

## **PARTICLE CHARACTERISATION INTEREST GROUP NEWSLETTER**

**January 2010**

### **FORTHCOMING MEETINGS:**

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**“Characterisation of sub-micron and nano sized materials”**

**At the Royal Pharmaceutical Society,  
Lambeth High Street, London SE1 7JN  
Wednesday 17th March 2010**

**hosted with the Joint Pharmaceutical Analysis Group**

In 1883 Lord Kelvin stated “To measure is to know.” When characterising sub-micron particles it is not possible to use a simple optical microscope to validate instrumental characterisation techniques. So the method of analysis of sub-micron particles should be robust and the operator needs an alternative approach to the optical microscope to validate whatever result is obtained. This technical meeting will have presentations on the different techniques available for sub-micron and nano sized characterisation, and will discuss method validation and checking. The important aspects of sample preparation and dispersion, within the context of the most appropriate end-use of the data, will also be covered. During the day, there will be a timetabled session for questions and answers, and delegates will be encouraged to submit questions prior to the event for discussion on the day.

#### **Seminar on equipment and applications of image analysis : June 2010**

With further advances in cameras and software Image analysis techniques continue to grow. The June meeting sponsored by PCIG will concentrate upon equipment and applications of image analysis ranging from oil exploration through 3D imaging to production control. The date is to be confirmed in early 2010

Expressions of interest for attending, presentations or demonstrations are welcome and should be directed to Nicki Tonkinson at [particles@btconnect.com](mailto:particles@btconnect.com)

## **Seminar on fluid and powder suspensions : September 2010**

The PCIG is looking to run a two day seminar on fluid and powder suspensions in September 2010. The days will be separated between powder and fluid suspensions and can be attended together or individually depending upon your areas of interest.

Each day will consist of a morning theoretical session looking at either powders or fluid suspensions, their processing issues, analytical techniques and case studies. Each afternoon will consist of a hands-on session using some of the techniques discussed earlier in the day.

Expressions of interest for attending, presentations or demonstrations are welcome and should be directed to Nicki Tonkinson at [particles@btconnect.com](mailto:particles@btconnect.com)

## **Waving the flag for England, Britain and the United Kingdom**

### **Nayland Stanley-Wood**

To impart the expertise gained over many years to the global powder technological audience and especially within the United Kingdom, an intrepid band of stalwart delegates, representing the UK and the British Standards Institution [BSI], travelled to the computer empowered and technologically advancing country of Japan. This country was the venue for the 34<sup>th</sup> International Standards Organisation meeting of ISO/TC24/SC4 “Particle Characterisation including sieving-Particle Characterisation” held on 2009-10-21 and 2009-10-22 at Osaka Academia, Nanko-Kita, Suminoe-ku, Osaka, Japan 599-0034

This small, but knowledgeable, UK delegation was lead by our leader Maurice Wedd and consisted of Alan Rawle, Paul Quincy and Nayland Stanley-Wood, who after arriving by air at various airports within Japan then had to contend with the complex internal Japanese transportation of limousines, shuttles, Nozomi Shinkansen, Bullet and local trains, planes and subway networks. In addition, dexterity had to be shown in the employment and negotiation of two speed escalators. One track for the tired but energetic thrusting young executives and the other for the sprightly, more sedate, but sage retirees.

With the rate of technological changes taking place worldwide, and especially in the Asia countries, impetus has also been transferred to changes in the arena of powder and particle technology, methodology and instrumentation. The need thus arises to ensure that scientific awareness and commercial advances are implemented into consensual standards for data collection and interpretation. To these ends, ISO/TC24/SC4 “Particle Characterisation including sieving-Particle Characterisation” has striven to provide up to date published protocol documentation, which is globally accepted.

A large proportion of published ISO Standards undergo mandatory revision every 5 years to maintain ‘technologically cutting edge’ advice and guidelines to standard procedures and protocols. These quinquennial revisions occur in the Work Groups, which performed the initial task of drafting and subsequent assembly of consensual advice into the final published International Standard. The pro-active approach of sub-committee SC4 of the Technical

Committee 24 [ISO/TC24/SC4 “Particle Characterisation including sieving-Particle Characterisation”] also initiates and encompasses new Work Groups into the sub-committee, as the techniques of particle measurement and characterisation expands, advances and also intrudes into the arena of nanotechnology

The current activity of each WG is listed below:

**WG 1: Representation of analysis data. (convener Michael Stintz)**

Representation of results of particle size analysis—

Part 1: Graphical representation [Published ISO 9276-1:1998/Cor : 2004 ]

Now the subject of a 5 yr systematic review within WG 1

Part 2: Calculation of average particle sizes/diameters and moments from particle size distributions [Published BS ISO 9276-2:2001]

Now subject to the incorporation of the Moment-Ratio (M-R) notation and conceptualisation into BS ISO 9276-2 for use in the calculation of average particle size. [CD 9276-2]

Part 3: Adjustment of an experimental cumulative curve to a reference model [Published as ISO 9276-3:2008]

Part 4: Characterisation of a classification process used for particle size analysis. [Published ISO 9276-4:2001]

Now the subject of a 5 yr systematic review

Part 5: Methods of calculations relating to particle size analysis using the logarithmic probability distribution . [Published as ISO 9276-5:2005]

Part 6: The description and quantitative representation of Particle Shape and Morphology. [Published as ISO 9276-6:2008]

ISO/WD 26824 Particle characterization of particulate systems – Vocabulary

Now actively being discussed in the Work Group

**WG 2: Sedimentation, classification (convener Dietmar Lerche)**

Determination of particle size distribution by gravitational sedimentation methods -

Part 1: General principles and guideline [BS ISO 13317-1:2001]

This quinquennial review has proceed to a new work item NWI 13317- 1

Part 2: Fixed pipette method [BS ISO 13317-2:2001] Subjected to a corrigendum

Part 3: X-ray gravitational technique [BS ISO 13317-3:2001].

Part 4: Balance method. [ISO/NWI 13317-4] has been advanced to a committee draft

Determination of particle size distribution by centrifugal liquid sedimentation methods -

Part 1: General principles and guidelines [BS ISO 13318-1:2001] Now the subject of a 5 year revision.

Part 2 Photocentrifuge method [BS ISO 13318-2:2001 and ISO 13318-2:2007].

Part 3 Centrifugal X-ray method [ISO 13318-3:2004].

Part 4: Pipette method [ISO/DIS 13318-4: 2004].

**WG 3: Pore size distribution, porosity (convener Matthias Tommes)**

Evaluation of pore size distribution and porosity of solid materials by mercury porosimetry and gas adsorption-

Part1: Mercury porosimetry [ ISO 15901-1 : 2005 and ISO 15901-1:2005/Cor

1:2007] to undergo a quinquennial revision as a preliminary work item  
Part 2: Analysis of mesopores and macropores by gas adsorption [ISO 15901-2:2006]

Part 3: Analysis of micropores by gas adsorption [ISO 15901-3:2007]

Determination of the specific surface area of solids by gas adsorption –BET method [To be published as ISO 9277:2009 or 2010]

Determination of density by volumetric displacement – Skeleton density by gas pycnometry under discussion as a preliminary work item [ISO/PWI 12154]  
Measurement of water sorption and other vapours in solids [PWI 12918]

**WG 5: Electrical sensing methods (convener Andrew Mark)**

Determination of particle size distribution –

Electrical sensing zone method [ Published BS ISO 13319: 2007 ]

**WG 6: Laser diffraction methods (convener Ron Iacocca)** Particle size analysis - Laser diffraction methods - General principles.

Has undergone a five year revision [ISO 13320: 2009]

**WG7: Dynamic light scattering. (convener Robert Finsy)**

Particle size analysis- Dynamic light scattering (DLS)

[Published as ISO 22412 :2008]

**WG 8: Image analysis methods (convener Yoshio Otani)**

Particle size analysis -

Part 1: Static Image analysis methods [ISO/DIS 13322-1:2004]. Subject to a 5 year revision May wish to include ISO 13322-2 into ISO 13322-1

Part 2: Dynamic Image analysis methods [ISO 13322-2: 2006].

Size and shape by discretized image [ISO/PWI 12177]

**WG 9: Single particle light interaction methods (convener Kazuo Ichijo)**

Determination of particle size distribution- Single particle light interaction methods

Part 1: Light scattering aerosol spectrometer [ISO/FDIS 21501-1]

Part 2: Light scattering liquid-borne particle counter [ISO/DIS 21501-2]

Part 3: Light extinction liquid-borne particle counter [ISO/DIS 21501-3]

Part 4: Light scattering airborne particle counter for clean spaces [ISO/DIS 21501-4]

**WG 10: Small angle x-ray scattering method (convener Chen Jingyi)**

Particle size analysis -

Small angle X-ray scattering method [Published as ISO/TC 13762:2001]

Working draft standard under discussion

**WG 11: Sample preparation. (convener Kari Heiskanen)**

Particulate materials –

Sampling and sample splitting for the determination of particulate properties. [Published as ISO 14488:2007]

Sample preparation -

Dispersing procedures for powders in liquids. [ISO14887: 2000].

A preliminary work item [PWI] has been created and under discussion in the Work Group entitled 'Sample preparation and reference materials'.

**WG 12: Electrical mobility and number analysis for aerosol particles. (convener Gilmore Sem)**

Determination of particle size distribution –

Differential electrical mobility analysis for aerosol particles. Published as BS ISO 15900:2009.

**The preliminary work item [PWI 27891] on 'Aerosol particle number concentration-calibration of condensation particle number counters' is now a new work item.**

**WG 14: Particle characterisation by acoustic methods. (convener David Scott)**

Measurement and characterisation of particles by acoustic methods –

Part 1: Concepts and procedures in ultrasonic attenuation spectroscopy, [ISO 20998-1: 2006]

Part 2: Guidelines for linear theory

**WG15: Focused scanning beam techniques (convener Gregor Hsaio)  
Working draft only**

**WG16: Characterization of particle dispersion in liquids (convener Dietmar Lerche)**

Particle size analysis –

Dispersed stability characterisation in liquids. Preliminary work item [ISO/PWI 1287]

**WG17: Methods for zeta potential determination. (convener Ren Xu)**

Method for zeta potential determination –

**Part 1: Introduction [CD 13099-1] is under preparation**

**Part 2 : Optical Methods [CD13099-2 ] is under preparation**

[PWI Proposed work item; NWI New Work item; WD Working draft; CD Committee draft; DIS Draft International Standard; FDIS Final Draft International Standard]

**Resolutions from 34th Meeting:**

**Resolution 187**

ISO TC24/SC4 resolved that ISO TC24/SC4 establish a liaison with TC 229 'Nanotechnologies'

**Resolution 188**

ISO TC24/SC4 resolved that PWI 13317- 1 'Determination of particle size distribution by gravitation liquid sedimentation methods- Part 1: General principles and guidelines ' in WG 2 Sedimentation, classification proceed to a NWI 13317-1

**Resolution 189**

ISO TC24/SC4 resolved that NWI 13317- 4 ‘Determination of particle size distribution by gravitation liquid sedimentation methods- Part 4: Balance method’, under preparation in WG 2 Sedimentation, classification, proceeds to a committee draft.

#### **Resolution 190**

ISO TC24/SC4 resolved that ISO 15901-1:2005 ‘Evaluation of pore size distribution and porosity of solid materials by mercury porosimetry and gas adsorption – Part 1. Mercury porosimetry’ under go revision as a preliminary work item.

#### **Resolution 191**

ISO TC24/SC4 resolved that PWI 27891 ‘Aerosol particle number concentration – calibration of condensation particle number counters’ under preparation in Work Group 12 Electrical mobility and number concentration analysis for aerosol particles be submitted as a new work item NWI 27891.

#### **Resolution 192**

ISO TC24/SC4 resolved that the Central Secretariat recognise that Dr Andrei Duhkin be appointed as Shadow Convener in place of Dave Cannon for Work Group 17 ‘Methods for zeta potential determination’.

More information available either from PCIG Mrs Nicki Tonkinson  
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### **The Brian Scarlett Scholarship Fund**

For over 40 years Professor Brian Scarlett made a major contribution to the Particulate Sciences. During this period many hundreds of students of many nationalities have gained from Brian’s tutoring and lively stimulation of debate. Over the years, Brian made a habit of taking with him on conference and overseas visits, as many of his students as the budget would permit and sometimes more. He reasoned that exposure to new people with other stimulating ideas would build the students character, broaden their understanding and improve their confidence. When one looks at the positions former students of Brian now command one can see that this philosophy was well founded.

We are therefore seeking to mark Brian’s contribution to society and to the discipline of particle science and engineering, by setting up a ring-fenced fund that will be devoted to supporting student travel in this specific area. The fund will be administered by the Particle Characterisation Interest Group, under the umbrella of the Royal Society of Chemistry, who are experienced in this field and registered as a charity.

Initial Sponsors:

Prof Rose Amal (University of New South Wales)	Prof George Klinzing (University of Pittsburgh/AIChE)
Dr Judith Bonsall (Unilever)	Dr Henk Merkus (Delft TU)
Prof Reg Davies (Du Pont Fellow)	Prof Brij Moudgil (University of Florida)
Prof John Dodds (Ecole de Mines)	Prof R Pfeffer (NIJT)
Professor Leslie Ford	Prof Wolfgang Peukert (University of Erlangen)
Prof Kari Heiskanen (University of Helsinki)	Prof Dr Sotiris Pratsinis (ETH)
Prof Ko Higishitani (University of Kyoto)	Mr Maurice Wedd (Malvern Instruments)
Dr Sue Ion (BNFL)	Prof. Richard Williams (University of Leeds)
Dr Nikolaas de Jaeger (President, International Fine Particle Research Institute)	

Further Information can be obtained from:

The Administrator of The Brian Scarlett Scholarship Fund, c/o PCIG, Station Yard Industrial Estate, Hatton, Derbyshire, DE65 5DU UK, Tel: +44 (0) 1283 810091 Fax: +44 (0) 1283 520412.

Email [particles@btconnect.com](mailto:particles@btconnect.com)

Bursaries have already been awarded to students for travel to PSA2008 and various International Events.

One of the reports received:

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1. Name of Meeting: [6<sup>th</sup> NIZO Elsevier Dairy Conference](#).
2. Location and Date: [Papendal, The Netherlands, \(30<sup>th</sup> September – 2<sup>nd</sup> October 2009\)](#).
3. Web site corresponding to the meeting: <http://www.nizodairyconf.elsevier.com/>
4. Approximate number of attendees by type, e.g.

[More than 250 delegates from nearly 40 different countries participated.](#)  
[8 Keynote speeches, 15 oral presentations, 6 Young scientists' presentations, 69 posters.](#)

Industrial: [Nearly 50](#)  
Students: [Nearly 100](#)  
Academic : [Nearly 70](#)  
Others : [Nearly 30 \(e.g. Publishers, Sponsors\)](#)

5. Review (not more than 200 words, commenting on aspects/talks you found to be most relevant and mentioning why):

The 6<sup>th</sup> NIZO Elsevier Dairy Conference was held in Papendal, The Netherlands, and the theme was "Dairy Ingredients: Innovations in Functionality". Experts from academia and food industries from different nations with diverse backgrounds were together to exchange ideas from fields of chemical engineering, food technology, biochemistry, genetic engineering and sensory science to improve the functional properties or identify any novel characteristics of dairy ingredients. At the conference, I presented a talk entitled "**Interactions of milk-protein stabilized emulsions with pancreatin and/or bile salts in an *in vitro* intestinal model system**", focussing on emulsion droplet behaviour and droplet coalescence in presence of simulated intestinal fluid, using particle characterization and confocal microscopic imaging techniques, with an aim to show how food microstructures can modulate lipid digestion. The talk was identified as a key area of recent research applications involving controlled release of bioactive dairy ingredients and fetched me the prestigious "**6<sup>th</sup> NIZO Elsevier Young Scientist Award (1<sup>st</sup> Prize)**" for my best presentation.

There were two areas of research that I found to be most relevant in the conference:

1. **Using dairy ingredients to alter the texture of foods** by Dr. A. Foegeding, North Carolina State University, USA. In this talk, the understanding of oral processing of foods was investigated by electromyography and 3-dimensional jaw tracking. By understanding oral processing better, Foegeding's group proposed that how the mastication behaviour (muscular forces, mandibular jaw movements, fluid flow, chewing time, number of mastication cycles) differ in low fat dairy products from that of the high fat ones. These insights might be used to intelligently manipulate dairy ingredients for creating suitable food microstructures, thus providing desirable texture.
2. **Micro- and nano-scale food engineering with dairy ingredients** by Dr. Karin Schroen, Wageningen University and Research, The Netherlands. The talk elaborated the recent advancement in field of micro fluidization, micro-encapsulation and nano-fibril formation techniques. These techniques might be very useful for manufacturing novel food micro and nano-structures to allow site-dependent controlled release of lipid bioactive (such as omega-3 fatty acids, carotenoids etc.), gradual release of flavour for better sensory appeal, and also for drug release in pharmaceutical applications.

The final part of the conference involved a "Hide and Seek session" in which the development of processed dairy products was performed on stage by a team of NIZO (a commercial research organization at The Netherlands) and some of the delegates from the audience. And, a NIZO scientist was explaining the colloidal science behind each food product development, on stage, which clearly illustrated the science-to-delivery-to-consumer acceptance cycle involved in innovations.

In conclusion, this was a very successful conference, which contributed to understanding the functionality of dairy ingredients and future prospects of research in basic and applied sectors. I am grateful to Brian Scarlett Scholarship Fund, which made my attendance possible at the 6<sup>th</sup> NIZO Elsevier Dairy Conference, The Netherlands.





**THE JOINT PHARMACEUTICAL  
ANALYSIS GROUP**

**<[www.jpag.org](http://www.jpag.org)>**

**Symposium programme 2009-2010**

**Thursday 3 December 2009**

**Analytical science and the regulation of  
pharmaceutical packaging**

Royal Pharmaceutical Society, London

**Thursday 4 March 2010**

**Quality by Design for analytical methods**

Royal Pharmaceutical Society, London

**Wednesday 17 March 2010**

**Characterisation of sub-micron and nano-sized  
materials**

Particle Characterisation Interest Group of the Royal Society of Chemistry  
Royal Pharmaceutical Society, London

**Thursday 22 April 2010**

**Chemometrics and predictive tools in pharmaceutical  
development**

In partnership with the Chemometrics Group of the Royal Society of Chemistry  
Royal Pharmaceutical Society, London

**Thursday 10 June 2010 Current issues in the stability of products**

Royal Pharmaceutical Society, London

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**Enquiries** about the symposium programme can be obtained from the Secretariat: Ms  
Julie Churchill, Events Coordinator. Tel 020 7572 2640; Fax: 020 7572 2506;  
E-mail: <[events@rpsgb.org](mailto:events@rpsgb.org)>

**For current information see the JPAG website: <[www.jpag.org](http://www.jpag.org)>**

## **PCIG Bursaries**

PCIG AWARDS in the form of bursaries, which may be up to £250.00 each, are available to student members of the Particle Characterisation Interest Group of the RSC in order to attend Conferences.

GENERAL BURSARY AWARDS: Consideration will be given on a case by case basis to full Particle Characterisation Interest Group members who by the receipt of such a bursary may make a contribution for the benefit of the particle characterisation community that would otherwise not be possible. These may be for travel expenses etc for attending conferences or standards meetings. The applicant must have been a full member of the PCIG for at least 1 year. Further information on either of these awards can be obtained from the Secretary (see back page for contact details).

## **Useful Web Links**

Royal Society of Chemistry

<http://www.rsc.org/>

Particle Characterisation Interest Group

<http://www.rsc-particles.org>

CHEMSOC, the Royal Society of Chemistry's Chemical Science Network

<http://www.chemsoc.org/events/conhome.htm>

ISO, International Organisation for Standardisation

<http://www.iso.ch/iso/en/aboutiso/introduction/index.html>

Institute of Particle Science & Engineering, University of Leeds

<http://www.leeds.ac.uk/speme/ipse/events-frame.html>

EventsWeb

<http://www.particlescic.com/eventsweb.php>

Free Book on Particle Technology

[http://www.particles.org.uk/particle\\_technology\\_book/index.htm](http://www.particles.org.uk/particle_technology_book/index.htm)

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Comments on the newsletter or items for inclusion in the next edition should be sent to the editor.



# PSA2011

**PARTICULATE SYSTEMS ANALYSIS**  
**Monday 5<sup>th</sup> – Wednesday 7th September 2011**  
**EDINBURGH UK**

***First Announcement***

This 11<sup>th</sup> PSA conference, organised by the Particle Characterisation Interest Group of the RSC, follows on from the successful conference and exhibition held in Stratford upon Avon in September 2008. The location for 2011 is the vibrant city of Edinburgh.

The venue chosen is the contemporary Hilton Edinburgh Grosvenor Hotel in the West End of the city. ([www.hilton.co.uk/edinburghgrosvenor](http://www.hilton.co.uk/edinburghgrosvenor))

**Papers will be invited in the following thematic areas:**

Manufacturing and functionalisation of particulates or structured particulate products from the nanometre to millimetre scale.

The following sub-areas will be considered:

- Process Analytical Technology
- Particulate product design and particle chemistry
- Particulate solids handling and processing
- Suspension, dispersion, and granular flows
- Pneumatic and hydraulic conveying, and fluidisation
- Process control
- Measuring techniques for particulate systems
- Particle size, shape, and structure analysis
- Rheological analysis
- Measurement of electrical charges
- Single particle and bulk powder characterisation
- Cohesive powder characterisation
- Non-intrusive particle tracking techniques
- Flow measurement
- Emerging techniques for nano particulate systems
- Modelling of particulate systems across length scales
- New theories and methods for nano particulate systems

The PSA2011 conference and exhibition will be relevant to a range of scientific, technological and engineering sectors, in particular, the pharmaceutical, nuclear, chemical, biomedical, mineral, food and household product industries.

[www.psa2011.com](http://www.psa2011.com)

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