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ISSN 1463-9262 CODEN GRCHFJ 11(9) 1273–1484 (2009)

Cover

See Qi *et al.*, pp. 1327–1331. An efficient green process for conversion of fructose to 5-hydroxymethylfurfural in ionic liquids.

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HIGHLIGHTS IN CHEMICAL TECHNOLOGY

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Highlights in Chemical Technology

September 2009/Volume 6/Issue 9

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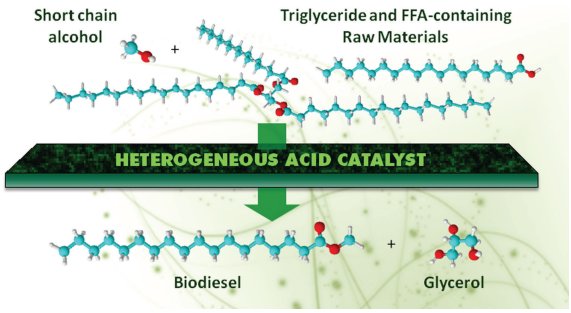
CRITICAL REVIEW



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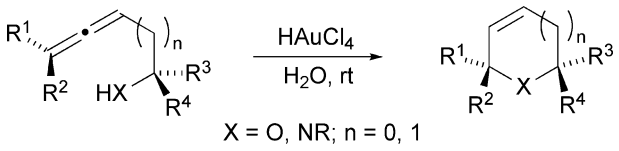

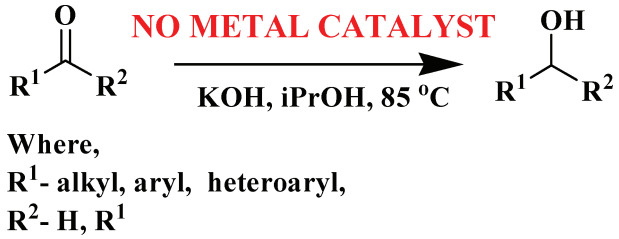

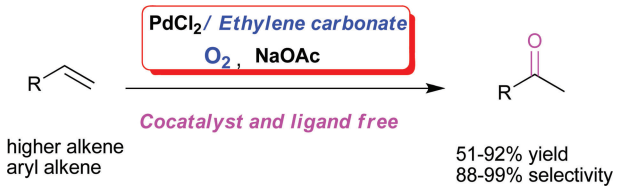

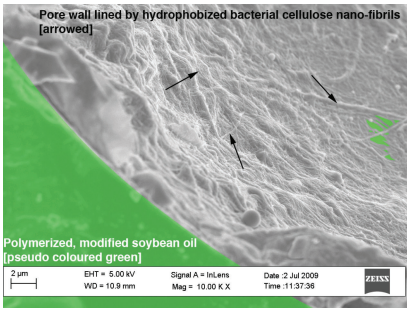

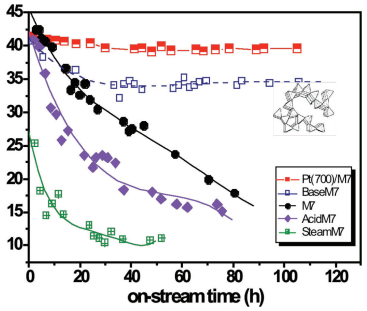

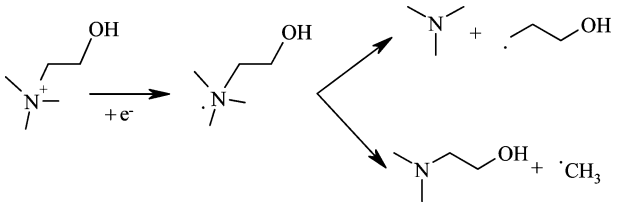

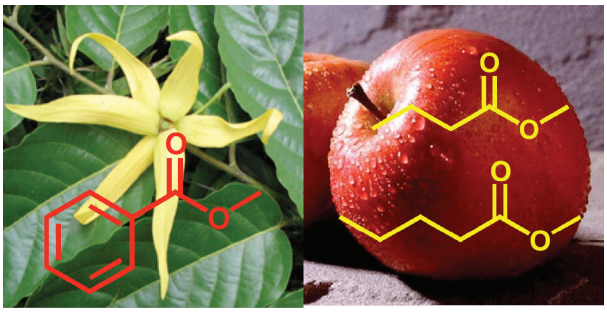

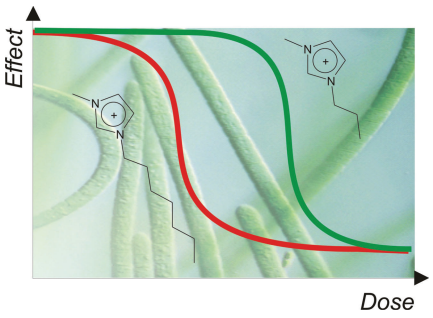

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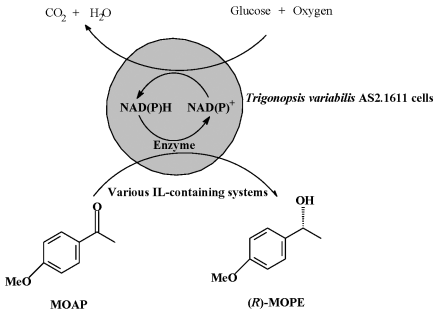

Biocatalytic anti-Prelog stereoselective reduction of 4′-methoxyacetophenone to (*R*)-1-(4-methoxyphenyl)-ethanol with immobilized *Trigonopsis variabilis* AS2.1611 cells using an ionic liquid-containing medium

Wen-Yong Lou, Wei Wang, Thomas J. Smith* and Min-Hua Zong*

The biocatalytic anti-Prelog enantioselective reduction of 4′-methoxyacetophenone to (*R*)-1-(4-methoxyphenyl)ethanol using immobilized *Trigonopsis variabilis* AS2.1611 cells was successfully conducted in an ionic liquid (IL)-containing system.

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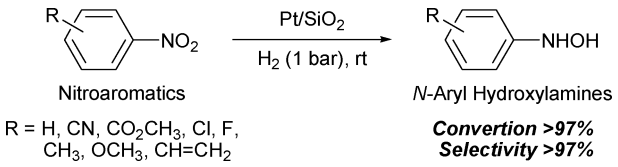
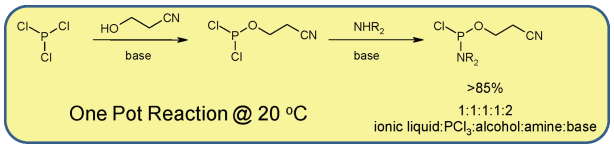


Selective synthesis of *N*-aryl hydroxylamines by the hydrogenation of nitroaromatics using supported platinum catalysts

Yasumasa Takenaka,* Takahiro Kiyosu, Jun-Chul Choi, Toshiyasu Sakakura and Hiroyuki Yasuda*

Various substituted nitroaromatics were successfully hydrogenated to the corresponding *N*-aryl hydroxylamines in excellent yields (up to 99%) using supported platinum catalysts such as Pt/SiO_2 under a hydrogen atmosphere (1 bar) at room temperature.

1391

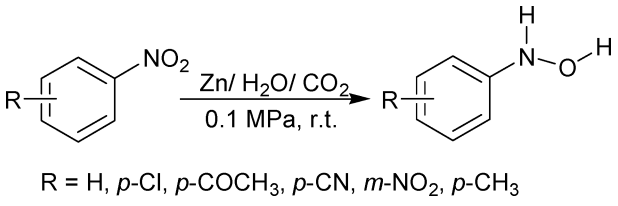


Selective synthesis of chlorophosphoramidites using ionic liquids

Eric J. Amigues, Christopher Hardacre,* Gillian Keane, Marie E. Migaud,* Sarah E. Norman and William R. Pitner

A range of chlorophosphoramidites have been prepared in ionic liquids and their synthesis compared with that performed in molecular solvents.

1397



The selective reduction of nitroarenes to *N*-arylhydroxylamines using Zn in a CO_2/H_2O system

Shijuan Liu, Yanhua Wang, Jingyang Jiang* and Zilin Jin

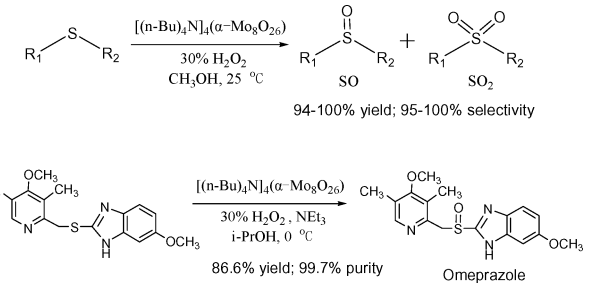
N-arylhydroxylamines can be prepared from nitroarenes with high yield and good selectivity using Zn dust in a CO_2/H_2O system under mild conditions. Use of NH_4Cl is avoided and the method is environmentally benign.

1401

Tetra-(tetraalkylammonium)octamolybdate catalysts for selective oxidation of sulfides to sulfoxides with hydrogen peroxide

Chuanbo Yang, Qingping Jin, Hua Zhang, Jian Liao, Jin Zhu, Bin Yu and Jingen Deng*

Tetra-(tetraalkylammonium)octamolybdate catalysts are successfully applied in the selective oxidation of various sulfides to sulfoxides with 30% aqueous hydrogen peroxide as oxidant under mild reaction conditions in 94–100% yield and 95–100% selectivity.

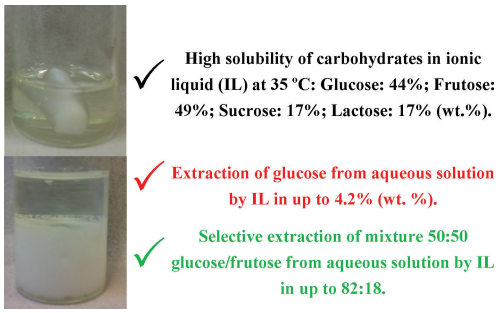


1406

Studies on dissolution of carbohydrates in ionic liquids and extraction from aqueous phase

Andreia A. Rosatella, Luis C. Branco and Carlos A. M. Afonso*

Here is described the identification of unique ionic liquids that provide high solubilities of carbohydrates as well as efficient, clean and selective extraction from aqueous solution.



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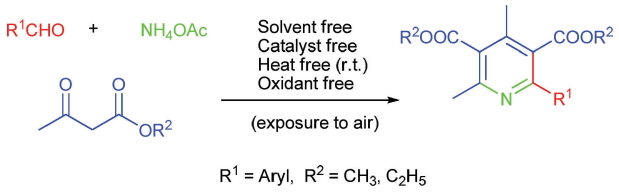
A revisit to the Hantzsch reaction: Unexpected products beyond 1,4-dihydropyridines

Li Shen, Song Cao,* Jingjing Wu, Jian Zhang, Hui Li, Nianjin Liu and Xuhong Qian*

A novel, efficient and environmentally friendly one-pot three-component method for the synthesis of 2-aryl-pyridines under solvent-, catalyst- and heat-free conditions in an air atmosphere has been reported.



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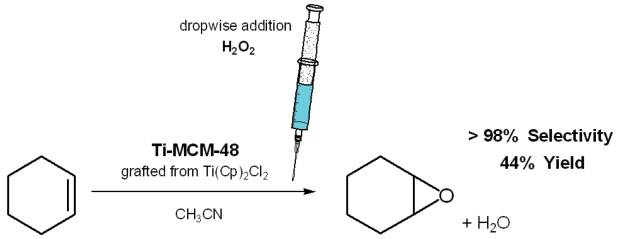
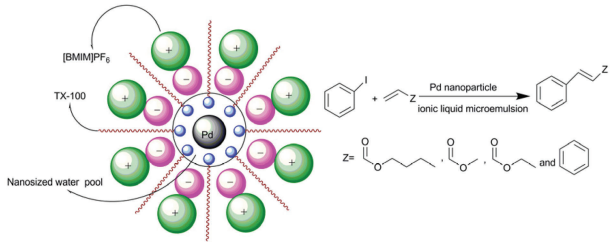
The use of H_2O_2 over titanium-grafted mesoporous silica catalysts: a step further towards sustainable epoxidation

Matteo Guidotti,* Claudio Pirovano, Nicoletta Ravasio, Beatriz Lázaro, José M. Fraile, José A. Mayoral, Bernard Coq and Anne Galarneau

The epoxidation of cyclohexene with aqueous hydrogen peroxide over mesostructured titanocene-grafted silica catalysts is described for the first time. Excellent selectivity in cyclohexene epoxide is obtained thanks to the controlled dropwise addition of the oxidant.

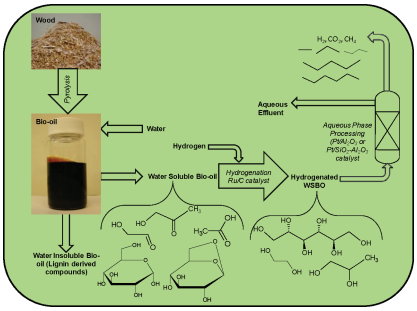




Pd nanoparticles catalyzed ligand-free Heck reaction in ionic liquid microemulsion

Guoping Zhang, Haihui Zhou,* Jiaqi Hu, Mei Liu and Yafei Kuang*

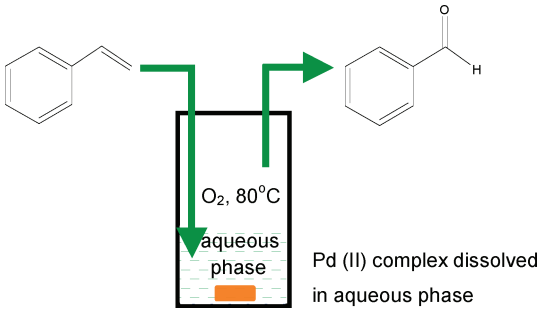
In the H_2O/TX-100/[BMIM]PF_6 microemulsion, palladium nanoparticles were prepared *in situ* for the first time, and the resultant Pd catalysts exhibited high efficiency for Heck reaction without the aid of phosphine ligands.



Production of hydrogen, alkanes and polyols by aqueous phase processing of wood-derived pyrolysis oils

Tushar P. Vispute and George W. Huber*

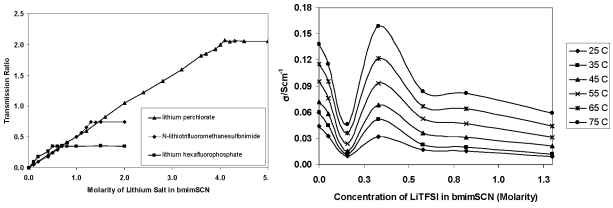
Hydrogen, alkanes (ranging from C_1 to C_6) and polyols (ethylene glycol, 1,2-propanediol, 1,4-butanediol) can be produced from the aqueous fraction of wood-derived pyrolysis oils (bio-oils).



Selective aerobic oxidation of styrene to benzaldehyde catalyzed by water-soluble palladium(II) complex in water

Bo Feng, Zhenshan Hou,* Xiangrui Wang, Yu Hu, Huan Li and Yunxiang Qiao

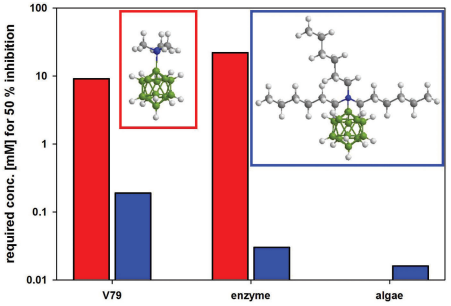
The selective oxidation of styrene to benzaldehyde has been carried out for the first time in aqueous phase by using a green and water-soluble palladium(II) complex as a catalyst under neutral, chloride and base-free conditions.

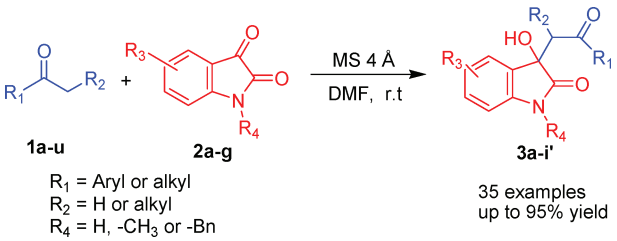


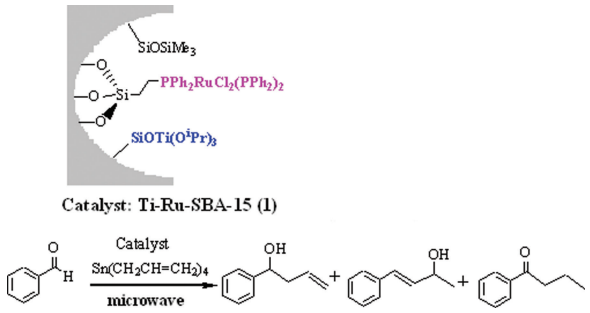
Solubility, ionic conductivity and viscosity of lithium salts in room temperature ionic liquids

Zachary P. Rosol, Natalie J. German and Stephen M. Gross*

The solubility of common lithium salts in room temperature ionic liquids was determined by FTIR-ATR. Optimal lithium salt concentration in terms of maximum ionic conductivity was determined by AC impedance.







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Highlights in Chemical Technology

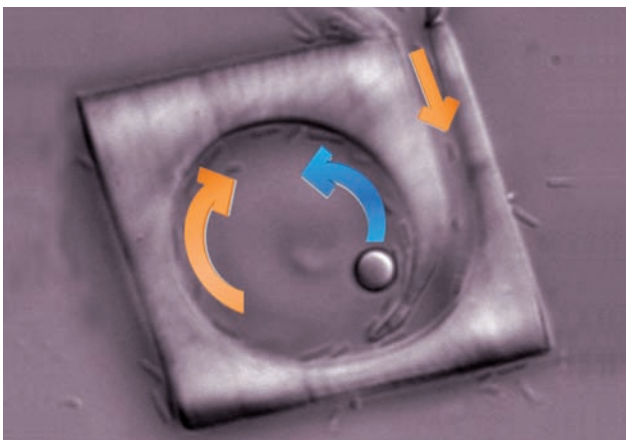
Cells move in circles to drive microfluidic devices

Bacteria swim for power

Microfluidic cavities can be built around swimming bacteria using photopolymerisation, say US scientists. The method makes it quicker and easier to use the bacteria's motion as a power source, they claim.

Bacterial motion can be used to mix and transport fluids and microparticles in microfluidic devices, removing the need for external pumps and power sources. But until now, scientists have had to build a whole new device each time they wanted to change a small part of its structure.

Bryan Kaehr and Jason Shear from the University of Texas have now developed a much quicker method of modifying devices. They filled their microfluidic device with a protein solution, then polymerised the protein to create solid structures by focusing a laser beam on to it. This can be done with the bacteria swimming around in the solution, making it 'a highly efficient strategy for optimising microscopic architectures', says Shear.



The bacteria swim in one direction only (yellow arrows), generating a circular flow (blue arrow) that can transport a bead

Kaehr and Shear used a variety of *Escherichia coli* bacteria that swim continuously in one direction. By making a circular microfluidic cavity with an angled entrance, they forced the bacteria to all swim in the same direction. The motion of the bacteria's tail-like flagella set up a liquid flow in the opposite direction. The researchers demonstrated that this flow is able to transport a bead.

A key advance is that the bacteria are not attached to the device's walls, says Shear – they can enter and leave the cavity, and when they die, they are simply replaced. Ideally, the bacterial population should be kept constant, he adds, which could be achieved by adding an outlet port that allows excess bacteria to be flushed out.

'It's a vivid demonstration of how the work done by the proton-driven flagellar motors can be harnessed, through collective motion, to greater and greater length scales,' says Greg Huber, an expert in biological physics at the University of Connecticut Health Center, US.

Shear says he has high hopes for the technology: 'We could imagine that bacterially powered microfluidic devices could be employed as deep-sea or extraterrestrial environmental sensors, lying dormant until an environmental cue activates the motile population, allowing a device to function under specific conditions.' *David Barden*

Reference
B Kaehr and J B Shear, *Lab Chip*, 2009, DOI: 10.1039/b908119d

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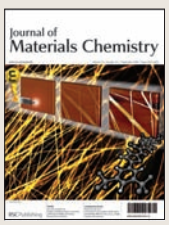


The latest applications and technological aspects of research across the chemical sciences

Application highlights

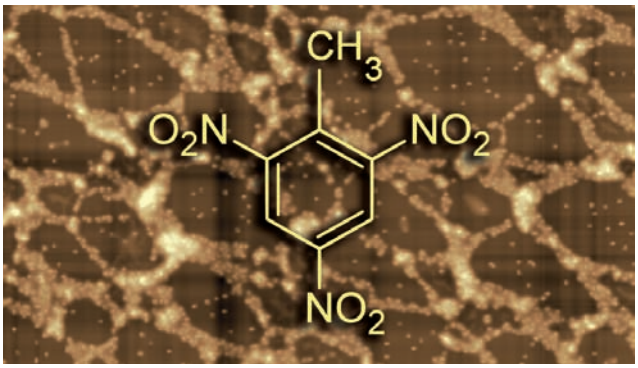
Sunlight simplifies synthesis of super SERS substrates

Nanoparticles take on terrorism

Chinese scientists have used sunlight and DNA to make bimetallic nanoparticles that can detect tiny amounts of explosives.

Liang-bao Yang and colleagues, at the Chinese Academy of Science, Hefei, exposed a solution of silver nitrate and DNA to sunlight. The light reduced the silver ions to form silver nanoparticles on the DNA. They then added gold ions, which they reduced with light, forming a gold coating on the silver particles. The synthesis is simpler and greener than other methods for making bimetallic nanoparticles, says Yang.

The team found that the nanoparticles are excellent substrates for surface enhanced Raman scattering (SERS) – their size and shape magnifies light scattering and makes it easier to detect low concentrations of absorbed molecules. They used them to detect the explosive 2,4,6-trinitrotoluene (TNT) at lower concentrations than previously tested. Yang predicts that the nanoparticles could represent another weapon in the fight against terrorism.



Sunlight induces bimetallic nanoparticles to form on DNA. The particles can be used to detect explosives, such as TNT.

Katrin Kneipp, an SERS expert at the Technical University of Denmark, Kongens Lyngby, says this 'is a very interesting new way to make SERS active substrates' but cautions that the nanoparticles need further testing.

The nanoparticles could have many applications in other fields, comments Yang. The team have already used them for detecting cancer and now plan to focus on improving their stability and selectivity.

Holly Sheahan

Reference
L-B Yang *et al*, *J. Mater. Chem.*, 2009, DOI:10.1039/b909600k

Labelled ligands enable characterisation of nanoparticle assemblies

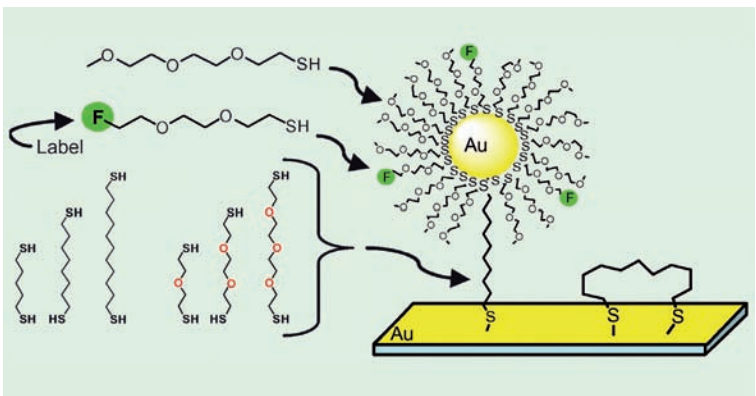
Nanoelectronics on track

US researchers have developed a method to track nanoparticle self-assembly by incorporating fluorine-labelled ligands into the nanoparticle shells.

Chemically self-assembling nanoparticles could be a way to make smaller electronic devices than are currently accessible by lithography. However, depositing them uniformly and reproducibly is difficult and there aren't simple ways to characterise them, says Arthur Snow at the Naval Research Laboratory in Washington DC.

Snow and colleagues devised their own cheap and easy-to-use analytical method to characterise large numbers of nanoparticle assemblies. They attached a fluorine atom to an oxyethylene chain to make a fluorine-labelled ligand, which they substituted into the shells of gold nanoparticles. They then showed they could use the fluorine tag to track the particles' self-assembly on surfaces with X-ray photoelectron spectroscopy.

Although proximal probes techniques, such as atomic force microscopy, and analytical techniques, such as scanning and transmission electron microscopies, can provide excellent detail of isolated assemblies, they are not easily adapted to the large numbers of assemblies needed to manufacture nanoelectronic devices, explains Snow. 'Any technology that allows reliable engineering design from device to device throughout development will lead to significantly smaller, faster, lower power and less expensive electronics,' he says.



The nanoparticles have shells containing fluorine-labelled thiols

James Whitten, an expert in organic electronics at the University of Massachusetts Lowell, US, is impressed by the work, commenting that it is 'a difficult problem analytically since both the surface and attached particles contain gold, thiol groups and hydrocarbons'.

Snow says that he hopes this work will highlight the need for more versatile characterisation tools, which could ultimately lead to improved nanoelectronics manufacturing. *Janet Crombie*

Reference
A W Snow *et al*, *Analyst*, 2009, DOI:10.1039/b906510p

Dehydration-induced film deformation produces teeth-like structures

Buckling down to make microgears

Thin films can buckle round curved substrates to form gears for micromachines, say US researchers.

Xi Chen and colleagues from Columbia University, New York, deposited a stiff thin polyvinyl chloride film on the surface of a polyurethane cylinder. Upon dehydration, the polyurethane contracted more than the film, causing the film to buckle and form structures like the teeth on a gear.

Mismatched deformation is the key to their method, explains Chen. 'Cooling or dehydration is just an approach to introduce the mismatch,' he says. 'Heating the system also works, as long as the film expands more than the substrate.'

The researchers showed they could predict the number and depth of the teeth. 'The stiffer the film, the harder to buckle and the fewer teeth you get,' states Chen.

Many different shapes of gears can be made by varying the substrate or film type

He claims the method can be easily adapted to make microgears for flexible electronics and biological microelectromechanical systems.

Sami Yunus, who studies the self-organisation of thin films at the Catholic University of Louvain, Belgium, expresses interest in the method. 'It's a new way of thinking about how we use materials to build gears,' he comments. 'Using a natural phenomenon such as self-assembly is very powerful because it avoids the complications of lithography and clean rooms [used in current methods].'

Until now, making microgears has required expensive etching and micromachining. Chen's method only requires a change in temperature – no external guidance is required. Chen demonstrated that he could make a variety of gears – helical and bevel, for example – by varying the shape of the polyurethane substrate or the type of film.

The team have made gears with diameters of 6 millimetres but they are keen to go smaller and make true microgears that could be used in biomedical engineering or aerospace. 'Future experiments will be extended to micrometre or sub-micrometre scales,' says Chen.

Christina Hodkinson

Reference
J Yin, E Bar-Kochba and X Chen, *Soft Matter*, 2009, DOI: 10.1039/b904635f

Blue dye dip gives silicone antibacterial properties

Sterile surfaces in a flash

European scientists have created light-activated antimicrobial surfaces by modifying a material used in medical devices with tiny amounts of commonly used dyes.

Silicone is used in medical equipment, such as catheters. But bacteria can colonise its surface so that infections associated with catheter use are very common. Ivan Parkin and Mike Wilson, at University College London, and colleagues in the UK and Spain have modified the polymer so that it kills bacteria when it is irradiated with a laser or visible light.

The researchers covalently bound organic dye molecules, methylene blue or toluidine blue O, to silicone surfaces. The process involves dipping a modified silicone in a solution of the dye for 24 hours, washing and drying it. It uses only small amounts of the dyes (picograms per square millimetre) but is very effective. After a few minutes' exposure to a low power laser, levels of viable *Escherichia coli and Staphylococcus epidermidis* on the polymeric surfaces dramatically drop: up to 99.999 per cent in the case of *S. epidermidis*.

Light-activated organic dyes kill bacteria on silicone surfaces

The dyes work by generating reactive oxygen species under light irradiation and it is these that are toxic to the bacteria. The dyes have been incorporated into silicone before, but not covalently meaning they could potentially leach from the polymer.

Previous methods to sterilise catheters include silver coatings – an expensive method – or flushing the catheters with antibiotics. However, using antibiotics persistently can make bacteria resistant to the drugs. 'This [technique] would strengthen the lifetime you could use antibiotics for,' says Parkin. Not only catheters, but antimicrobial keyboards or telephones made of these materials could soon be possible, which 'would be especially important to minimise infections in hospitals,' suggests Parkin.

For Declan McCormack, an expert in materials chemistry from the Dublin Institute of Technology, Ireland, the coating's importance is clear. 'Parkin's work is an interesting and novel strategy in developing effective antimicrobial coatings for medical surfaces,' he says. 'It is a significant advancement in functional coatings.'

Amaya Camara-Campos

Reference
C Piccirillo *et al*, *J. Mater. Chem.*, 2009, DOI: 10.1039/b905495b

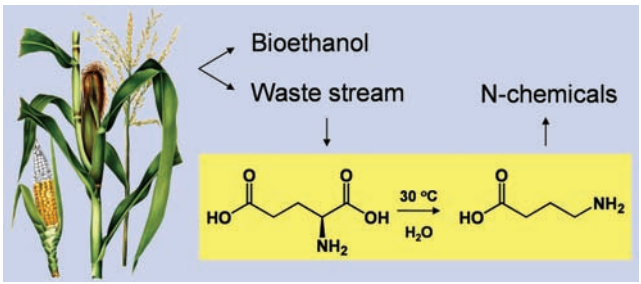
Enzyme immobilisation aids production of industrial intermediate

Corn waste converted to chemicals

Biofuel waste could be turned into building blocks for industrial chemicals, thanks to an enzyme-based process developed by European scientists.

Tijs Lammens, at Wageningen University, the Netherlands, and colleagues studied the conversion of glutamic acid to γ-aminobutyric acid (GABA) using a decarboxylase enzyme. Glutamic acid is a major component of the waste formed when grains, such as maize, are converted into bioethanol. Because glutamic acid contains nitrogen, it could be used to make nitrogen-containing industrial chemicals more cheaply than the energy intensive, fossil fuel- and ammonia-based routes usually used.

GABA is a useful intermediate in the pathway from glutamic acid to industrial chemicals because it can be turned into many useful products, explains Lammens. Although the enzymatic conversion of glutamic acid to GABA is known, Lammens showed that the process could be scaled up for industrial production by immobilising the enzyme in a batch reactor.



The waste from bioethanol production can be used to make nitrogen-containing chemicals

'There is a scientific basis for making bulk chemicals from agricultural waste,' says Lammens. '[This study] shows industry that this process can be economically feasible using an enzyme.'

'Apart from being scalable, this process could also contribute to improving the green credentials and the economics of biofuel production,' comments Rafael Luque, a biofuel expert at the University of Cordoba, Spain. 'But the suitability of directly using an actual waste effluent containing glutamic acid requires further evaluation.'

Lammens acknowledges that the process would be too expensive if only glutamic acid produced by fermentation could be used. He says the next step is to 'investigate further if we can isolate amino acids, such as glutamic acid, from agricultural waste streams in a cost effective way'.

Carl Saxton

Reference
T M Lammens *et al*, *Green Chem.*, 2009, DOI: 10.1039/b913741f

Interview

Raising the bar

Scott Tanner on measuring cell biomarkers and Olympic gymnastics. Ben Merison investigates

Scott Tanner

Scott Tanner is an associate professor in the department of chemistry at the University of Toronto, Canada. He is coordinating a multidisciplinary, multi-institute project to develop instrumentation, reagents and methods for the multi-parametric determination of biomarkers of individual cells and particles. He is also on the *Journal of Analytical Atomic Spectrometry (JAAS)* editorial board.

Who or what inspired you to become a scientist?
I bought my first chemistry set when I was six. Growing up in the 1950s and 60s meant that my chemistry bent towards highly exothermic reactions conducted in tubes with fins and a nose cone. My real inspiration came from Professors Cherniak and Koffyberg at Brock University (St. Catharines, Canada) who provided lab space, materials and much patient instruction to me when I was trying to replicate Rutherford's experiment of shooting alpha particles through gold foil. Though my current research is directed to cell biology problems, I am really still a physical-analytical chemist. This new adventure began when Dmitry Bandura, Vladimir Baranov and I, inspired by Olga Ornatsky, realised that atomic mass spectrometry has well-developed capabilities that could answer the challenges of multi-parameter cell biomarker analysis.

What are you working on at the moment?
I have a wonderful multidisciplinary research group who are developing metal-encoded polymers and beads that are used in immunological staining of cells, and the high-speed 'reader' of those cells based on inductively coupled plasma mass spectrometry (ICP-MS). The technology is aimed at producing a mass spectrometer analogue of flow cytometry that permits the simultaneous measurement of many biomarkers in individual cells at up to 1000 cells per second. This development is principally aimed at accurately detecting early-stage diseased cells, such as cancer stem cells, that are extremely rare in patients' samples, and to allow the investigation of protein translational pathways that reflect the genesis of disease at the single cell level. A significant challenge of the overall project is to bridge the gap between atomic MS and cell biology, two fields that have had little, if any, communion.

What's the hardest problem you have encountered and how did you solve it?
I think my most difficult technical challenge was developing a method for high throughput trace-level dioxin measurement in food and soil in the early 1980s. That was finally solved with the development of a glow discharge ion source linked with flash gas chromatography and an early incarnation of triple quadrupole MS. Interestingly, it was my attempt to deal with the high ion current flow in the glow discharge source that first brought my attention to ICP-MS.

What's the key to being a successful project team leader and how do you keep up morale?
The obvious key is to have all the right people. The current team has been some 15 years in the making and includes some people that we had to track down after being out of touch for more than a decade. The core team also happens to include my closest personal friends. I had some really good advice from an early mentor: 'it is not possible to manage a top-notch group of researchers: the best you can do is guide them.'

What do you hope your research will lead to within the next decade?
I hope and expect that our research will allow biomedical research to evolve into the genesis of disease, drug discovery and development, and eventually clinical diagnosis and prognosis. I believe that personalised health management, through the application of bioinformatics based on genomic and proteomic information, will be enabled with massively multi-parametric analysis of single cells. It is at the single cell level where a sufficient biomarker signature will be able to identify a diseased cell early enough to allow effective and specific therapeutic response with minimal adverse effects.

If you could be any famous scientist from history responsible for a groundbreaking discovery, who would you be and why?
I think I'd choose to be Frederick Banting. He and his colleagues discovered insulin, which has had enormous impact on people and society. If I were he, it also means that I'd be working in Canada!

You were a member of the Canadian Olympic gymnastic team, which games did you compete at?
Gymnastics was a defining part of my life, even beyond my competitive years of the late 1960s to mid 70s. My goal was the 1976 Montreal Olympics. I made it as far as being selected for the national team 2, but was injured during the 1976 tryouts.

I decided against holding on for the 1980 Moscow games, which was a prescient decision since those games were boycotted. Instead, I went to grad school, and took on administrative roles in the national gymnastics federation, where I was national judging chairman through the 1984 LA games. The most important part of my gymnastics career, though, is that this is where I met my wife, Linda!

Finally, if you weren't a scientist (or an Olympic gymnast!), what would you be?
Was there another choice?

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Instant insight

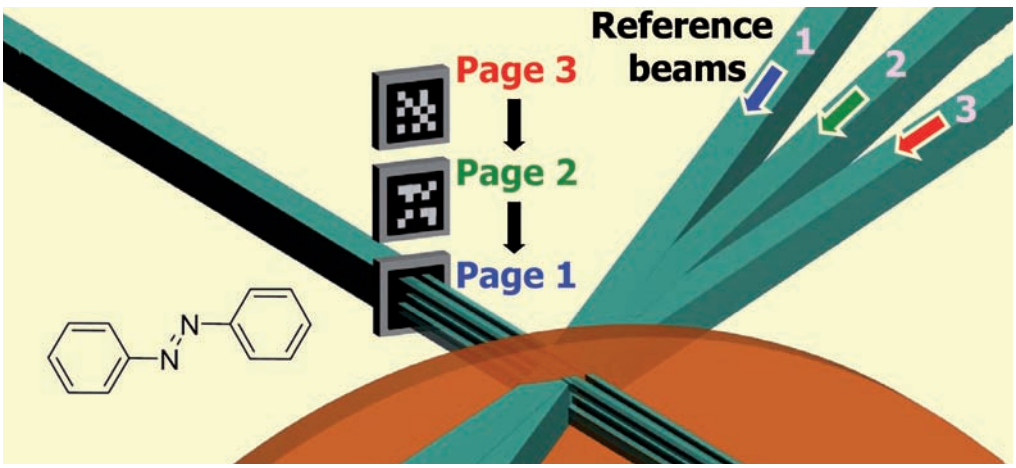
Holography speaks volumes

As the world generates more and more data, scientists strive to develop technologies to store all the information. Søren Hvilsted, at the Technical University of Denmark, Kongens Lyngby, and colleagues explain how holograms could be the answer

We are immersed in an information age. We demand efficient data generation, transmission and storage, as well as quick access to these data. The development of cheap, high capacity data storage media has been of key relevance in this information revolution, which is exemplified by the ubiquitous world wide web. But the never-ending growth of information content in our society pushes researchers to develop new storage technologies with increasing capacities and faster data access.

Current commercial optical media use lasers to record information bit by bit as a local property change in 2D films. Their storage capacity is determined by their ability to record and read these changes, which depends on the laser's spot size. The pioneering CD has been surpassed by the DVD and, more recently, by the Blue-ray disc. This increasing information density has predominantly been achieved by reducing the laser's wavelength and increasing the laser lens' numerical aperture (the range of angles over which it can accept light). This allows more data to be tightly packed on to the same size of disc.

Holographic recording can overcome some of the limitations in optical storage capacity and writing and reading rates by recording complete pages of bits simultaneously as an optical interference pattern. Two coherent beams, called the signal and reference beams, interfere in the storage material. The signal beam carries the information to be stored while reference beam is designed to reproduce it. The light in the interference pattern modifies some of the optical properties of the storage material, such as its refractive index or absorption. Irradiating the material with the reference beam for a second time causes part of the light to be diffracted, reconstructing the signal beam and recovering a complete page of information. This dramatically boosts the information transfer rate. By increasing the thickness of the recording film (known as volume holographic storage), scientists have achieved huge improvements in storage capacity. 1000 pages of information can be stored in, and recovered independently from, the same small volume of the disc. Although the concept of volume holography was proposed some decades ago, the associated technology has developed slowly, partly due to the lack of suitable materials that can act as recording media.



The signal and reference beams interfere in the azobenzene polymer films and store pages of information in the same volume of the disc

Azobenzene-containing polymers have drawn the attention of many research groups interested in optical storage. When irradiated with linearly polarised light (light that travels in a single plane), azobenzene molecules change their orientation to align perpendicular to the light, a property known as macroscopic optical anisotropy. This photoinduced change can be used to write information into the material, either bit by bit or by holography. But the recording laser light cannot penetrate right through thick azobenzene films because azobenzene units absorb strongly at this wavelength. Therefore, most studies have been limited to recording in films only a few micrometres thick.

To fully exploit the advantages of volume holography, scientists have investigated diluting the azobenzene molecules in a polymeric matrix that is transparent at the recording wavelength. The recording light can penetrate through the samples, which can be several hundreds of micrometres thick. But the reduced azobenzene content can result in a decrease in the sensitivity and stability of the recorded holograms. Different approaches based on random copolymers, block copolymers and blends of polymers are being examined to try to fulfil application requirements.

Read more in 'The volume holographic optical storage potential in azobenzene containing polymers' in a forthcoming issue of Journal of Materials Chemistry.

Reference
S Hvilsted, C Sánchez and R Alcalá, *J. Mater. Chem.*, 2009, DOI: 10.1039/b900930m

Essential elements

IUPAC 2009

The RSC hosted the 42nd IUPAC Congress at the SECC, Glasgow, UK, and enjoyed meeting over 2000 delegates from 72 countries and 64 chemical societies. The programme featured seven themes: Analysis & Detection, Chemistry for Health, Education & Communication, Industry & Innovation, Materials, and Synthesis & Mechanism. RSC journals sponsored a variety of sessions within the 50 symposia taking place. Speakers presented key research topics demonstrating the impact of the chemical sciences, and highlighting exciting innovations with an overall focus on 'Chemistry Solutions'.

Following the RSC's acquisition of ChemSpider, Graham McCann, Business Manager for ChemSpider, joined Antony Williams, ChemSpider Vice President of Strategic Development, on the ChemSpider stand to share future plans on what the collaboration will bring to scientists. The new website, demonstrated on the stand, gave delegates the opportunity to navigate around the website to see the new functionality it offers to users.

The RSC stand was also very well attended, and showcased hot new titles including the very latest news on *Analytical Methods* and *Nanoscale*, the new journals to be launched later this year, and *Polymer Chemistry*, a new journal for 2010.

This year's IUPAC conference also saw the successful launch of RSC's highly interactive social networking tool, MyRSC.

MyRSC allows chemical scientists to network with one another across the globe, share information about themselves and their research, receive details of career opportunities and join specialist groups. *Visit http://my.rsc.org for the very latest information on this exciting new development, and to find out details on how to join.*

Don't miss out on the next IUPAC Congress in Puerto Rico in 2011! (www.iupac2011.org)

Working together

What do a free online source of structure-based chemical information, Twitter and a roadmap have in common?

They are all ways in which the RSC is working with the global scientific community – and they all feature in Issue 2, 2009 of *Fusion*, RSC Publishing's newsletter, which has a distinct technology theme. We, as members of the community, have a vast range of new and emerging technologies at our disposal. We can alert you to an article immediately it is published online, and provide links to open online resources to help you enhance your knowledge.

You can share your experiences with other scientists via virtual discussion groups, and allow a global audience to view details of your work on videos.

There are many other ways in which technology has facilitated international networking and dissemination of the latest scientific advances. Gone are the days when a researcher waited for a print journal to arrive on the desk to see the latest developments, or relied on the occasional overseas trip to a scientific conference to catch up with like-minded researchers!

So can these new technologies help us to work together to overcome some of the global challenges that are facing scientists? We'd like to think so.

Find out more on our website: www.rsc.org/publishing/fusion

ChemSpider sensation

August marks a milestone in ChemSpider's 2009 calendar. Just two months after announcing RSC's new partnership, we unveiled to the world at the 42nd IUPAC Congress in Glasgow a refreshed looking ChemSpider, now hosted on powerful RSC servers.

The ChemSpider booth at the event was abuzz: delegates searched for chemicals they didn't expect ChemSpider to have...and found them! They deposited and curated data live. People who'd never heard of ChemSpider rushed to tell others. We heard comments like, 'This is the best thing I have seen all day' and 'Do you realise how much this will do for the world of chemistry?'

Delegates were impressed by the fast text and structure searching capabilities, the size and diversity of the database (including videos, reactions and blog posts). They were also complimentary about the new ChemSpider look and feel delivered through the logo, exhibition booth and literature, and excited about ChemSpider's vision for the future.

The ChemSpider team thanks everyone for their support.

Search, share and help refine the data at www.chemspider.com

ChemSpider
Building community for chemists

Highlights in Chemical Technology (ISSN: 2041-5826) is published monthly by the Royal Society of Chemistry, Thomas Graham House, Science Park, Milton Road, Cambridge UK CB4 0WF. It is distributed free with *Chemical Communications, Journal of Materials Chemistry, Analyst, Lab on a Chip, Journal of Atomic Absorption Spectrometry, Green Chemistry, CrystEngComm, Physical Chemistry Chemical Physics, Energy & Environmental Science* and *Analytical Abstracts*. *Highlights in Chemical Technology* can also be purchased separately. 2009 annual subscription rate: £199; US $396. All orders accompanied by payment should be sent to Sales and Customer Services, RSC (address above). Tel +44 (0) 1223 432360, Fax +44 (0) 1223 426017 Email: sales@rsc.org

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