Powerful new way to control magnetism

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A team of scientists at Rutgers University has found a material in which an electric field can control the overall magnetic properties of the material. If the magnetoelectric effect discovered by the Rutgers group can be extended to higher temperatures, it could be useful for manipulating small-scale magnetic bits in ultra high-density data storage. The research appears in the current issue of *Physical Review Letters*.

The researchers found the effect by studying the magnetic properties of a manganite mineral consisting of magnesium, oxygen, europium and yttrium.

At low temperatures (7 to 20 degrees above absolute zero) and in high magnetic fields, a slight change in applied electric fields causes a large change in the mineral's magnetic properties.

The magnetoelectric effect could lead to advances comparable to the cheap, high capacity hard drives that were made possible with the discovery of giant magnetoresistance. Unlike devices relying on giant magnetoresistance, which require magnetic fields to manipulate electrical resistance, magnetoelectric decives could be controlled with smaller and simpler electrical read and write heads.

Replacing magnetic components with electrical ones could potentially lead to much denser storage than the terabyte discs now available.

Related materials that demonstrate magnetoelectricity at much higher temperatures would likely be required before the technology reaches

commercial computer components, but discovery of the effect is an encouraging advance.

A Viewpoint by Dimitri Argyriou (Helmholtz Zentrum Berlin fur Materialen und Energy) provides an overview of the latest step on the path to colossal magnetoelectricity in this week's edition of *Physics*.

More information: Cross-Control of Magnetization and Polarization by Electric and Magnetic Fields with Competing Multiferroic and Weak-Ferromagnetic Phases, Y. J. Choi, C. L. Zhang, N. Lee, and S-W. Cheong, Phys. Rev. Lett. 105, 097201 (2010) - Published August 23, 2010, Download PDF (free)

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