Beam etches books on the side of a pin

Decades from now, readers searching for a back issue of SCIENCE NEWS might pop a metal pin into a microscope instead of threading a roll of microfilm into a projector.

Scientists at Los Alamos (N.M.) National Laboratory have developed an information storage method they call "high-density read-only memory," or HD-ROM. An ion beam etches microscopic patterns, which could be not only binary data but also letters, pictures, or even three-dimensional maps, onto the surface of durable materials like stainless steel or iridium. A steel pin 25 millimeters long and 2 mm across can store 2 gigabytes of data, or almost 23 times as much as a computer hard drive of the same size.

Since the storage technique is akin to engraving a stone tablet, although on a much smaller scale, the data on the HD-ROM cannot be manipulated directly. For this reason, HD-ROM would be best used to archive information, say inventors Bruce Lamartine and Roger Stutz.

Unlike computer disks or microfilm, HD-ROM materials don't degrade readily. And since they're nonmagnetic, data can't be erased accidentally. "We've actually taken the pins, dropped them on the floor, rolled our feet over them, and then put them back in the machine and read them," Stutz says. "The scratches you get are spaced so far apart on the surface, and typically are not very deep. . . that with normal error-correcting methods, it's not a problem."

The ion beam carves lines as narrow as 150 billionths of a meter. Reading characters that small would require a high-magnification research microscope, but HD-ROM can inscribe features in a range of sizes. "We can go from a level that an optical microscope can read to a fairly expensive, higher-speed, atomic force microscope," Stutz says. To work with the data, an electronic microscope could read and transfer them to a computer, Stutz says.

Lamartine and Stutz have applied for a patent and are hoping to license the technology. Since most libraries don't yet have atomic force microscopes on hand, "what's really attractive for the near-term market is something shrunk only a factor of 10, at most, in linear dimension from today's microfilm or microfiche," Lamartine says.

Teflon templates stimulate nerve growth

A Teflon surface modified with a technique used in computer chip manufacturing encourages nerve cells to grow on it, say researchers at the State University of New York at Buffalo.

The group exposed Teflon to an ion plasma, replacing the fluorine atoms on the surface with highly reactive hydroxyl groups. Onto the hydroxyls they then bonded protein chains of five amino acids that help the neurons stick to the surface.

The material provides a test bed for studying the growth and development of neurons and may one day serve as a support for regenerating nerves inside the body, say Joseph A. Gardella Jr. and his colleagues. They report their work in the June JOURNAL OF BIOMEDICAL MATERIALS RESEARCH.

Since nerves must grow in an oriented way in order to transmit signals from one to another, scientists would like to grow them in precise patterns. Lines can be laid down on the Teflon simply by masking the surface; the ion plasma only changes the uncovered areas.

So far, the researchers have tested their system with cultured nerve cells. They plan next to test nerve cells from living animals and humans.