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Magnetoresistance of Sr_2IrO_4 Epitaxial Thin Films[1] O.B. KORNETA, J. NICHOLS, J. TERZIC, L.E. DE LONG, G. CAO, S.S.A. SEO, Department of Physics and Astronomy and Center for Advanced Materials, University of Kentucky — Recent studies on Sr_2IrO_4 single crystals and thin films have revealed an intriguing insulating ground state, even though there are continued debates whether to classify this material as a Mott or Slater insulator. We have recently synthesized epitaxial Sr_2IrO_4 thin films on various substrates, which allow for the deposition of films under either tensile or compressive strain. The measurements of temperature-dependent magnetoresistance (MR), $\Delta R/R = [R(H) - R(0)]/R(0)$ on these samples reveal a negative linear MR near the room temperature, which is well above the antiferromagnetic ordering temperature ($T_N \approx 240$ K). However, as the temperature decreases, the MR becomes larger with a positive parabolic response. This behavior is very robust showing no noticeable dependence on magnetic field direction, strain, or film thickness and is remarkably different from the MR observed on Sr_2IrO_4 single crystals. This intriguing effect can be potentially explained by the presence of multiple conducting channels within the sample. We will discuss this model as well as other possible mechanisms for this unique phenomenon.

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