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Magnetic effects at the interface between nonmagnetic oxides

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The electronic reconstruction at the interface between two insulating oxides can give rise to a highly conductive interface. In analogy to this remarkable interface-induced conductivity we show how, additionally, magnetic effects can be induced at the interface between the otherwise nonmagnetic insulating perovskites SrTiO_3 and LaAlO_3 [1]. A large negative magnetoresistance, up to 50% at 50 mK, of the interface is found together with a logarithmic temperature dependence of the sheet resistance. These magnetic effects only appear in samples that have been grown under conditions that minimize the incorporation of oxygen vacancies. It is suggested that the interface electronic reconstruction induces localized magnetic moments in the SrTiO_3 that interact with the conduction electrons. At low temperatures, the sheet resistance reveals magnetic hysteresis with a long relaxation time scale. The conducting oxide interface now provides a versatile system to induce and manipulate magnetic moments in otherwise nonmagnetic materials.

[1] A. Brinkman *et al.*, Nature Materials **6**, 493 (2007).