

# THE matrix NEWSLETTER

Powdermatrix

ISSUE 17. Spring/Summer 2008

## Powdermatrix Shows its Resolve

**Six years on from the first gathering of the particulate materials community under the Powdermatrix banner, our annual review meeting, Powdermatrix Resolutions, set out for the delegates many of the results from projects which were completed during the year and provided an opportunity to look forward to future initiatives.**

Over 100 delegates joined the meeting which returned, once again, to Holywell Park, Loughborough. The plenary talks and parallel technical sessions gave the large audience from industry and academia a full programme to choose from.

In the opening session, Alan Hooper, Lead Technologist – Advanced Materials at the Technology Strategy Board, set out the background and emerging strategy for its support for the UK materials business community. The Technology Strategy Board has the overall remit to lead a £1Bn programme, over three years; working with the Research Councils, RDAs and Government departments, to support the UK's leading and emerging businesses and growth sectors. As well as supporting collaborative research and development, the Small Business Research Initiative will be reformed and numbers of Knowledge Transfer Partnerships will be doubled. Within this, advanced materials technologies will play a vital underpinning role.

The Advanced Materials strategy will focus on a number of key challenges, with priorities for 2008 – 2011 including: secure, clean and affordable energy; clean and sustainable transport; sustainable construction; the reduce, reuse and recycle agenda; healthcare and the ageing society; and creative industries. As well as recognising the need for the support of both evolutionary and revolutionary technology developments, consultation with the materials community has also highlighted proof of concept actions (like the Powdermatrix SPARK awards)

and pre-product demonstrators as two areas where a lack of current support is hampering the exploitation of advanced materials.

Parallel conference sessions covered Magnetics, Ceramics, Processing and Powder Metals. Industry members highlighted the significant benefits gained from the third round of SPARK award projects that Powdermatrix fund for problem solving and feasibility studies in applications such as solid oxide fuel cells, particulate sampling and photocatalytic coatings.

The Powdermatrix Associates also presented their research. The best poster award went to Karl Hossbach, Anish Paul and Vinothini Venkatachalam demonstrating their work on microwave sintering and the best Associate presentation to Bala Raghupathy, Loughborough University on nanostructured ceramics.

Commenting on the day Keith Harrison, Sulzer Metco said "This is yet again a high standard event with great opportunities to meet with potential customers, suppliers, researchers and competitors."



**For more information contact**  
[stuart.maclachlan@ceram.com](mailto:stuart.maclachlan@ceram.com)

### Core partners:

| CERAM | Institute of Materials, Minerals and Mining | EPMA | British Hardmetals Research Group | NPL  
| University of Birmingham | University of Manchester | Loughborough University | EPSRC

# Turning Ideas Into Reality

**When asked if we've had a good patentable idea over the years, we would all probably say "yes" and "I could have made money out of it as well!". The problem is we did nothing about it!**

For the last two years, PowdermatriX Associates, the postgraduate and postdoctoral researchers from universities all over the UK engaged in PowdermatriX supported projects, have attended a workshop linked to our Annual Review Meeting. This year they were joined by associates from Faraday Advance and MADE (nodes of the Materials KTN) to learn about intellectual property (IP).

The Associates were given excellent, practical training by Brian More of Coventry University Enterprises who took them through the IP protection landscape including the importance of database searching. This culminated in an assessment of their R&D projects, rating the total commercial opportunity.

Brian was delighted with the effort and skill demonstrated and said "The Associates embraced the finer points of assessing a real commercial opportunity, considering the research stage as an essential component in delivering a product to market. Their business presentations were considered and realistic, demonstrating their obvious skill and ability to look at the holistic process of commercialisation. The skills learnt are used in every business to a lesser or greater extent, and the Associates showed what valuable employees they would make to any organisation in the demanding global marketplace."



## Award Winning Anti-corrosion Spray

**A 2005 PowdermatriX SPARK Award grant helped to form a fruitful partnership between Metallisation Limited and Aston University, which culminated in the two organisations receiving the prestigious Lord Stafford Impact Through Innovation Award in November 2007.**

On collecting the winning cheque for £5000 and a special edition Wedgwood plate, Terry Lester, Managing Director of Metallisation said: "The collaboration with Aston University enabled us to undertake invaluable research work on our products that we simply wouldn't have been able to conduct ourselves".

Metallisation produces flame spray equipment for anti-corrosion applications and, through the collaboration with Aston University, has now developed a pioneering spray gun known as the Met Jet 4 which is a high velocity oxy-fuel system offering substantial technological, quality and commercial benefits to both Metallisation Ltd and their customers. This new product has the potential to open significant new markets for the company, particularly for applications where extreme wear takes place. Typical uses for the products include spraying protective coatings for hydro-electric turbines, oil valves and mining equipment which significantly increase the lifespan of materials.

Initial combustion modelling investigations were supported by MAS-WM and PowdermatriX SPARK funding to prove the feasibility of the approach and followed by a number of further projects, facilitated by Aston's Business Partnership Unit.



## Award Winners Flying High

**With a predicted upsurge in companies embracing nanotechnology, a PowdermatriX SPARK Award has assisted Naneum Ltd to develop cost-effective apparatus for monitoring the workplace atmosphere when handling nano-material.**

Naneum Ltd, an SME based in Canterbury specialising in the development and sale of equipment for sampling and analysing airborne particulate, gained the award to assist in the evaluation of their Wide Range Aerosol Sampler (WRAS) by working with CERAM Research Ltd and NPL.

The WRAS detects heavy metals in urban atmospheres, resolving samples in up to 15 size sections and covers the whole aerosol, including nanoparticle fractions. Particles in size ranges 0.25 - 30 microns are collected on glass slides and particles in the size ranges 5nm - 250nm are collected on a series of nylon nets. Samples can then be analysed using a variety of techniques including atomic adsorption and mass spectrometry to give a chemical composition versus size distribution. Separation is performed by innovative application of inertial impaction and diffusivity phenomena - the very mechanism by which particles are deposited in the human respiratory tract. Measurements can therefore be related directly to the extent particles enter different regions of the lungs and subsequent health risks.

The Spark award showed that, whilst heavy metals such as arsenic and antimony could not be detected, lead was present in particles of two distinct sizes: 5-7nm and ~300nm. Using models that show how particle size impacts on the probability of particles reaching the inner lung, Naneum Ltd were able to demonstrate that the 5-7nm particles were likely to make a bigger contribution to bioavailability and potential health problems.

Following the award, Naneum Ltd has continued to work with CERAM and NPL on improving their technology. A number of instruments have been sold, including one to the University of Massachusetts (U-Mass). In a study at a workplace producing engineered nanoparticles U-Mass used an array of instruments to measure potential exposures. U-Mass confirmed that WRAS was the only instrument able to detect target Engineered Nanoparticles in the air against background aerosols. Naneum are now in the negotiation stage of an FP7 application for a substantial grant award from the EU.



# Thumbs Up for EGS Project

**Engineering the Green State of Powder Products, the major flagship PowdermatriX supported project, recently received outstanding reviews from EPSRC referees assessing the outputs following its completion in late 2007.**

This EPSRC funded project has delivered fundamental understanding for improved process controls of each step involved in the production of green (unsintered) compacts by die pressing, linking 6 universities and 21 industrial partners.

The referees rated the project as well executed and industrially focused delivering significant scientific and technological progress with a high level of planning to manage a large and complex work programme.

Several aspects of the research were highlighted as being of leading international quality, particularly the impressive development of innovative test equipment and the 3D tomographic monitoring of powder movement in early stage compaction. Advances in imaging, modelling and novel applications of tomography also demonstrated great potential for future scientific impact.

The referees also complimented the very strong training provided to the researchers and the close links with industry. PowdermatriX's role was specifically identified for the training provision offered through its Associate scheme and for its organisation of industry focused events and works visits.

Engineering the Green State has spread its results not only through an impressive range of journal and conference papers, but also through the Powdermatrix organised industrial meetings and workshops.

**To learn how your company could benefit from these cutting edge technologies contact PowdermatriX Technology Translator, David Whittaker, [david.whittaker@ceram.com](mailto:david.whittaker@ceram.com)**

## In-speck-tion and Powder Quality

**Branscan is a UK manufacturer of on-line and laboratory based analytical instruments dedicated to the quantification of specking. The equipment uses high speed cameras and a special lighting setup which, when combined with innovative in-house software, allows the detection of specks in slurry, gel and powder products.**

In a recent application, Branscan assisted an internationally renowned European food producer. Casein powder is an ingredient produced from milk that is used in infant formulations and processed cheese. The client was looking to monitor its production output by monitoring the quality of the casein powder produced.

In 2006 the client realised that precious time and resources were being wasted through visual inspections and time consuming filter tests. This resulted in delayed reaction from

production operators and sometimes led to inferior quality powder being added to good quality product already present in silos. The financial impact was some ten thousands of Euros lost per day.

A Powderscan on-line system was installed in 2007 which instantly alerted operatives to any changes in quality. Productivity has subsequently risen due to an ability to address problems quicker resulting in a reduction in waste. Ayton Erdentug, CEO of Branscan said "The Powderscan online system has become a vital link between processing and quality. Powderscan can instantly pick up contamination caused by the drying process which generates colour change and dark specks in the Casein powder. Through quick monitoring of the production process, significant increases in production rates should be realised thus increasing profitability".

Branscan was established as an independent company in 2001 and is based in Evesham, Worcestershire. It is the only business offering an online system for analysing impurities in slurry, gel or powder products. To date, Branscan have installed over 300 systems worldwide and operate 22 distributors over all five continents. As a member of PowdermatriX, Branscan is aiming to expand their applications into other industries using powders.

**Further information can be obtained at [sales@branscan.com](mailto:sales@branscan.com) and [www.branscan.com](http://www.branscan.com)**



## Roadmap Progress

**PowdermatriX has identified key development opportunities for particulate materials and products in power generation, transformation, transmission, distribution and storage industries.**

The study covers plant and equipment for:

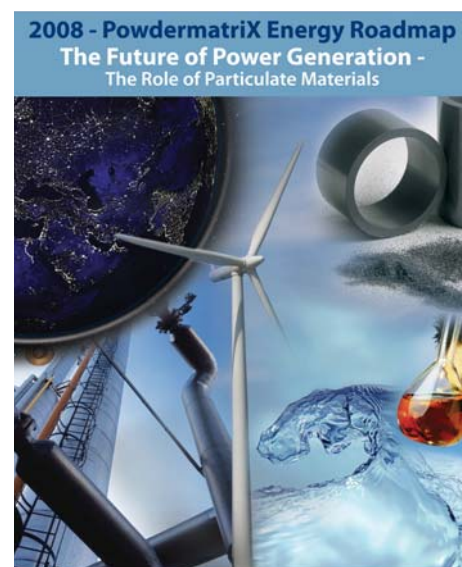
- Fossil-fuelled combustion generation technologies
- Nuclear power generation
- Water power generation technologies
- Power generation from other renewable sources
- Fuel cell technologies
- Power transformation, distribution and storage systems

The recommendations within the report could make significant contributions in satisfying the future performance needs of the energy sectors forecast to grow significantly in the next 25 years whilst meeting stringent environmental requirements.

Highlighted development areas include:

- Improved surface engineering solutions
- Novel metal deposition technologies
- High performance, protective NdFeB magnet coatings
- Improved performance refractory lining materials

**For the full document or further information, please contact Stuart Maclachlan, [stuart.maclachlan@ceram.com](mailto:stuart.maclachlan@ceram.com)**



## Register NOW for 'HiPerNano' 2008 – FINDING NANOMATERIALS SOLUTIONS FOR ENGINEERING PROBLEMS; London, 19th May 2008.

Most engineering industries require materials for components which are subjected to extreme environments such as high temperature, friction, corrosion, erosion and ballistic impact. The Nanotechnology KTN, in association with the Materials KTN through PowdermatriX, are organising a major industry awareness event on nano-enhanced materials solutions.

Nanotechnology provides a toolbox of new solutions in coatings, fillers, enhanced and novel hybrid materials which could give manufacturers and users a significant competitive advantage.

The HiPerNano event (High Performance Nano-Enhanced Materials for Extreme Environments) will provide an opportunity for manufacturers and end-users to hear from and meet the people behind the latest developments.

Confirmed speakers include Airbus UK, Defence Science & Technology Laboratory (DSTL), Diamond Hard Surfaces, E-On Power Technology, EPSRC, Ilika and Technology Strategy Board covering topics such as needs and opportunities in key market sectors, new technology developments and sources of funding for R&D.

Booking forms can be downloaded from [www.nanotechnologyktn.com](http://www.nanotechnologyktn.com)

# Particulate Systems Analysis (PSA) 2008 - Call for Papers

**Powdermatrix is pleased to be supporting the 10th Particulate Systems Analysis conference and exhibition, organised by the Particle Characterisation Interest Group of the Royal Society of Chemistry, being held on 2nd – 4th September 2008 in Stratford-upon-Avon.**

Following the successful 2005 event, the programme will include papers in the areas of:

- Process analytical technology
- Measuring techniques for particulate systems
- Particulate systems, products and processes
- Computer modelling of particulate systems and processes

The PSA 2008 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.

See [www.psa2008.co.uk](http://www.psa2008.co.uk) for further details.



## New Focussed Seminars at EuroPM08

**New for this year, and in response to requests from member companies, the European Powder Metallurgy Association (EPMA) is testing a fresh concept; two workshops aimed at parts makers, suppliers and end users. The meetings organised by the European Structural Parts Group (ESPG) will run in parallel with the technical conference, held in Mannheim.**

The first part will be for corporate members of the EPMA. The main focus will enable attendees to:

- Learn about the future trends for the powder metals industry
- Gain an insight into how powder metals technology is pushing the technical envelope
- Discuss with other industry professionals how powder metals can provide real competitive advantages

The second part of the programme will be an end user

seminar focused on future needs for design changes and on the opportunities for the powder metal supply chain. It is a chance for powder metal parts makers to give their customers a high level insight into the benefits of powder metal technology as the seminar will include:

- Presentations by end-users on how they have previously benefited from using powder metals
- Future trends in design and technology
- Presentations on how the European powder metals industry can meet these current and future challenges

Attendees from both seminars will also be able to attend the EuroPM08 opening plenary session and exhibition as well as the EPMA Awards luncheon on the 30th September.

Further details of EuroPM08 and registration can be found on the EPMA web site, [www.epma.com](http://www.epma.com)

## Cracking Green State Meeting

**The focus of a one day meeting at Leicester University on 24th June 2008 will be the ability to deliver products that are free from internal cracks, a vital issue for all sectors of the Powdermatrix community involved in the development of compact powders.**

The meeting will begin with a series of presentations by experts from a range of industry sectors that will compare and contrast the principal sources of cracking in each sector and the practical measures taken to alleviate cracking problems.

The remainder of the agenda will then define the current status of the scientific studies being carried out as part of a number of UK projects, which have:

- Provided experimental observation of shear crack initiation in powder transfer and early stage compaction
- Developed methods to characterise the strength in shear and tension of powder feedstocks
- Developed numerical simulation methods for the prediction of crack formation
- Assessed potential means of non-destructively identifying the presence of cracks in green or sintered parts

Further details on this meeting can be found on-line at [www.powdermatrix.org](http://www.powdermatrix.org) or from [ann.barratt@ceram.com](mailto:ann.barratt@ceram.com)

### Events Listing

Dates in Full	Event	Venue	Organiser	Contact
19th May 2008	'HiPerNano' 2008 – Nanomaterials Solutions for Engineering Problems	London	NanoTechnology KTN	<a href="http://www.nanotechnologyktn.com">www.nanotechnologyktn.com</a>
24th June 2008	Green State Cracking Meeting	Leicester University	Powdermatrix	<a href="mailto:ann.barratt@ceram.com">ann.barratt@ceram.com</a>
25th -26th June 2008	UK Particle Technology Forum	Heriot-Watt University	-	<a href="mailto:D.Wilkinson@hw.ac.uk">D.Wilkinson@hw.ac.uk</a>
2nd-4th September 2008	PSA 2008: Particle System Analysis	Stratford-upon-Avon	Royal Society of Chemistry Particle Characterisation Interest Group	<a href="mailto:JWilliams@particletechnology.com">JWilliams@particletechnology.com</a>
29th September - 1st October 2008	EuroPM2008: Congress and Exhibition	Mainheim, Germany	EPMA	<a href="http://www.epma.com/pm2008">www.epma.com/pm2008</a>

## Add a Colleague

If one of your colleagues would like to receive the Powdermatrix newsletter, please email their name and address with 'matrix' entered into the subject box to [powdermatrix@ceram.com](mailto:powdermatrix@ceram.com)

**Powdermatrix**

**CERAM**

Queens Road  
Penkhull  
Stoke-on-Trent  
ST4 7LQ

Tel: 0845 026 0902

Fax: 01782 412331

Web: [www.powdermatrix.org](http://www.powdermatrix.org)

Contact: [powdermatrix@ceram.com](mailto:powdermatrix@ceram.com)

### Contact details

For general and membership enquiries contact:

Stuart MacLachlan -

Telephone: 01782 764404

Email: [stuart.maclachlan@ceram.com](mailto:stuart.maclachlan@ceram.com)

### Funded by



Accelerating business innovation; a Technology Strategy Board programme