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Resonant inelastic x-ray scattering study of charge ordering in CuIr2S4 HLYNUR GRETARSSON, University of Toronto, Canada, JUNG-HO KIM, DIEGO CASA, THOMAS GOG, Argonne National Laboratory, USA, SANG-WOOK CHEONG, Rutgers University, USA, YOUNG-JUNE KIM, University of Toronto, Canada — We present Ir L_3-edge resonant inelastic x-ray scattering (RIXS) spectra and resonant x-ray emission spectra (RXES) on the thiospinel, $CuIr_2S_4$, which has been attracting much interest due to intriguing metal-insulator transitions. At room temperature $CuIr_2S_4$ is metallic, but goes through a metal insulator transition at $T_{MI} \sim 226$ K due to the formation of charge order (CO) of Ir^{3+} and Ir^{4+} together with spin dimerization between Ir^{4+} ions. By exposing the sample to x-ray below T = 50 K, the crystal symmetry goes from triclinic to tetragonal, accompanied by reduced resistivity. The RIXS signal was dominated by a broad and strong feature around 3 eV, arising from t_{2g} to e_g transition, but we were able to observe a clear signature of opening of the insulating gap across the metal-insulator transition. In addition, we also found that this gap is partially filled in the irradiation-induced phase. The emission spectra reveals the existence of an excited Ir-5d t_{2g} state, which is hidden in the Ir L_3-edge XAS of $CuIr_2S_4$. The result indicates that the electronic reconstruction that takes place in the irradiation-induced phase comes from the Ir^{3+} while the Ir^{4+} dimers are unchanged.

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