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Metal-Insulator Transition in Epitaxial Pyrochlore Iridates $Bi_2Ir_2O_7$ thin Films JIUN-HAW CHU, JIAN LIU, DI YI, C. RAYAN-SERRAO, S. SURESHA, XAVI MARTI, Department of Physics and Department of Materials Science and Engineering, University of California, Berkeley, SCOTT RIGGS, MAX SHAPIRO, FISHER IAN, Department of Applied Physics and Geballe Laboratory for Advanced Materials, Stanford University, R. RAMESH, Department of Physics and Department of Materials Science and Engineering, University of California, Berkeley — Recently there is a surge of interest in searching for topological order in correlated electronic systems such as transition metal oxides. The strong spin-orbit interaction of 5d electrons and the geometric frustration in the crystal lattice make the pyrochlore iridate($A_2Ir_2O_7$) an ideal candidate to achieve this goal. Pioneering experiments on bulk polycrystalline and single crystal samples revealed a temperature dependent metal-insulator transition coupled to a long range magnetic order, and the transition temperature can be tuned by either A-site ionic radius or an external pressure. In this talk we present our efforts to understand and control the metal-insulator transition and the underlying electronic structure of pyrochlore iridates via epitaxial $Bi_2Ir_2O_7$ thin films. Bulk $Bi_2Ir_2O_7$ is located at the metallic side of the phase diagram. However as the film's thickness decreases the transport evolves from a metallic to a strongly localized character. Resonant X-ray spectroscopy suggests that the density of states near Fermi level is dominated by the Ir J_eff=1/2 states. Intriguingly, the magnetoresistance shows a linear field dependence over a wide range of fields at low temperatures, which is possibly consistent with the existence of Dirac nodes.

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