Optical Investigation on the Electronic Structures of Multi-band Ca_{2-x}Sr_xRuO_4

S. J. MOON, J. S. LEE, T. W. NOH, ReCOE & School of Physics, Seoul National University, Korea, S. NAKATSUJI, Y. MAENO, Department of Physics, Kyoto University, Japan — We investigated the polarization dependent optical spectra of the quasi-two-dimensional multi-band Ca_{2-x}Sr_xRuO_4 (0.0 < x < 2.0) system. Recently, it becomes an important issue to understand how the electronic structure evolves from a multi-band metal Sr_2RuO_4 to a Mott-insulator Ca_2RuO_4 in the Ca_{2-x}Sr_xRuO_4 system, especially whether the orbital selective Mott-transition occurs at x=0.5 or not. In the in-plane optical spectra, we observed an intriguing behavior in the electrodynamics, i.e., the decrease of the mass enhancement accompanying the reduction of the plasma frequency. We found that such result could not be attributed to the Mott-gap opening. Instead, with the detailed understanding of the c-axis optical spectra, we suggested that the critical behaviors near x=x_c should be closely related with the renormalization of the d_{xy} band, which is strongly affected by the tilting of the RuO_6 octahedra.

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