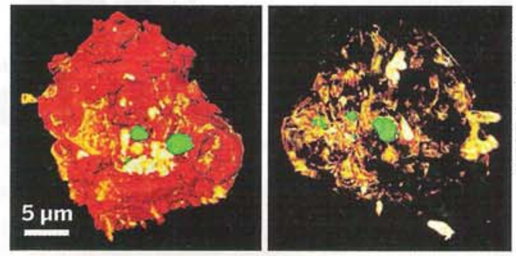
CURIOSITY TAKES A LOOK AT MARTIAN DIRT

Hints that NASA's *Curiosity* rover may have found organic compounds on Mars were clarified last week. At a Dec. 3 press conference, NASA scientists revealed that chlorinated methanes—CH_3Cl, CH_2Cl_2, and $CHCl_3$—have been detected in a sandy soil sample processed by *Curiosity*'s onboard chemistry laboratory. The findings were presented at the American Geophysical Union meeting in San Francisco. But whether those organic compounds can be taken as a sign that Mars once harbored life is not yet clear: The compounds' chlorine has been confirmed to be martian, but team members will need to perform more analyses to determine whether the carbon source is also from Mars. Even if scientists eventually show that the carbon is martian in origin, they'll have to carefully analyze carbon isotopes and gather additional samples before concluding whether the organics are abiotic or biological in origin. That will take time, said the mission's project scientist, John P. Grotzinger. "We're doing science at the speed of science, in a world that runs at the pace of Instagrams."—EKW

X-RAYING CATALYSTS IN ACTION

Thanks to a specially designed reactor cell, researchers can now probe changes in the chemical composition, morphology, porosity, and other properties of individual 20-µm-sized catalyst particles as the particles mediate chemical reactions (*Angew. Chem. Int. Ed.*, DOI: 10.1002/anie.201204930). The study conducted by Joy C. Andrews of SLAC National Accelerator Laboratory; Bert M. Weckhuysen of Utrecht University, in the Netherlands; and coworkers demonstrates a procedure for exploiting high-energy X-ray microscopy to penetrate deeply into complex materials and resolve chemically distinct nanoscale regions within their bulk. Solid catalysts often undergo substantial changes—sometimes beneficial, sometimes detrimental—upon exposure to reactive chemicals at high temperature and pressure. Mapping those changes in three dimensions as they occur could lead to improved catalysts, but capturing the information remains challenging. To demonstrate the new method's capabilities, the team probed a model Fischer-Tropsch C–C coupling catalyst as it was exposed to 10 atm of a mixture of H_2 and CO at 350 °C. The method pinpointed regions rich in Fe_2O_3, Fe_2TiO_5, Fe_3O_4, ZnO, and K_2O and monitored the evolution of those regions over the course of several hours.—MJ



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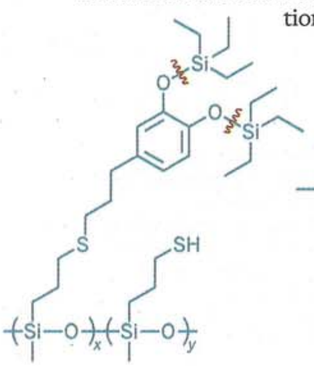
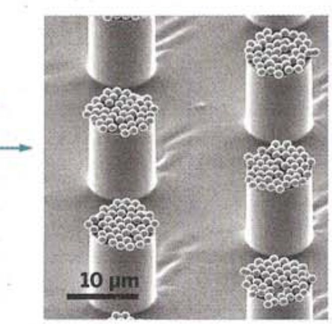
An X-ray tomography method maps the distribution of Fe (red), Zn (green), and Ti and K (orange, yellow, and white) species in a single catalyst particle.

& VIDEOS ONLINE

BIOINSPIRED POLYMERS GET STICKY ON DEMAND

Drawing inspiration from the sticky adhesive proteins produced by mussels and sandcastle worms, a multidisciplinary research team has devised a synthetic pathway to make adhesive polymers for underwater applications without the polymers getting fouled up during processing (*J. Am. Chem. Soc.*, DOI: 10.1021/ja309044z). Chemists have tried to use the dihydroxy functional group of catechols to mimic the amino acid 3,4-dihydroxy-L-phenylalanine, which gives marine adhesive proteins their stickiness. But the catechols are susceptible to oxidation, side reactions, and untimely adhesion that diminish polymer performance. Craig J. Hawker of the University of California, Santa Barbara, and his colleagues overcame these problems by using silyl groups to protect the hydroxyl groups. The researchers added triethylsilyl groups to eugenol, a natural catechol found in clove oil, then coupled protected eugenol to thiols along the backbone of a commercially available polysiloxane. After using lithographic techniques to make patterned polymer substrates, they removed the silyl groups with a mild acid to unveil the sticky surface. The technique should provide a versatile platform for underwater and biomedical applications, Hawker says, including adhesive coatings, antifouling surfaces, and bone glues.—SR





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Removing silyl protecting groups from this polysiloxane creates a sticky-when-wet surface, shown here with captured silica particles stuck to pillars on a patterned substrate.

CONNECTING ALZHEIMER'S WITH INFLAMMATION

An antibody that's being used to treat psoriasis and is in clinical trials for Crohn's disease and multiple sclerosis can now add Alzheimer's disease to the list of conditions for which it shows promise (*Nat. Med.*, DOI: 10.1038/nm.2965). The Y-shaped macromolecule binds and neutralizes p40, a subunit of two cell-signaling proteins called interleukins that regulate tissue inflammation via the immune system. A research team led by Burkhard Becher of the University of Zurich and Frank L. Heppner of Germany's Charité University Hospital has demonstrated that, when administered to mice with Alzheimer's symptoms, a p40-blocking antibody improves the rodents' short-term memory. It also reduces the amount of aggregated amyloid-β—the hallmark peptide of Alzheimer's—in their brains. Before testing the antibody on the mice, the team established the p40-Alzheimer's connec-