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Electronic structure changes in novel J_{eff}=1/2 system: Ruddlesden-Popper series $Sr_{n+1}Ir_nO_{3n+1}$ (n=1, 2, and ∞) S.J. MOON, J.S. LEE, W.S. CHOI, T.W. NOH, ReCOE & FPRD, Department of Physics and Astronomy, Seoul National University, Korea, H. JIN, J. YU, CSCMR & FPRD, Department of Physics and Astronomy, Seoul National University, Korea, Y.S. LEE, Department of Physics, Soongsil University, Seoul, Korea, V. DURAIRAJ, G. CAO, Department of Physics and Astronomy, University of Kentucky, Lexington, Kentucky 40506, USA, A. SUMI, H. FUNAKUBO, Deparment of Innovative and Engineered Materials, Interdisciplinary Graduate School of Science and Engineering, Tokyo Institute of Technology, Japan — We investigated the electronic structures of Ruddlesden-Popper series $Sr_{n+1}Ir_nO_{3n+1}$ (n=1, 2, and ∞) compounds with optical spectroscopy and first-principles calculation. Among $Sr_{n+1}Ir_nO_{3n+1}$, while $SrIrO_3$ is a metal, Sr_2IrO_4 and $Sr_3Ir_2O_7$ are insulators. In optical conductivity spectra $\sigma(\omega)$, we found unique bandwidth-driven changes of the electronic structures which were quite different from those of $3d$or $4d$ S=1/2 systems. From the comparison between $\sigma(\omega)$ and the results of first-principles calculation, we found that the intriguing changes of the electronic structures can be realized by the cooperative interaction between the SO coupling and the electron correlation. These results clearly demonstrate that $Sr_{n+1}Ir_nO_{3n+1}$ should be considered as a J_{eff}=1/2 single band system.

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