

# Cheaper substrates made of oxide materials

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Imagine building cheaper electronics on a variety of substrates -- materials like plastic, paper, or fabric. Researchers at Taiwan's National Chiao Tung University have made a discovery that opens this door, allowing them to build electronic components like diodes on many different substrates. They describe their findings in the journal *Applied Physics Letters*, published by the American Institute of Physics.

"Rectifying diodes are the fundamental building blocks in electronics," says Tuo-Hung Hou, describing the research. "Diodes made of oxide materials instead of traditional silicon are especially interesting because they can be fabricated at room temperature, as opposed to the 1,000° C typically required for silicon diodes. Besides complex materials engineering, our work shows a new route to greatly improve the rectification efficiency of oxide diodes by forming nanoscale current paths in oxides."

An extra bonus, Hou adds, is that by carefully controlling the nanoscale paths, they can create either a resistive nonvolatile memory, so-called "RRAM," or a rectifying [diode](#) in the same structure. RRAM simply consists of a layer of transition metal oxides sandwiched between two metal electrodes and is being actively pursued by many companies as the next "big thing" in memory.

The researchers hope their continued work will yield a new generation of [electronic circuits](#) made entirely of oxide materials.

**More information:** The article, "Nonvolatile memory with molecule-

engineered tunneling barriers" by Tuo-Hung Hou, Hassan Raza, Kamran Afshari, Daniel J. Ruebusch, and Edwin C. Kan was published online in the journal Applied Physics Letters on April 15, 2010. See:

[link.aip.org/link/APPLAB/v92/i15/p153109/s1](http://link.aip.org/link/APPLAB/v92/i15/p153109/s1)

Provided by American Institute of Physics

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