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Etch-a-Sketch Nanoelectronics

JEREMY LEVY, University of Pittsburgh

The popular children's toy Etch-a-Sketch has motivated the invention of a new material capable of writing and erasing wires so small they approach the spacing between atoms. The interface between two normally insulating materials, strontium titanate and lanthanum aluminate, can be switched between the insulating and conducting state with the use of the sharp metallic probe of an atomic-force microscope. By "sketching" this probe in various patterns, one can create electronic materials with remarkably diverse properties. This material system shows promise both for ultra-high density storage and as possible replacements for silicon-based logic (CMOS). This work is supported by the National Science Foundation, Defense Advanced Research Projects Agency, Army Research Office and Air Force Office of Scientific Research.