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Electronic structure of Rh and Ru doped Sr_2IrO_4 SHALINEE CHIKARA, Argonne National Laboratory, GILBERTO FABBRIS, Argonne National Laboratory and Washington University at St. Louis, JASMINKA TERZIC, TONGFEI QI, KAMAL BUTROUNA, University of Kentucky, LARISSA VEIGA, NARCIZO SOUZA NETO, Laboratorio Nacional de Luz Sincrotron, Brazil, GANG CAO, University of Kentucky, DANIEL HASKEL, Argonne National Laboratory

— Sr_2IrO_4 is a spin-orbit interaction(SOI) assisted insulator. It has been proposed that the weaker SOI in the $4d$-substituted $\mathrm{Sr_2Ir_{1-x}(Ru, Rh)_xO_4}$ closes the insulating gap, rendering it a paramagnetic metal. Rh($4d^5$) is isoelectronic to Ir($5d^5$) whereas Ru($4d^4$) has one less electron in the $4d$-band. The AFM-I/PM-M transition takes place at lower x for Ru than Rh, presumably due to the effect of hole doping. X-ray absorption near edge structure (XANES) and x-ray magnetic circular dichroism (XMCD) measurements at the Ir $L_{2,3}$ edges show that $\langle \mathbf{L.S} \rangle$ is non-zero and independent of x. This is indicative of a strong local $5d$ spin orbit interaction that is rather insensitive to the $4d$ doping. In contrast, measurements at the $L_{2,3}$ edges of Ru and Rh show $\langle \mathbf{L.S} \rangle \approx \mathbf{0}$ for all x. The results point to the importance of local $4d/5d - 2p$ hybridization as opposed to $4d - 5d$ band formation in the Rh and Ru doped Sr_2IrO_4.

Shalinee Chikara
Argonne National Laboratory

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