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# C&EN

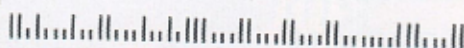
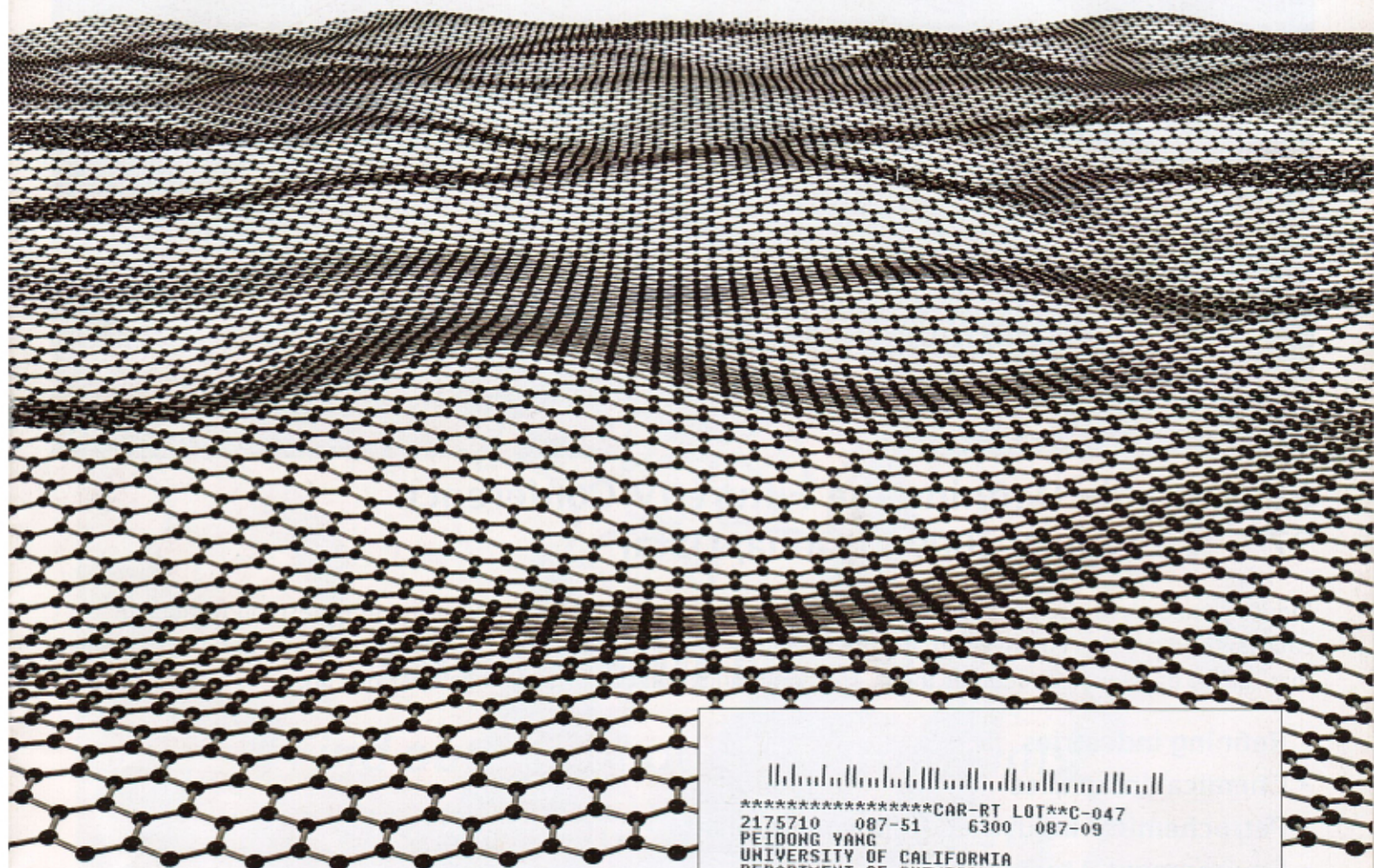
CHEMICAL & ENGINEERING NEWS

## STIMULUS FUNDING

Key science agencies look to spend their share **P.36**

## ACS IN SALT LAKE CITY

Events planned for national meeting **P.57**



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## GRAPHENE ON THE HORIZON

Thinnest carbon is thick with promise **P.14**



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## CHEMICAL BEAVER TALE

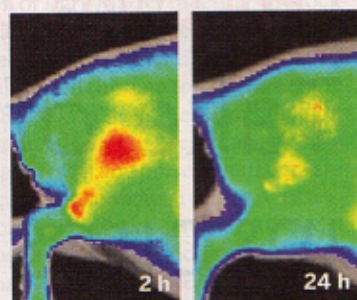
The Canadian beaver's scent glands were once a source of pricy perfumes, and extracts from the glands continue to be used in homeopathic medicine. But on a different note, researchers in Germany have synthesized a component of the odoriferous cocktail through methodology that uses sugar groups to confer chirality in organic molecules (*Angew. Chem. Int. Ed.*, 10.1002/anie.200805606). Horst Kunz and colleagues at the University of Mainz report the first enantioselective synthesis of an all-cis nupharamine found in the beaver's scent gland. In one of the 10 synthesis steps, a bulky pivaloyl-decorated sugar is attached to an intermediate enolate that eventually leads to an indole moiety. The presence of the bulky carbohydrate directs cis protonation of the enolate; without the sugar, trans protonation occurs. Although the team hoped a tantalizing aroma would emerge from their products, the trans epimer smells like stale fish and the cis epimer is odorless, Kunz says. About 40 compounds are in the gland extract, but the combination that produces the distinctive scent is "still a secret of the beaver," Kunz notes.—SE

## STREAMLINED WAY TO LABEL GLYCOPROTEINS

A novel method for labeling sialylated glycoproteins on animal cell surfaces could have important advantages for glycoproteomics—population studies of glycosylated proteins for cancer diagnostics and other applications (*Nat. Methods*, DOI: 10.1038/nmeth.1305). In current labeling techniques, reactive groups such as alkynes are introduced into cells as reagent-derivatized substrates that are taken up and incorporated into cell glycoproteins during biosynthesis. The new approach, developed by Philip E. Dawson, James C. Paulson, and coworkers at Scripps Research Institute, is the first to efficiently label cellular glycoproteins by direct synthesis. The researchers use periodate oxidation of diols in conjunction with aniline-catalyzed oxime ligation to add biotin tags to sialic acids on cell glycoproteins. The method is inexpensive and nontoxic, doesn't require growing cells in the presence of reagent-derivatized sugar precursors, and achieves 10- to 100-fold higher levels of labeling than with biosynthetic techniques.—SB

## SHORT-GLOW NANOPARTICLES

The first fluorescent nanoparticles that can circulate in the blood and quickly degrade into nontoxic by-products could also help medical professionals image tumors and deliver cancer-fighting drugs. Michael J. Sailor of the University of California, San Diego, and colleagues developed the porous nanoparticles from silicon wafers (*Nat. Mater.*, DOI: 10.1038/nmat2398). Although other fluorescent nanoparticles such as quantum dots are available for imaging studies, he says, the brightest dots contain toxic cadmium selenide, whereas silicon is a nutrient for humans. In addition, porous silicon can carry drugs, unlike most nanoparticles, which are solid. The researchers loaded the degradable particles with the anticancer drug doxorubicin, coated them with a polysaccharide, injected the particles into a mouse with a tumor, and demonstrated with imaging that the particles aggregate in the tumor.—RAP

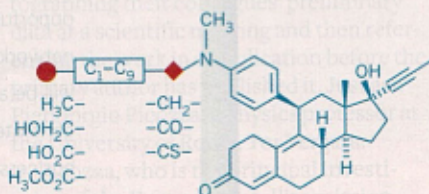


Sugar-coated nanoparticles (red) gravitate to a tumor in a mouse's hindquarter, quickly degrade, and are eliminated via urine.

J. HO PARK/UC SAN DIEGO

## SYNTHETIC STEROID GARNERS WIDER ROLE

Mifepristone, better known as RU-486, is a synthetic steroid that outcompetes the pregnancy steroid hormone progesterone in binding to progesterone receptors. As a result, mifepristone is effective at inducing abortion and as a contraceptive. A research team led by Wolfgang S. L. Strauss of the University of Ulm, in Germany, and Hans-Wolfgang Schramm of the University of Graz, in Austria, now reports the synthesis of mifepristone derivatives that could take advantage of the drug's progesterone-receptor binding to advance diagnostic imaging and cancer treatment (*J. Med. Chem.*, DOI: 10.1021/jm800985z). The researchers replaced one methyl group of the steroid's dimethylaminophenyl substituent with various linker groups to which a fluorescein dye or additional anticancer drug can be attached. These conjugates could be designed to retain or cleave the dye or anticancer drug once mifepristone enters cancer cells. In breast cancer



RU-486 derivatives

cell assays, the team identified several derivatives for which adding the linker nominally affects mifepristone's bioactivity, a prerequisite to making the strategy practical.—SR

## CHROMATOGRAPHY IN AN NMR TUBE

Getting NMR spectral data on the product of a chemical transformation usually means separating the molecule from the reaction's starting material, intermediates, and side products via chromatography. Now, Sami Heikkinen and coworkers of the University of Helsinki, in Finland, have developed a way to resolve this witches' brew in an NMR tube using an inexpensive, commercially available polymer (*Org. Lett.*, DOI: 10.1021/ol9001398). The method employs diffusion-ordered NMR spectroscopy, or DOSY, which separates the spectra of individual compounds in a mixture according to the compounds' diffusion rates. The researchers liken the technique's ability to separate analytes to thin-layer chromatography (TLC). Because insoluble silica—the stationary phase used in TLC—would severely compromise the quality of the NMR spectra, the researchers chose soluble polyvinylpyrrolidone as the "stationary phase" to enhance diffusion. "This method provides a fast, cheap, and simple technique to resolve the NMR spectra of complex mixtures," the authors write.—BH