

Particle Characterisation Interest Group of RSC
Analytical Division
The Royal Society of Chemistry

Imaging techniques for Particle Characterisation

**Donington Park Farmhouse Hotel, Melbourne Road, Isley Walton,
Nr Castle Donington, Derby DE74 2RN 01332 862409
Thursday 17th June 2010**

Who should attend?

It is envisaged that engineers or scientists engaged in challenging particle characterisation applications be they from quality control, research or development will draw benefit from the meeting. Significant advances have been made in cameras, lighting and computer techniques benefiting the field of particle characterisation. This one day meeting seeks to inform of the latest apparatus available together with descriptions of a broad spectrum of applications demonstrating the growing penetration of imaging techniques. A number of equipment suppliers will provide a table top presentations.

A poster presentation option is available, with 5 minutes for oral introduction before lunch.

The venue is very conveniently located just off the M1 and M42 and just 3 miles from East Midlands Airport. There is copious free parking.

Nearest train stations: Loughborough, East Midlands Parkway or Derby, all are 6 to 10 miles.

PROGRAMME

9.00-09.30 Registration and Coffee

09.30 Richard Holdich – Loughborough University

Scene setting and Introduction (size, shape, standards and image analysis overview)

10.20 Paul Sheppard – Imaging Associates Ltd

Microscopy and image analysis – a flexible approach to particle characterisation.

The microscope offers a wide variety of illumination and contrast techniques for particle visualisation. Automated microscopes combined with image capture and analysis can be used for many particle characterisation applications. The current state of image analysis will be reviewed including segmentation techniques and choice of measurement parameters.

Techniques such as multi-resolution analysis, classifiers and image mosaics can be used to solve more complex problems. The limitations to resolution and object recognition will be discussed.

Applications to industrial quality control, materials research and biological sciences will be used as examples.

11.05 Coffee

11.30 Bob Carr - NanoSight

Despite the growing importance of obtaining accurate estimates of size, size distribution and concentration of nanoscale particles in an increasingly wide range of applications, existing techniques for obtaining such information (e.g. electron microscopy, light scattering) can prove time consuming and complex and results difficult to interpret, particularly in samples which are heterogeneous in composition or which contain a range of particle sizes, e.g. are polydisperse.

Nanoparticle Tracking Analysis (NTA) is a newly developed method for the direct and real-time visualisation and analysis of nanoparticles in liquids. Based on a laser-illuminated microscopical technique, Brownian motion of nanoparticles is analysed in real-time by a CCD camera, each particle being simultaneously but separately visualised and tracked by a dedicated particle tracking image analysis programme. Because each and every particle is visualised and analysed separately, the resulting estimate of particle size and particle size distribution does not suffer from the limitation of being an intensity weighted, z-average distribution which is the norm in conventional ensemble methods of particle sizing in this size regime, e.g. the well established method of Dynamic Light Scattering (DLS) or Photon Correlation Spectroscopy (PCS). The ability of NTA to simultaneously measure particle size and particle scattering

intensity allows heterogeneous particle mixtures to be resolved and, importantly, particle concentration can be estimated directly, the particle size distribution profile obtained by NTA being a direct number/frequency distribution. Furthermore, NTA is capable of tracking, counting and sizing fluorescent nanoparticles such as quantum dots in liquids and in real-time when suitable (e.g. 405nm) excitation sources are used.

12.0 Ulf Willens - Malvern Instruments

Static or Dynamic Image Analysis: Which technique is appropriate for my samples?

Particle characterisation by automated image analysis is increasingly important for many industrial sectors, including pharmaceuticals, foods, household goods, minerals and engineering applications. Important information in terms of size, shape and transparency of a statistically significant number of particles may be obtained in a relatively short amount of time. Commercially available instrumentation for image analysis can be divided into two broad types; static systems where the sample is stationary in the field of view and dynamic imaging systems where the sample is flowing through the field of view. In this presentation we shall discuss the merits of both static and dynamic image analysis, including important points to consider when selecting the most appropriate technique for a particular application. This will be illustrated with examples for various applications including QC, trouble shooting, method validation and others.

12.40 Posters / Buffet Lunch / Networking

13.45 Rick Gaskin - Jorin

Applications of particle characterisation in oilfield wastewater treatment

'Oil and gas production incurs the co-production of large volumes of water, with an average of more than 3 barrels of water produced for each barrel of oil. With worldwide oil production of 85 million barrels per day, this equates to 13.5 million cubic meters of waste water per day. This waste water has residual oil and solids removed by a variety of mechanical separation processes, chemical additions and filtration processes and in many of these processes particle and droplet size are critical to separation efficiency. Once the water has been treated then there are two primary disposal routes available, discharge to the environment or injection to a disposal or pressure maintenance well and in the case of injection then particle and droplet size data is again critical for well maintenance. In this paper we will review case studies where the use of the on-line video microscopy has provided process control data, chemical optimisation and well protection, demonstrating that the key to success is in identifying specific particulate species and treating them appropriately.'

14.15 Wolfgang Witt - Sympatec

Latest Developments of High Speed Dynamic Images Analysis for Partice Size and Shape Characterisation

Since its introduction in 2004 the technique of high speed image analysis with powerful dry dispersion has been continuously improved. Today the combination of a pulsed 1-nanosecond light source, telecentric illumination and imaging, and a high speed mega-pixel camera adjustable up to 450fps, is applicable to a wide field of applications: laboratory and process environment including GMP, wet and dry dispersion including fibres, a size range from 1µm to 20mm, and particle numbers of up to >100.000.000 particles per measurement. As all individual particle images are stored in a database, the size and shape parameters show formerly unimaginable statistical relevance.

15.05 Graham Rideal - Whitehouse Scientific

Imaging analysis of reference materials

15.35 David Palmlund -Fluid Imaging Technologies Inc

Resolution issues of dynamic imaging and its application to the identification of particles –

Imaging particle analysis represents an exciting method of particle analysis which combines the speed of automated particle analyzers with the discrimination found in optical microscopy. However, in order to discriminate shape differences, it is limited to particles of larger than a certain size.. The primary factors that lead to this limitation are due to the optical systems used and available and the detecting sensors as well as the need to use sampling theories such as Nyquist – Shannon and lead to differing lower size limits for particle counting, simple shape and higher level shape characterisation . Applications of the technique, in particular its use for identification of particulate matter are also discussed with examples of applications in the identification of particulate contamination of pharmaceutical preparations and cellular organisms in water.

16.15 Conference Close

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Particle Characterisation Interest Group Analytical Group of RSC
Registration Form

To register please complete this page and return with payment by 10th June to:

Mrs Nicki Tonkinson C/O Particle Technology Ltd

Unit 1, Station Yard Industrial Estate

Hatton, South Derbyshire

DE65 5DU.

Tel: 01283 810091/520365

Fax: 01283 520412

Email: particles@btconnect.com

Delegate (please complete one form per delegate) **PLEASE PRINT**

Name	
Company	
Address	
Telephone	
Fax	
E mail	
Indicate Payment Method & Amount	
Special Requirements Access / Dietary / Other	
Please indicate where you heard of this meeting	
Topics of Interest –	please indicate in quotes “”, if you have a specific question that you wish to have raised / addressed.

Registration Fees: Please indicate*

Costs include tea/coffee and lunch:

£195.00 Non Members, £170.00 RSC/PCIG Member, £90.00 Student Rate(£150 incl. poster board)

I enclose a cheque for £_____ payable to Particle Characterisation Interest Group

(overseas cheques should be made in £ Sterling by a cheque drawn on a London Bank or otherwise free of all bank charges and commission).

If you prefer to pay via Paypal, please email particles@btconnect.com to arrange this.

Unfortunately, we are unable to accept credit cards directly.

Preferred Method: Payment can be made by Bank Transfer upon receipt of invoice.

Registration fees must be paid prior to the official start of the event. Registration can only be confirmed on receipt of payment. Receipts will be sent on request with a map and confirmation of Booking.

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