Developments to Watch

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INNOVATIONS

Of ceramics, pig's eyes, and cross talk

>> Because ceramics are so brittle, machining them can be a nightmare. Ask most engineers to carve filaments 1,000 times as thin as a human hair, and they'll throw up their hands. But it's a snap for Sehoon Yoo, a materials-science student at Ohio State University. He bakes titanium-dioxide ceramic in hydrogen gas, and its surface develops deep holes that create ceramic hairs no more than 50 nanometers wide. How

does it happen? Nobody knows. Yoo hopes to earn his PhD figuring it out.

>> Using the microscopic tip of an atomic-force microscope, researchers at Purdue University have carved scaffoldlike patterns on the surface of a pig's retina. They hope to use the resulting template to promote the growth of transplanted retinal cells. If it works, it could be the first step toward halting macular degeneration, the leading cause of blindness in people 55 and older.

>> Engineers at Penn State University have developed an error-correction scheme that drastically boosts the capacity of copper wire to carry voice and data simultaneously in local area networks. In simulations, speeds hit an unprecedented 10 gigabits a second. *–Otis Port*

COURTESY SEHOON YOO/OHIO STATE UNIVERSITY; [illegible] PANORAMA IMAGES/THE IMAGE WORKS;

ARCHAEOLOGY

AN INNOVATIVE WAY TO GET THE NITTY-GRITTY ON DIRT

THE SPRAWLING Dunhuang caves in China are covered with colorful paintings dating from the 4th century. Sadly, though, moisture, wind, and salt rising from the groundwater are taking a toll. Weather stations in the caves alert preservationists to potentially dangerous conditions, but workers must enter the caves to gather the data, and their very presence adds to the degradation.

Engineers at the **University of California at Berkeley** think "smart dust" could help. A network of matchbox-size computers measures dozens of environmental changes and transmits the data to computers outside the cave. "Someone working there could just walk by with a laptop and get all the information," says project leader Steven Glaser. The battery-powered sensors can operate for months at a time with no human helpers. Glaser plans to install the smart dust this spring. *–Arlene Weintraub*

IMMUNOLOGY

A WEAPON IN THE NEXT WAR ON SARS?

A NEW CASE OF SARS in China has alarmed doctors and government officials. Some potential good news, reported last month in *The Lancet*: A genetically altered common-cold virus has successfully protected six rhesus monkeys against the deadly virus. However, medical experts believe it will be two to five years before a human vaccine is available.

The research team, from the **University of Pittsburgh** and the **Centers for Disease Control & Prevention**, created the vaccine by inserting pieces of the SARS virus into a virus from the same family that causes the common cold. Six monkeys were injected with the vaccine and received a booster shot 28 days later. Six weeks after the initial shot, all the monkeys had developed a significant immune system response against the virus, a hallmark for determining the success of a vaccine. The team says human testing could begin next year. SARS, which first emerged in China in the fall of 2002, has killed 774 people and infected more than 8,000 in 30 countries.

NANO TECH

ENLIGHTENING LESSONS FROM SQUIDS

THE BIOLOGICAL world is proving to be an important source of clues about how to design and produce nano-scale materials and devices, which have features measured in billionths of a meter. One newly discovered model of nano-fabrication in animals is the "flashlight" on the underside of the Hawaiian bobtail squid. The creature uses this light-producing organ, powered by glowing bacteria surrounded by stacks of reflector plates, to find food in the dark ocean. The light also helps the squid hide its distinctive shadow from predators.

Other sea animals have similar reflector plates, composed of crystals. But a team of researchers from the **University of Hawaii** and the **University of California at Los Angeles** discovered that the squid's plates are made of an unusual family of proteins, never before identified. Four rare amino acids account for more than half of each protein. The research team, reporting in the journal *Science*, suggests that similar protein-based biomaterials could be created for use in optic and spectroscopic applications.