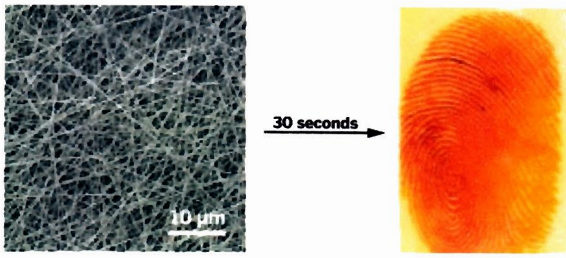
alignment at the CNT/PDMS interface, which enhances interaction between the components, the researchers suggest.—MJ

SOME MOUTH MICROBES BATTLE DENTAL PLAQUE

Many of the hundreds of species of bacteria living on your teeth build biofilm communities that become cavity- and gum-disease-causing plaque. Yet new research reveals that your mouth also contains some tooth-friendly bacteria that produce biofilm-busting enzymes. Researchers led by Hidenobu Senpuku of Japan's National Institute of Infectious Diseases found that *Streptococcus salivarius* and several other saliva bacteria produce enzymes, including a fructosyltransferase and an *exo*-β-D-fructosidase, which inhibit biofilm formation in the mouth after sucrose consumption (*Appl. Environ. Microbiol.*, DOI: 10.1128/AEM.02066-10). The team suggests that this inhibition occurs because the enzymes interfere with polysaccharide production by *S. mutans*, an infamous mouth bacterium known to be a culprit in cavity formation. After brushing your teeth, *S. mutans* likely uses sucrose-based polysaccharides to build biofilms that lead to plaque. Given the biofilm-thwarting properties of the enzymes, toothpaste makers may consider including them in future formulations.—SE

PRESS-AND-GO FINGERPRINTING

By spinning nanosized fibers from a polyurethane resin and the dye fluorescein, chemists have developed a portable mat that can quickly detect latent fingerprints on surfaces such as glass, wood, or marble (*Angew. Chem. Int. Ed.*, DOI: 10.1002/anie.201006537). The mats don't require pre- or posttreatments, lift prints nondestructively, and display prints in 30 seconds after exposure to hot air. Shengyang Yang, Cai-Feng Wang, and Su Chen from China's Nanjing University of Technology applied an electrospinning technique to solutions of commercial thermoplastic polyurethane resin and fluorescein to obtain the mats. The team suggests that chemical components of sweat in fingerprint residues react with trace isocyanate groups in the polyurethane to produce cross-links, releasing fluorescein from the nanofibers to produce images. A given spot on a mat is not reusable, but the mats, which measure about 12 × 50 cm, can be divided for multiple uses, Chen says. In the absence of fingerprints, the mats have proven stable for six months so far, Chen notes, so they could be useful for forensics or medical diagnostics.—CD

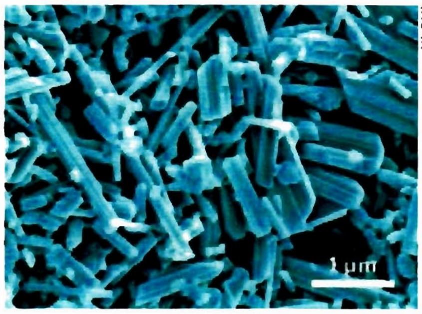


ANGEW. CHEM. INT. ED.

IMPRINTED An SEM image of a nanofiber mat (left), and a bright-field image of a fingerprint on the mat (right).

A SALTY ENERGY SOURCE

The difference in salinity between ocean and river water can be tapped as a renewable energy source by a battery that stores the energy electrochemically, according to work led by Stanford University materials scientists (*Nano Lett.*, DOI: 10.1021/nl200500s). Exploiting the enormous quantity of entropic energy dissipated as freshwater and saltwater mix in estuaries is a decades-old idea and technical challenge. Most of the strategies for capturing that energy of mixing, such as a recently reported sandwich device based on porous carbon electrodes and ion-exchange membranes, rely on membranes to prevent freshwater and saltwater from mixing directly. As such, developing those technologies depends heavily on the cost, lifetime, and ion-transport efficiency of the membranes. In contrast, the battery demonstrated by Stanford's Fabio La Mantia, Mauro Pasta, Yi Cui, and coworkers features an electrode made from sodium manganese oxide nanorods that selectively incorporates and releases sodium ions and a silver electrode that interacts selectively with chloride ions. By alternately submerging the electrodes in freshwater and saltwater, the team charged and discharged the battery, measuring an energy extraction efficiency of up to 74%.—MJ

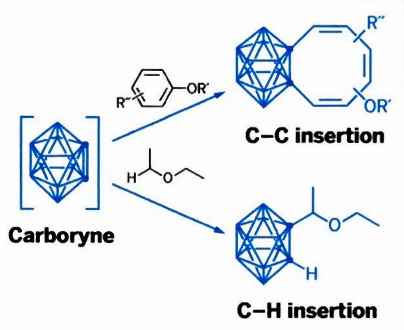


YI CUI

Batteries with electrodes made from sodium manganese oxide nanorods, shown in this SEM image, can capture energy from the freshwater-saltwater mixing.

CARBORYNE INSERTION GOES TWO WAYS

Researchers in China have discovered that reactive boron-carbon clusters called carborynes, $C_2B_{10}H_{10}$, which are in effect three-dimensional versions of benzyne, can exist in two resonance forms that exhibit significantly different reactivity patterns



(*J. Am. Chem. Soc.*, DOI: 10.1021/ja201126h). Last year, Sunewang R. Wang, Zaozao Qiu, and Zuowei Xie at the Chinese University of Hong Kong reported that carborynes can insert into a C–C bond of aromatic rings in a [2 + 2] cycloaddition, expanding the six-membered ring of anisoles to eight-membered rings (shown, top). The team has discovered that carborynes can also insert into the C–H bond of diethyl ether (shown, bottom). After conducting a set of kinetics experiments, the team concluded that carborynes are best described as resonance hybrids with bonding and biradical forms: The bonding form reacts with aromatics to give cycloaddition products, whereas the biradical form undergoes C–H insertions with aliphatic ethers. The pair of reactions serve as a new strategy for generating functionalized carboranes, the researchers note, which feature extensively in the synthesis of polymers, ceramics, catalysts, and radiopharmaceuticals.—SR