polymer LINKS

News from the UK's #1 academic/industrial polymer research network

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Issue 9 August 2007

COMPOSITE MATERIALS TAKE OFF

Big Day for Boeing and Rolls Royce

July 8 was the official debut of the technologically advanced and environmentally progressive Boeing 787 Dreamliner, marked by a Premiere at the aircraft's final assembly factory in Everett, Washington in the United States. A live audience of 15,000 witnessed the launch of the world's first mostly composite commercial aeroplane.

A major benefit of the advanced, lightweight plastic materials used in its construction is that the aircraft will use 20% less fuel per passenger than similarly sized planes, claims the company, so environmental impacts such as carbon emissions and aircraft noise will be lower.

Boeing is the key industrial partner in Sheffield's Composites and Advanced Materials Technology Centre (CAMTeC), and several research groups in the Faculty of Engineering at the University of Sheffield are active in the field of advanced composites for aerospace. Terry McGrail, Technical Director of CAMTeC, welcomed the unveiling of the 787 Dreamliner, adding that "CAMTeC is looking forward to an exciting future working with its industrial partners to develop innovative processing technologies to help to satisfy the predicted exponential increase in demand for composite materials over the next few years."

To date, 47 companies have ordered a total of 677 Dreamliners worth up to $110bn at current list prices. The first 787 is scheduled to enter passenger service in May 2008.

A significant proportion of Dreamliners will be powered by engines from Rolls Royce, another of the University of Sheffield's strategic partners. The Materials Damping University Technology Centre, one of four Rolls Royce UTCs at Sheffield, has seen several technologies adopted commercially by the company, including lightweight, noise-reducing polymer foams for filling hollow turbine fan blades.

More information is available online about CAMTeC (www.camtec-uk.org) and the Rolls Royce UTCs (www.shef.ac.uk/business/portfolio/rr.html).

PLASTICITY — ONE HUNDRED YEARS OF MAKING PLASTICS

From Bakelite to biodegradable cars: a century of plastics goes on display at the Science Museum

Running until January 2009, the free to enter *Plasticity* exhibition at the Science Museum celebrates the centenary of the world's first entirely synthetic material, Bakelite, invented by Leo Baekeland in 1907. It displays the plethora of plastics spawned in Bakelite's wake and shows how they have transformed consumer society.

The exhibition covers the history, development and future of plastics and presents some of the most practical, ingenious and strange uses of polythene, PVC, nylon, polyester and many others in fashion, the home, design, transport and more. A selection of inventions developed in the Polymer IRC contributes to a focus on the future at the exhibition.

Among the 400 exhibits are design classics such as Ekco radios and Art Deco mantle clocks, beautifully engraved cigarette boxes, the 1960s Finnish Futuro House whose design was inspired by the Apollo space mission craft, a 1960s PVC mac and boots, a polyurethane 2006 World Cup football, a working chandelier made from hundreds of Bic biros, an ergonomically designed Herman Miller

Mirra office chair, made from recyclable materials and itself 96% recyclable, and even an extremely rare Bakelite coffin together with a phone made from plant-based plastics.

Plasticity is brought up to the modern day with new uses of plastics, such as a wondrously light and resilient ski suit, a plastic model-producing printer and

aeroplanes which are able to change shape during flight to optimise flight at different speeds. Dr Peter Hine and Prof Ian Ward, of the University of Leeds, developed the self-reinforcing composite sheet used in the manufacture of the pictured suitcases. Exhibits from the University of Sheffield on plastic blood and medicinal polymer vesicles, developed by Dr Lance Twyman and Dr Giuseppe Battaglia, respectively, also take prominent positions.

Dr Susan Mossman, Science Museum exhibition curator and author of a history of early plastics, said: "The story of plastics is a key story of the material world over the past century. Plastics allowed a consumer revolution with the cheap mass production of an array of goods such as radios, televisions, computers, synthetic clothing and disposable biros and razors. However, whilst we have become reliant on plastics for a variety of consumer goods, this exhibition enables visitors to consider the changes needed in the production, reuse, recycling and disposal of plastics to continue enjoying them in the future."

www.sciencemuseum.org.uk

FOCUS : IRC Interactions

WORLD CLASS NEW FACILITIES AT BRADFORD

£2M Micro & Nano Moulding Lab Opened

A new multimillion pound atrium-style engineering research laboratory was officially unveiled at the University of Bradford on 3 July 2007 by Baroness Lockwood and Yorkshire Forward's Dr Ceri Williams. The Centre for Micro & Nano Moulding is a £2.2 million development funded by the Higher Education Funding Council for England and regional development agency Yorkshire forward, the Department for Business, Enterprise and Regulatory Reform (formerly DTI), the Engineering and Physical Sciences Research Council and industrial concerns, including Battenfeld, Motan and Fanuc.

The new centre, managed by Ben Whiteside, currently has six staff covering ultra small-scale precision moulding and compounding of polymers, nanocomposites and biomedical materials, complementing the larger scale processing facilities in the IRC laboratory. Typical products include medical components, telecommunications and optical products.

For more information visit: www.polyeng.com and www.ukmig.com

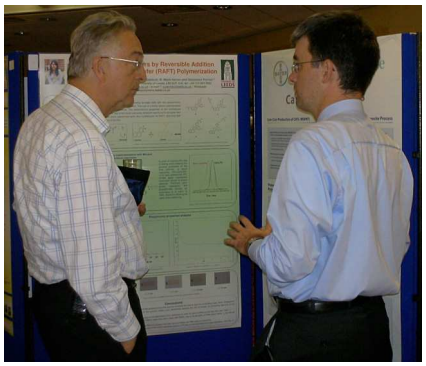
THE POLYMER IRC CLUB

Linking Knowledge and Innovation

A major aim of the Polymer IRC is to foster links with industry, research foundations and government agencies that have an interest in the advancement of polymer science and technology and soft nanotechnology to couple science with innovation. The IRC network links extensively with industry, other UK and international research groups, trade associations, Knowledge Transfer Networks and other KT bodies and the new Department of Business, Enterprise and Regulatory Reform (BERR). Core expertise can be provided in a wide range of polymer related areas including: novel architectures, polymers in electronic devices, polymer synthesis, molecular modelling, nanotechnology, materials characterisation and the control of polymer process and production.

Recently members gave their principal reasons for joining the club as:

- Gaining access to key academics working in areas of interest to them
- Identification of new ways of approaching existing technical issues
- Awareness of new applications for materials
- Enabling contact with members of the polymer community
- Promoting interaction with universities active in polymer research



- Networking and identification of potential collaborators

Currently Artenius, Arizona Chemical, Bayer Materials Technology, Cytec Engineered Materials, Dow Benelux BV, DSM, DuPont Teijin Films, Huntsman Core Technology Group, Huntsman Polyurethanes, ICI, Infineum, Invista Performance Technologies, Mitsubishi, Mitsui Chemical, Procter and Gamble, Scott Bader, Smith and Nephew, Unilever Corporate Research, Unilever Port Sunlight, Vertellus Chemicals and Victrex, all enjoy the benefits of being a Club member.

If you think your organisation would benefit from closer links with the Polymer IRC, contact Helen Clancy at h.e.clancy@leeds.ac.uk for more information about the different levels of membership available.

UK POLYMER SHOWCASE 2007

Innovative Materials

The *UK Polymer Showcase 2007* takes place at the London College of Fashion, 5-7 September. A growing list of 150 delegates has already registered, attracted by a fascinating range of activities and talks. Confirmed speakers include:

- Colin Bain, University of Durham
- Sharon Baurley, St Martin's College
- Rachel Brazil, NESTA
- Lionel Dean, Future Factories
- Christina de Matteis, Nottingham University
- Simon Edmonds, BERR (formerly DTI)
- David Farrar, Smith & Nephew
- Stuart Green, Invibio
- Tony Ryan, University of Sheffield
- Phil Sams, Unilever Port Sunlight
- Helen Storey, London College of Fashion
- Lynn Walker, Carnegie Mellon University
- Helen Wilson, UCL

Themes for the meeting are *IRC Research Highlights*, *Smart Textiles*, *Polymer Biomaterials*, *UK Materials Strategy*, *Science and the Arts*, *Instabilities in Polymers and Process Control* and *Interfaces and Composites*.

For further information, please visit the website, www.polymerirc.org/pages/PolymerShowcase, or email polymer.showcase@leeds.ac.uk

YORKSHIRE FORWARD AT NANOTECH 2007

The RDA represented in California

Yorkshire Forward was pleased to be invited to the NSTI (Nano Science Technology Institute) Conference, Nanotech 2007 in Santa Clara, CA. Dr Malcolm Butler and Miss Shelagh Cowley were delighted to represent the RDA at the Showcase event on 23 May.

The purpose of our visit was to promote the very best our region has to offer in terms of equipment, technical and academic expertise in micro- and nanotechnology, and a selection of marketing material representing these defined "specials" was displayed on our stand.

We had the added bonus of having Professor Tony Ryan with us on the stand who had been invited as a plenary speaker at the conference and who gave two excellent presentations on the first day on subjects "Soft Machines: Nanotechnology and Life" and "Synthetic Muscles from Block Copolymers".

IRC MODULAR TRAINING COURSE

Places still available

Polymer Science and Technology, a nine day modular course form the IRC will take place at Novotel in Sheffield between 29 October and 8 November. Thanks to the growing reputation of the course, we have seen a marked increase in bookings relative to previous years. Places are still available, however, and discounts apply for the IRC Club and multiple module bookings. For more information, please contact Shelagh Cowley on s.h.cowley@sheffield.ac.uk or via www.polymercentre.org.uk/courses/shorts.php

FOCUS : Technology News

SHEFFIELD SCIENTISTS TURN GLUE ON AND OFF

Polyelectrolytes for drug delivery?

Scientists from the University of Sheffield, in collaboration with the University of Bayreuth in Germany and the Rutherford Appleton Laboratory in Oxford, have developed a water-based adhesive that can be turned on and off. The glue, which can lose and regain its stickiness at different pH levels, could have huge implications for administering drugs in the body.

The glue is made up of polyelectrolytes, which are polymers that are electrically charged and can change their shape in response to their environment. A polyelectrolyte can either stretch out, when at one pH level, or roll into a ball at another pH.

The researchers, led by Dr Mark Geoghegan in the Department of Physics and Astronomy at the University of Sheffield, showed that if oppositely charged polyelectrolytes are brought together in water they stick tightly. This was widely known, but until now the strength of this bond and the fact that the process can be reversed and repeated was a mystery.

The study showed that the adhesion was nearly as strong as epoxy glue. Not only that, but when the water was made acidic, the two materials came apart. The separation of the two could also be reversed by immersing them again in water.

The work is expected to have applications in nanotechnology where changes in pH levels can be used to control the not as yet invented nanoscale machines of the future. It is also thought it could aid in drug delivery.

Dr Mark Geoghegan said: "There are several advantages to this mechanism. It is strong, as good as epoxy glue, but reversible in the fact that it can be turned off and still be re-used. It is also water-based, and so environmentally friendly. "Trying to identify where this will be used at this point is difficult. As scientists we have contributed what you might call the molecular tools of nanotechnology with our adhesive, but it is up to the engineers to decide how to use it. Drug delivery is always a possibility because different parts of the body have different pH values. A possibility is that the body's natural pH could be used with the adhesive to allow drug release."

For further information, please contact Liam Sutton at the Polymer Centre on 0114 222 9383 or L.R.Sutton@sheffield.ac.uk.

SHEFFIELD'S PLASSO TECHNOLOGY BOUGHT OUT

Plasso Technology has been snapped up by New Jersey medical technology company, Becton, Dickenson and Company.

Plasso was spun out of Sheffield University's Department of Engineering Materials and incorporated in 2003 (involving Professor Rob Short of the Sheffield Polymer Centre). Plasso has recently been investigating ways of immobilising biomolecules called glycosaminoglycans, or GAGs, found on the surface of cells, which are believed to play an important role in the progress of diseases such as cancer, deep vein thrombosis and arthritis.

Plasso chairman, Dr Allan Folwell said "We are delighted that Plasso's value in the market place has been fully realised, having seen its potential from the start."

Outgoing chief executive, Sameer Kothari, described the sale as "a welcome move in bringing our company's research and development to market globally."

PACKAGING LINKS

In November 2007, Faraday Packaging will have been providing 10 years of insights, intelligence and inspirations to the consumer packaging industry. The last ten years have seen a number of changes at Faraday Packaging. More recently, the management team has rapidly expanded to a team of ten, our network of industrial members and academic experts continue to be excited about the research and development opportunities presented to them and we are searching constantly for new research activities with potential applications in the packaging industry and adding value for consumers.

Faraday Packaging Partnership

As the issues surrounding packaging are constantly changing, Faraday Packaging intends to build on its current high-level status and remain in the best position possible to serve its members and the wider community.

To meet the specific needs and issues relating to materials in packaging, Faraday Packaging has just launched the *Packaging Materials Link*, our new portal on the Materials KTN website. *Packaging Materials Link* provides the latest news, advice and information on the world of materials for packaging.

Major Changes Affecting FMCG Packaging Design and Development will be the focus for our annual two-day conference, faraPack Briefing. This year's conference will be held on 6-7 November 2007 in York when we will celebrate our 10th anniversary with a Gala Dinner.

For further information on Faraday Packaging or FaraPack Briefing 2007, contact Pauline King, Marketing & Account Manager, Faraday Packaging, on Tel: +44 (0) 113 284 0213 or Email: pauline.king@faradaypackaging.com

FOCUS : Staff News

NEW APPOINTMENT IN EPSRC PRIORITY AREA

Professor Richard Jones FRS of the University of Sheffield has been appointed as EPSRC Senior Strategic Advisor for Nanotechnology, taking up the post from 1 June 2007. Professor Jones will spend three days per week advising EPSRC on the development and implementation of our nanotechnology strategy. He will also act as an advocate for nanotechnology and for EPSRC both within the UK and internationally.

Nanotechnology is a priority research area for EPSRC. Key elements of the strategy include developing a series of nanotechnology grand challenges, equipment sharing and provision for doctoral level training.

Professor Jones said: "Nanotechnology, responsibly developed, could help meet a number of society's pressing needs in areas like sustainable energy and medicine. I am looking forward to working with EPSRC and the research community to ensure the UK is at the forefront of the global competition to develop exciting science and valuable applications in nanotechnology."

A professor of physics at the University of Sheffield, he leads the Polymer Physics group and conducts research into the properties of polymers and biopolymers at surfaces and interfaces. As well as research, he is also involved in public engagement activities in the area of nanotechnology, both in explaining the technology itself and in debating the social and ethical issues. He is Chair of the Nanotechnology Engagement Group, a body set up by government to co-ordinate public engagement activities in this area.

Contact: Liam Blackwell
liam.blackwell@epsrc.ac.uk

NEW FACE AT BRADFORD

Dr. Emma Burton has joined the Bradford IRC. Originally from Liverpool, Dr. Burton first moved to Bradford in 1998 to study a degree in Chemistry with Pharmaceutical and Forensic Science. In 2002 she returned to Bradford to begin her PhD, working jointly with the Chemistry department and the IRC. Emma's research combined synthetic organometallic chemistry with polymer engineering, with the overall aim of developing immobilised catalysts for extrusion processes. Since completing her PhD in 2006 her research has continued focusing on reactive extrusion and in-process spectroscopic measurements.

For further information Dr. Burton can be contacted on e.l.burton@bradford.ac.uk

POLYMER IRC ASSIGNS A NETWORKS DEVELOPMENT DIRECTOR

From BP to the IRC

Dr Barry Maunders, formerly of BP Chemicals, is joining the Polymer IRC in the capacity of Polymer IRC Networks Development Director.

The Polymer IRC has been successful in its activities and further advancement and growth of the IRC could be achieved by taking full advantage of the opportunities that other UK and EU bodies offer.

The role involves:

- Networking with UK organisations, in particular the relevant BERR (formerly DTI) groups.
- Helping to identify new collaborative opportunities for the Polymer IRC.
- Networking with EU organisations and appropriate European Technology Platforms.
- Strengthening contact with appropriate Knowledge Transfer Networks.
- Seeking strategic opportunities for the Polymer IRC to run joint workshops with the groups and networks.

PASTURES NEW FOR JEN

Jen Harris has left the Polymer Centre at Sheffield, where she had been Secretary since August 2005, to take up a position as an administrator at Sheffield Hallam University. One of Jen's main responsibilities was to oversee the production of *Polymer Links*, so we are sure that readers will join us in wishing her all the best for the future.

Jen has been replaced on a temporary basis by Adam Ellis, a recent graduate in Chemistry from the University of Sheffield. He will be with us until the start of his PhD studies in October.

Adam can be contacted on 0114 222 9537 and at:

cpa03ae@sheffield.ac.uk

CHEMICAL CONUNDRUM

Rearrange the nine letters below to find a polymer-related word.

A	U	N	T	I	E	D	E	B

Send your answer to polymers@sheffield.ac.uk to win a mystery prize!

CONTACT US

For further enquiries or feedback on our Newsletter:

Adam Ellis, Polymer Centre: cpa03ae@sheffield.ac.uk

Helen Clancy, Polymer IRC Manager: h.e.clancy@leeds.ac.uk