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Molybdenum and tungsten in biology: the bird's-eye view of the enzyme reaction centres and their artificial chemical analogues.
Image reproduced by permission of Hideki Sugimoto and Hiroshi Tsukube from *Chem. Soc. Rev.*, 2008, **37**, 2609.

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New insights in the 2-His-1-carboxylate facial triad in non-heme iron enzymes show the unprecedented versatility of this oxidative catalytic platform.
Image reproduced by permission of Pieter C. A. Bruijnincx, Gerard van Koten and Robertus J. M. Klein Gebbink from *Chem. Soc. Rev.*, 2008, **37**, 2716.

CHEMICAL SCIENCE

C89

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

Chemical Science

December 2008/Volume 5/Issue 12

www.rsc.org/chemicalscience

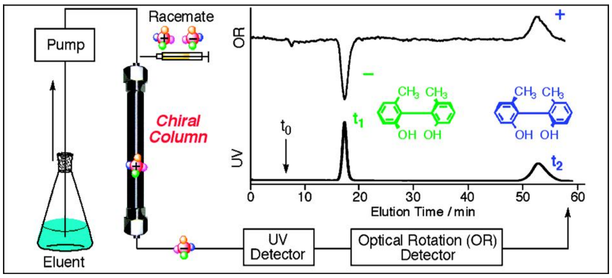
TUTORIAL REVIEW

2593

Chiral HPLC for efficient resolution of enantiomers

Yoshio Okamoto* and Tomoyuki Ikai

Optically active small molecules and polymers with a chiral recognition ability as the chiral stationary phases for HPLC are outlined.



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Chemical Society Reviews publishes accessible, succinct and reader-friendly articles on topics of current interest in the chemical sciences. The promotion of international and multidisciplinary awareness and cooperation is particularly encouraged. Chemical Society Reviews publishes two article types: tutorial reviews, which present an accessible introduction to the topic, and critical reviews, which provide a deeper evaluation of the current literature.

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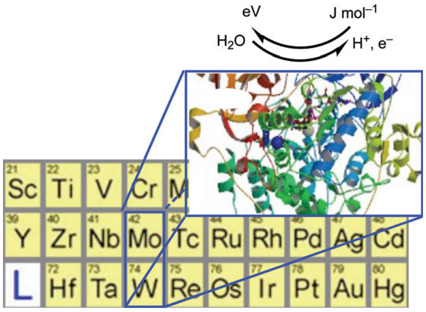
TUTORIAL REVIEWS

2609

Chemical analogues relevant to molybdenum and tungsten enzyme reaction centres toward structural dynamics and reaction diversity

Hideki Sugimoto* and Hiroshi Tsukube

This tutorial review describes structures/reactivities of molybdenum and tungsten reaction centres and related biological coordination chemistry.

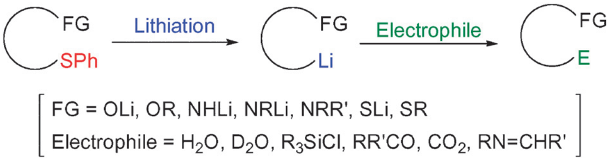


2620

Functionalised organolithium compounds by sulfur–lithium exchange

Francisco Foubelo* and Miguel Yus*

The arene-promoted lithiation of functionalised phenylthioethers generates functionalised organolithium intermediates able to transfer the functionality to electrophiles yielding polyfunctionalised molecules.

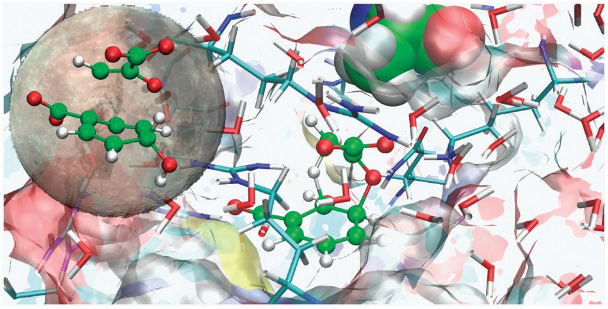


2634

Computational design of biological catalysts

Sergio Martí, Juan Andrés, Vicent Moliner,* Estanislao Silla, Iñaki Tuñón* and Juan Bertrán

Computational techniques provide an enormous quantity of information to guide the development of new biological catalysts by protein engineering from potential protein scaffolds.

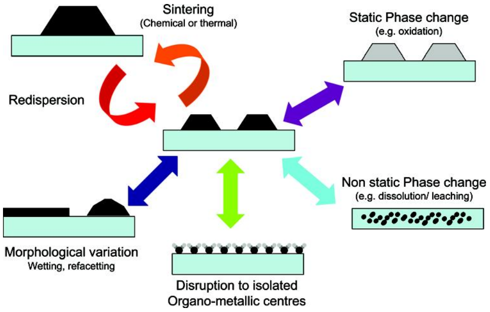


2644

Dynamic adsorbate/reaction induced structural change of supported metal nanoparticles: heterogeneous catalysis and beyond

Mark A. Newton*

Supported metal nanoparticles are structurally flexible and dynamic entities that respond rapidly to changes in their environment. This review aims to introduce how and why this might occur, how we may see into such processes using X-rays and electrons, and give examples of where such behaviour may be tangibly linked to catalytic behaviour.

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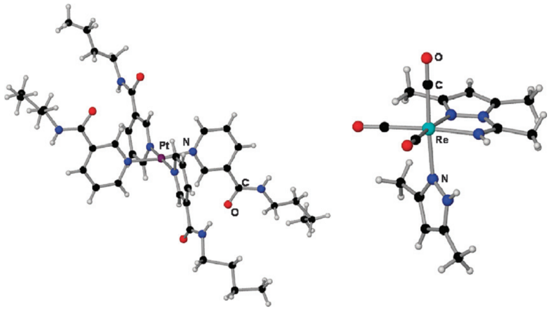
TUTORIAL REVIEWS

2658

Stable metal–organic complexes as anion hosts

Julio Pérez* and Lucía Riera

Metal–organic complexes such as the ones pictured, with ligands armed with hydrogen bond donor groups in suitable positions, positive charge and sufficient stability, are a distinct type of anion hosts.

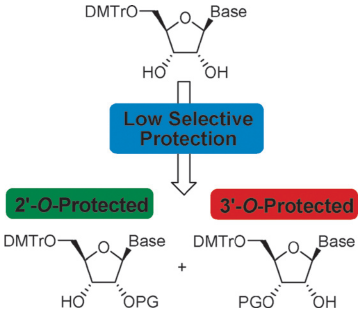


2668

Protecting groups for RNA synthesis: an increasing need for selective preparative methods

Álvaro Somoza*

This tutorial review summarizes the methods available for the selective protection of ribonucleosides in RNA synthesis, pointing out the need for more efficient approaches.

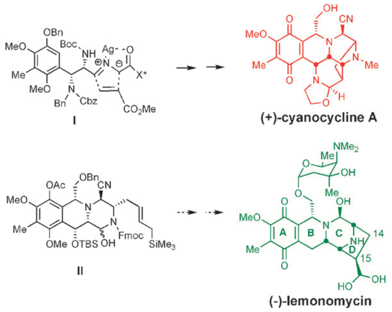


2676

Recent progress in the total synthesis of naphthyridinomycin and lemonomycin tetrahydroisoquinoline antitumor antibiotics (TAAs)

Peter Siengalewicz, Uwe Rinner and Johann Mulzer*

Targeting tetrahydroisoquinoline alkaloids: for cyanocycline A, a 1,3-dipolar cycloaddition was used, whereas, in an uncompleted approach to lemonomycin, an allylsilane was the key intermediate.

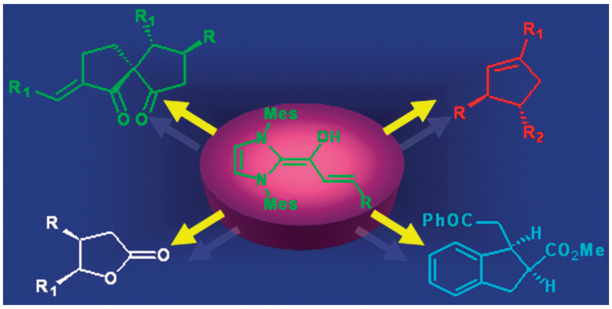


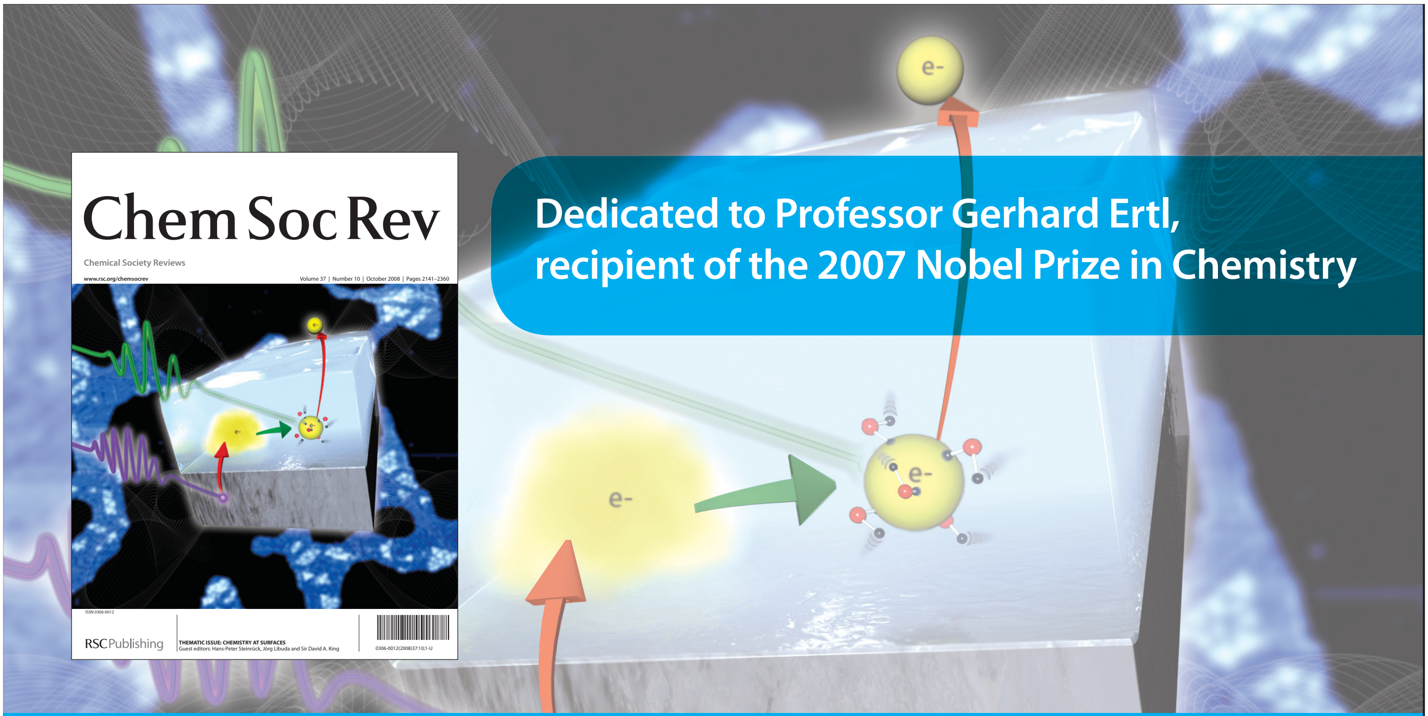
2691

Recent advances in carbon–carbon bond-forming reactions involving homoenolates generated by NHC catalysis

Vijay Nair,* Sreekumar Vellalath and Beneesh Pattoorpadi Babu

This tutorial review covers reactions which demonstrate the synthetic potential of NHC-bound homoenolates in organic synthesis.





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THEMATIC ISSUE: CHEMISTRY AT SURFACES
Guest editors: Hans-Peter Steinrück, Jörg Libuda and Sir David A. King

0306-0012(2008)37:10;1-U

Dedicated to Professor Gerhard Ertl, recipient of the 2007 Nobel Prize in Chemistry

Chemistry at Surfaces themed issue

The issue highlights state-of-the-art research from the scientific field pioneered by Professor Gerhard Ertl. Selected and representative examples of modern topics are presented by a number of colleagues who contributed to the emergence of surface science together with Professor Ertl, as well as by younger colleagues who significantly contributed to the present reputation of the field.

Driven by rapid progress in experimental and theoretical methodology, surface science turned into a well-established scientific area, nowadays laying the foundations for a molecular-level understanding of the chemistry behind 21st century key technologies in fields such as heterogeneous catalysis, corrosion, fuel cell research, and the semiconductor industry.

Reviews include:

Molecular surface chemistry by metal single crystals and nanoparticles from vacuum to high pressure
Gabor A. Somorjai and Jeong Y. Park

The nature of the active site in heterogeneous metal catalysis
Jens K. Nørskov, Thomas Bligaard, Britt Hvolbæk, Frank Abild-Pedersen, Ib Chorkendorff and Claus H. Christensen

A surface science approach to ultrafast electron transfer and solvation dynamics at interfaces
Julia Stähler, Uwe Bovensiepen, Michael Meyer and Martin Wolf

Oxide ultra-thin films on metals: new materials for the design of supported metal catalysts
Hans-Joachim Freund and Gianfranco Pacchioni

Nanoscale surface chemistry over faceted substrates: structure, reactivity and nanotemplates
Theodore E. Madey, Wenhua Chen, Hao Wang, Payam Kaghazchi and Timo Jacob

Guest editors

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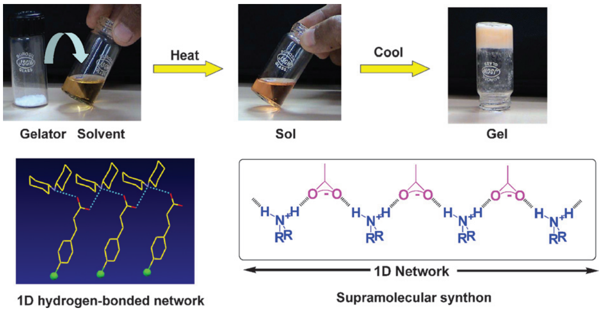
TUTORIAL REVIEW

2699

Supramolecular gelling agents: can they be designed?

Parthasarathi Dastidar*

This tutorial review focuses on some of the recent developments covering both *molecular* and *crystal engineering* approaches in designing low molecular mass organic gelators (LMOGs).



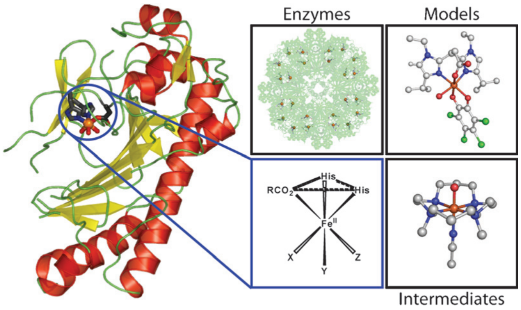
CRITICAL REVIEWS

2716

Mononuclear non-heme iron enzymes with the 2-His-1-carboxylate facial triad: recent developments in enzymology and modeling studies

Pieter C. A. Bruijnincx, Gerard van Koten and Robertus J. M. Klein Gebbink*

These non-heme iron enzymes catalyze a stunningly diverse array of oxidative transformations. Recent advances in enzymology and modeling studies are discussed.

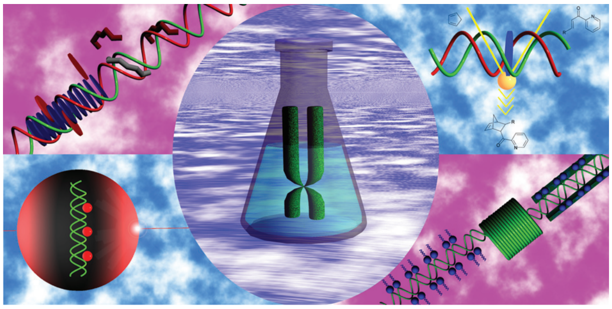


2745

Applied chemistry of natural DNA

XiangDong Liu,* HongYan Diao and Norio Nishi

In this critical review article, recent developments in utilizing natural DNA are reviewed by focusing on three basic properties of DNA: the electrostatic property as a polyelectrolyte, selective affinity for small molecules, and its biocompatibility.

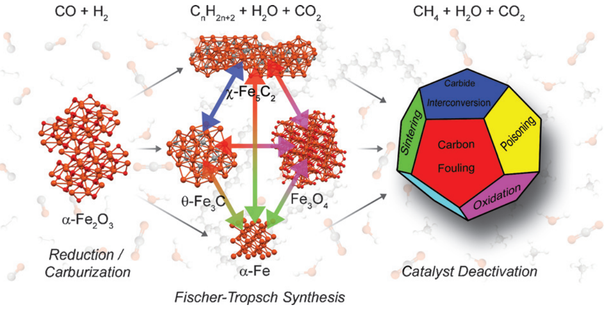


2758

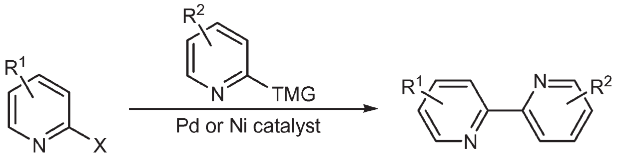
The renaissance of iron-based Fischer–Tropsch synthesis: on the multifaceted catalyst deactivation behaviour

Emiel de Smit and Bert M. Weckhuysen*

Old and new views on extending the lifespan of iron-based Fischer–Tropsch catalysts for the production of synthetic fuels.



CRITICAL REVIEW



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Chris Dobson, University of Cambridge
Ben L Feringa, University of Groningen
Sir Harold Kroto, Florida State University
Klaus Müllen, Max-Planck Institute for Polymer Research
Sir J Fraser Stoddart, Northwestern University
Vivian W W Yam, The University of Hong Kong
Richard N Zare, Stanford University

For a detailed list of symposia, keynote speakers and to submit an abstract visit our website.

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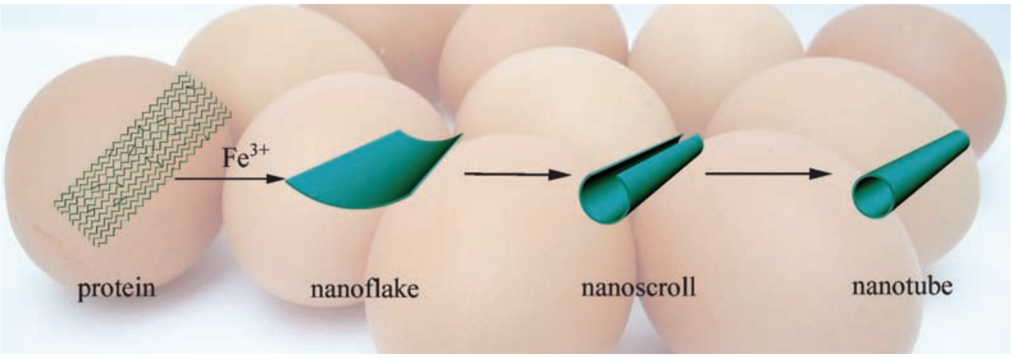
December 2008 / Volume 5 / Issue 12 / ISSN 1478-6524 / CSHCBM / www.rsc.org/chemicalscience

Chemical Science

Egg white proteins aid formation of magnetite nanotubes

Which came first, the nanotube or the egg?



Egg whites have found a novel use as a template for making inorganic nanotubes, thanks to Chinese scientists.

Baoyou Geng and colleagues at the Anhui Normal University, Wuhu, made magnetite (Fe_3O_4) nanotubes in an egg white solution. The egg white protein – which has a high affinity for metal ions – forms organic–inorganic complexes with Fe(III). The complexes then aggregate to form nanosheets, a process that generates heat. The increase in temperature ruptures hydrogen and peptide–iron bonds so that the iron oxide dissociates from the egg white template. The iron oxide sheets then roll up to form hollow nanotubes.

The use of proteins from bones and shells as templates is well known, but most need time consuming and complex methodologies to generate the biological template. Geng explains that their new strategy uses a cheap and easily obtainable protein template.

Inorganic nanotubes have a wide range of applications from drug delivery to solar energy conversion devices. And magnetite – one of the most magnetic minerals – is particularly interesting for magnetism related applications.

Xitian Zhang – a specialist in the preparation and applications of nanotubes from the Chinese University of Hong Kong, Shatin – says that this research 'provides a simple, novel and feasible method for the preparation of single-crystalline iron oxide nanotubes.' 'This approach not only enriches magnetite chemistry, but also provides a new strategy to synthesise similar materials,' he adds.

Iron oxide nanotubes have magnetism related applications

The next challenge is to investigate 'the reaction conditions on the egg white structure, which may result in morphology changes to the product,' says Geng. Geng and his team will also try synthesising other nanotubes to investigate the effects of different metal ions on egg white.

Michael Brown

Reference

B Geng *et al*, *Chem. Commun.*, 5773, 2008 (DOI:10.1039/b813071j)

In this issue

Underperforming yeasts opt out of life
Suicidal yeasts assist in the search for enantioselective enzymes

Quantum leap in chemical sensing
Quantum dots improve the detection of metal ions in water

Instant insight: Asbestos comes naturally
Martin Harper, National Institute for Occupational Safety and Health, US, points out a hazard in the natural environment

Interview: A total mismatch
Penny Brothers tells Michael Brown about porphyrins and their potential role in neutron capture therapy

A snapshot of the latest developments from across the chemical sciences

Research highlights

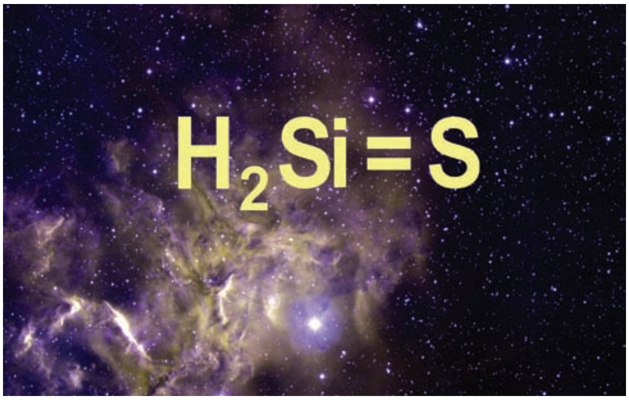
A 'plausible astronomical molecule' has been characterised for the first time

Silanethiones reach for the stars

German researchers have identified experimentally $H_2Si{=}S$, a molecule thought to exist in outer space, for the first time.

A team led by Sven Thorwirth at the Max Planck Institute for Radioastronomy, Bonn, were able to characterise this elusive molecule using microwave spectroscopy. 'Cosmically, silicon and sulfur are very abundant elements,' says Thorwirth. This unsubstituted silanethione is 'a plausible astronomical molecule' that may exist in the shells of dust surrounding dying stars, he explains.

Several substituted silanethiones, $RR'Si{=}S$, stabilised by bulky alkyl (R) groups have already been synthesised and their structures determined using X-ray crystallography. But the unsubstituted silanethione – the second-row analogue of formaldehyde – had never been seen before.



Silanethione may exist in the shells of dust surrounding dying stars

Thorwirth used microwave spectroscopy – which measures the difference between the electromagnetic radiation absorbed by a molecule and that emitted – to look for the molecule. The radiation difference is associated with the molecule's rotation, and is used to indentify molecular species and isotopes. The team then backed up their experimental results with high-level quantum chemical calculations. Explaining the significance of this work, Thorwirth says that the 'data provide the laboratory basis needed for future radio astronomical searches for this molecule in space.'

The research is welcomed by Paul Davies, a member of the infrared laser spectroscopy group at the University of Cambridge, UK, who says that this combination of spectroscopy and high-level calculations 'should be generally applicable for unravelling the spectra from increasingly complicated molecules, hence enabling the full potential of microwave spectroscopy to be realised.'

Vikki Chapman

Reference

S Thorwirth *et al*, *Chem. Commun.*, 2008, 5292 (DOI: 10.1039/b814558j)

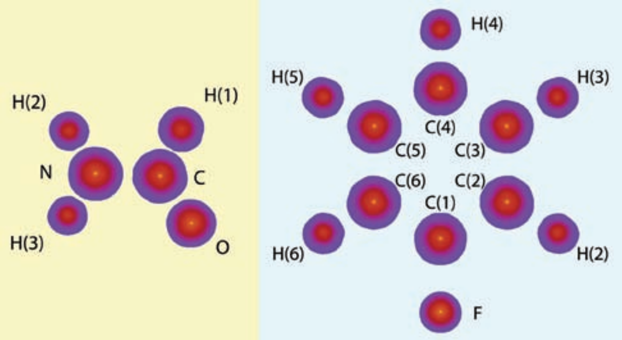
Scientists solve the 'how many electrons are on each atom in a molecule' puzzle

Cracking charge density

A new computational approach to accurately and reliably divide a molecule's electronic properties into its component atom parts has been developed by scientists in the UK.

While chemists typically think of the properties of molecules as a sum of their atomic parts, molecular characteristics such as electron density are impossible to experimentally divide into their atomic components, and have proven difficult to derive computationally. Now, Timothy Lillestolen and Richard Wheatley at the University of Nottingham have developed a simple algorithm that they say gives atoms with the smooth, spherical shapes and charges that would intuitively be expected.

'If you ask a chemist whether the properties of a molecule can be understood in terms of the properties of its constituent atoms, you are likely to get an affirmative answer,' says Wheatley. 'However, the tools available for accurate chemical calculations treat the molecule holistically, and do not allow information on separate atoms to be easily extracted.'



A simple algorithm has allowed electron density to be divided up into atomic components

To tackle the problem, the team developed an iterative stockholder approach to calculate the electron density of each atom. Electronegative atoms were correctly predicted to have negative charges, while hydrogen atoms bonded to electronegative atoms had a positive charge.

'The beautiful results produced by the iterated stockholder method have taken us by surprise: if it has an Achilles' heel, then we have yet to discover it!' says Wheatley. 'However, our results so far are preliminary, and we are still working on applications of the method to a wider range of chemicals,' he adds. The team are in talks with several software companies over the possibility of incorporating the work in quantum chemistry programmes.

'This is a slick and simple idea that provides a way to answer a question that is in most chemists' minds: how many electrons are there on each atom of a molecule?' says Peter Knowles, who develops computational methods at Cardiff University, UK. 'Further work should answer the question as to whether there is a practical use for this simple theory – can we use it to predict relative chemical reactivity, or to construct a simple force field for intermolecular interactions, using these atomic charges?'

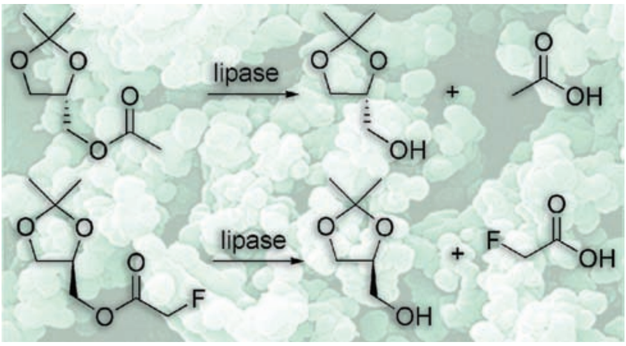
James Mitchell Crow

Reference

R Wheatley and T Lillestolen, *Chem Commun.*, 2008, DOI: 1039/b812691g

Suicidal yeasts assist in the search for enantioselective enzymes

Underperforming yeasts opt out of life



The yeasts die if the enzyme their gene encodes for generates the toxic byproduct

German scientists looking to evolve yeast enzymes to catalyse asymmetric organic reactions have used a chemical trick to force underperforming yeasts to commit suicide even before they have to be screened.

Manfred Reetz and co-workers, at the Max Planck Institute for Coal Research, Mülheim, were searching for a better enantioselective enzyme to catalyse cleavage reactions of a chiral ester to make a chiral alcohol. The standard way of doing this, directed evolution, involves generating libraries of mutant enzymes from host yeasts containing the enzyme of interest, sorting through the new enzymes to pick out the best progeny, and continuing until the desired degree of catalyst improvement has been reached. But, as Reetz explains, 'screening large libraries of mutant enzymes in order to fish out the best ones is very time-consuming and costly.'

Instead, Reetz's team designed a selection system so that yeasts producing a lipase which cleaved the wrong chiral ester killed themselves, while yeasts whose enzymes were on the right track grew faster. They fed the yeasts with two almost identical esters of chiral isopropylidene glycol, a test compound. When the *S*-enantiomer was cleaved (the desired reaction) it generated acetate as a byproduct, which acts as an energy source for the yeast. The mirror-image ester, the undesired *R*-enantiomer, was in fact a pseudo-enantiomer with a fluorine atom attached. Cleavage of this compound produced poisonous fluoroacetate, which kills the yeast. So the yeasts effectively commit suicide if the enzyme their gene encodes for cleaves the wrong enantiomer.

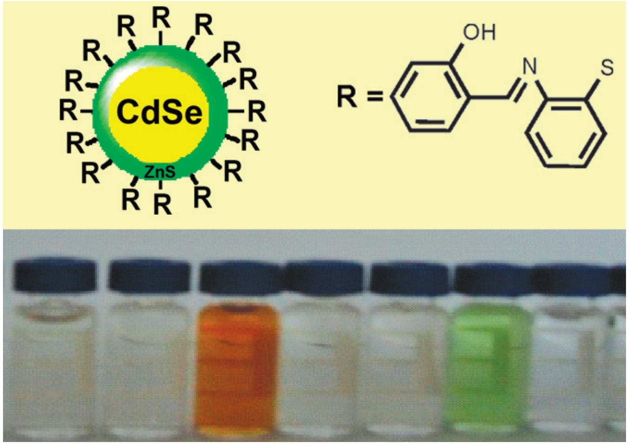
'Here the undesired enzyme mutants are not formed, which is of great advantage relative to screening systems in which mostly junk mutants are generated,' explains Reetz.

Stefan Lutz, who is a US expert on protein engineering and biomolecular chemistry at Emory University, Atlanta, says the findings represent a significant advance in the field. 'It is a classic example of a carrot-and-stick idea, Reetz and colleagues have devised a system that uses easily synthesised substrates (acetate versus fluoroacetate esters of their alcohol of interest). It is hard to imagine that one could find something simpler.' *Kathleen Too*

Reference
M T Reetz *et al*, *Chem. Commun.*, 2008, 5502 (DOI: 10.1039/b814538e)

Organic ligands bound to quantum dots improve metal ion detection in water

Quantum leap in chemical sensing



Iron and copper can be detected simultaneously in water samples

Small molecules that bind to many types of metal ions in water can be transformed into highly selective multi-functional sensors by harnessing them to quantum dots, UK scientists have demonstrated.

John Callan and colleagues at the Robert Gordon University, Aberdeen, created nanocrystals that can simultaneously detect copper and iron in water. The sample solution visibly changes colour when metals come into contact with the sensor: from colourless to green for copper, or to orange for iron.

'The remarkable aspect of the work is that the receptor itself shows no selectivity for any particular metal ion, but displays dual selectivity when anchored to the quantum dot surface,' says Callan.

Once the organic ligands attach to the dots – which are cadmium selenide/zinc sulfide semiconductor nanoparticles – they are confined by the surrounding three-dimensional structure, and form binding sites that complement the size, shape and electronic properties of copper and iron ions. Because the ultraviolet–visible spectra of detected copper and iron metals in solution don't overlap, each metal can be tracked simultaneously using ultraviolet–visible spectroscopy.

'This fine work brings multi-functionality to quantum dot sensors for the first time,' comments A P De Silva, an expert in sensors from Queens University, Belfast, UK.

Callan's sensor is straightforward to prepare and gives results in real time. It compares well with other multi-analyte sensors which often involve long-winded methods for receptor synthesis and data processing. And, Callan claims, it also has superior optical properties compared with the organic dyes currently used in optical sensors.
Ziva Whitelock

Reference
N Singh *et al*, *Chem. Commun.*, 2008, 4900 (DOI:10.1039/b813423e)

Journal of Environmental Monitoring

Focus on Medical Geology & Air- and Biomonitoring

Journal of Environmental Monitoring (JEM) issue 12, 2008, is focusing on the areas of Medical Geology & Air- and Biomonitoring.

Medical Geology has seen immense growth and maturation allowing biomedical/health professionals and geoscientists to take strong root in the international arena. The journal anticipates publishing many articles in this field. The first two reviews, included in this issue, are:

The utility of mosquito-borne disease as an environmental monitoring tool in tropical ecosystems
Andrew Jardine, Angus Cook and Philip Weinstein

10th Anniversary Critical Review: Naturally occurring asbestos
Martin Harper

Air- and Biomonitoring features six selected papers on exposure monitoring within the preventive framework of identifying and controlling health hazards within the workplace and in the environment presented at AIRMON 2008, held at Geilo, Norway, January 28-31, 2008.

Highlighted papers:

Three dimensional modeling of air flow, aerosol distribution and aerosol samplers for unsteady conditions
Albert Gilmutdinov and Ilya Zivilskii

Experimental methods to determine inhalability and personal sampler performance for aerosols in ultra-low windspeed environments
Darrah K. Schmees, Yi-Hsuan Wu and James H. Vincent

A study of the bio-accessibility of welding fumes
Balázs Berlinger, Dag G. Ellingsen, Miklós Náray, Gyula Záray and Yngvar Thomassen

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Instant insight

Asbestos comes naturally

Martin Harper, National Institute for Occupational Safety and Health, Morgantown, WV, US, points out a hazard in the natural environment

The standard reaction to pollution is to blame the polluter – in most cases man and his activities. But what happens when the polluter is the environment? Recently, we have started to view the environment as a source of substances likely to be harmful to human health. A high-profile example of this 'natural pollution' is the contamination of groundwater by arsenic from natural sources in Bangladesh and India.

Another, less well-known problem is asbestos that occurs naturally in rock. Naturally occurring asbestos (NOA) is the name given to the silicate minerals serpentine and amphibole that, in certain environmental conditions, form exceedingly thin crystals in parallel alignment – with the appearance of cotton or silk. The term NOA can also be used to describe different minerals that crystallise in a finely fibrous manner resembling asbestos, and minerals that can produce elongated particles when broken or crushed.

The most significant risk from NOA is serious illness that may occur through exposure through inhalation. The illnesses include asbestosis – the chronic inflammation of the inside of the lungs (which is a result of exposure to high concentrations of asbestos), lung cancer and mesothelioma – a cancer that occurs in the protective lining that covers most of the body's internal organs. These latter two diseases result from exposure to lower concentrations and are the largest concern for NOA. Not all particles that might find themselves classified as NOA are likely to have the same disease risk, and trying to determine the exact risk from low-level environmental exposures is not easy. So far, adverse health effects as serious and widespread as those related to arsenic in groundwater have not been observed. For the asbestos particles to become airborne – and therefore pose a health risk – the rock or soil normally needs to be disturbed. The nature of the soil and local climate are also important, as well as the type of activity causing disturbance. Simple erosion isn't as much of a risk as man's activities – such as mining and quarrying, excavation for construction, farming, landscaping and gardening. People carrying out these activities have the highest risk occupations, but second-hand exposure is also possible for local residents. Exposure can also occur through recreational activities that seriously disturb the soil such as riding motorised vehicles, bicycles, jogging and other sports. The trailing members of a group of riders, cyclists or runners are known to be exposed to much greater quantities than the leaders, and children may suffer higher exposure than adults.

DAVID TERPENING, USEPA

Shovelling and raking of gravel containing asbestos minerals can cause asbestos particles to become airborne

A community may have lived for many generations in an area with NOA without realising it. Such communities may be more comfortable in dealing with the presence of NOA when discovered than people moving into new developments would be – especially those where there is ongoing major construction activity.

Once NOA is identified, risk assessment is required in order to assess the problem, and this can be challenging and hard to communicate effectively when there is not a consensus on the risk.

Once it is known that a region has NOA, the local population must determine whether the risk is tolerable, and this becomes more difficult with increasing uncertainty in the assessment. Risk tolerance is a function of many socio-economic factors, which may involve politics and the law, and the role of government. In each situation where communities deal with NOA there is a unique combination of risk assessment and social issues – which include employment, income and property values. A different combination of the following groups of people get involved in each case – local activists, people with commercial interests, politicians, media, scientific experts, local and national government agencies, and courts of law. Failure to come up with an acceptable solution to the issue of NOA is not pretty; leading to litigation and political and social recriminations, in addition to loss of amenity, reduction of property value, and ultimately the possibility of impaired future health. With all these factors to consider it is clear that this isn't a situation where the one-size-fits-all approach could work, and how each 'newly' contaminated area is dealt with will have to be custom-fitted.

NOA is an issue of study, debate and concern within the affected areas of the US today, and also for some countries around the Mediterranean, such as Italy and Turkey, where NOA is relatively common. However, the widespread occurrence of these minerals suggests that this matter will become an issue for many other countries in the future.

Read Martin Harper's critical review 'Naturally occurring asbestos' in issue 12, 2008 of Journal of Environmental Monitoring

Reference

M Harper, *J. Environ. Monit.*, 2008, DOI: 10.1039/b810541n

Interview

A total mismatch

Penny Brothers tells Michael Brown about porphyrins, the porphyrin–boron mismatch and their potential role in neutron capture therapy

Penny Brothers

Penny Brothers is an associate professor at the University of Auckland, New Zealand. Her research brings together her interests in porphyrin chemistry, the main group elements and organometallic chemistry. She investigates how the porphyrin ligand can be used to modify the chemistry of elements such as boron and bismuth. She has recently begun to explore the chemistry of main group elements with the related macrocycle corrole.

What motivated you to specialise in organometallics and porphyrins?

At the University of Auckland, where my father was a geology professor, there were display cases full of minerals that I loved looking at. All the beautiful crystals, with all their different morphologies and colours, helped attract me to inorganic chemistry. When I was choosing my masters research subject area, Professor Warren Roper, an organometallic chemist, was my mentor. Warren Roper had a long association with Jim Collman and I went to Stanford to do a PhD in his group, which was focused on porphyrin chemistry. I worked on a porphyrin project, which I enjoyed, and that was how I got into porphyrin chemistry. I have been there ever since.

Can you explain the significance of your work?

Boron–porphyrin chemistry is where my attention is at present. In terms of significance there are potential applications of boron porphyrins in sugar sensing and in neutron capture therapy. Porphyrins are known to localise on the surface of a tumour and the boron serves as the neutron capture element. Others have investigated boron attached to the periphery of the porphyrin, but my research involves boron coordinated to the centre of the porphyrin. In coordination chemistry, a ligand is often designed for a specific coordination geometry and metal centre, producing a thermodynamically stable complex. In our research, we do the reverse. Porphyrins are a total mismatch for boron, with the wrong coordination geometry and the wrong size, and this mismatch can stimulate some unusual and interesting chemistry. This fundamental interest is my main motivation.

What are the advantages of collaborations and have they been beneficial?

Absolutely. Students view chemistry as something rather dry that you read about in text books and journal articles. If you can show students the link between the research and the people that are committed to chemistry, then it becomes more interesting and easier to understand. I think chemistry becomes more alive and a richer subject when you know the people that are involved in it. When you read the work of someone you know personally, you can find it easier to understand because chemists, like anybody else involved in creative endeavours, express their personalities through their work. We have no hesitation in understanding this for artists and musicians, but it is also true in science. With collaborations, you not only get the experience of someone else's expertise, you get their intellectual input, and a personal interaction that means it becomes the creative endeavour of a bigger team.

Did you face any challenges as a woman in science?

Because I grew up in a household of scientists, I never felt I had a barrier, either as an individual or as a woman, to overcome. I had a lot of support from my family, teachers, mentors and advisors, so I had a very straightforward pathway through the system. Women often have a more difficult journey into an academic career, as they may have family responsibilities or may have to fit with the career plans of a partner. For my generation in particular, the career aspirations of women began to be valued for the first time, so I was very lucky to start my career at the time I did. I have never encountered any overt discrimination, but I do recognise that there are barriers in the system. I think that we often generate some of the barriers ourselves and women can lack the confidence to strive for their goals.

What do you enjoy most about your role on the Chemical Communications editorial board?

The more diverse the network of people I know in the world of chemistry, the more I enjoy it. When I was appointed to the editorial board, my first reaction was to think that I need to get over my lack of confidence. I can make as much of a contribution to the editorial board as anyone else. Particularly, I can add a perspective from a smaller country that is outside the big hubs of activity like the US, the UK, Europe and Asia. I have always been interested in publishing, but felt that it was inevitable to end up in an academic position as I grew up in that environment. If I hadn't ended up doing academic chemistry, I would have liked to be involved in science publishing, so this is a really good opportunity for me to learn a bit more about that and make a contribution to a different area.

Essential elements

Board member wins Nobel Prize

The Nobel Prize in Chemistry 2008 has been awarded to Roger Tsien (below right), University of California, San Diego, US, a member of the editorial board for the upcoming RSC journal *Integrative Biology* (to be launched in January 2009), and colleagues for their work in the development of the gene marker green fluorescent protein (GFP).

Harp Minhas, editor of *Integrative Biology*, says: 'Congratulations to Professor Tsien, from all of us at the RSC. We are all immensely pleased that 2008 Nobel Prize winner Roger Tsien is an editorial board member for *Integrative Biology*; his work typifies the quality of material we are seeking in the development of biology through new tools and technologies.'

Derivatives of GFP are used in experiments to observe cell dynamics and behaviour – their fluorescent glow allows scientists to visualise processes inside cells.

Furthermore, as it is non-toxic to cells it can be used in live cell (in vitro) studies meaning that real time analysis of cells is possible.

GFP is a protein first extracted from the jellyfish *Aequorea victoria* in the 1960s by Osamu Shimomura, who was jointly awarded this year's prize with Tsien and Martin Chalfie. Variants of GFP can fluoresce in different colours, allowing several different proteins in a cell to be studied simultaneously.

Find out more about our new journal Integrative Biology *at www.rsc.org/ibiology*

Announcing *Lab on a Chip* prize winners

Lab on a Chip, the miniaturisation journal for chemistry, biology and bioengineering, has yet again shown extensive community support by sponsoring some of the most prestigious prizes in the miniaturisation field. At this year's μ-TAS meeting in San Diego the journal, together with Corning Inc., awarded the 'Pioneers in Miniaturisation Prize' to Patrick Doyle, professor at the department of chemical engineering at MIT, US. Jean-Louis Viovy from the Institute Curie comments on Doyle's work: '[Patrick] developed the "stop-flow lithography" technological platform, which I consider a major breakthrough in microfluidics.'

Lab on a Chip also awarded the 'Widmer Young Researcher Poster Award' to Maged Fouad for best poster and presentation. Among 589 candidates, this poster titled 'Nanotechnology meets plant biotechnology: carbon nanotubes deliver DNA and incorporate into the plant cell structure' caught the judges' eyes.

A new award named 'Art in Science' recognised the aesthetic value in scientific illustrations. 'The winner, Yu Wen Huang (Texas A & M University) clearly understood the principles of this award and produced an image that was reminiscent of a tall city building seen in an early morning fog. The picture is an optical effect generated by concentrated double-stranded DNA in the vicinity of a 50 micrometre wide electrode inside a microchannel,' comments Harp Minhas, editor of *Lab on a Chip*, who proudly presented all awards to the winners.

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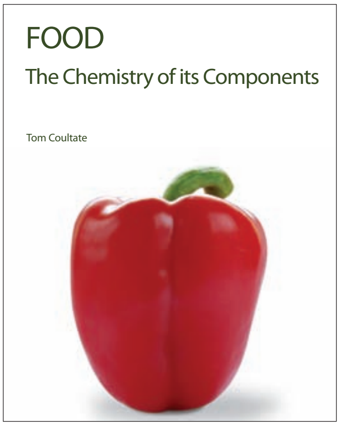

This textbook has been fully revised and updated and includes a foreword written by Heston Blumenthal. Look out for other exciting new food science books in 2009 such as *Kitchen Chemistry* (new volume), *Handbook of Culture Media for Food* and *Water Microbiology and Nanotechnologies in Food.*

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