

# Chemical Technology

## Small and simple



A new way of making microwell arrays has been devised by Peng Jiang at Corning Inc. in the US. Circular silicon wafers (4 cm across) are coated with a polymer containing tiny silicon spheres (one third of a micron in diameter). The top layer of the polymer is then burnt off using an oxygen plasma exposing the spheres protruding from the surface. The spheres are then dissolved away with acid resulting in a pitted surface ideal for use in micro-scale chemical analysis. This simple method readily lends itself to mass production of wells with volumes as low as  $10^{-17}$  litre.

P Jiang  
*Chem Commun.*, 2005, 1699

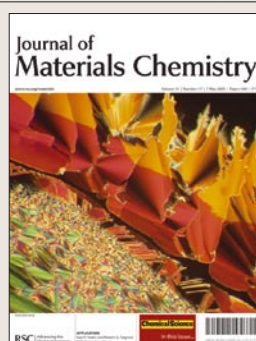
## Illuminating spore detection



Portable detectors for bacterial spores may be one step closer thanks to Andreas Manz at ISAS, Dortmund, Germany and colleagues in the UK. They have come up with an ultrafast approach to detect spores from microbes such as anthrax bacteria, using a laser to disrupt spores on a microchip. This releases the DNA into the microchannel, allowing on-chip amplification by PCR and detection by mass spectrometry. With further advances in laser technology, the method could be used in portable high-sensitivity spore detectors.

O Hofmann *et al*  
*Lab Chip*, 2005, **5**, 374

## Thin films with nanoparticles



An effective route to films of transition metal oxides highly dispersed on silica has been achieved by a multinational team of researchers in Italy, Austria and Germany, led by Silvia Gross from ISTM in Padova, Italy. The homogeneous, smooth and transparent films were prepared using polymer processing methods that offer greater control at the nanoscale than previously. Gross hopes to apply this technique to systems with up to three different metal oxides to create thin films with potential applications in microelectronic devices.

L Armelao *et al*  
*J. Mater. Chem.*, 2005 (DOI:101039/b500521c)

## The eyes have it



Improved global monitoring of prohibited growth promoters in livestock is now possible according to scientists in Northern Ireland. Kevin Cooper and D Glenn Kennedy have developed a technique using only single mass spectrometry or UV detection to detect nitrofurans metabolite residues at the parts per million levels found in porcine retina. Cooper and Kennedy say that this will help laboratories, particularly in South East Asia, who do not have access to instrumentation equipped to monitor nitrofurans down to the low parts per billion levels commonly found in edible tissues.

K M Cooper and D G Kennedy  
*Analyst*, 2005, **130**, 466

# Application highlights

New gels could allow artwork to be cleaned without causing damage

## Softly-softly approach to art conservation



A gel that turns to liquid for easy removal has been developed to clean works of art.

A wide range of solvents and other cleaning agents, such as enzymes, can be gelled. This enables

**Cleaning artwork using gels can cause damage. An easy to remove gel might be the answer**

the most appropriate solvent to be chosen for the type and quantity of compound needing removal.

One of the biggest challenges of using gels to clean artwork is removing them after cleaning is

complete. Failing to remove all traces of gel, and even the force needed to wipe them off, can destroy fragile artwork.

Richard Weiss from Georgetown University, US, and colleagues at the University of Florence, Italy, have developed a class of gel that can be converted to a liquid after application and then be removed rapidly and completely.

The conversion from gel to liquid is prompted by adding a drop of weak acid that is compatible with the gel and solvent being used.

A lot of work is still needed to determine the short and long term effects of these gels on different surface types before art conservationists will be able to use them on priceless works of art.

*Suzanne Abbott*

### Reference

E Carretti, L Dei and R G Weiss, *Soft Matter*, 2005 (DOI: 10.1039/b501033k)

Academics team up with chemical companies to investigate catalysis

## Industrial collaboration adds to thymol

A cleaner way to make thymol, a perfume, disinfectant and medicinal molecule, has been developed by chemists in the UK and Switzerland. Thymol is also used as an intermediate in menthol manufacture.

A continuous synthetic process in supercritical carbon dioxide was devised by Martyn Poliakoff and colleagues at the University of Nottingham in conjunction with Thomas Swan & Co. and Swiss company Schenectady Pratteln.

The process is a great improvement on the traditional manufacturing method, which creates waste and involves hazardous chemicals.

Poliakoff's technique involves correlating gas chromatograms to investigate how products are formed during the reaction. With their deeper understanding of the process, researchers could then

**Supercritical carbon dioxide improves reaction selectivity**

find more environmentally friendly catalysts.

Solid resins with acid groups are often used in these reactions but in this case gamma-alumina was found to be a much better catalyst.

The supercritical carbon dioxide was also shown to have an important role in suppressing the formation of minor products, and so improving the selectivity of the reaction.

'I see good opportunities to extend this chemistry to other aromatic products and to incorporate such reactions into a more complicated sequence of reactions,' said Poliakoff. He added that industrial implementation of organic reactions is an important goal in green chemistry and that his work exemplifies effective collaboration between industry and academia.

*Niamh O'Connor*

### Reference

R Amandi *et al*, *Green Chem.*, 2005 (DOI: 10.1039/b418983c)

## Electrons turn red polymers green



A polymeric material that changes colour when an electric current is applied has been developed by scientists in Germany.

The polymer, known as a metalloviologen, is made from cobalt ions and a nitrogen-containing organic compound. Dirk Kurth and colleagues from the Max Planck Institute of Colloids and Interfaces in Potsdam used the compound to build up a film layer-by-layer using electrostatic self-assembly.

The film acts as an electrochromic component, turning from red to

**Adding and removing electrons causes a polymer to change colour**

green when electrons are added to the polymer. The original red colour is restored when the electrons are removed.

This is the first example of a metalloviologen being incorporated in an operating device.

Metalloviologens' potential lies in their use as molecular materials. It is easy to change their properties, for example their colour, by changing their metal ion. Materials like this could be used to coat windows, allowing information to be displayed at the touch of a button. *Lorna Jack*

### Reference

D G Kurth, J P López and W-F Dong, *Chem. Commun.*, 2005, 2119

## Ionic liquids studied using NMR

The first steps towards performing routine NMR spectroscopy in ionic liquids have been taken by a group of scientists working in Germany.

Ralf Giernoth and co-workers at the University of Köln have developed high performance NMR techniques so that reactions in ionic liquids can be studied to levels of resolution similar to those achieved in more conventional solvents.

Ionic liquids have been hailed as new 'green' solvents but to date there have been no routine spectroscopic methods available to understand their structure and reactions.

Giernoth and his group hope their work will be used by others as a basis for future *in situ* spectroscopic studies. 'We are most certainly only at the beginning of a large field of research. There is still so much to learn,' he said.

*Katherine Davies*

### Reference

R. Giernoth *et al.*, *Green Chem.*, 2005 (DOI: 10.1039/b417783e)

## Cheap portable gene fragment analysis developed

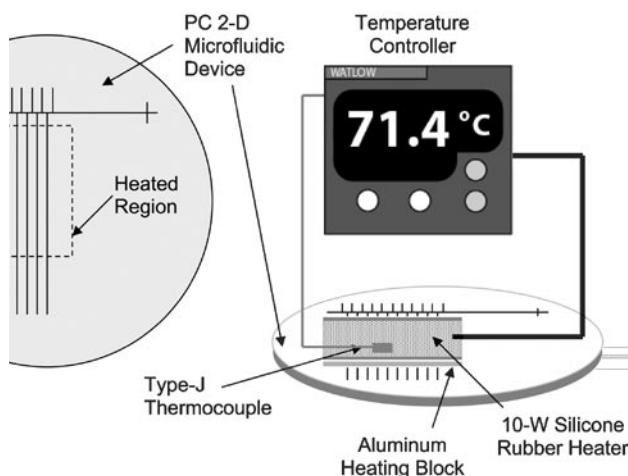
A cheap, portable method to determine gene mutations, suitable for use in hospital labs, has been developed by US scientists.

Information on gene mutation can suggest whether an individual is predisposed to suffer from a disease, follow disease progression and check on the response to medication.

The 'gold standard' for determining gene mutation is currently nucleotide sequencing but this is too expensive for routine use in hospital labs.

Cheng Lee's group at the University of Maryland has been working on producing a high-throughput scanning method for polymerise chain reaction products.

The researchers have created



**Mini electrophoresis is used to quickly work out gene mutations**

a polycarbonate chip containing miniature two-dimensional electrophoresis equipment that passes the DNA fragments (of the selected size) from the first dimension gel electrophoresis, via connecting channels, to the second dimension channels. Here temperature gradient gel electrophoresis takes place.

Finally, a laser-induced fluorescence detector monitors the separated products.

The procedure takes about five minutes and the apparatus is cheap and highly portable.

*Roger Young*

### Reference

J S Buch *et al.*, *Lab Chip*, 2005, 5, 392

# Essential elements

## We have lift off!

The countdown is over and the first print issue of *Molecular BioSystems*, a chemical biology journal with a particular focus at the interface between chemistry and the -omic sciences and systems biology, launches this month. Everyone involved, from editorial and production staff, through marketing and sales teams, to authors, referees and readers, are waiting for feedback from the scientific community.

The content of the new journal speaks for itself: a Highlight from Paul Workman at the UK's Institute of Cancer Research looks at the role of genomics in cancer drug development, while the first Review covers novel gene discovery systems. The first



Opinion looks at why systems biology is called systems biology, and the first Method reports on the use of electrophoretic and

mass spectrometric strategies for profiling lipopolysaccharides. Communications and full papers complete the range of high quality material from international authors in this impressive first issue.

In a recent Editorial<sup>1</sup> Thomas Kodadek and Caroline Evans (*Molecular BioSystems*' Editorial Board chair and editor respectively) described the new journal as 'a forum for the publication of novel work at the interface between chemistry and biology'.

● Read the first issue and judge for yourself at [www.molecularbiosystems.org](http://www.molecularbiosystems.org)

<sup>1</sup> *Chem. Commun.*, 2005, 2067

## And finally.....



*Physical Chemistry Chemical Physics* (PCCP) has been selected by the National Library of Medicine to be indexed and included in *Index Medicus*/MEDLINE - the world's most comprehensive source of life sciences and biomedical bibliographic information. Coverage will begin from 2005 and represents a significant milestone for the journal, recognising the quality of biophysical research published within it.

A number of RSC Journals are now indexed in MEDLINE and all chemical biology content is showcased free of charge in the *Chemistry Biology Virtual Journal*.

● To find out more, visit: [www.rsc.org/pccp](http://www.rsc.org/pccp) or [www.rsc.org/chembiol](http://www.rsc.org/chembiol)



## As clear as crystal

'Dealing with nearly 1300 manuscripts and 3000 cif files a year means my day is never dull!' says Kirsty Anderson, crystallographic data editor at the Royal Society of Chemistry.

Kirsty joined the RSC in 2001 after obtaining her PhD in Chemical Crystallography from Bristol University. She is responsible for the assessment of crystallography in all papers submitted to the RSC's primary research journals - a unique role in the publishing industry.

'It is important to recognise that we publish chemistry journals rather than purely crystallographic journals' says Kirsty. 'I read every paper I assess thoroughly and although



I am obviously keen to maintain high crystallographic standards, I am initially interested in whether the science in the paper is backed up by the diffraction

data as well as the technicalities of the structure itself.'

Kirsty is also closely involved with the RSC's electronic-only journal *CrystEngComm* and has been instrumental in the creation of *CrystEngCommunity*, a web resource for all scientists interested in crystal engineering and supramolecular chemistry. Future challenges include the further development of *CrystEngCommunity* as well as designing a new crystallographic web resource to aid authors with their submissions.

● If you have any comments or queries about crystallography or *CrystEngCommunity*, contact Kirsty at [crystals@rsc.org](mailto:crystals@rsc.org)

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