

Powder Characterisation: Chemical, Physical and Mechanical Properties

18-21 May 2010

Weetwood Hall Hotel & Conference Centre, Otley Road, Leeds, LS16 5PS

Organised by *Professor M Ghadiri and Dr A Hassanpour*
Institute of Particle Science and Engineering,
School of Process, Environmental and Materials Engineering
University of Leeds, UK

This short course will outline the principles and methods for characterising the chemical, physical and mechanical properties of powders at length scales ranging from molecular level to single particles and to bulk levels. Sample preparation and the state-of-the-art techniques for particle characterisation will be detailed. The course is intended for scientists, engineers and technologists wishing to gain a better understanding of powders characteristics to enable them to address powder handling, processing and manufacturing issues from a fundamental base.

The course has been running for the last seven years, and the structure and contents are revised annually based on inputs from the participants' feedbacks and suggestions from academic and industrial advisors. The course is given by over ten lecturers with internationally-leading expertise in their own speciality fields. The outcome of the course should enable the participants to choose what and how to characterise the powder and suspension properties and to diagnose particular process and product issues of interest.

Provisional Programme

Tuesday 18 May 2010 CHARACTERISATION OF PHYSICAL PROPERTIES OF PARTICLES

- **Sample preparation for particle characterisation**
 - Origins of problems in particle property analysis
 - Colloidal science and sample preparation
- **Particle size characterisation**
 - Principles of size analysis
 - State-of-the-art instruments for particle sizing
- **Particle shape and structure**
 - Shape and shape description
 - Surface morphology and structure
- **Suspension rheology**
 - Introduction to the principles of suspension rheology
 - Particle structuring in suspensions
 - Measurement of suspension rheology

Wednesday 19 May 2010 CHARACTERISATION OF MECHANICAL PROPERTIES OF PARTICLES

- **Mechanical properties of powders**
 - Introduction to mechanical properties of powder
 - Characterisation by nano-indentation
- **Mechanical behaviour of powders**
 - Characterisation of deformation and breakage of particles
 - Particle breakage under brittle and semi-brittle failure modes
 - impact and side crushing
 - bulk compression and crushing
- **Cohesive powders**
 - Mixing of cohesive powders
 - Cohesive powder flow
 - Segregation
- **Bulk characterisation of powders**
 - Shear cell
 - Frictional properties
 - Consolidation and unconfined yield stress

Thursday 20 May 2010 CHARACTERISATION OF CHEMICAL PROPERTIES OF PARTICLES

- **Synchrotron radiation, X-Ray diffraction and Raman spectroscopy**
 - Principles
 - Application in crystallisation
- **Dynamic Vapour Sorption (DVS), Differential Scanning Calorimeter (DSC) and Thermogravimetric Analysis (TGA)**
 - Principles
 - Applications
- **Electrostatics in Powder Systems**
 - Fundamentals of tribo-electrification of powders
 - Measurements of tribo-electrification of powders
 - Industrial applications of electrostatics in powder systems

Friday 21 May 2010 CHARACTERISATION OF NANO, SUBMICRON PARTICLES

- **Atomic force microscopy**
 - Principles
 - Applications in both dry and wet systems
 - State-of-art in the field
- **Nano and submicron particles systems**
 - Nano and submicron particle products
 - Characterisation of nanoparticles and nanoparticulate products
 - Introduction to transport properties and interfacial phenomena at the nanoscale
 - Measurement of transport properties of nanoparticulate systems
- **Solubility and dissolution of particles**
 - Principles
 - Applications
- **Tabletting and compaction of powders**
 - Fundamentals of tabletting and compaction of powders
 - Industrial use of tabletting and compaction

Lecturers

Professor Simon Biggs
Professor Richard Buscall
Professor Reg Davies
Professor Yulong Ding
Professor Rob Forbes
Professor Mojtaba Ghadiri

Professor Norman Harnby
Dr Ali Hassanpour
Mr Nikolaas de Jaeger
Dr Xiaodong Jia
Mr David Merrfield
Dr Csaba Sinka

The course is designed on a single topic per day, enabling the participants to attend on a daily basis or the full course. The fee for the course is £300 + VAT per day. The total cost for the whole course, however, will be £1000 + VAT inclusive of lunches, refreshments and course dinner. If you would like to attend, please fill the enclosed form, and send it to Mrs K.K. Jutla, Institute of Particle Science & Engineering, University of Leeds, Leeds LS2 9JT, UK, or fax to + 44 (0)113 343 2405. You may also contact at +44 (0)113 343 2404, or e-mail: k.k.jutla@leeds.ac.uk. Early booking of your accommodation is highly recommended to ensure bedroom availability.

Characterisation of Physical, Chemical and Mechanical Properties of Powders

Tuesday 18 May – Friday 21 May 2010

REGISTRATION FORM

Registrations and payment should be sent before Monday 19 APRIL 2010 (complete the details and tick the relevant boxes):

Title _____ Surname _____ First name _____

Organisation _____

Address _____

Postcode _____

Tel. _____ Fax. _____

Email: _____

COURSE FEES including refreshments and lunches, please tick the following boxes indicating the days you would like to attend:

£300 Tuesday 18

£300 Wednesday 19

£300 Thursday 20

£300 Friday 21

£1000 Full Course, Tuesday 18 - Friday 21

Total: _____ +VAT (which I understand will be invoiced and paid to the University of Leeds)

Please send your purchase order to the address below and give the number here:

Please note that it is possible to do an online registration by credit card payment at:

<https://store.leeds.ac.uk/catalogue/products.asp?compid=1&deptid=8&catID=145&hasClicked=1>

COURSE DINNER

I would like to attend the Course Dinner on Thursday 20 May 2009 YES / NO

VENUE The course is held at Weetwood Hall Hotel & Conference Centre (Otley Road, Leeds LS16 5PS), providing an on-site accommodation with complimentary parking; see <http://www.weetwood.co.uk/> for details.

ACCOMMODATION – The participants are responsible for booking accommodation directly with the hotel. It is highly recommended to stay at the course venue; negotiation is being made to obtain a special deal with the Hotel. If you do not wish to stay at this hotel, we will be pleased to help you find alternative accommodation. In the latter case, your attention is drawn to a nearby hotel, Village Hotel, where sport facilities including swimming pool are available; see <http://www.village-hotels.co.uk/hotels/leeds/> for details.

Please send completed form to: Mrs K.K. Jutlla, IPSE, Houldsworth Building, University of Leeds, LEEDS, LS2 9JT, UK, Tel: +44 (0)113 343 2404, Fax: +44 (0)113 343 2405, Email: k.k.jutlla@leeds.ac.uk