

# THE **matrix** NEWSLETTER

PowdermatrixX

ISSUE 11. Summer 2006

## Powder Powers Ceramic and Pharma

**The recent PowdermatrixX meeting "Powder Processing: Where Ceramics and Pharmaceuticals Meet" showed that particulate engineering is not confined to advanced materials.**

The meeting, organised jointly by PowdermatrixX and Phoenix Calibration Services Ltd, was the first time where the pharmaceutical and ceramics sectors have come together to share experience and good manufacturing practice.

With consistency and quality as common prime sector goals, the speakers discussed the process steps that produce a tablet or engineering ceramic component from a starting powder. Preparation and mixing, powder flow and compaction and die design all play a part in efficient processing and high quality products.

The positive delegate reaction has encouraged PowdermatrixX to organise further events with a more specific focus. 13th September sees a review of powder flow characterisation methods used by industry, in a meeting with the Particle Characterisation Interest Group of the Royal Society of Chemistry. More events will follow in areas of powder mixing and preparation.

*To find out about forthcoming events and meetings, visit the PowdermatrixX website at [www.powdermatrix.org](http://www.powdermatrix.org)*



## Spotlight on Casting

**High pressure casting has many potential environmental and process benefits over conventional and tape casting methods.**

Currently used only to make tableware items, advances in mould materials have opened the way to manufacture more complex shapes in advanced and refractory ceramics.

Supported under the DTI Technology Programme, a feasibility study led by CERAM showed the possible lower environmental impact and better processing costs offered by High Pressure Casting of advanced ceramic and refractory substrates. Following the successful completion of this study, a £1.2M project to develop High Pressure Casting for advanced material and refractory substrate fabrication has been approved by the DTI. With a planned start in Summer 2006, the project will develop materials, processes and technology on a pilot scale. The preparation of this four year project was supported by PowdermatrixX and involves our Industrial Members in the 6 company consortium.

*For more details, contact [steve.kessel@ceram.com](mailto:steve.kessel@ceram.com)*

## Pulling Takes the Lead



**David Pulling, who is the Managing Director of GKN Group Services, is the new Chairman of the PowdermatrixX Research Committee. A metallurgist with a PhD from the University of Wales, he has had over 25 years experience in GKN, where he has held a variety of technical and managerial roles.**

Prior to his present role, David was GKN's Director of Strategic Planning for more than a decade, during which time the GKN Group transformed itself from an industrial conglomerate and returned to its roots as an engineering company. A major plank of this strategy has been the development of its Powder Metallurgy Division. Since the mid-90s, the Division has expanded tenfold from a medium sized European business into the world's largest manufacturer of sintered components, as well as becoming a major producer of metal powders, with operations worldwide.

Technical development has been at the heart of this growth, and David hopes that the experience he has gained over this period can benefit the continued development of PowdermatrixX.

*For further details of Research Committee activities, please contact [steve.harmer@ceram.com](mailto:steve.harmer@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

# Award SPARKs Increased Production

With a strong demand for hard wearing coatings, a PowdermatriX SPARK award enabled Chapmans Agricultural Ltd to discover how to make their Armatech coating even more durable and to successfully launch a new product into the agricultural market place.

Chapmans Agricultural Ltd is one of Europe's leading suppliers of abrasion resistant wear parts for a wide range of sectors. The firm has a strong reputation for innovative products including Armatech, a powder metallurgy based coating which improves the wear resistance of metal parts used in the agricultural industry.

Initial tests carried out by Chapmans and the Materials and Engineering Research Institute (MERI) at Sheffield Hallam University suggested that the addition of certain hard phase powders could improve coating performance.

Testing for compatibility with the Armatech matrix, characterising coating microstructure and measuring physical properties at Sheffield Hallam University, resulted in a list of four powders likely to give the greatest improvement in product performance.

The contenders were then sintered by Chapmans and assessed by MERI using lab-based abrasive wear testing procedures, which use silica to replicate the abrasive effect of soil. These initial feasibility tests revealed one particular material meeting all the necessary performance criteria.

A year on from project completion, Chapmans are seeing the benefits from the SPARK Award. Richard Day, Toolroom Manager said: "After launching our new Armatech product, we have increased the production on the coating line from one shift to three shifts per day to meet customer demands".

**For more information, contact:**

**Chapmans Agricultural Ltd, Peter Wallis, Sales Director, [pw@chapmans-uk.com](mailto:pw@chapmans-uk.com)  
MERI, Sheffield Hallam University, Dr Hywel Jones, [a.h.jones@shu.ac.uk](mailto:a.h.jones@shu.ac.uk)**



Photo courtesy of Science Photo Library.



## Isabel is in the House

National Science Week 2006 saw Britain's top young scientists, engineers and technologists gathering at the House of Commons in March. Amongst them was Dr. Isabel Santacruz. A former PowdermatriX Associate at Loughborough University, Isabel was selected to join other successful young researchers from all over United Kingdom to present her work and compete for prestigious national level medals and prizes.

Currently working as a postdoctoral researcher with Prof Jon Binner's group, Isabel's work focuses on the preparation of stable, high solid content, low viscosity ceramic nanosuspensions, the green forming of ceramics through slip casting, coagulation casting and gel casting, and the properties and microstructure of ceramic components from nanosized powders.

Isabel commented "My experience was very enjoyable. The event is a unique opportunity to interact with both the scientific community and parliamentarians. I was able to present my most relevant research and also network with renowned researchers from different scientific backgrounds, institutions and career levels."

## New Collaboration in PM

**PMRADNET** is a new collaboration between a group of twelve major research centres and universities across Europe in the field of Powder Metallurgy (PM). In this way a critical mass of resources and skills can be utilised for the development of PM technology materials and processes.

These key PM research centres in Europe will collaborate more closely together for the common good of the PM industry and PM technology. Operating under the auspices of the European Powder Metallurgy Association (EPMA) the partners of **PMRADNET** have signed a Memorandum of Understanding to enable them to work together as follows:

- Development of collaborative research projects
- Transfer of students and/or staff on secondment between partners
- Sharing of equipment on a case by case basis
- Within the umbrella of EPMA, to develop links with its sectoral groups to facilitate industry participation in collaborative research programmes and to promote the development of the group

The group intends to be active in developing new proposals under the EC Framework 7, which is due to start by the end of 2006.

**For details of the partners and their activities visit the PMRADNET website at [http://www.epma.com/rand\\_area/radnet\\_home.htm](http://www.epma.com/rand_area/radnet_home.htm)**



## Sarah's on the CASE



**Sarah Maude, one of the 21 PowdermatriX Faraday Associates, has a BSc in Medicinal and Pharmaceutical Chemistry and is currently working towards a PhD at Loughborough University in the Institute of Polymer Technology and Materials Engineering (IPTME). However, when she isn't busy in the lab, Sarah doesn't like to keep still. She is a keen athlete, running both cross country and**

**middle distance on the track and has represented England for both. Here she tells The matriX a little about herself and her project.**

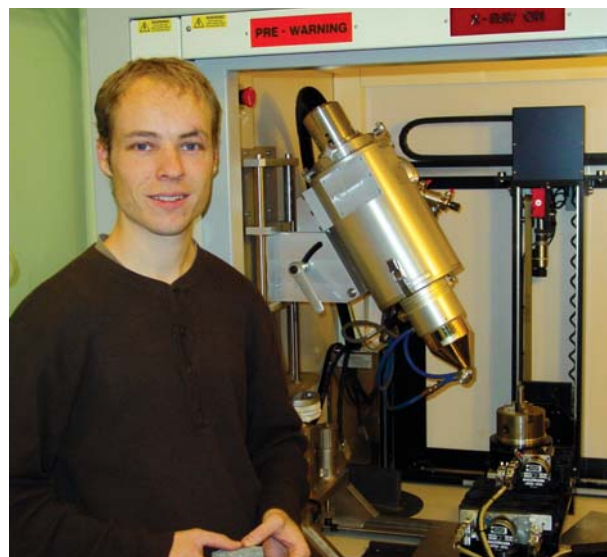
Since joining IPTME I have developed a strong knowledge and interest in materials, particularly ceramics. My PhD, titled; "UV absorbent nanoceramics", is sponsored by Qinetiq Nanomaterials Ltd (QNL) through the EPSRC Industrial Case Programme.

I first learnt about the CASE project from an advertisement in New Scientist. I was working as a researcher for 3M Healthcare on the development of asthma inhalers, but I felt it was time to start a PhD. I am really enjoying it, particularly the freedom to investigate my own theories and managing my own project.

I recently attended the 2006 Materials Congress where I presented a poster, and I am looking forward to attending CIEC 10 Conference where I will be presenting a poster and paper.

I am studying the factors influencing the visible light and UV radiation absorbency of suspensions made from plasma produced ceramics nanopowders manufactured by QNL. In particular I have been concentrating on zinc oxide and titania nanopowders suspensions to determine the relationship between particle loading, particle size and phase composition on the UV absorbency behaviour with a view to developing a new range of nanopowder products which could lead for example to improved sun protection products.

This CASE project ends in April 2007, but I would like to continue working with sunscreen products, perhaps in a development role or continue with the research.



## Sam's the Man

**Congratulations to Sam MacDonald on receiving The Royal Society Armourers & Brasiers' Prize for Excellence in Materials Science and Technology! Sam, who featured in the Winter 2005 issue of The matriX, is a Research Assistant at Manchester Materials Centre and is working on the PowdermatriX/EPSC project, Engineering the Green State.**

Sam commented on winning the award, "It was a really nice surprise when I heard I had been awarded the 'Armourers & Brasiers' Fellowship' prize. I felt quite honoured to be recognised for the work I have done during my PhD and Post Doc.

I have been involved in helping the development of X-ray microtomography at the Materials Science Centre, University of Manchester for the past 5 years, whilst applying the technique to different material systems. These have included the study of fibre cracking in titanium matrix silicon carbide fibre composites, the deformation of aluminium cellular foams, and the study of powder flow under transfer and compaction. Each of these complements my interest of in situ damage characterisation."

## Advanced Materials: One of DTI's Key Technology Areas

**Advanced Materials is one of the six Key Technology Areas covered by the medium term strategy documents launched on 26 April 2006 by the DTI Technology Strategy Board. The strategies, developed in consultation with business, are set out in the TSB publication "Developing UK Capability".**

The Technology Strategy Board has a vision for the UK to be seen as a global leader in innovation achieved through focus on those areas where the UK has the greatest capacity to develop and exploit technology. The goals of the TSB are to:

- Help leading UK sectors and businesses maintain their position in the face of global competition
- Stimulate those sectors and businesses with the capacity to be among the best in the world to fulfill their potential
- Ensure that the emerging technologies of today become the growth sectors of tomorrow
- Combine all these elements in such a way that the UK becomes a centre for investment by world-leading companies



Through the DTI Technology Programme, the Board has supported Competitions for Collaborative R&D and established a number of Knowledge Transfer Networks. Individually these initiatives will have impact, but to maximise benefits the TSB is taking a holistic approach to ensure they form part of a co-ordinated package of activities, which includes work on standards, regulation, procurement and global market intelligence. This will create an innovation ecosystem marshalling the elements required for a stimulating and supportive environment where UK business is given the best opportunity to succeed.

Input from business will help shape the strategies as they evolve and enable the Technology Strategy Board to provide an effective business voice in government. According to Dr. Robert Quarshie, Materials KTN Director, "the key technology strategies are designed to take a more integrated approach closely linked to the needs and priorities of business. In the materials area, we have engaged widely with the community through the work of the Materials Innovation and Growth Team and the Materials KTN and have developed a good set of priorities."

**The Advanced Materials report can be found at:**  
[www.technologyprogramme.org.uk/site/DTISpring06/KeyTechnology/AreaDocs/AdvancedMaterials.pdf](http://www.technologyprogramme.org.uk/site/DTISpring06/KeyTechnology/AreaDocs/AdvancedMaterials.pdf)

**You can register as a member of the Materials KTN at [www.materialsktn.net](http://www.materialsktn.net)**

# EPMA Titanium Group



The first steps towards launching the new EPMA Titanium Group were taken at the association's Annual Meeting in Palma Mallorca (4-5 May), when **David Whittaker, PowdermatriX Technology Translator and co-Chairman of the group, made a preliminary presentation to the Research, Education and Training Working Group.**

His presentation gave a personal review of current activity and potential in Titanium PM, proposed a draft mission statement for the group and suggested a range of future actions.

## Titanium watch and bracelet

One important future action is the organisation of a half-day Workshop on Metal Injection Moulding of Titanium, to be held on the morning of 25 October during the Euro PM2006 Conference in Ghent, Belgium. The agenda is anticipated to include an opening paper from a major end-user, setting the challenges for MIM titanium in capturing new markets, followed by four papers highlighting the parts makers' and powder suppliers' responses to these challenges.

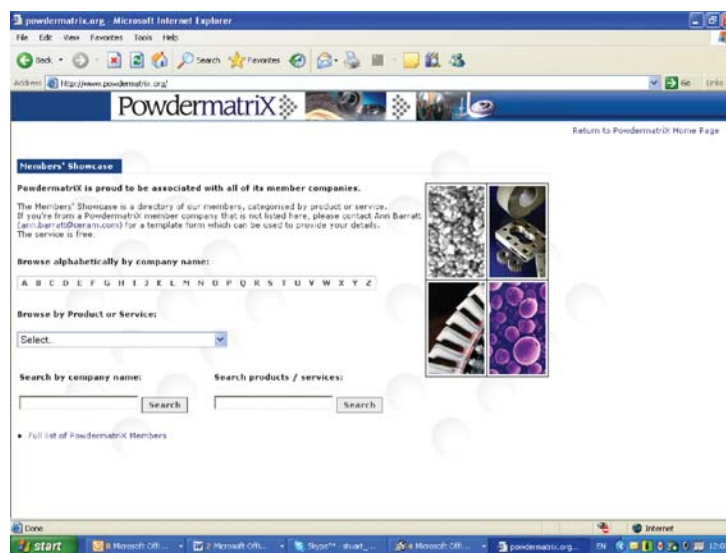
An encouraging number of expressions of interest in participation in the Titanium Group has already been received, several from PowdermatriX members, and its first formal meeting is likely to coincide with the Ghent conference.

For more information, contact [david.whittaker@ceram.com](mailto:david.whittaker@ceram.com)

# Members' showcase

The Members' Showcase gives you easy access to the products and services of many of the industrial members of PowdermatriX, either from our website, [www.powdermatrix.org](http://www.powdermatrix.org), or from the Materials KTN site, [www.materialsktn.net](http://www.materialsktn.net), through the PowdermatriX pages.

If you're a PowdermatriX member, don't miss this opportunity to publicise your products and services alongside your fellow Members. **Contact Ann Barratt on [ann.barratt@ceram.com](mailto:ann.barratt@ceram.com) and we will send you the templates for the information we need to enter your details.**



# Powder Flow Characterisation Meeting

**Powder flow characterisation is the topic of our seminar on 13th September at Pride Park Derby. Once again this event will be run with the Particle Characterisation Interest Group of the Royal Society of Chemistry.** Keynote talks on different aspects of powder flow will be followed by case studies showing how correlating flow to other powder properties can solve processing problems; and presentations on measurement methods. In addition, analytical equipment suppliers will be on hand to demonstrate relevant apparatus and NPL will report opportunities to participate in their project on particle size measurement.

For further details of the meeting contact [phil.jackson@ceram.com](mailto:phil.jackson@ceram.com)

## Events Listing

Dates in Full	Event	Venue	Type	Organiser	Contact
13th Sept 2006	Powder Flow Characterisation	Derby	Meeting	PowdermatriX	<a href="mailto:phil.jackson@ceram.com">phil.jackson@ceram.com</a>
21st-22nd Sept 2006	7th Particle Technology Forum	London	Meeting	Imperial College/IChemE	<a href="mailto:d.r.williams@imperial.ac.uk">d.r.williams@imperial.ac.uk</a>
22nd-25th Oct 2006	EuroPM 2006	Ghent	Conference	EPMA	<a href="mailto:info@epma.com">info@epma.com</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)



### CERAM

Queens Road  
Penkhull

Stoke-on-Trent  
ST4 7LQ

Tel: 01782 764444

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

