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Temperature and bias dependence of anisotropic magnetoresistance in antiferromagnetic Sr_2IrO_4[1] HEIDI SEINIGE, CHENG WANG, Physics Department, The University of Texas at Austin, GANG CAO, Center for Advanced Materials, University of Kentucky, JIAN-SHI ZHOU, JOHN B. GOODENOUGH, Texas Materials Institute, The University of Texas at Austin, MAXIM TSOI, Physics Department, The University of Texas at Austin — We study anisotropic magnetoresistance (AMR) in antiferromagnetic (AFM) Mott insulator Sr_2IrO_4 [1]. Such AMR is a promising candidate for monitoring the magnetic order parameter in AFM spintronics. Here we present temperature- and electrical bias-dependent measurements of the point-contact AMR in single crystals of Sr_2IrO_4. The point-contact technique allows to probe very small volumes and, therefore, look for electronic transport in Sr_2IrO_4 on a microscopic scale. Point-contact measurements at liquid nitrogen temperature revealed a large negative magnetoresistance (MR) for magnetic fields applied within IrO_2 a-b plane and electric currents flowing perpendicular to the plane. The observed MR decreases with increasing temperature and falls to zero at $T_{Néel} \sim 240$ K. Interestingly, the temperature dependence of MR ratios differs qualitatively from that of the resistivity. The point-contact measurements also show a strong dependence of MR on the dc bias applied to the contact. The latter can be associated with correlations between electronic transport and magnetic order in Sr_2IrO_4.

[1] C. Wang et al., Phys. Rev. X, November 2014.

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