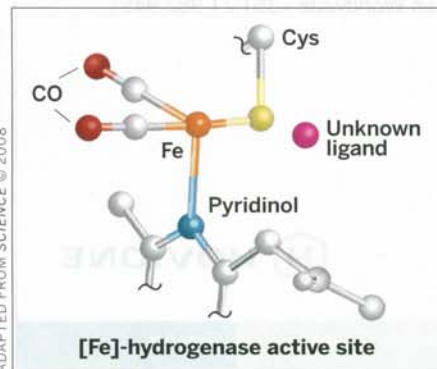


## MEASURING MASS WITH A NANOTUBE

Physicists at the University of California, Berkeley, have devised a nanotube-based mechanical sensor with atomic resolution that has several advantages over traditional mass spectrometers (*Nature Nanotech.*, DOI: 10.1038/nnano.2008.200.) The new nanomechanical device does not destroy samples via ionization and is more sensitive to large molecules such as proteins. In addition, it is small enough to incorporate into an electronic chip. Alex Zettl and Kenneth Jensen at UC Berkeley and coworkers previously designed a radio receiver from a nanotube. To explain their new work, they wrote, "In effect, we broadcast a radio signal to the nanotube and listened for its vibrations." The Berkeley researchers hooked up one end of a double-walled carbon nanotube, 2-nm wide and 254-nm long, to an electrode and left the other end free to vibrate, similar to a diving board. To test the sensor at room temperature, the researchers loaded several gold atoms onto the free end of the nanotube. The mass of the gold lowered the mechanical resonance frequency of the vibrating carbon nanotube. By monitoring this change, the researchers could determine the mass of the attached gold atoms.

## HYDROGENASE SITES SURPRISINGLY SIMILAR

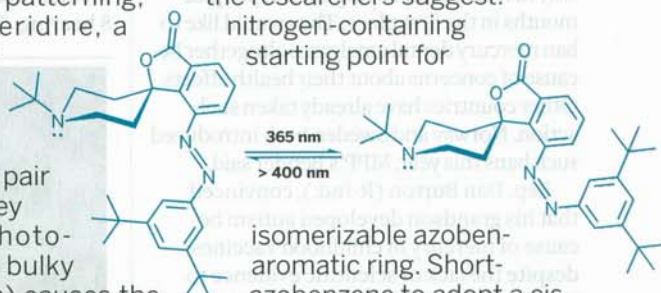
The structure of the iron-based active site in mononuclear [Fe]-hydrogenase reveals unexpected similarities to iron centers in the binuclear [NiFe]- and [FeFe]-hydrogenases, according to a group of researchers led by Seigo Shima at the Max Planck Institute for Terrestrial Microbiology and Ulrich Ermler at the Max Planck Institute of Biophysics, both in Germany (*Science*



ADAPTED FROM SCIENCE © 2008

## LIGHT-TRIGGERED BASE

By employing a light-responsive molecular shield, Stefan Hecht and coworkers at Humboldt University, in Berlin, have developed an organic base that can be reversibly switched on and off on demand (*Angew. Chem. Int. Ed.* **2008**, *47*, 5968). The controllable process could lead to new applications in chemical surface patterning, the researchers suggest. Hecht's team used piperidine, a six-membered ring, as the nitrogen-containing starting point for their reversible base. By adding a substituent to the nitrogen, they effectively locked its basic lone pair of electrons into place. They then incorporated a photozene tether tipped with a bulky wavelength light (365 nm) causes the isomerizable azobenzenaromatic ring. Short-wavelength light (365 nm) causes the azobenzene to adopt a cis form that leaves the nitrogen's basic lone pair sterically accessible (right). Long-wavelength light beyond 400 nm regenerates the trans form, which blocks access to the lone pair, rendering the base inactive (left). The research complements recent work directed by Neil R. Branda of Simon Fraser University, in Burnaby, British Columbia, which used light to tune acidity by altering a Lewis acid's electronic properties (*Angew. Chem. Int. Ed.* **2008**, *47*, 5034).



*2008*, *321*, 572). Hydrogenases catalyze the formation and consumption of H<sub>2</sub> and are of interest commercially as replacements for platinum catalysts that produce H<sub>2</sub> fuel. The crystal structure of [Fe]-hydrogenase indicates there are five ligands to the metal: a cysteine (Cys) sulfur, two CO molecules, the nitrogen of a 2-pyridinol cofactor compound, and a ligand the researchers were unable to identify. A solvent molecule occupies the sixth ligation site, but it is too far away to be considered a ligand. The researchers suggest that the sixth site is where H<sub>2</sub> binds. Notably, although the structures evolved independently, iron sites of the [NiFe]- and [FeFe]-hydrogenases also include a cysteine sulfur, two CO molecules, and a cyanide ligand akin to the 2-pyridinol, making the hydrogenases a remarkable example of convergent evolution, the authors say.

## WHAT'S IN A WHIFF OF WHISKEY?

Aficionados of American Bourbon whiskey may be interested in the results of a new study that identifies the beverage's most odor-active compounds. Researchers have been studying the volatile components of

whiskey for more than 40 years, but not all such compounds can be detected by the human olfactory system, note Luigi Poisson and Peter Schieberle of the German Research Center for Food Chemistry, in Garching. To zero in on the key aroma compounds, Poisson and Schieberle used gas chromatography and aroma extract dilution analysis (*J. Agric. Food Chem.* **2008**, *56*, 5813). The pair identified more than 40 aroma compounds that contribute to whiskey's fruity, smoky, and vanillalike odor profile, including 13 compounds that hadn't been detected previously. The most active aroma compounds are (*E*)- $\beta$ -damascenone, which smells like cooked apple, and  $\gamma$ -nonalactone, which resembles coconut. The researchers suggest that such studies could help whiskey producers modify or improve the aroma of whiskey by changing the recipe or the manufacturing process.



MITCH JACOBYS/C&EN