SCIENCE NEWS 2000 February 12, 2000
Vol. 157 No. 7 p. 109

PHYSICS

Scaling energy barriers to save data

Without magnetic disks to help them out, computers can't remember much. That's because nearly all electronic memory in computers goes blank when the power goes off.

Kai Shum of the City University of New York (CUNY) and his colleagues have developed a new approach to avoid computer amnesia. To create so-called nonvolatile electronic memory, the researchers built one-bit, prototype memory cells from layers of metal and semiconductors, manipulating the energy barriers that appear naturally at the interfaces.

In the Jan. 24 APPLIED PHYSICS LETTERS, Shum and Zhongwei Pan, also of CUNY, report the success of a III-V device, a cell made from semiconductor compounds composed of elements from columns III and V of the periodic table. Shum and coworkers made a comparable II-VI device in 1997. They will next try to create a memory cell from elements in column IV, which include silicon, the industry's standard semiconductor, Shum says. "Once we demonstrate this in silicon, it's big news," he predicts.

Other types of nonvolatile microcircuit memories are available commercially, but magnetic disks remain the cheaper alternative. Harry C. Shaw of NASA's Goddard Space Flight Center in Greenbelt, Md., calls the CUNY design "very promising technology."

A large obstacle looms, however. The new devices fail after not many rounds of switching between zero and one states—about 200 cycles for the III-V version. Shum foresees possible improvement with silicon, which generally has fewer defects than other semiconductors do.

—P.W.