

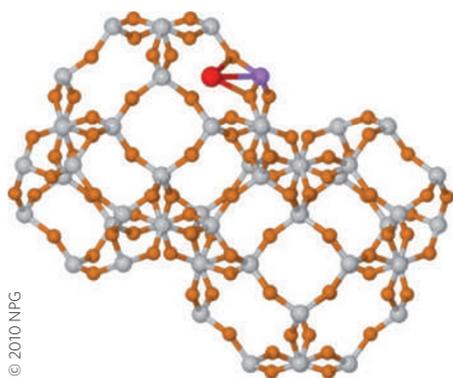
not. Exposure of the crystalline complex to a mixture of ethylene, propylene and hydrogen resulted in hydrogenation of both alkenes with a small selectivity for ethylene. Catalytically active sites at and near the surface of the crystal were passivated by exposing them to carbon monoxide — which binds more strongly than ethylene. Using this modified catalyst — albeit at a higher temperature — led to a significantly higher selectivity for hydrogenation of ethylene.

MICROSCOPY

Zooming in on zeolites

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The crystalline microporous materials known as zeolites are intensively studied and widely used as catalysts, sorption agents and for separating molecules. They are also used as supports for metal catalysts, giving the added advantage of size or shape selectivity through their pore structure. A wide range of techniques has been used to understand the structure of these supported catalysts, to gain mechanistic insights crucial to improving their performance. Among these techniques, transmission electron microscopy (TEM) methods are useful, but the zeolite samples can be damaged by the electron beam.

Now, Volkan Ortolan and colleagues from the University of California Davis have used a low-dose form of TEM, combined with image-processing techniques, to directly image single iridium atoms within a zeolite's pores. After obtaining aberration-corrected high-angle annular dark-field scanning TEM images that minimized the effect of the beam on the zeolite, the team used real-space averaging after Fourier filtering. The averaging technique preserved the zeolite structure in the images, removing the iridium atoms. Superimposing the original images therefore revealed the metal positions.

One of the advantages of the technique is that its nanometre-scale depth of focus

makes it possible to analyse different depths within a sample. Ortolan and colleagues took advantage of this to look at regions where there are few or no mesopores. They also examined catalysts after exposing them to flowing hydrogen for 30 minutes, simulating a reactive environment. The iridium atoms form clusters, identifiable as Ir₄ and Ir₆.

GRAPHENE OXIDE

Surfactant sheets

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Graphene oxide — a graphene sheet functionalized with oxygen-containing groups — can be produced by chemically exfoliating layers of graphite, and is an intermediate in some methods of producing graphene. It has been known for over 150 years and has been considered to be hydrophilic, because of the ease with which it can be dispersed in water, which is caused by the concentration of the oxygen atoms in carboxylic acid groups at the edge of the sheet. Jiaying Huang and colleagues from Northwestern University now suggest that graphene oxide is actually amphiphilic, because the main surface of the sheet contains polyaromatic rings.

On investigating this, Huang and colleagues found that the amphiphilic behaviour — in this case, floating on an air–water interface — was only observable after a few hours, because of the sheet's large molecular mass. They could speed this up by using carbonated water: the sheets stick to the bubbles and rise to the surface. Convection flows caused by heating had the same effect. To test whether the amphiphilicity was caused by a hydrophobic central plane, the team studied the effect of sheet size. They found that, as expected, larger sheets were more hydrophobic and floated more readily than smaller sheets. This could be used as a method of size-separating graphene oxide sheets.

Huang and co-workers also found that graphene oxide could act as a colloidal surfactant, by using it to emulsify small droplets of toluene in water, creating a suspension that was stable for months. The amphiphilic behaviour could be tuned by controlling the pH of the solution, because this affects the ionization, and therefore the hydrophilicity, of the carboxylic acid groups on the edge of the sheets.

The definitive versions of these Research Highlights first appeared on the *Nature Chemistry* website, along with other articles that will not appear in print. If citing these articles, please refer to the web version.

blogroll

Beyond big bangs

Science music videos face single combat, flashy chemistry talks come under scrutiny and we salivate over cake.

"Two videos enter. One video leaves." So says Lauren Wolf in the introduction to her post titled Video Thunderdome on C&EN's Newsprints blog (<http://go.nature.com/O2KLqr>). Taking her inspiration from the film *Mad Max Beyond Thunderdome*, Wolf uses the gladiatorial approach to assess two chemistry-focused music videos. One is from the Science Rapper, whose previous claim to fame is a video about PCR. He has now moved on to cover structural biology, parodying a *Saturday Night Live* video. In the other corner is The Chemistry Jock, a video created by three students in Neil Garg's class at UCLA. "He offered them an extra-credit assignment to make a music video about organic chemistry", Wolf said, and had more than 60 responses. Lyrics from the The Chemistry Jock include "I start to see the bonds; they're forming in my head, Alkene won't reduce? Try a catalyst instead." At the time of writing, the UCLA offering had 68% of the vote — and 1600 hits on YouTube.

On New Scientist's S Word blog (<http://go.nature.com/mMDQEj>), Andrea Sella ponders the use of "bangs and flashes" in public chemistry talks. He's quite the expert, having done several banging flashes on BBC TV programmes. But he is "nagged by one question: aren't we misrepresenting our subject?" He's particularly worried that these spectacular effects "leave out that deeper story that underpins the amazing phenomena". Sella points out that too many of these shows "have little or no plot". He goes on to suggest that "we need to become real storytellers" and "to probe deep into the personalities of the strange and abstract characters that populate the scientific worlds".

And finally ... the science blog of the *Guardian* has a long, interesting and mouth-watering article by Andy Connelly about 'The science of cake' (<http://go.nature.com/cEhKIE>). If you have ever wondered what goes on between flour, eggs, sugar and fat in the mixing bowl and the oven, this post is for you.