

Chem Soc Rev

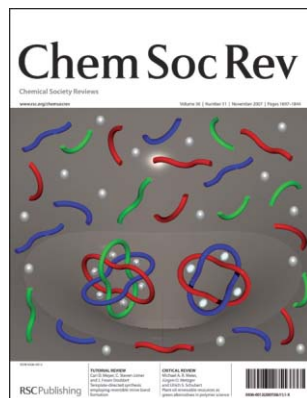
Chemical Society Reviews

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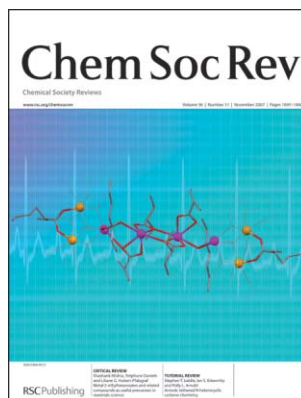
IN THIS ISSUE

ISSN 0306-0012 CODEN CSRVBR 36(11) 1697–1844 (2007)



Cover

See Cari D. Meyer, C. Steven Joiner and J. Fraser Stoddart, page 1705.
Put an *endo* ligand in,
Put an *exo* ligand out,
Add a pinch of salt
And shake it all about.
What do you get?
Molecular Borromean rings and
Solomon knots.
That's what it's all about.
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Steven Joiner and J. Fraser
Stoddart from *Chem. Soc. Rev.*,
2007, **36**, 1705.



Inside cover

See Shashank Mishra, Stéphane Daniele and Liliane G. Hubert-Pfalzgraf, page 1770.
The cover image shows the first
1 : 1 Pb–Zr–carboxylatoalkoxide
heterometallic based on 2-
ethylhexanoate ligand, a
potential single-source
precursor for PbZrO₃ materials
for energy storage applications
(e.g. cardiac defibrillator).
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Stéphane Daniele and Liliane G.
Hubert-Pfalzgraf from *Chem.
Soc. Rev.*, 2007, **36**, 1770.

CHEMICAL SCIENCE

C81

Drawing together the research highlights and news from all RSC publications, *Chemical Science* provides a 'snapshot' of the latest developments across the chemical sciences showcasing newsworthy articles, as well as the most significant scientific advances.

Chemical Science

November 2007/Volume 4/Issue 11

www.rsc.org/chemicalscience

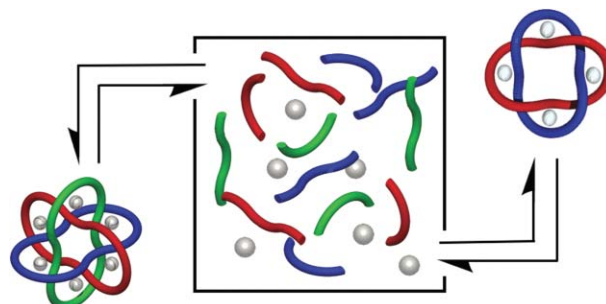
TUTORIAL REVIEWS

1705

Template-directed synthesis employing reversible imine bond formation

Cari D. Meyer, C. Steven Joiner and J. Fraser Stoddart*

This *tutorial review* surveys the wide range of mechanically interlocked compounds that are easily accessible by template-directed syntheses employing imine bond formation. It should be of interest to chemists in the fields of self-assembly, molecular recognition, crystal engineering, and metallo-organic and host–guest chemistry.



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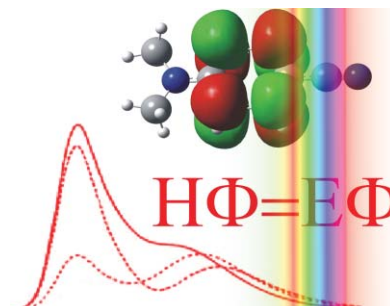
TUTORIAL REVIEWS

1724

Integrated computational strategies for UV/vis spectra of large molecules in solution

Vincenzo Barone* and Antonino Polimeno

Interpretation of optical spectroscopies is discussed, based on quantum mechanical descriptions of structural properties and stochastic modelling of relaxation processes.

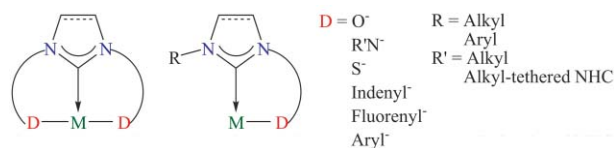


1732

Anionic tethered *N*-heterocyclic carbene chemistry

Stephen T. Liddle, Ian S. Edworthy and Polly L. Arnold*

The emerging chemistry of anionic tethered *N*-heterocyclic carbene metal complexes is discussed in this *Tutorial Review*.

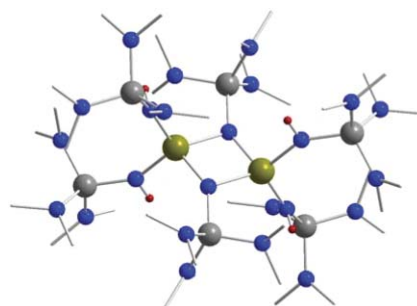


1745

Materials synthesis using oxide free sol-gel systems

Andrew L. Hector

Sol-gel synthesis and processing methods promise new forms of nitride and chalcogenide materials for a host of potential applications.

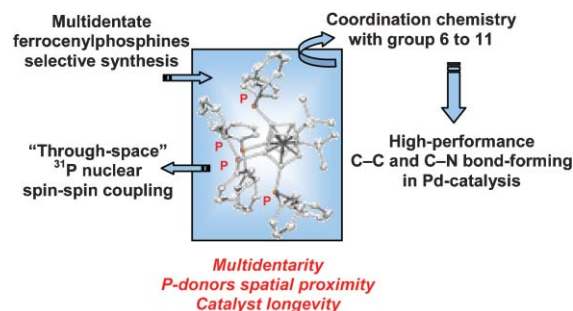


1754

New concepts in multidentate ligand chemistry: effects of multidentarity on catalytic and spectroscopic properties of ferrocenyl polyphosphines

Jean-Cyrille Hierso,* Radomyr Smaliy, Régine Amardeil and Philippe Meunier

New multidentate ferrocenylphosphine ligands have driven progress in highly-efficient homogeneous catalysis and in fundamental physical chemistry related to structural elucidation by NMR.



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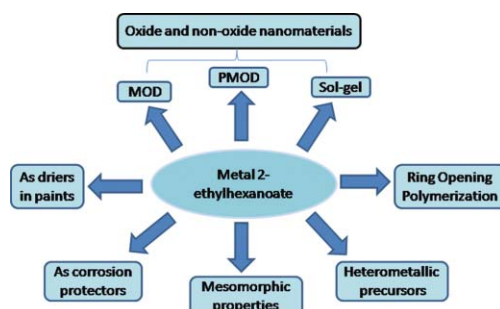
CRITICAL REVIEWS

1770

Metal 2-ethylhexanoates and related compounds as useful precursors in materials science

Shashank Mishra,* Stéphane Daniele* and Liliane G. Hubert-Pfalzgraf

This *critical review* discusses the chemistry and applications of metal 2-ethylhexanoates and related medium chain (C_5 to C_{12}) metal alkanooates. These compounds are rapidly emerging as attractive precursors for the preparation of nano-materials and are amongst the most promising catalysts for the ring opening polymerization of lactones and lactides.

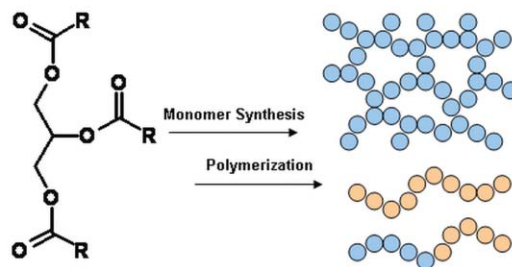


1788

Plant oil renewable resources as green alternatives in polymer science

Michael A. R. Meier,* Jürgen O. Metzger and Ulrich S. Schubert*

Plant oil renewable resources offering manifold possibilities for a sustainable synthesis of polymeric materials are discussed within this contribution.

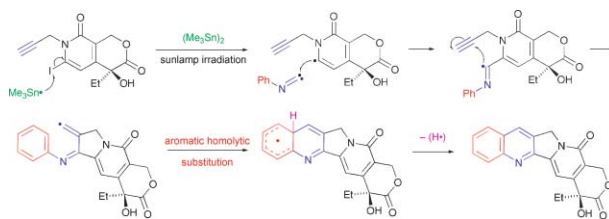


1803

Synthesis using aromatic homolytic substitution—recent advances

W. Russell Bowman* and John M. D. Storey*

Recent developments in intramolecular aromatic homolytic substitution facilitate the synthesis of a wide range of natural products and novel heterocyclic structures.

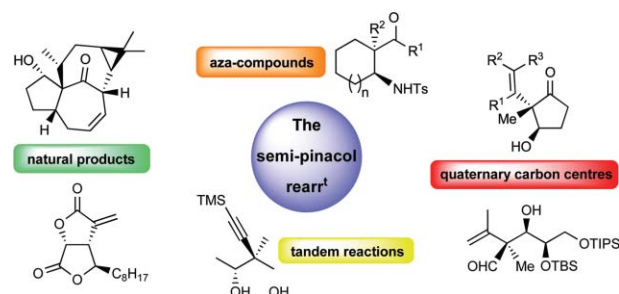


1823

Recent advances in the semi-pinacol rearrangement of α -hydroxy epoxides and related compounds


Timothy J. Snape*

Recent advances in the semi-pinacol and related rearrangements are reviewed, demonstrating the diversity of this reaction towards synthetically useful intermediates.



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Chemical Science

Another source of arsenic exposure has been uncovered

Arsenic poisoning from cow-dung fuel

Cow dung is the latest culprit found to be causing arsenic poisoning in unsuspecting villagers in West Bengal, India.

During the last century people living in China, Nepal, India and Bangladesh were encouraged to use well water rather than surface water. Whilst reducing the number of casualties from bacterial diseases, it was soon discovered that the well water is contaminated by arsenic leaching from rock. Sickness through drinking the well water and rice, and other crops, irrigated with contaminated water has been widely reported. Dipankar Chakraborti and colleagues from Jadavpur University, India, have now discovered another related route through which people in West Bengal are exposed to arsenic.

Chakraborti explains that in this region cow dung, from cows fed with contaminated rice straw, is dried in the sun and used as fuel in domestic ovens. He found that when the cow dung cakes are burnt arsenic is released into the air, which is then inhaled.

Jose Centeno, an expert in medical



Dried cow pats are used as a fuel in some regions of India

geology at the US Armed Forces Institute of Pathology in Washington, DC, said the findings are important as they describe yet another previously unknown source of arsenic exposure in this region.

The exposure is magnified because the ovens and kitchens are not ventilated, said Chakraborti. He explained that women and children in the region are the worst affected because they spend an average of seven hours a day next to ovens. Inhalation of arsenic leads to respiratory problems such as persistent coughs and reduced lung capacity, said Chakraborti.

Centeno believes that a concerted effort is needed to prevent further communities being exposed to arsenic. He said that geoscientists are currently 'trying to determine the source rocks from which arsenic is being leached' and to determine what caused the arsenic to be mobilised from the rock.

Nina Athey-Pollard

Reference

A Pal et al, *J. Environ. Monit.*, 2007, **9**, 1067 (DOI: 10.1039/b709339j)

In this issue

Titania in sunscreens made safe

Polymer coating stops nanoparticles from damaging DNA

Degrading asbestos out of the environment

Oxalic acid and ultrasound break down the structure of asbestos

Interview: A calculated approach

Odile Eisenstein tells Nicola Nugent about the power of computers in chemistry

Instant insight: Swimming in molasses

Dean Astumian uncovers the mysteries of Brownian molecular machines



A snapshot of the latest developments from across the chemical sciences

Research highlights

Oxalic acid and ultrasound break down the structure of asbestos

Degrading asbestos out of the environment

The presence of asbestos as a persistent pollutant in soil and water is of major environmental concern, but scientists at the University of Torino, Italy, may have found a way to clean it up.

Despite many countries having imposed strict regulations that limit asbestos use and control asbestos disposal, asbestos is still a growing environmental problem. For example, the various types of silicates that are classed as asbestos are often found in water or mud surrounding disused asbestos mines.

There are standard procedures for removing asbestos from buildings, but these aren't suitable for application to soil or water remediation. Now, Bice Fubini and colleagues have developed a new procedure that could be developed into a tool for bioremediation of asbestos contaminated



environments.

The researchers managed to degrade chrysotile – the most common form of asbestos – using a combination of oxalic acid and ultrasound treatment. Oxalic acid acts as a chelating agent, binding to the magnesium in the asbestos.

Asbestos fibres are known to be carcinogenic

Reference

F Turci *et al.*, *J. Environ. Monit.*, 2007, **9**, 1064 (DOI: 10.1039/b709571f)

Together with the ultrasound, this disrupts the mineral structure, breaking down the long fibres that make the asbestos species carcinogenic. The resulting product is mainly an amorphous solid, with small amounts of mineral fibres that are unregulated and believed to be harmless.

Mike Hochella, professor of mineralogy and geochemistry at Virginia Polytechnic Institute and State University (or Virginia Tech), US, was impressed with the results. 'In the earth, these fibres may persist for as long as millions of years. In an organism, they may persist from years to decades. Under the treatment described in this paper, they persist for less than 24 hours. This technique has great potential as a remediation tool, and it may be relatively easy to implement,' said Hochella. *Edward Morgan*

Enhanced gas permeability without the need for bulky side groups

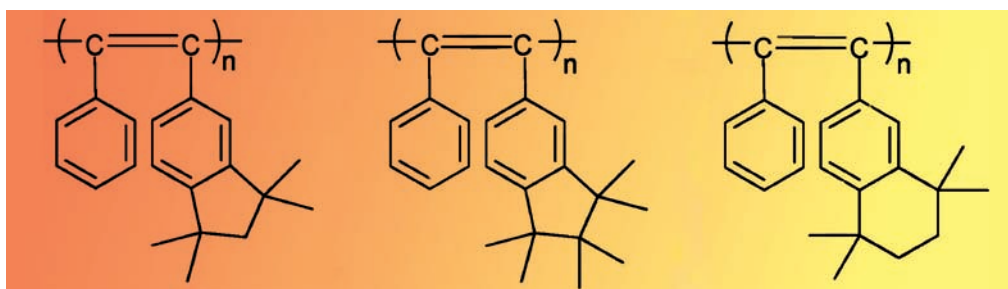
New paradigm for permeable polymers

Scientists in Japan have made a new class of gas-permeable polymers that could replace the materials currently used to separate gases.

Polymer membranes can be used to separate mixtures of gases, for example to separate nitrogen from air or to remove carbon dioxide from natural gas. Different gases travel through a polymer membrane at different speeds because of the varying solubility and diffusivity of the gas within the polymer. Membrane gas separation is much less energy intensive than other gas separation technologies, such as cryogenic distillation.

Now, research directed by Toshio Masuda at Kyoto University has led to the creation of a polymer that is highly permeable to gases even though it has a fundamentally different structure to previous polymers of this type.

Polyacetylenes are an important class of gas separation membranes and the most permeable of these,



poly(1-trimethylsilyl-1-propyne) or PTMSP, was developed by Masuda in 1983. The polymer's high permeability stems from its large free volume, which is the space within the material that is not occupied by the polymer atoms. The large free volume is attributed to the polymer's stiff main chain and its bulky spherical substituents.

But Masuda proposed that bulky substituents might not be necessary to make a polymer gas-permeable. 'We made a hypothesis that the incorporation of many

Numerous methyl groups are the key to the polymers' permeability

Reference

Y Hu *et al.*, *Chem. Commun.*, 2007, DOI: 10.1039/b712327b

methyl groups could enhance the gas diffusivity due to their rotational movement,' he explained. 'Eventually we found a new category of polyacetylenes with gas permeability as high as PTMSP.' The polymer also has a greater stability at higher temperatures.

Benny Freeman, at the University of Texas at Austin, US, said the work 'provides a new breakthrough in materials design strategies for the preparation of extremely permeable membranes'.

Gavin Armstrong

Microstructure of functional foods could be revealed by ultrasound

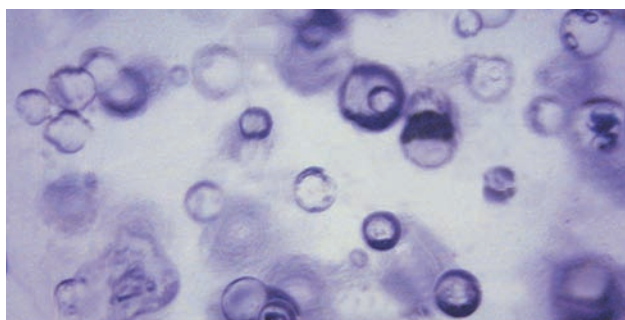
Sounding out food quality

Ultrasonic spectroscopy could be used to evaluate the quality of so-called functional foods, say scientists in Canada.

Concerns over healthy eating and diet-related disease have seen an increase in the number of functional foods – foodstuffs with ingredients added to increase the food's health benefits.

However, according to John Page and colleagues at the University of Manitoba, Winnipeg, added ingredients can disrupt the structure of the food and impair its quality, which affects consumer satisfaction with the product.

Page's team have now shown that ultrasonic spectroscopy can be used to investigate how the structure of aerated foods such as bread, cakes and desserts is disrupted by the inclusion of additional components. The scientists used an agar gel to mimic the food and added bubbles,



polystyrene beads (to mimic added ingredients), and a mixture of both to the gel to test how easily these disruptions to the structure could be detected.

Ultrasonic spectroscopy is a non-invasive technique in which ultrasonic pulses are directed into the material. The structure of the material affects the propagation of the ultrasonic pulses allowing structural disruptions to be detected.

Agar gel with added air bubbles and polystyrene beads was used to mimic a functional foodstuff

Reference

A Strybulevych *et al*, *Soft Matter*, 2007, DOI: 10.1039/b706886g

The scientists showed that the bubbles had a large effect on the acoustic properties of the model aerated food system. They also found that the scattering from the polystyrene beads, which were a similar size to the bubbles, was observed at much higher frequencies. The spectra could be successfully modelled and the size distributions and concentrations of the inclusions could be obtained.

Because the solid and gas inclusions could both be detected at the same time, the researchers believe that ultrasonic spectroscopy is a promising technique for evaluating foodstuffs that are impaired when the added nutrients interact with the food's structure. This, they believe, will lead to more control over the microstructure of the foods while maximising the food's nutritional benefits.

Caroline Moore

Ionic liquids made from 'Spanish fly' inhibit enzyme activity

From aphrodisiacs to designer inhibition

Ionic liquids can be designed to control protein activity, say Australian researchers.

Adam McCluskey at the University of Newcastle, New South Wales, Australia, and colleagues have found some of the most potent inhibitors of dynamin, an enzyme with a range of biochemical roles.

'Almost weekly there are reports of dynamin mediated biological effects, but as yet there are few chemical tools for studying it, and even fewer agents that might have an effect on diseases related to abnormal levels of dynamin expression or mutations,' said McCluskey.

McCluskey's team made their ionic liquids by modifying cantharidin, a compound secreted by the emerald green beetle known as the Spanish fly. Cantharidin is purported to be an aphrodisiac, although even relatively small doses can be fatal to humans.



Cantharidin, secreted by the Spanish fly beetle (above), is purported to be an aphrodisiac

Reference

J Zhang *et al.*, *New J. Chem.*, 2007, DOI: 10.1039/b707092f

'We can tune room temperature ionic liquids (RTILs) to interact with proteins benignly via solvation and stabilisation, or as inhibitors,' said McCluskey. Although the team had been investigating the solvation of proteins, they were 'delighted' to discover the inhibitory effects.

'The serendipitous outcome was new inhibitors of dynamin. Given the increasing relevance of

dynamin in human physiological conditions, for example Charcot-Marie-Tooth, a common heredity disorder, this is a significant advance,' explained McCluskey.

Nick Gathergood, a researcher in ionic liquids at Dublin City University, Ireland, said the discovery of therapeutic properties of these ionic liquids is a significant development. 'The work illustrates an exciting interface of ionic liquid research with medicinal chemistry. These novel materials have great potential,' he added.

However, there is still plenty of work to be done. 'The lack of predictability in the assembly of a cation and anion in the generation of an RTIL is a major hurdle yet to be overcome,' said McCluskey. He also cautioned that 'as these RTILs gain mainstream acceptance we must examine their potential utility and potential impact on biological systems'.

Colin Batchelor

News in brief

Sensitivity problem solved

Polymers that are normally used in optoelectronic devices could be modified for use in biosensors.

Cleaning up nuclear waste

Coordination complexes that can remove radioactive elements from the environment, have been developed by US scientists.

Calcium carbonate under control

UK scientists are a step closer to understanding how and why nature makes amorphous calcium carbonate.

See www.rsc.org/chemicalscience for full versions of these articles

This month in Chemical Technology**A photoelectrochemical ruler**

A photoelectrochemical sensor can be used to measure micron-sized objects.

Catalyst problems dissolve away

Medium-chain aldehydes can be made in a continuous-flow process using a homogeneous catalyst.

Digital chips cut down on complexity

Programmable microfluidic devices could help reduce animal testing, according to scientists in the US.

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This month in Chemical Biology**Nanofibres see Congo red**

An imaging process could help shed light on cellular processes in Creutzfeldt–Jacob disease.

Lanthanides get to the bones of the matter

Lipophilic wrapping paper is helping lanthanides cross into cells. The ion delivery method could lead to osteoporosis treatments, says the Canadian team behind the research.

A shining light in cancer research

A less invasive treatment for prostate cancer is a step closer thanks to researchers in the US.

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Coating stops nanoparticles from damaging DNA

Titania in sunscreens made safe



Polymer-coating the nanoparticles used in sunscreens would protect DNA against any potential UV damage they might cause.

There has been recent controversy over the potentially adverse effects of using nanoparticles such as titania (TiO_2) in sunscreens. TiO_2 is a major component of photovoltaic cells and it is well-known that it emits a photoelectron when exposed to UV light. It is believed that these electrons go on to catalyse the production of peroxide radicals and other reactive oxygen species (ROS) which are known to react with lipids and DNA, causing damage.

Now, Miriam Rafailovich at Stony Brook University, New York, US, and colleagues have provided clear evidence that titania nanoparticles do in fact catalyse DNA damage. But the researchers also say that they have found a solution that would allow nanoparticles to be used safely in sun lotions and creams.¹ 'We have produced a coated titania particle, which completely protects DNA against UV damage,' said Rafailovich.

The team grafted anti-oxidant molecules, made from a mixture of grape seed extracts, and an anionic

The exact type of titania particles used by sunscreen manufacturers isn't clear

polymer onto the titania particles. The multi-component polymer coating absorbs the photoelectron generated when titania nanoparticles are exposed to UV light and blocks the photocatalytic activity that causes DNA damage.

What is not clear, however, is exactly what kind of titania particles sunscreen manufacturers are already using. A spokesperson from cosmetics giant L'Oréal UK confirmed that their sun-care products do contain titanium dioxide among other sun filtering ingredients. 'This may be in a microparticle form, sometimes coated, to enhance the light filtering performance,' said the spokesperson. 'We comply with all EU and national laws in ensuring the absolute safety of our products and their ingredients, which are clearly labelled on our products.'

Kerry Hanson, a research scientist at the University of California, Riverside, US, has recently published a report on the enhancement of UV-induced reactive oxygen species in the skin due to sunscreen.² The real question, said Hanson, is whether titania particles actually penetrate skin cells. Researchers have shown that the particles can penetrate the hair shaft, but whether or not they penetrate the surface of the skin or can travel through the nuclear membrane remains to be determined.

Even if the particles do get deep into cells, it's not clear that UV light would actually reach them there. 'If the molecules penetrate the skin, but the UV attenuation at the skin surface is great such that it does not reach the penetrated particles, then ROS will not be sensitised,' added Hanson.

Nevertheless, Hanson remained enthusiastic about the findings. '[These researchers] have come up with a clever way to reduce ROS generated by the sunscreen itself, right at the source of the ROS, which would prevent any subsequent damage that the sunscreen would have otherwise caused.'

Kathleen Too

References

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Interview

A calculated approach

Odile Eisenstein tells Nicola Nugent about the power of computers in chemistry



Odile Eisenstein

Odile Eisenstein is the head of theoretical chemistry at the University of Montpellier 2, France. She specialises in the use of quantum theoretical methods for the study of catalytic mechanisms. She is an editorial board member for *New Journal of Chemistry* and is on the advisory editorial board of *Chemical Society Reviews*.

What motivated you to specialise in theoretical chemistry?

I studied physics and chemistry, but it turned out that I wasn't very good at physics. So I registered in chemical physics where I had two outstanding professors. One taught a very modern topic at the time, called the Woodward–Hoffmann rules. I thought that this was so good that I had to work with Hoffmann. I became a postdoc with him a couple of years after my PhD with Nguyen T. Anh and L. Salem.

What kind of things do you work on and what are the applications of your research?

I work on catalysis. In general, transition metal chemistry, structure and reactivity, which helps to understand mechanisms. I am not working on a specific type of catalyst. I am interested in anything where I can try to solve the mechanisms with a computational approach. This covers any transition metal and even lanthanides and actinides. I have no prejudice or preference for any element!

What can experimental and theoretical chemists learn from each other?

A lot! I recently got an award from the RSC's Dalton Division, so the fact that it was actually an experimental community that gave me an award might be proof that I was useful! There is great need for these two communities to work together and in general this helps to advance the overall field of chemistry.

What impact have the huge advances in computing had on the work that you do?

I started using very simple qualitative approaches in which I could find conceptual ideas but could not prove them with hard numbers. We were then able to put better numbers into the model, but the models were sometimes very far from the experimental system. For example, phosphine was always PH_3 , which is never the phosphine used experimentally. Now we try to zoom in on the real system – why does it work with one molecule and not work with another?

Of course, very often the solvent is not really represented in an accurate manner. We know there are years of improvement before we really are looking at macroscopic systems.

What will be the next big breakthrough in the field?

The goal is to link the microscopic events to the macroscopic measurement. Typically we look at one molecule, but the reality is that you have Avogadro's number of molecules. It is a big challenge to actually relate one to the other. This will need considerable advances in methodology. The big difficulty right now is to understand entropy change, which will enable us to understand free enthalpy change. If that is possible, we will be able to work with the solvent, and we will be able to look at lots of molecules. A major challenge is the fact that molecules are not isolated in the gas phase at zero degrees Kelvin!

With unlimited computational power, what would be the limits of theoretical chemistry?

Chemistry is much more complex than what you can put into a computer. The computer and the theoretical chemist will never replace the experimental chemist. I am not interested in that world – it should not exist! There will always be something that won't have been put into the model.

What do you think would be the most rewarding aspect of your career over the years?

Involvement with young researchers – students and postdocs. It's nice to see them become independent and successful. And to know that you have inspired them. I would be very unhappy if I left only papers.


What advice would you give to a young researcher at the beginning of their career?

One piece of advice was given to me by Roald Hoffmann – he said you should work well on a topic you like, then learn from that and expand. Don't think that you are immediately going to work on an important topic. Work on a specific point, which has to have some interest to people, and do it well. Quality is also important. You have to be known for quality work and to be trusted. Produce a good paper that has depth is my biggest advice.

If you weren't a scientist what would you do?

I like movies and spend quite a lot of time in the cinema, but I'm not sure that I would like to be involved in the movie industry. I have no special skill but I am interested in visual art. I do a little painting and I collect art.

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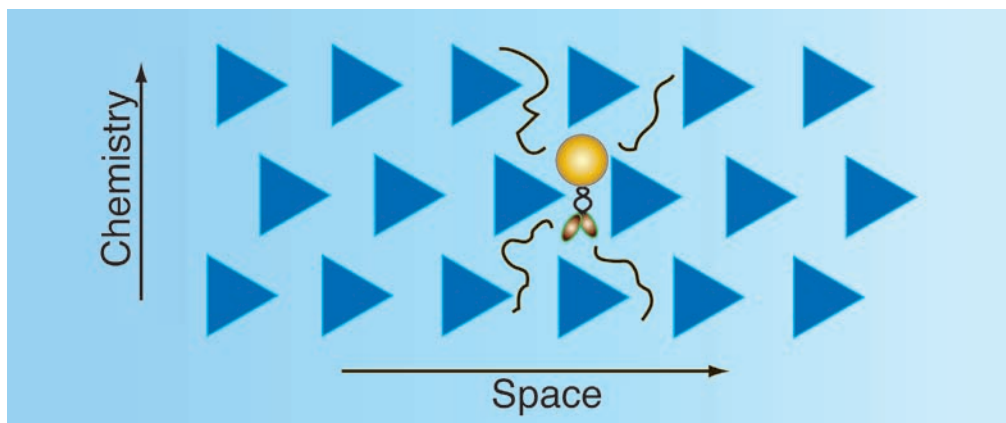
Dean Astumian from the University of Maine, Orono, US, uncovers the mysteries of Brownian molecular machines

When we think of a motor that can drive movement at velocities of several hundred times its own length per second, we probably picture a massive oily machine such as the four stroke internal combustion engine. But biomolecular motors – proteins such as kinesin that move and assemble biological structures – are a just few nanometers in size and can move at nearly a micrometer per second along a polymeric track. These motors are often described by biologists in terms of automobiles or even steam engines. They are said to be driven by a ‘power stroke’ – a conformational change triggered by, for example, adenosine triphosphate (ATP) hydrolysis.

However, there is a problem with these easily understandable large scale descriptions of molecular motors. The mechanical principles called to mind by association with familiar machines simply do not apply to nanoscale systems such as molecular motors.

For molecules in water, viscosity dominates inertia – in order to move forward, a molecular motor must ‘swim in molasses’. Further, the thermal noise power exchanged reversibly between the motor and its environment due to random collisions with water molecules is much larger than the power provided by the ‘power stroke’. One might think that moving in a specific direction would be as difficult as walking in a hurricane. Yet biomolecular motors move and accomplish their function with almost deterministic precision.

The emerging picture of how biomolecular motors operate is known as a Brownian motor mechanism. The motor is viewed as a molecule in mechanical equilibrium undergoing a random walk on a lattice of states that are distinguished from each other by their spatial position and their chemical substituents. The different stabilities



The paths of a Brownian motor are determined by the stabilities of its possible states, and by the heights of the barriers between these states

of the states and the barriers between them restrict the path that the molecule can follow across the lattice. The chemical free energy of the fuel sets the direction along the preferred path.

Take as an example, a single kinesin molecule at chemical equilibrium. The molecule vigorously moves about on its polymeric track because of thermal noise, sometimes stepping left, sometimes stepping right, sometimes binding ATP, sometimes binding ADP (adenosine diphosphate), sometimes hydrolyzing ATP, sometimes making ATP from ADP. The chemical equilibrium is maintained not by a static opposition of equal magnitude forces, but by dynamic processes in which every forward motion is exactly as likely as the microscopic reverse of that motion. When the chemical potential of ATP is higher than that of ADP in the bulk solution, ATP hydrolysis then drives directed motion by mass action.

When comparing this picture of a biomolecular motor with that of a very small macroscopic motor, we see a stark contrast. In his now famous after dinner talk, ‘Plenty of Room at the Bottom’, Richard Feynman issued a challenge to build a motor that, not counting the power supply and connecting wires, would fit into

a cube 1/64th of an inch (a bit less than half a millimetre) on a side. This challenge was successfully accomplished by an engineer, William McClellan, only a year later. It is reported that Feynman was disappointed that no new principles were applied; McClellan’s motor was simply a tour de force of miniaturization. When viewed (under a microscope!) without any source of external energy the motor does absolutely nothing – it simply sits there, totally still.

A key difference between Brownian and mechanical motors is that, due to thermal noise, a nanoscale system explores all possible motions and configurations. This feature allows a uniquely chemical approach to controlling motion at the nanoscale. By using chemical design and input energy to prevent motion that we do not want, what is left behind is the motion that we do want.

Insight into the importance of Brownian motion for molecular motors paves the way toward rational design of molecular machines for a wide range of tasks at the nanometer scale.

Read Dean Astumian’s Perspective article on Brownian molecular machines in issue 37 of PCCP.

Reference

R D Astumian, *Phys. Chem. Chem. Phys.*, 2007, **9**, 5067 (DOI: 10.1039/b708995c)

Essential elements

Success for RSC eBook Collection



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A successful launch

On September 7th, over 200 senior industrialists and academics gathered in Beijing to mark the launch of *Chemistry World: China* magazine, and to hear leading chemists and policymakers stress the importance of developing science links between China and the UK.

The launch follows months of collaboration between the RSC and two of the key membership organisations promoting the interests of the chemical sciences in China: the Chinese Chemical Society (CCS)

and the Chemical Industry & Engineering Society of China (CIESC).

Jim Feast, RSC president, led the launch event and introduced the accompanying inaugural *Chemistry World: China* lectures.

Richard Pike, RSC's chief executive, acknowledged that 'We face the same global issues and opportunities and we need our best minds working together across international boundaries to show leadership in matters such as improving

health, materials, energy, the environment, and better use of global resources.'

He noted that, with the launch of *Chemistry World: China*, the science community at large now had an authoritative and influential magazine that would report on significant Chinese research in the context of such global issues, which in turn would help to focus future strategic debate between the RSC, CIESC and CCS.

Find out more at www.chemistryworldchina.org

Under the spotlight...

This month sees three RSC journals focus on key research areas:

Molecular BioSystems, Issue 10

Hagan Bayley's special issue on 'Understanding and Manipulating Channels and Pores'. The investigation of channels and pores is a delightfully varied field requiring a wide range of knowledge and experimental tools taken from a multiplicity of scientific disciplines.

Natural Product Reports, Issue 5

A themed issue, guest edited by Alison Smith and Finian Leeper from the University of Cambridge, UK, brings together six reviews which take different aspects of research into the chemistry, biochemistry and biology of vitamins and cofactors and show how, for each aspect, there are common themes for many of the pathways.

Journal of Materials Chemistry, Issue 38

Guest edited by Cameron Alexander, University of Nottingham, UK, this issue focuses on the increasing demands for better healthcare products and biomedical materials.

To find out more, visit www.rsc.org/journals

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