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Magneto-transport of filling controlled Mott insulator, Sr_2IrO_4 JAYAKANTH RAVICHANDRAN, DMITRI EFETOV, Department of Physics, Columbia University, New York, NY 10027, CLAUDY RAYAN SERRAO, DI YI, RAMAMOORTHY RAMESH, Department of Materials Science and Engineering, University of California, Berkeley, CA 94720, PHILIP KIM, Department of Physics, Columbia University, New York, NY 10027 — Sr_2IrO_4 (SIO) is shown to be a special Mott insulator with the ground state stabilized by a combination of electron correlation and spin-orbit coupling. [1] Both structurally and electronically, electron doped SIO shows characteristics comparable to hole doped La₂CuO₄, one of the parent compounds of the high- T_c cuprates. [2] This leads us to a natural question of whether doped SIO can turn into a metal and eventually a superconductor. Sustained efforts of chemically doping SIO, [3] without altering its band structure significantly, have been severely hampered due to solubility limitations. In this work, we perform a combination of chemical and electrostatic doping of SIO, to explore the possibility of achieving a robust metallic state. We show that undoped SIO shows ambipolar characteristics and there is significant gating action even after heavy alloying of SIO with La. In depth magneto-transport measurements such as Hall effect and magnetoresistance also provide us a deeper understanding of electronic structure and transport in this exotic Mott insulator.

[1] B. J. Kim et. al., PRL (2008).

[2] F. Wang and T. Senthil, PRL (2011).

[3] Y. Klein and I. Terasaki, J. Phys. : CM (2008).

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