100% recovery after an hour. Activities of free protein and immobilized Hb on other galleries recovered by at most 50%. The researchers believe that the combination of the three approaches demonstrate the first stoichiometrically recovered Hb/α-ZrCMP. The researchers believe that the nature of the surface functions and the chemical reactivities of the support matrix played a very important role during this recovery process. The irreversibility of Hb/α-ZrRP was due to the space orientation of the carbonyl group. The CH_2CH_2COOH group in Hb/α-ZrCEP (α-zirconium carboxymethylphosphonate) reacted with amines to form the amide that prevented the protein from recovering. But the CH_2COOH group in α-ZrCMP was inert to amines, and no amide formed. Thus, Hb/α-ZrCMP could recover from its denaturation.

According to the researchers, "zirconium phosphonate support matrix with appropriate surface function may function as artificial chaperones for protein folding." In future studies, they plan to conduct molecular studies of these support surfaces for efficient refolding of proteins.

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Nanowires Fabricated by Step-Edge Decoration Process

Reginald Penner, a professor of chemistry at the University of California—Irvine, and graduate student researchers Michael P. Zach and Kwok Ng, have applied a method called step-edge decoration to build nanowires from molybdenum. The nanowires feature the conductivity, strength, and length necessary for use in microelectronic devices.

As reported in the December 15, 2000, issue of *Science*, the Penner group electrochemically deposited molybdenum dioxide onto a piece of graphite. Rudimentary wires began growing when their molecules linked onto step edges. After the brittle molybdenum dioxide wires were formed, they were heated in hydrogen gas at 350°C to remove the oxygen, leaving only the molybdenum metal.

The resulting pure molybdenum wires were smaller in diameter but also stronger, more conductive, and more flexible than those created in the first step of the process. The metal wires were then embedded in a polystyrene film and peeled off the graphite surface. The nanowires measured between 10 nm and 0.5 μm in diameter and up to 100 μm in length.

In developing a method to build long, uniform nanowires, Penner said that the step-edge decoration method used on graphite is proving to be more practical than using template synthesis, which is another fabrication method. When using templates, he said, a different one is needed for every diameter of wire, and thick templates required for the preparation of long nanowires are not readily available. The step-edge decoration process bypasses these obstacles. □

Correction

The figure in the February 2001 issue of *MRS Bulletin*, page 88, has been reproduced with permission from *Chemistry of Materials*; this is the web site version before publication of its modified version in the December 2000 issue.

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