

and they all contain the crucial  $\text{Fe}_2\text{X}_2$  layer. Some of the iron in these layers can be substituted by other transition metals without loss of superconductivity, in contrast to the  $\text{CuO}_2$  layer in the cuprate family of superconductors, which is very sensitive to copper substitution. Some pnictide compounds rely on iron substitution to form superconducting phases, but all superconducting pnictides have so far contained iron.

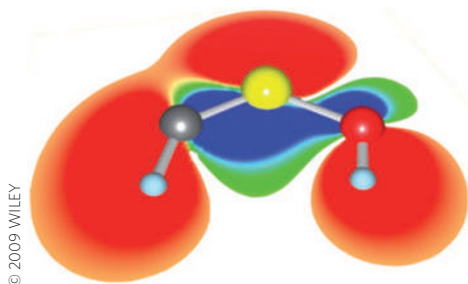
Now, Jian-Shi Zhou and colleagues from the University of Texas at Austin have discovered a pnictide superconductor that contains no iron at all. The material,  $\text{LiCu}_2\text{P}_2$ , has been known for over 40 years, but has never been investigated at low temperature. It has a structure similar to  $\text{BaFe}_2\text{As}_2$ , with layers of face-sharing  $\text{CuP}$  tetrahedra and lithium ions in between, and was synthesized at 650–850 °C from the constituent elements.

When cooled to 3.7 K, it showed the Meissner diamagnetism characteristic of superconductors as well as the drop to near-zero resistance. Superconductivity has been reported in non-pnictide compounds with the same structure, but at lower temperatures. Zhou and co-workers suggest that the transition temperature could be raised by substituting arsenic for phosphorus, a trend that has been seen in other pnictides.

#### HIGH-ORDER BONDS

### A triple riddle

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Compounds with a carbon–sulfur triple bond are extremely rare, and those that have been proposed to exist are either highly unstable (CS) or with bonding deemed ‘unclassical’ ( $\text{F}_3\text{S}-\text{C}\equiv\text{SF}_3$  and  $\text{F}_3\text{S}-\text{C}\equiv\text{SF}_3$ ).

So Peter Schreiner, Grzegorz Mloston and colleagues, of the Justus Liebig University in Giessen and the University of Lodz in Poland, were surprised when  $\text{H}_2\text{C}=\text{S}=\text{O}$  photochemically rearranged to give not the carbene they were hoping for, but  $\text{H}-\text{C}\equiv\text{S}-\text{OH}$ . The infrared spectrum of the product very closely resembled

that given by high-level calculations. Further computational work to investigate the possible structure of this molecule suggested that the all-*cis* configuration was most likely. Even lower in energy, however, was the sulfinyl carbene species  $\text{H}-\text{C}=\text{S}-\text{O}-\text{H}$ , but this was not observed experimentally.

The length of the carbon–sulfur bond was calculated to be very similar to the triple bond in CS, and to the sum of the triple-bond covalent radii for carbon and sulfur. Bond-order analysis suggested that it is below three, so the team describe it as a weak triple bond or a strong double bond.

#### HETEROGENEOUS CATALYSIS

### Support by unsaturated ions

*Science* **325**, 1670–1673 (2009)

The most common type of industrial catalyst consists of a precious metal fixed to the surface of an oxide support. Understanding catalyst–support interactions is key to controlling the dispersion and structure of the catalyst atoms on the support surface and thus crucial to improving catalytic activity. Strong interactions are necessary for high activity under harsh operating conditions and occur at electronic defects on the surface of reducible oxide supports, such as  $\text{Ti}^{3+}$  sites on the surface of titania. The surface of a non-reducible  $\gamma\text{-Al}_2\text{O}_3$  support, however, has no such defects, but yet still binds catalytically active precious metals.

Ja Hun Kwak from the Pacific Northwest National Laboratory and co-workers have now shown that platinum atoms bind to unsaturated pentacoordinate  $\text{Al}^{3+}$  on the support surface. Using  $^{27}\text{Al}$  magic-angle spinning NMR spectroscopy they see a decrease in the number of unsaturated pentacoordinate  $\text{Al}^{3+}$  sites and an increase in the number of saturated sites after platinum loading. Using electron microscopy they also observe that platinum atoms are evenly dispersed at low loading, with one at each  $\text{Al}^{3+}$  site, but when loading is higher they observe the formation of two-dimensional PtO ‘rafts’.

Kwak and colleagues propose that the binding is driven by coordinatively saturating the aluminium sites, rather than electronic interactions between catalyst atoms and reducible oxide supports.

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

### Your precious thesis

**Should students focus more on writing papers than on worrying about their thesis? And some historical gems from Google Books.**

The Thesis. The Mount Doom of your PhD (for the full — and both funny and worrying — *Lord of the Rings* allegory, visit <http://go.nature.com/cpbCEN>). But does it have to be? Prof-like Substance thinks not (<http://go.nature.com/Y67DQh>). He recommends “Don’t focus on an arcane document that will gather dust for the next 50 years until the departmental office needs space and throws the old ones out.” Instead, he suggests that students need to concentrate on getting the papers out: “Write the papers, or at least write the chapters as papers so you can get them out quickly after the thesis.” That should lead to less fixation on a document that he suggests very few people read anyway. Prof-like Substance himself has not opened his own thesis since discovering a typo in the very first sentence just after it was bound. Many of the comments agreed, but not all: finding descriptions of failed experiments saved Patchi valuable time, plus “in a thesis you can outline your thought process, pitfalls and have a complete description of your methods”.

The Google Books project — to scan and make available millions of books that are no longer in print — has been gathering headlines recently, and Egon Willighagen takes a look in a post at Chem-bla-ics (<http://go.nature.com/GNncsj>). He found “41 thousand books, just for the ‘chemistry’ search term” in the pre-1923 book set. That’s a lot of books. He points out a “cool” English translation of the works of Antoine Lavoisier, the fourth edition from 1799 (<http://go.nature.com/OS9bQG>). This actually allows him “to read all the stuff I read about when doing a History of Chemistry” course at university. The course, alas, is no longer offered to students, but maybe the Google Books project will re-kindle [pun fully intended] students’ interest in the history of their subject. Who could fail to be inspired by the 1913 copy of the CRC Handbook of Chemistry and Physics (<http://go.nature.com/6g8OH7>)?