9. Multiplet Structures in $3d$ and $4d$ X-ray Core Photoemission Spectra for La and Ce Compounds

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Core-level spectroscopy is well known to be a very powerful tool to investigate electronic states in solids. In X-ray core photoemission, the response of outer electronic systems, both localized and itinerant, to the core hole produced by the incident photon is reflected in structures of the spectra.

We study $3d$ and $4d$ X-ray core photoemission spectra (XPS) for La and Ce compounds on the basis of the Anderson model which considers the hybridization between $4f$ states and valence band states. We concentrate on the multiplet structures arising from the interactions between $4f$ electrons and core hole. Narrowing of the multiplet structures occurs when the multiplets strongly mix with each other through the hybridization, while the multiplet structures are preserved when a sufficient mixing does not occur. We also attempt a consistent explanation of $3d$- and $4d$-XPS for each compound choosing reasonable parameters.

10. Pairing Mechanism of Holes in High Tc Superconductors —Attraction through spin polarization in the Cu-O plane—

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Excess holes in oxide superconductors which are responsible for superconductivity will enter hybridized orbitals between Cu $d_{3z^2-r^2}$ orbitals in the Cu-O plane and oxygen p_z orbitals in the Ba-O plane, if the Hund rule coupling in Cu-$3d$ orbitals is dominant. Then the excess holes itinerate among these orbitals. Since transfer of holes between Cu $d_{x^2-y^2}$ orbitals is suppressed by large intraatomic coulomb energy. The holes behave as local spins. We, therefore, represent the Cu-O plane by an antiferromagnetic Heisemberg spin system. There is a ferromagnetic interaction between the spin system and an excess hole caused by the Hund rule coupling within the