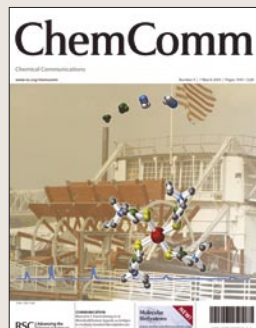


Chemical Technology

Recycling 'sandwiches'



Paul Alsters and an interdisciplinary team from DSM Pharma Chemicals and the University of Twente, the Netherlands and the Weizmann Institute of Science, Israel, have developed a lipophilic polyoxometallate (POM) catalyst which can be separated from the organic reaction mixture via nanofiltration and then reused. This is achieved by retaining the POM within a robust ceramic membrane which is permeable to both reactants and products.

P T Witte *et al*
Chem. Commun., 2005 (DOI:10.1039/b416096g)

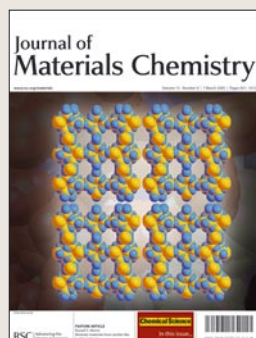
Arsenic and old crabs



Ulrik Nørum in Denmark and colleagues in Canada and Greece have identified the presence of arsenic in the blood of crabs for the first time, using chromatography and mass spectrometry. Their results show that arsenic in the diet of crabs is not fully metabolised. Little is known about what happens to arsenic once it is ingested or which organs process it. This research suggests a possible route for future investigation into the biotransformation pathways of arsenic compounds.

U. Nørum *et al*
J. Environ. Monit., 2005, 7, 122

Advanced ceramics



Christian Schön and colleagues at the Max Planck Institute in Stuttgart, Germany, are making further progress in understanding how structure influences the properties of high-performance ceramics. Since atoms in amorphous materials have no regular arrangement in the way that crystals do it is difficult to work out how the molecules actually come together during synthesis, but computer modelling – essential for the proposal/validation of mechanisms – is producing results which may be valuable to the development of future tailored ceramics.

A Hannemann, J C Schön and M Jansen
J. Mater. Chem., 2005 (DOI: 10.1039/b415188g)

Green glycol solvents



Regulatory pressure is increasingly focusing on the use, manufacture, and disposal of organic solvents, and thus the development of non-hazardous alternatives. Jonathan Huddleston and colleagues at the University of Alabama discuss the potential for using polyethylene glycols, PEGs, as more benign solvents with uses as reaction mediums, phase transfer catalysts and in biphasic reactive extractions. PEGs are very well characterised both physically and toxicologically; an advantage over other more recently suggested green solvents.

J Chen *et al*
Green Chem., 2005, 7, 64

Application highlights

A first step to rapid anthrax detection in tap water has been made

Anthrax under attack

Terrorists face a new adversary: chemists. US researchers have found a quick way to detect anthrax spores in water supplies.

William Heineman and colleagues at the University of Cincinnati developed their 'ultra-sensitive rapid detection method' to spot traces of *Bacillus globigii* (BG) spores, which are used to simulate *B. anthracis*, or anthrax spores.

The group first optimised their bead-based immunoassay detection system for BG spores in a controlled, buffered water system. To make detection more relevant they needed to see if their system would work on so-called finished water, so used Cincinnati tap water.

After optimising the technique and applying it to finished water, the immunoassay could be performed completely in 30 minutes. Subsequently, real-time fluorescence spectroscopy could detect the BG spores in less than a minute.

Current US government guidelines on homeland security encourage scientists to be cautious in promoting work that could give

terrorists information to use in a potential attack.

Heineman and his colleagues declined to comment on their work. Alistair Hay, an expert in chemical weapons and environmental toxicology at the University of Leeds, UK, offered his opinion about their technique. While conceding that this is just a first step, he believes that 'it is a very

Chemists join in the fight against terrorists by detecting anthrax simulators in water

Reference
S Farrell, H B Halsall and W R Heineman, *Analyst*, 2005 (DOI: 10.1039/b413652g)

helpful development', adding that 'detection limits for the organism in water probably need to improve by some three to four orders of magnitude to detect concentrations which may be capable of causing intestinal anthrax...I anticipate assays becoming much more sensitive and I welcome this first step.'

Katharine Sanderson

Pneumatic nebuliser offers a much improved route for sample introduction

A nozzle for easy introduction

Sample introduction for analytical chemists is about to become a lot easier, thanks to a group of German scientists and their new nebuliser.

Peter Walzel's group at Dortmund University has developed a pneumatic nebuliser, the miniaturised pneumatic extension nozzle (PEN), for sample introduction in inductively coupled plasma optical emission spectrometry (ICP-OES)

Nebulisers make the fine aerosols needed to get samples into the plasma in ICP systems. Pneumatic versions are the most commonly used.

Walzel's group claims that its PEN can greatly enhance detection limits compared to classical pneumatic nebulisers. This is

because the PEN produces higher numbers of droplets that are the right size to make it into the plasma.

Walzel and his colleagues studied the droplets being formed

Reference
S Groom *et al*, *J. Anal. At. Spectrom.*, 2005 (DOI: 10.1039/b410772c)

A new nebuliser makes life easier for analytical chemists

under different conditions and with different nozzle geometries. By using the nozzle diameter as a linear size scale, they came up with a model for predicting the mean droplet diameter, and so be able to change the nozzle size to get the best results for a given sample.

The team emphasises the many other advantages offered by their PEN design over commonly used nebulisers; it is easy to clean, is robust and the risk of it becoming blocked is low. As well as this it can be adapted to various ICP instruments. Developing its studies further, the team intends to modify the nebuliser for use with flame atomic absorption spectrometry.

Carolyn Ackers

Heart disease test within spitting distance

US researchers have come up with a novel microchip-based assay with the potential to help diagnose heart disease and associated inflammatory conditions.

High levels of C-reactive protein

Could heart disease detection be easier if you spit on your chips?

(CRP) in the blood is a strong risk factor for developing cardiovascular disease (CVD) and it is also associated with inflammatory oral infections.

A salivary test for CRP is attractive because it would be less invasive than current blood-based methods, and also because CRP might be a link between CVD and oral inflammation. However, existing tests are not sensitive enough to detect CRP in saliva.

Now, John McDevitt from the University of Texas at Austin and colleagues have developed a lab-on-a-chip system to detect CRP in saliva. Their system can detect much lower CRP levels than was previously possible. It has also been used to provide direct evidence that chronic periodontal disease may be associated with high CRP levels in saliva. *Rowena Milan*

Reference

N Christodoulides *et al*, *Lab Chip*, 2005 (DOI: 10.1039/b414194f)

Ionic liquids clean up

A greener way to extract metal ions from water is being developed by US chemists.

Removing metal cations from water sometimes needs two extractants – for example, one to neutralise the cation's charge by forming a complex, and another to replace remaining hydrating water molecules. The combined effect of the two extractants working together can be greater than the sum of them employed individually – a synergistic effect.

Mark Dietz and colleagues from Argonne National Laboratory, have demonstrated such a synergistic effect using a combined ionic liquid–crown ether system to extract strontium ions from water.

Ionic liquids have garnered intense interest as 'green' alternatives to conventional organic solvents in wide ranging applications. In their studies Dietz and his colleagues found that extraction into ionic liquids was especially amenable to this kind of synergistic enhancement.

Experiments continue, with this work raising the possibility of forming predictive guidelines for designing effective green synergistic systems. *Philip Earis*

Reference

D C Stepinski *et al*, *Green Chem.*, 2005 (DOI:10.1039/b414756a)

Structuring electrolytes in solar cells

A new approach to improve the performance of electrolytes in dye-sensitised solar cells (DSSCs) has been developed by Japanese scientists.

DSSCs are photoelectrochemical cells used to convert sunlight into electricity. A liquid electrolyte, able to transport charge, is a vital DSSC component. Potential electrolytes in both organic solvents and ionic liquids have already been tested but suffer drawbacks such as a low durability or low conductivity.

Shozo Yanagida and colleagues at Osaka University and Yokohama National University have developed a strategy to improve the conductivity of ionic liquid electrolytes. The strategy is based on organising conductive pathways for the fast transport of charge.

An ionic liquid crystal (ILC), the liquid crystal phase of an ionic liquid, can achieve just that. The ILC's structure self-assembles, allowing conductive pathways to form. This leads to better conduction.

Yanagida's team used the ILC in a

Self-assembling ionic liquid crystals are helping solar cell efficiency

DSSC, which showed better light-to-energy conversion efficiency than previous systems. *Meriel Dyche*

Reference

M E Howard and R D Vocke Jr, *J. Anal. At. Spectrom.*, 2004, **19**, 1423

Essential elements

Chemistry World Entrepreneur of the year

David Haddleton, chemistry professor at Warwick University, has won the 2004 *Chemistry World* Entrepreneur of the year award. The prize recognises an individual's contribution to the commercialisation of research in the chemical sciences. Haddleton is the founder of Warwick Effect Polymers (WEP), which specialises in the design and development of polymers with specific properties (aka 'designer polymers'), utilising living radical polymerisation techniques. Since WEP's initial launch as a university funded venture in April 2001, the company has rapidly expanded and now operates independently. When he started the company Haddleton held all the senior management positions; he has since stepped



back and now employs a full-time chief executive officer. 'I never started the company

as an exit route from academia' he told *Chemistry World* this month 'I love being an academic

and I like my job'.

It is this enthusiasm for carrying out cutting-edge research that originally drew the one-time industrial chemist into academia, and in which he has earned the respect of many of his peers. The RSC is pleased to have a professional relationship with the highly acclaimed academic; he is a member of the editorial board of *ChemComm* and has just agreed to join the international editorial advisory board for *Soft Matter*, a new interdisciplinary journal publishing research into soft materials – a subject close to Haddleton's heart.

● To read the profile of David Haddleton and Warwick Effect Polymers (WEP), visit: www.chemistryworld.org

Synthetic inorganic chemist honoured



Christopher C. 'Kit' Cummins, chemistry professor at Massachusetts Institute of Technology, has been

awarded the inaugural *Dalton Transactions* lectureship. 'Our choice of the inaugural speaker was an easy task' comments John Arnold, North American associate editor for *Dalton Transactions*. 'Kit Cummins is an outstanding scientist who has developed some of the nicest synthetic inorganic chemistry of the last decade.' Perhaps most notable, is his development of a simple technique to split nitrogen molecules using a molybdenum 'saw'.

The aim of the *Dalton Transactions* lectureship is

to enhance communication between some of the best researchers in inorganic chemistry, by offering the awardee an opportunity to present their work and subsequently spend time interacting with students, postdocs and faculty at a host university. The inaugural lecture will be held on 15th April 2005, at the University of California, Berkeley.

● To find out more about *Dalton Transactions*, visit: www.rsc.org/dalton

And finally.....

Look out for the second in the series of *ChemComm* 40th Anniversary Articles, which is published this month. The author, Jean-Pierre Sauvage from the Université Louis Pasteur, describes how the spectacular developments in dynamic molecular systems over the last decade have led his group to look at transition metal-containing catenanes and rotaxanes as molecular machine prototypes.

● To find out more visit: www.rsc.org/chemcomm

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