Magnetic memories manipulated by voltage, not heat

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In their search for smaller, faster information-storage devices, physicists have been exploring ways to encode magnetic data using electric fields. One advantage of this voltage-induced magnet control is that less power is needed to encode information than in a traditional system.

But earlier this year, researchers reported that a key element of magnetization called coercivity is not controlled by voltage at all, but rather by an unfortunate byproduct of applying electricity to a material – that is, by heat. (Coercivity is the tendency of a magnetic material to resist becoming demagnetized.)

To further explore whether voltage or heating is responsible for changes to a magnet's coercivity, scientists from Tsinghua University in Beijing, China, tested three structures commonly used in magnetic memory experiments. Their verdict: It's not the heat. In a paper accepted for publication in the AIP's *Journal of Applied Physics*, the authors show that the voltage is directly controlling changes in the magnetic properties of all three of the tested materials.

For example, the researchers demonstrate that the effect can be turned on and off almost instantaneously, whereas the changes should lag if heat is the cause. This is a good thing for the field, since a system that produces too much heat would slow down the performance of any real-world device made from this technology.

More information: "Switchable voltage control of the magnetic

coercive field via magnetoelectric effect" by Jing Wang et al. is published in the *Journal of Applied Physics.*

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