**Magnetic field remote control for memory devices**

Physicists at the Indian Institute of Technology (IIT) in Hyderabad have fabricated a 'nonvolatile memory' (NVM) storage device whose 'on' and 'off' states can be remotely controlled by varying the magnetic field1. Their findings may help develop future memory devices operated by magnetic fields.

NVM, exhibited by devices such as USB flash drives, MP3 players and digital cameras, is a type of computer memory that can hold saved data even if power is turned off. As present silicon-based devices approach their scaling limits, research is on to develop the next generation of NVM technology that will allow storage of more data at less cost.

The device, that IIT's Dwipak Prasad Sahu and Narayana Jammalamadaka report is based on one such promising next generation NVM technology called 'Resistive Random Access Memory' or RRAM.

RRAM exploits a phenomenon called "resistive switching" in which the resistance across a dielectric solid-state material can be altered between high resistance state and low resistance state corresponding to the 0s and 1s, that binary language computers use to communicate. RRAM devices based on different dielectric materials have been proposed and controlling their resistance states has also been demonstrated in these devices by applying an electrical voltage.

The IIT team fabricated an RRAM using titanium dioxide (TiO2) as the dielectric material with a thin layer of conducting silver (Ag) as the top electrode and fluorine-doped tin oxide (FTO) as the substrate. The device — Ag/TiO2/FTO — thus created was then subjected to varying magnetic field to study its effect on the resistive switching ability of this device.

The researchers could tune the resistance states with the magnetic field and attain multilevel resistance switching for different 'on' and 'off' states. "Magnetic field control of ‘on’ and ‘off’ states suggest that this device can be controlled in a remote way for multi-bit data storage" — a finding, their report says, may help in the development of future RRAM based memory devices operated by magnetic fields.

**References**

1. Sahu, D. P. & Jammalamadaka, S. N. Remote control of resistive switching in TiO2 based resistive random access memory device. *Sci. Rep.* 7, 17224 (2018) doi: [10.1038/s41598-017-17607-4](http://dx.doi.org/10.1038/s41598-017-17607-4)

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