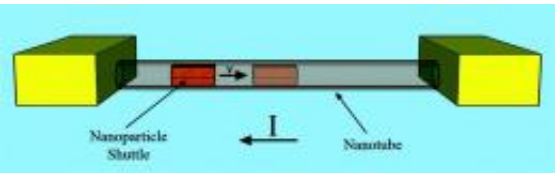
New memory material may hold data for one billion years

May 20 2009



Scientists are reporting an advance toward a memory device capable of storing data for more than one billion years. Credit: The American Chemical Society

(PhysOrg.com) -- Packing more digital images, music, and other data onto silicon chips in USB drives and smart phones is like squeezing more strawberries into the same size supermarket carton. The denser you pack, the quicker it spoils. The 10 to 100 gigabits of data per square inch on today's memory cards has an estimated life expectancy of only 10 to 30 years. And the electronics industry needs much greater data densities for tomorrow's iPods, smart phones, and other devices.

Scientists are reporting an advance toward remedying this situation with a new computer memory device that can store thousands of times more data than conventional silicon chips with an estimated lifetime of more than one billion years. Their discovery is scheduled for publication in the June 10 issue of ACS' *Nano Letters.*

Alex Zettl and colleagues note in the new study that some of today's highest-density experimental storage media can retain ultra-dense data

for only a fraction of a second. They note that William the Conqueror's Doomsday Book, written on vellum in 1086 AD, has survived 900 years. However, the medium used for a digital version of the book, encoded in 1986, failed within 20 years.

The researchers describe development of an experimental memory device consisting of an iron nanoparticle (1/50,000 the width of a human hair) enclosed in a hollow carbon nanotube. In the presence of electricity, the nanoparticle can be shuttled back and forth with great precision. This creates a programmable memory system that, like a silicon chip, can record digital information and play it back using conventional computer hardware. In lab and theoretical studies, the researchers showed that the device had a storage capacity as high as 1 terabyte per square inch (a trillion bits of information) and temperature-stability in excess of one billion years.

More information: *Nano Letters*, "Nanoscale Reversible Mass Transport for Archival Memory"

Provided by American Chemical Society (news : web)