Physicists create magnetic 2-D metal in artificial oxide material

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An international research group led by physicists at the University of Arkansas created magnetic two-dimensional metal in an artificial oxide material that could be used to make better transistors.

Physicists hope to harness the power of an electron's spin to make spin transport electronics—spintronics—multifunctional computational devices that could replace hundreds of conventional devices, said Jak Chakhalian, professor of physics at the U of A who directed the research.

"Our idea was to take a sheet of non-magnetic, two-dimensional electronic gas in an oxide interface and add a third layer that would make the ultrathin metal magnetic with atomic precision," Chakhalian said.

The discovery furthers the understanding and control of magnetic interactions at the nanoscale in complex oxide interfaces, said Yanwei Cao, a postdoctoral research associate at the U of A who led the study.

The research team published its findings in *Physical Review Letters*, the journal of the American Physical Society, in a paper titled "Magnetic Interactions at Nanoscale in Trilayer Titanates."

"What we discovered is that by adding a third magnetic layer to previously known two-dimensional electron gases we can make this two-dimensional sheet of metal magnetic and control the degrees of

magnetism by tuning the layer's thickness," Cao said. "This has important implications for spintronic research."

More information: Yanwei Cao et al. Magnetic Interactions at the Nanoscale in Trilayer Titanates, *Physical Review Letters* (2016). DOI: 10.1103/PhysRevLett.116.076802