institute of Chemical Technology, Prague, CZ

Prof. Chuan-Yu Wu, University of Surrey, UK

Dr. Gerhard Niederreiter, Nestlé, Switzerland

Ass. Prof. Rohit Ramachandran, The State University of New Jersey, USA

Prof. Gavin Reynolds, AstraZeneca, UK

Prof. Chris Vervaet, Ghent University, Belgium

Dr. Gurjit Bajwa, GSK, UK

Prof. Stefan Heinrich, Technical University Hamburg-Harburg, Germany

Dr. Kendal Pitt, GSK, UK

Dr. Poul Bach, Novozymes, Denmark

Dr. Hong Sing Tan; Procter & Gamble Co, China

Prof. Markus Thommes, TU Dortmund University, Germany

Dr. Steve Keningley, Unilever, UK

Prof. Anders Rasmuson, Chalmers University of Technology, Sweden

Dr. Tibor Attila Nagy, Gedeon Richter Ltd., Hungary

Prof. Göran Alderborn, Uppsala University, Sweden

Dr. Bindhu Gururajan, Novartis Pharma AG, Switzerland

Prof. Evangelos Tsotsas, Otto-von-Guericke-University Magdeburg, Germany

Prof. Jim Litster, University of Sheffield, UK

Prof. Stefan Palzer, Nestlé Switzerland

Prof. Mike Hounslow, University of Sheffield, UK

Prof. Agba Salman, University of Sheffield, UK

# Workshop Themes

## The Macro Scale I: Processing for Granulation

### Processes

- Fluidized Bed Granulation
- Spray Drying
- High Shear Granulation
- Extrusion-Spheronisation and Pelletization
- Roller Compaction
- Tableting
- Coating and Encapsulation

### General topics

- Continuous Granulation (including feed rate and granule composition)
- Scale-Up
- Powder Mixing
- Particle Dissolution, Dispersion and Deposition
- Tools for Process Control and PAT
- Evaluating Product Performance
- Environmental Aspects / Energy Consumption
- Overall Process Concepts & Design
- Granulation: Variability and Error
- On-line measurement
- Variability and Error
- Affordability/Economics of granulation
- Industrial challenges in manufacturing
- Process control when running on the edge-continuous and batch systems
- Feed forward control based on powder characterisation
- Fast start up and shut downs

## The Meso Scale: Mechanistic Description

- Wetting and Nucleation, and Growth and Consolidation
- Granulation Rate Processes
- Breakage in Granulation
- Characterisation of Material Properties and their Influence on Granulation
- Binder Properties
- Transport Phenomena during Granulation
- Stress Distributions and Flow Profiles in Granulation Processes

## Towards a Generalised Model of Agglomeration

- Influence of material properties of feed particles on agglomeration mechanism
- High Viscosity and Low Viscosity Binders
- High Shear and Low Shear Granulators
- How to Design the Optimal Agglomerator
- How to Control Properties (Shape, Density, Strength and Size)

## The Macro Scale II: Applications

- Tableting
- Pharmaceutical Granulation
- Fertilizer Granulation
- Agglomeration in the Food Industry
- Detergent and Personal Care Products
- Agglomeration in Suspension-Flocculation
- Nanoparticle-Granulation
- Agglomeration in the Metallurgical Industry
- Agglomeration in Catalysts
- Bio-granulation-Aerobic granulation
- Agglomeration in other Processes
- Undesired Agglomeration and Powder Caking
- Green Granulation - Innovative Processes

## The Micro Scale: Granules and Smaller

- Structure-Property (Granule Structure, Product Performance)
- Droplet; wetting, spreading and rebound phenomena
- Interparticle Forces – Particle Adhesion – Sintering – Liquid bridge
- Product Structure vs Application Properties
- New Granule Characterisation Methods
- Hierarchically Structured Granules

## How to register

To register please visit:

<http://www.sheffield.ac.uk/agglom/2017/registration>

# Organisation Committee

- Dr. Dave Doughty
- Dr. Csaba Sinka
- Dr. Robert Sochon
- Dr. Ian Gabbott
- Dr. Nejat Rahmanian
- Dr. Iyad Rashid
- Dr. Constantijn Sanders
- Dr. Ali Hassanpour
- Dr. Hong Sing Tan
- Dr. Ranjit Dhenge
- Dr. Vikram Chouk
- Dr. Waleed Al Nasser
- Dr. Chi Mangwandi
- Dr. Kimiaki Washino
- Mr. Jiankai Yang

### Local Organisation Committee:

- Dr Ranjit Dhenge
- Miss Arthi Rajkumar
- Bilal Khorsheed
- Dr Syed Islam
- Mr Jiankai Yang

## Abstracts

For details on how to submit an abstract and the deadline, please visit:

<http://www.sheffield.ac.uk/agglom/2017/callforabstracts>

For details on how to submit a paper and the deadline, please visit:

<http://www.sheffield.ac.uk/agglom/2017/papersubmission>

## Further Information

Prof. Agba Salman

Chemical and Biological Engineering

University of Sheffield

Mappin Street, Sheffield, S1 3JD, UK.

Tel: +44 (0)114 222 7650

Fax: +44 (0)114 222 7501

Email: [granulationworkshop@sheffield.ac.uk](mailto:granulationworkshop@sheffield.ac.uk)

Website: <http://www.sheffield.ac.uk/agglom/2017>

## Poster Competitions

There will be poster competitions at the conference, sponsored by GSK, AstraZeneca, IChemE, TTC and Alexanderwerk.

## Sponsors



# Conference Social Events

## 28<sup>th</sup> June 2017 Evening Dinner The City Hall

Sheffield City Hall is one of Sheffield's prominent historical landmarks, located in the heart of the city at Barker's Pool. It is a popular venue for numerous international and local events thanks to its famous ballroom and Concert Hall. It is also home to the Sheffield's War Memorial.



## 29<sup>th</sup> June 2017 Gala Dinner Cutlers' Hall

Cutlers' Hall, built in 1832, is an outstanding example of Victorian architecture and is described as being the most prestigious venue in Sheffield. It is home to the Company of Cutlers' in Hallamshire and, therefore, Sheffield's steel history shines through its walls.

