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Phase Transitions of $SrFeO_3$ Studied Using a Single-Crystalline Film NAOAKI HAYASHI, SHIGETOSHI MURANAKA, Graduate School of Human and Environmental Studies, Kyoto University, TAKAHITO TERASHIMA, Research Center for Low temperature and Materials Sciences, Kyoto University, MIKIO TAKANO, Institute for Chemical Research, Kyoto University — To study the electronic nature of $SrFeO_3$ (SFO), which is a cubic perovskite containing Fe^{4+} equipped with deep d levels and is, therefore, dominated by p-hole character, a single crystalline film was grown and the resistivity (ρ), Hall effect, magnetoresistance (MR) and susceptibility were measured. It is known that this oxide in bulk form becomes antiferromagnetically ordered in a screw spin structure. The T_N of the film has been found to be at 120$\sim$125 K from the susceptibility measurement, while the transport properties showed well-defined anomalies at 105 K, rather than at the T_N. The metallic film ($\rho = 9\times10^{-4}$ Ωcm at 300 K) exhibited a hysteretic, inflectional drop in the ρ -Tcurve at 105 K after showing a very small anomaly at 125 K; the Hall coefficient was positive and temperature-independent above 110 K but increased quickly below $\sim$100 K; the MR changed its sign from negative to positive quite steeply at 105 K. Considering these results together with what is known about bulk samples, we conclude that SFO undergoes its antiferromagnetic transition in two stages, passing an incompletely coherent stage before entering the final coherent state.

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