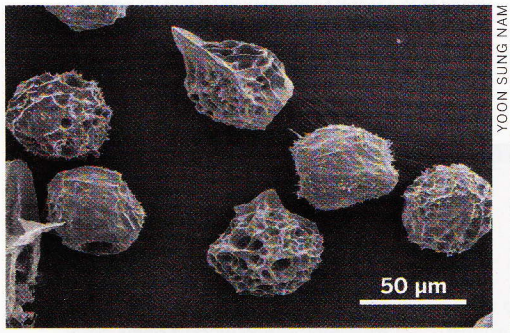
gradually cleared the material, and no toxicity was observed. This method of biocompatible dispersion should allow SWNTs "to be safely stored, handled, and transported for use in commercial or biomedical applications," the researchers note.—BH

VIRAL NANOSTRUCTURES ASSIST LIGHT-DRIVEN WATER OXIDATION

A genetically engineered virus acting as a nanoscaffold can precisely assemble the components of an artificial photosynthetic system, a promising new direction for capturing and storing solar energy (*Nat. Nanotechnol.*, DOI: 10.1038/nnano.2010.57). Despite intensive research, scientists have yet to devise systems that accomplish the photocatalytic splitting of water molecules



YOON SUNG NAM

This SEM image depicts microgel beads impregnated with virus-templated zinc-iridium photocatalytic nanostructures.

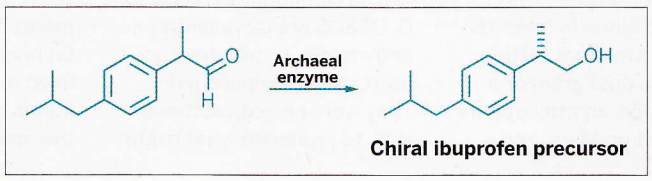
with the same ease as photosynthetic systems in cyanobacteria and plants. Tailoring the distances between photosensitizers and catalysts, which is essential for effective performance, has been a bottleneck. Angela M. Belcher and Yoon Sung Nam of Massachusetts Institute of Technology and colleagues made use of coat proteins on an engineered version of the M13 virus to assemble zinc porphyrin photosensitizers and iridium oxide hydrosol cluster catalysts together in optimal configurations. The team immobilized the system in a hydrogel microparticle for added stability. When exposed to light, the system evolved O_2, demonstrating that it's "an effective means by which to increase light conversion into chemical potential for water oxidation," the researchers write.—EKW

DICLOFENAC IN THE ENVIRONMENT

The anti-inflammatory drug diclofenac's legacy in the environment came into the public eye in 2004 when the collapse of an endangered vulture population in Pakistan was tied to the birds' feeding on medicated cattle. Several studies have since shown that diclofenac and its metabolites, after human use, slip through wastewater treatment plants and persist in the environment. Researchers led by Leif Kronberg of Finland's Åbo Akademi University are reporting that diclofenac and its metabolites can accumulate in rainbow trout livers at levels that can cause cellular changes (*Environ. Sci. Technol.*, DOI: 10.1021/es903402c). Those levels were recently quantified by Charles R. Tyler of the University of Exeter, in England, and coworkers (*Environ. Sci. Technol.* **2010**, *44*, 2176). The two reports combined suggest that fish living downstream from wastewater treatment plants may be at risk. However, the news on diclofenac is not all bad. A team led by Willy Verstraete of Ghent University, in Belgium, reports that manganese oxides produced by bacteria are better at breaking down diclofenac than is synthetic MnO_2 because the bacteria can reoxidize the formed Mn^{2+} (*Environ. Sci. Technol.*, DOI: 10.1021/es9027327). Biological MnO_x is a promising technology for removing diclofenac from wastewater in treatment plants, Verstraete says.—SE

PRIMORDIAL PATH TO PAINKILLERS

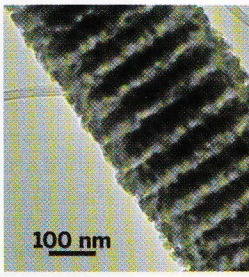
Thanks to an enzyme from an ancient microbe, researchers have found new options for making optically pure precursors to familiar painkillers. Most nonsteroidal anti-inflammatory drugs (NSAIDs) such as ibuprofen are sold as racemic mixtures, even though their biological activity resides in the S enantiomers. The body can convert R versions of NSAIDs to their S forms, but the process isn't equally efficient for all drugs and may be responsible for some side effects. David B. Berkowitz, Paul Blum, and colleagues at the University of Nebraska, Lincoln, have isolated an alcohol dehydrogenase enzyme from a single-celled Archaea microorganism and used the enzyme to transform racemic aldehyde starting materials to S alcohol NSAID precursors (*J. Am. Chem. Soc.*, DOI: 10.1021/ja910778p). Other routes to the chiral precursors exist, but because the archaeal enzyme is heat-stable, the team used higher temperatures and less solvent than is typically needed, with ethanol as a biorenewable reducing agent. The team collects crystallized products by filtration and recycles the enzyme. The work showcases how useful archaeal enzymes can be in asymmetric synthesis, the researchers point out.—CD



Chiral ibuprofen precursor

THICK-AND-THIN NANOWIRE SEGMENTS

A simple electrochemical method can be used to prepare semiconductor nanowires that feature segments of alternating density and size along the wire's length, according to a paper published in *ACS Nano* (DOI: 10.1021/nn9016612). Multisegmented nanowires could be used as nanometer-scale bar codes in biodetection applications or as basic components of optoelectronic devices that exploit the wires' periodic properties. Prior studies have led to multistep procedures for preparing nanowires with alternating segments of dissimilar materials—for example, two different metals, a metal and a semiconductor, or alloys of various compositions. Nava Shpaisman, Uri Givan, and Fernando Patolsky of Israel's Tel Aviv University have now devised a cyclic voltammetry method for growing CdSe nanowires in which uniformly sized dense segments of the material are separated by shorter uniformly sized porous segments that are less dense. The technique, which is based on delivering a single electrodeposition solution to a porous membrane, relies on computer control of the voltammetry parameters to tune the segment lengths. Cadmium metal, which codeposits with CdSe, is removed during voltage cycling, thereby forming the porous segments.—MJ



ACS NANO

An electrodeposition method forms single-component nanowires with dense and less dense segments, which appear dark and light, respectively, in this TEM image.