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Character of charge carriers in a low-carrier superconductor $Ag_5Pb_2O_6$ revealed by core-level photoemission SOOBIN SINN, IBS-CCES, Seoul National University, KYUNG DONG LEE, CHOONG JAE WON, Inha University, TAMIO OGUCHI, Osaka University, JI SEOP OH, HYANG KEUN YOO, CHENG-TAI KUO, IBS-CCES, Seoul National University, MOONSUP HAN, YOUNG JUN CHANG, University of Seoul, NAMJUNG HUR, Inha University, BYEONG-GYU PARK, Pohang Accelerator Laboratory, CHANGYOUNG KIM, HYEONG-DO KIM, TAE WON NOH, IBS-CCES, Seoul National University —
Identifying an element-specific orbital character of electrons near the Fermi level is important to understand electronic properties of a metallic solid, as manifested in high-T_c superconducting cuprates in which doped-hole and –electron characters are different from each other. Photoemission spectroscopy (PES) may serve as an ideal tool for that purpose by varying photon energies. However, in the case of a low-carrier superconductor $Ag_5Pb_2O_6$, distinguishing between Ag $5s$ and Pb $6s$ conduction bands is difficult by the technique. Here, we present another method utilizing core-level PES. The Pb $4f$ spectrum exhibits a quite asymmetric line shape unlike the Ag $3d$ spectrum. The asymmetry can be attributed to electron-hole pair excitations across the Fermi level in the Pb $6s$ band affected by strong local attractive Coulomb potential due to the Pb $4f$ hole. However, the Pb $4f$ spectrum is not explained by the well-known Doniach-Šunjić line shape for a simple metal. By employing Pb $6s$ PDOS from first-principle calculations, the line shape is successfully generated, thus confirming that the main charge-carrier character in $Ag_5Pb_2O_6$ is Pb $6s$ electrons.

Soobin Sinn
IBS-CCES, Seoul National University

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