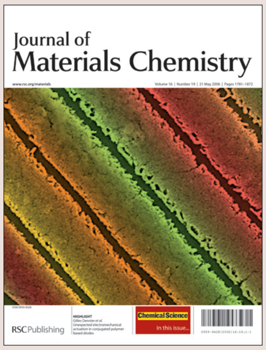
Take a look at some of the superb resources published by the RSC on nanoscience and nanotechnology...

Nanoscience at the RSC

Core materials science



Our core materials science publication, *Journal of Materials Chemistry* and its new sister publication *Soft Matter*, have proven track records in publishing leading nanoscience research. Issue 40 of *J. Mater. Chem.* will showcase special papers on anisotropic nanomaterials.

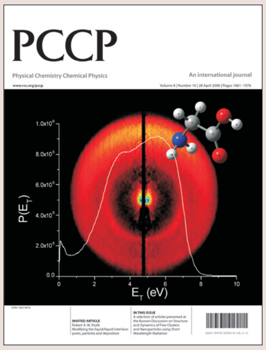
www.rsc.org/materials
www.softmatter.org

Dedicated micro & nano-research

The number one journal devoted to miniaturisation at the micro- and nanoscale across a variety of disciplines including chemistry, biology, bioengineering, physics, electronics, clinical/medical science, chemical engineering and materials science.

www.rsc.org/loc

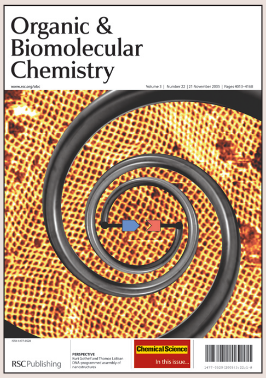
Nano-theme issues



A timely series of themed issues focusing on the physico-chemical aspects of nanoscience will appear in *PCCP*. Published in selected printed issues and collected together on a dedicated webpage, explore the exciting and expanding world of nanoscience and nanotechnology with *PCCP*.

www.rsc.org/pccpnano

Bio-nano theme issue



In September *Organic & Biomolecular Chemistry* will publish a themed issue on DNA-based nanoarchitectures and nano-machines guest edited by Itamar Willner (The Hebrew University of Jerusalem, Israel). Sign up for RSS alerts to get the latest published research delivered directly to your PC.

www.rsc.org/obc

Single-walled carbon nanotubes could be used as sensors in chemical weapons detection

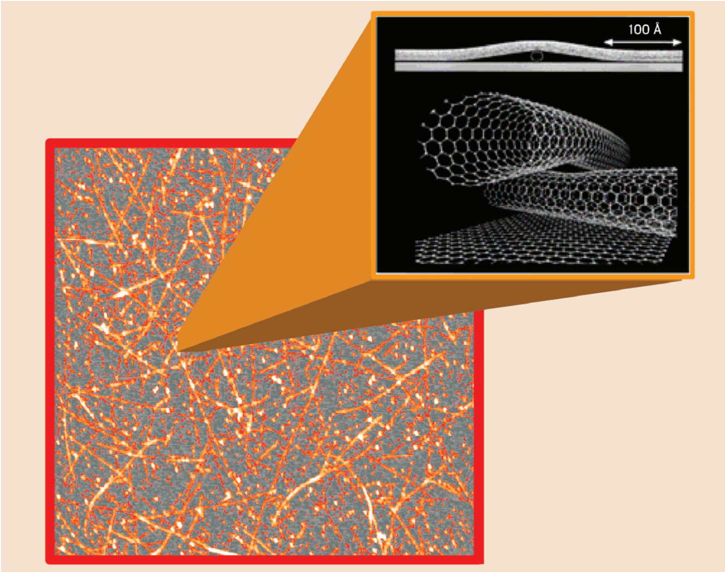
Nanotubes to the rescue

Carbon nanotubes could hold the key to chemical weapons detection, claim US navy scientists.

Eric Snow of the Naval Research Laboratory, Washington DC, US, suggests that using 2D networks of carbon nanotubes could overcome the problems that have blocked their use in sensors.

Carbon nanotubes have been the topic of much research over the years, including in chemical sensing. However, there are a number of problems which have blocked making a practical sensor. These include the difficulty in making reliably uniform nanotubes and the presence of high levels of noise in the signal.

Snow believes that single-walled carbon nanotubes are promising for detecting chemical vapours, as molecules adsorbed on the surface can significantly alter the nanotube's electronic properties. Snow made 2D networks that are shown to average the individual properties of the nanotubes. These networks can be made to a high yield using existing techniques. In addition, the networks can reduce the low frequency noise which is a significant problem in chemical detection, which are normally performed at such frequencies.



2-D networks of carbon nanotubes have improved their performance as sensors

Snow explained why he has focused in this area. 'Events over the past several years have placed an increased emphasis in the Department of Defense on the development of enhanced sensor technology,' said Snow.

Hoping that the technique will soon be ready for use, Snow said that in the future 'the areas of application will be determined by the imagination and creativity of scientists and engineers.'

Laura Howes

Reference
E S Snow, F K Perkins and J A Robinson, *Chem. Soc. Rev.*, 2006 (DOI: 10.1039/b515473c)

Nanoparticles can be used to restore works of art such as Italian frescoes

Art restoration the nanoway

Piero Baglioni and Rodorico Giorgi at the University of Florence, Italy, suggest that using nanoparticles is a simple and successful way to restore works of art.

Nanosized crystals of inorganic carbonates and hydroxides can be used to restore the calcium carbonate that binds paint pigments to the surface. The chemical corrosion of this binding by rain, humidity or pollution causes Italian frescoes and Mayan wall paintings to flake.

Commercially available carbonates and hydroxides have dimensions of several micrometres, much larger than the pores on the paint surface. This means they don't penetrate the painting well and there is also a risk of damaging the artwork by a glaze forming on the surface.

Nanocrystals have filled in the surface damage

Reference
P Baglioni and R Giorgi, *Soft Matter*, 2006, **2**, 293

Similar techniques have also been applied to the restoration of paper in cases where acidic inks have caused the cellulose fibres to break up.

Caroline Moore

The safety of nanomaterials needs to be demonstrated on the precautionary principle

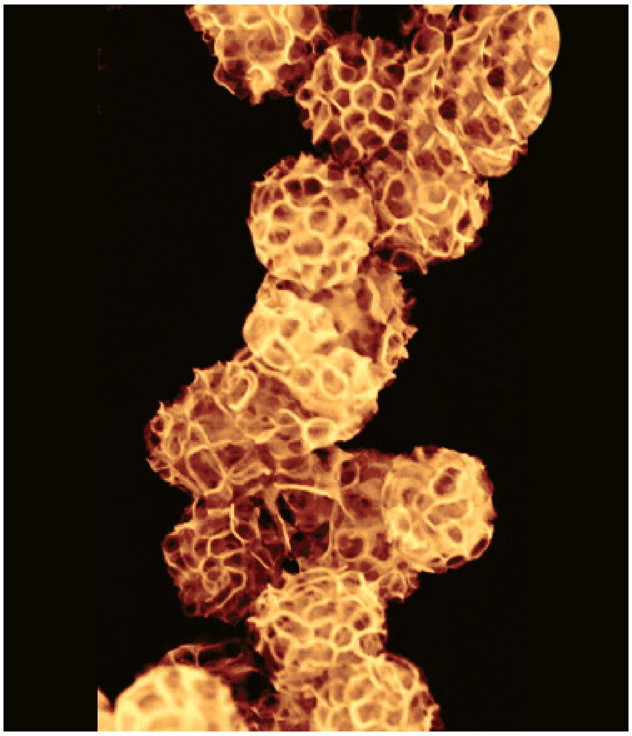
Nanotechnology – friend or foe?

Australian scientists call for biological and toxicological testing of nanomaterials.

Colin Raston and colleagues at the University of Western Australia have highlighted some recent advances in nanotechnology, from the use of nanomaterials in medicine to pollution clean-up. Raston has examined the health and ethical issues associated with the expanding nanotechnology industry.

Raston calls for specific biological and toxicological testing of nano-sized structures. The toxicity of nanoparticles cannot be assessed by simply testing the material in bulk form, he said. 'It would be prudent to examine and address environmental and human health concerns, before the widespread adoption of specific [nano]technologies.'

For instance, in drug delivery applications, nanoparticles have been engineered to cross the blood–brain barrier. Raston asks: could other synthetic nanoparticles cross this barrier unintentionally, with detrimental effects to humans? Raston also points out that nanoparticles that can easily become airborne (and can therefore be inhaled) could pose a greater health threat than those that are incorporated into another material.



Nanoparticles should undergo biological and toxicological testing

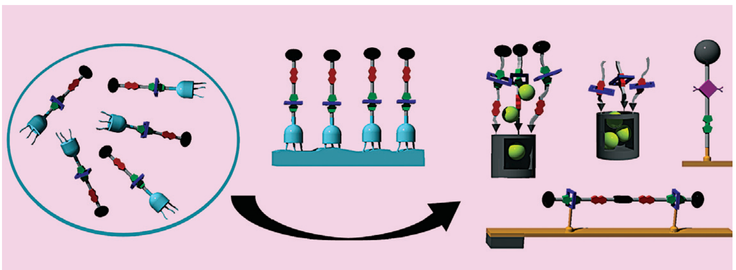
Andre Nel, a pioneer in nanomedicine at the University of California, Los Angeles, agrees that introducing meaningful testing is important. 'While it is likely that most nanomaterials will be safe from a biological perspective, we need to demonstrate this is the case as a matter of precautionary principle,' he said. 'As a rational approach to this problem, we should establish predictable paradigms of toxicity that can help to classify these materials into those that are likely to be safe and those that could be hazardous.'

Alison Stoddart

Reference
M A Albrecht, C W Evans and C L Raston, *Green Chem*, 2006, **8**, 417

Nanoscale machines have been assembled from rotaxanes and pseudorotaxanes

Molecular meccano



Molecules can be locked together to make nanoscale machines

Nanoscale machines can be made by mechanically locking molecules together, say researchers in the US.

Fraser Stoddart and colleagues at the University of California Los Angeles used rotaxanes and pseudorotaxanes to create such devices.

Rotaxanes consist of a molecular ring mounted on a spindle. The ring is prevented from leaving by bulky groups, or stoppers, at either end of the spindle. Pseudorotaxanes are similar to rotaxanes, but they instead rely on non-covalent interactions to hold the ring in place.

Long rotaxanes can have more than one stable site on the spindle where the ring can rest. As the ring moves between these sites, a switch is created. This can be achieved by reduction and oxidation, photochemistry, or by temperature control. Pseudorotaxane switches are operated by the threading and dethreading of the ring.

The group built both kinds of molecular switch onto nanopores to create chemically-operated valves, attached by the rings to a gold cantilever to make actuators. They also made a nanoscale photoelectrochemical cell that can power the dethreading of a pseudorotaxane.

Thorough studies of how these switchable molecules self-assemble, pack, align, and function on surfaces are essential for device design, say the researchers.

Colin Batchelor

Reference
A B Braunschweig, B H Northrop and J F Stoddart, *J. Mater. Chem.*, 2006, **16**, 32

Essential reading

RSC Publishing has over 400 handbooks, monographs, proceedings, textbooks and popular science books in print, including top titles in nanoscience and nanotechnology. For more details about current and forthcoming titles and to purchase a book visit www.rsc.org/books

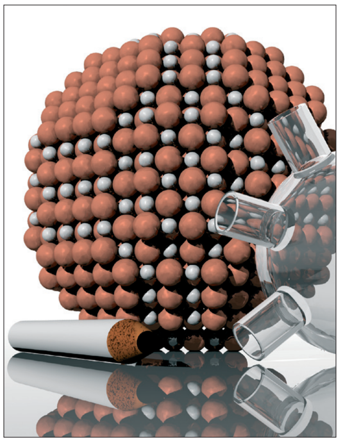
Bestselling text book

Nanochemistry: A Chemical Approach to Nanomaterials, the first textbook on the subject, made its debut last year. Written by Geoffrey Ozin and André Arsenault (University of Toronto, Canada), the title is well illustrated, with an interdisciplinary and comprehensive approach. It's already one of our best-sellers and is an excellent introduction to the wonderful world of nanochemistry!

Visit www.rsc.org/books/nanochemistry

"...a kaleidoscopic compendium of the achievements of chemists working with materials scientists and physicists"

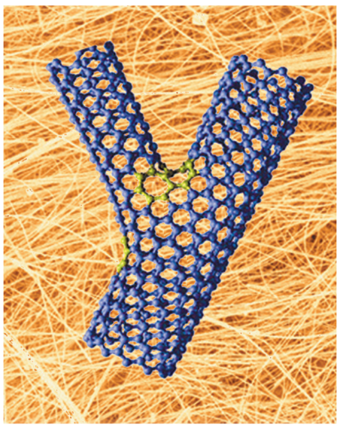
Times Higher Education Supplement



Nanoscience & Nanotechnology Series

Hot on the heels of our Nanochemistry textbook is the first title in the new RSC Nanoscience & Nanotechnology Series.

Nanotubes and Nanowires by Chintamani Rao and A. Govindaraj (Jawaharlal Nehru Centre for Advanced Scientific Research, India) provides a comprehensive reference to the research areas of carbon nanotubes, inorganic nanotubes and nanowires including synthesis, characterisation, properties and applications.

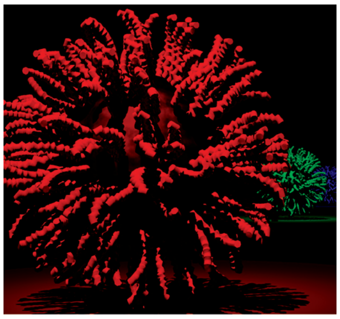


Look out for future titles in this superb series, which will cover nanoparticles, nanocharacterisation and other allied subjects.

Series Editors are Harry Kroto (University of Sussex, UK), Paul O'Brien (University of Manchester, UK) and Harold Craighead (Cornell University, USA).

To find out more visit www.rsc.org/books/nanoscience

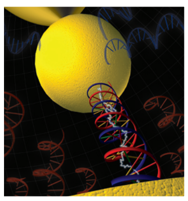
Coming soon



Nanoscopic Materials – Size Dependent Phenomena, a new textbook by Emil Roduner (University of Stuttgart, Germany), takes a qualitative and quantitative approach to all areas of nanotechnology, with emphasis on the underlying physico-chemical and physical principles of nanoscience. A section discussing the future potential and ethical implications of nanotechnology makes this a particularly timely addition to the literature.

Look out for news of this publication at www.rsc.org/books

And finally...



Also of interest are Faraday Discussions, vol. 131: *Molecular Wires and Nanoscale Conductors* and vol. 125: *Nanoparticle Assemblies*.

To view the full contents and, where available, purchase an article or a volume visit the website www.rsc.org/faraday_d

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