phenomena are being increasingly studied. However, studying materials interacting with hydrogen *in situ* is experimentally challenging for a variety of reasons.

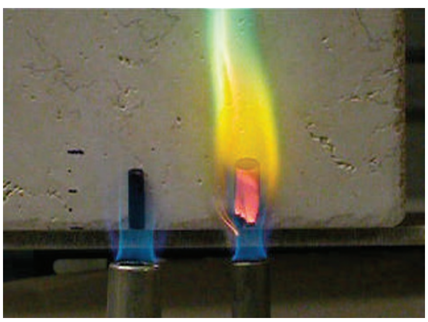
Now, Peter Battle of the University of Oxford, Mona Bahout of the University of Rennes and colleagues have followed the reduction of a complex metal oxide under flowing hydrogen. They used high-flux fixed-wavelength neutron diffraction to determine which oxygen atoms were removed from the Ruddlesden–Popper material $Pr_2Sr_2CrNiO_8$. It has previously been thought that this family of materials did not have the thermal stability to be used in high-temperature ionic devices. They found, however, that once reduction to $Pr_2Sr_2CrNiO_{7.5}$ was complete at 400 °C the material was chemically and structurally stable up to 750 °C.

Although the amount of reduction seemed to be governed by the Ni^{3+} ions changing to Ni^{2+}, a similar material $La_2Sr_2CrNiO_8$ reduced to $La_2Sr_2CrNiO_7$. Regardless of whether this promising material finds a use in high-temperature ionic devices, this demonstration of gathering subtle structural information *in situ* in such an extreme environment should open the possibility for many more systems to be studied.

ENERGETIC MATERIALS

Burn baby burn

J. Am. Chem. Soc. **131,** 4576–4577 (2009)



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Explosives — energetic materials containing an oxidizer and a fuel — can be categorized as either low or high order, examples being gunpowder and TNT respectively. The molecules in high-order explosives contain both an oxidizing part and a fuel part, and performance is usually a trade-off between energy density and reaction rate. The reaction rate of lower explosives can be improved by mixing the oxidizer and fuel as closely as possible.

Now, Nicholas Leventis and colleagues from Missouri University of Science and Technology working with Hongbing Lu from Oklahoma State University have created a mixed aerogel of an inorganic oxidant (CuO) and an organic fuel (a resorcinol–formaldehyde polymer, RF). Aerogels are assemblies of nanoparticles surrounded by space. Leventis and colleagues used a one-pot sol–gel reaction to make the aerogel, and the precursor of one component catalysed the other.

Previous reports have suggested that RF polymer networks can desensitize energetic materials. In this case, the RF–CuO aerogel is the energetic material itself, and is suitable for pyrotechnics. The material burnt rapidly on ignition with a flame, leaving behind only particulate CuO, but aerogels made from RF alone could not sustain the flame.

CROSSLINKED POLYMERS

Healing power of the Sun

Science **323,** 1458–1460 (2009)

Materials that are able to mend themselves when damaged would make particularly good coatings in a variety of fields, including transportation, packaging and biomedicine. Investigations in this direction have been guided by the self-healing abilities of materials in nature — such as some plants, or the human skin.

In a departure from these methods, Biswajit Ghosh and Marek Urban at the University of Southern Mississippi have now prepared a heterogeneous material that can repair itself at ambient temperature under ultraviolet (UV) irradiation. The researchers have incorporated UV-sensitive chitosan units, which are covalently bonded with constrained four-member oxetane rings, into heterogeneous polyurethane networks. These polymer networks are in turn crosslinked to form solid films. Characterization by infrared and optical imaging revealed that an area damaged by scratching could be repaired in less than 1 h under UV irradiation from a lamp or the Sun.

The repair mechanism is a recombination of the free radicals formed when the mechanical damage is inflicted (opening the oxetane rings) and those formed by exposure to UV light (upon cleavage of the chitosan chains) to crosslink the networks. Despite a limited ability of an area to heal itself if it is damaged a second time, these materials do not require other components to be repaired and so offer great promise for various applications.

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

Robot wars

Will robots take the drudgery out of lab work, and have you got a nose for isotopes?

I imagine a lot of bench-bound chemists sat up and took notice when they read a paper in *Science* (**324,** 85–89; 2009) reporting a robot system that can make discoveries without human input at all. Derek Lowe wrote on In the Pipeline (http://bit.ly/chU2Y) that the robot, called Adam, was "set up to look for similarities in yeast genes whose function hadn't yet been assigned, and then [...] set up experiments to test the hypotheses thus generated". Adam could then follow up on these results and discovered a new three-gene pathway. Lowe doesn't expect to be replaced as a medicinal chemist by a robot just yet, but can see a future where Adam's descendants can do a lot of the work. Many of the comments on the post have an air of scepticism, based on past experience of other advances that were going to render medicinal chemistry obsolete. As one person remarked "When the fever cools, we're still at work, but with a new tool."

Whether robots do take over the lab or not, Jean-Claude Bradley at Useful Chemistry (http://bit.ly/2JEWQD) thinks that machine-driven science will help to remove the human ego from science. He fears that researchers can "procrastinate doing certain experiments for fear of not liking the outcome" — a problem robots are unlikely to suffer from. Interestingly, he was led to discuss this after reading a book about Luca Turin, *The Emperor of Scent*, whose theory about the mechanism of the sense of smell was highly controversial. Turin suggested that the nose detects different vibrational modes and that isotopically enriched molecules should smell different from their normal counterparts — can you tell the difference between $CHCl_3$ and $CDCl_3$?

Finally, to celebrate ten years since the song 'Wear Sunscreen' hit the charts, David Bradley at Sciencebase (http://bit.ly/25uA3i) reminds us that "Everybody's free... to wear goggles" — advice certainly worth listening to.