

Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Visualizing the gap closure by Rh dopant in SOC induced Mott insulator Sr_2IrO_4 with Scanning Tunneling Microscopy JIXIA DAI, EDUARDO CALLEJA, KYLE MCELROY, Department of Physics, University of Colorado at Boulder, TONGFEI QI, GANG CAO, Center for Advanced Materials and Department of Physics and Astronomy, University of Kentucky — Sr_2IrO_4 is a novel $J_{\text{eff}} = 1/2$ Mott insulator with characteristics of 5d electrons. The strong spin orbit coupling (SOC) in the 5d orbitals of iridium plays an important role in the insulating nature of the parent compound, while replacing Ir^{4+} with the isoelectronic Rh^{4+} is able to drive the system to a metallic regime. We use variable temperature Scanning Tunneling Microscope to study both the insulating parent compound and the Rh doped $\text{Sr}_2\text{Ir}_{1-x}\text{Rh}_x\text{O}_4$, with $x=0.04, 0.11$. By doing differential conductance measurement, we were able to observe an insulating gap both in the parent compound and the low doping areas of the $x=0.04$ and 0.11 samples. We also observed that in the doped samples, local gaps varies largely at the atomic length scale. By correlating the locations of Rh dopant and the size of local gaps, we found that Rh doping will decrease the insulating gap size which is in accordance with the metallic behavior observed by transport measurements.

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Date submitted: 17 Nov 2012

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