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STM studies on the lightly doped Mott Insulator $Sr_{2-x}Eu_xIrO_4$ CARLOS J. ARGUELLO, ETHAN P. ROSENTHAL, Columbia University, QINGBIAO ZHAO, BUM JOON KIM, Argonne National Laboratory, ABHAY N. PASUPATHY, Columbia University — Sr_2IrO_4 is a $5d^5$ transition metal oxide that displays a novel J_{eff} =1/2 Mott insulator behavior. This has been attributed to a large spin-orbit coupling combined with narrow Hubbard bands. Several interesting effects of chemical doping on this system have been proposed, being of special interest the possibility of an insulating to metal transition and of induced superconductivity for large doping concentrations. However, a systematic study of this type requires an understanding of the effect of chemical dopants at the atomic scale. In this talk, we will present Scanning Tunneling Microscopy (STM) and Scanning Tunneling Spectroscopy (STS) measurements on lightly doped $Sr_{2-x}Eu_xIrO_4$. By obtaining atomic resolution images we have estimated the Eu doping concentration to be close to 0.5%. This dilute doping allows us to isolate the effect of an individual doping atom or impurity on the electronic properties of the system. Furthermore, high spatial resolution STS measurements enable us to study the effective spatial range of the effect of a dopant on the local density of states.

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