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Optical evidence of competitive nature between charge-order and dimer-Mott insulators RYUJI OKAZAKI, YUKIO YASUI, ICHIRO TERASAKI, Department of Physics, Nagoya University, YUKA IKEMOTO, TARO MORIWAKI, SPring-8, JASRI, TAKAHISA SHIKAMA, HATSUMI MORI, ISSP, The University of Tokyo, KAZUYUKI TAKAHASHI, ISSP, The University of Tokyo and Department of Chemistry, Kobe University, HIDEKI NAKAYA, TAKAHIKO SASAKI, IMR, Tohoku University — A family of two-dimensional (2D) quarter-filled organic materials exhibits various intriguing electronic and magnetic states. These salts are essentially metallic due to the partially-filled band, however, several materials show the correlated insulating states such as charge-order and dimer-Mott insulators owing to strong correlation effects coupled with their unique internal degrees of freedom. In this talk, we show a competitive nature between charge-order and dimer-Mott insulating phases in the 2D quarter-filled organic salt β -(meso-DMBEDT-TTF)₂PF₆ through the optical conductivity measurements. This material has been known to exhibit charge ordering below $T_c = 70$ K. We find optical evidence of a dimer-Mott insulating phase above T_c , indicating that the transition in this material is a transition from dimer-Mott to charge-order insulator. Below T_c , the optical peak feature of dimer-Mott insulator is significantly suppressed by the formation of charge order, implying a competition of these two insulators in this system. Furthermore our infrared imaging spectroscopy reveals a spatially inhomogeneous electronic state far below T_c , which is attributed to the competition between charge-order and dimer-Mott insulators.

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