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Spectroscopic Investigation on the Electronic Structure of Sr_2MO_4 (M=Ru, Rh, and Ir) S.J. MOON, M.W. KIM, K.W. KIM, T.W. NOH, ReCOE & School of Physics, Seoul National University, Seoul 151-747, Korea, J.-Y. KIM, PAL, Postech, Pohang, Korea, J.-H. PARK, Department of Physics & Electron Spin Science Center, Postech, Pohang, Korea, I. NAGAI, S.I. IKEDA, NeRI & AIST, Tsukuba, Japan, G. CAO, Deparment of Physics and Astronomy, University of Kentucky, Lexington, Kentucky 40506, USA — We investigated the intriguing metal-insulator transition and the electronic structure change of the layered perovskite Sr_2MO_4 (M=Ru, Rh, and Ir) by optical and O 1s x-ray absorption (XAS) spectroscopy. Sr_2RuO_4 (four 4d electrons) is a superconductor. Sr_2RhO_4 (five 4d electrons) is a poor metal. Sr_2IrO_4 (five 5d electrons) is a small gap insulator. All the compounds have similar crystal structures, yet their unoccupied d-bands show intriguing change as the M is changed from Ru to Rh, and to Ir. In this presentation, we will discuss the possible origin of the electronic structure change in terms of the change in local structural deformation, Coulomb energy, electron occupation, and the orbital degeneracy by comparing the optical conductivity with XAS spectra. We will also suggest a possible link between the electronic structure change and the metal (Sr2RuO4)-insulator (Sr2IrO4) transition.

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