

in the solution caused the polymer chains to become stressed, and as a result they engaged in a 'tug of war' with the triazole ring in between. Gel-permeation chromatography revealed that the original polymer chain was cut in half to form two smaller molecules, and infrared spectroscopy confirmed that one had a terminal azide and the other a terminal alkyne. This strongly suggested that the applied mechanical force had induced a cycloreversion process in which the triazole ring had fallen apart.

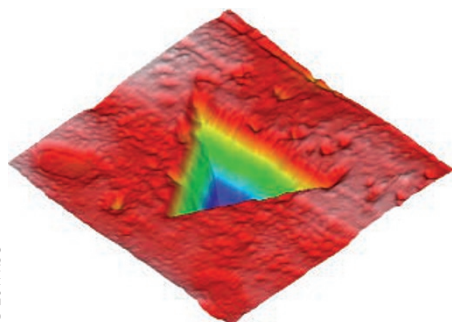
Control experiments showed that the chain scission does not occur because of thermal effects and that the polymers must be above a certain length threshold before the cycloreversion reaction is possible. Moreover, the triazole ring must be located near the centre of the polymer — in compounds with just a single long chain dangling from only one side of the triazole ring, no cycloreversion was observed. SC

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DRUG POLYMORPHISM

Aspirin headache solved

Chem. Sci. <http://dx.doi.org/10.1039/c1sc00430a> (2011)



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Polymorphism — the existence of different crystal structures of the same compound — is a problem in the pharmaceutical industry, because different polymorphs of the same drug may have different physical properties. Monitoring these subtle differences at each stage of a rigorous production process is a huge expense. Obtaining high-quality crystal structures is not always possible or practical in these circumstances.

Now, Sunil Varughese and colleagues from the Indian Institute of Science and the University of Southern Denmark have used a nanoindentation technique, which can measure the mechanical properties of very small amounts of solids to extremely high precision, to study and differentiate between the different polymorphs of aspirin. Aspirin, although used and studied as a drug for more than a century, has only recently been revealed to have a metastable polymorphic

form, known as form II. The structures of the two polymorphs are very similar in two dimensions, and form II has been observed to transform into the more stable form I at ambient conditions.

The different physical properties of the polymorphs — such as elastic modulus and hardness — mean that nanoindentation can be used to differentiate between them, as form II is considerably softer than form I. Varughese and colleagues discovered that what had appeared to be single crystals of form II in fact contained small domains of form I — something that single-crystal diffraction had failed to detect. NW

MAGNETIC MOLECULES

Spin switch

J. Am. Chem. Soc. **133**, 16243–16250 (2011)

Some complexes of first-row transition metals with *d*-orbital occupancy from d^4 – d^7 are capable of exhibiting the phenomena of 'spin crossover': switching between a high or low spin state. These different spin states have different magnetic properties and the switch is driven by an external stimulus such as heat or light. The latter has previously been used to induce spin crossover by altering the ligand field strength of photochromic ligands.

Now, Rainer Herges and colleagues from Christian-Albrechts University in Kiel have designed a system, also reliant on photochromic molecules, in which a change in the coordination number of the studied complex drives changes in its spin state and thus its magnetic properties. They used the square-planar complex Ni(II)-tetrakis(pentafluorophenyl)porphyrin — which is low spin and diamagnetic — and a 3-azopyridine ligand, which can be switched between *cis* and *trans* configurations using light. When the azopyridine ligand is in the *trans* configuration it binds well to the axial position of the square-planar nickel-porphyrin complex, causing it to switch to a high spin, paramagnetic state. When the complex is irradiated with a specific wavelength of UV light the azopyridine ligand isomerizes to its *cis* configuration. The ability of the ligand to bind to the nickel-porphyrin is now reduced — because of steric hindrance — allowing the complex to revert back to the low-spin, diamagnetic state.

The efficiency of the system was improved by adding bulkier groups to the 4 and 4' positions, thus increasing the difference between the abilities of the *cis* and *trans* isomers to bind to the nickel-porphyrin complex. GA

Written by Gavin Armstrong, Stuart Cantrill, Stephen Davey, Anne Pichon and Neil Withers.

blogroll

Carnival!

A celebration of chemical reactions, sensible and simple advice, and some much-loved cookies.

To celebrate the international year of chemistry, Central Science, the C&E News blog, launched a blog carnival on an unsuspecting world (<http://go.nature.com/L7tg9T>). Rachel Pepling requested posts from anyone, from "Big name bloggers and fledgling writers". The theme? Your favourite reaction. The lure (apart from the fun of the carnival itself)? The best posts will get published in C&E News. That bait proved hard to resist, and many regular bloggers rushed to contribute. Reactions ranged from the Mukaiyama thioester synthesis (ChemBark, <http://go.nature.com/mRY6lo>), not one but two on the Diels-Alder reaction (BRSM, <http://go.nature.com/rcU33v>, and Azmanam at the Chem Blog, <http://go.nature.com/WIJBUI>), its cycloaddition partner the azide-alkyne Huisgen (Shannon Morey at Chembits, <http://go.nature.com/ExZlCT>) all the way to the oscillating Belousov-Zhabotinsky reaction (Jyllian Kemsley at the Safety Zone, <http://go.nature.com/YFR2DL>). You can read David Kroll's final round-up post at Central Science (<http://go.nature.com/jQbZmp>).

How good are your data habits? Doug Natelson poses this question in a post at Nanoscale Views (<http://go.nature.com/by1BXk>) that covers a lot of ground in data management and note taking. Some of the good stuff: "Everything is data" and "The data are the science". "If you didn't document it, you didn't do it", so "Write down everything" and then "Back everything up". Sometimes simple advice is the best and, as Natelson says, "I guarantee, you will never, ever in your life look back and say, 'I regret that I was so thorough, and I wish I had written down less'."

And finally...do you like chocolate chip cookies? Do you like them enough to make 268 of them in order to perfect the recipe and make them just like your grandmother did? Well, Deborah Blum obviously does, because that's what she takes us through in her post at Speakeasy Science (<http://go.nature.com/7P36rJ>). A tasty read we can highly recommend.