

4p states and x-ray spectroscopy

Jun-ichi Igarashi¹ and Manabu Takahashi²

¹Faculty of Science, Ibaraki University, Mito, Ibaraki 310—8512, Japan

²Faculty of Engineering, Gunma University, Kiryu, Gunma 376-8515, Japan

The 4p states in transition metals and their compounds usually play minor roles on their physical quantities. Recent development of resonant x-ray scattering (RXS) at the K-edge of transition metals, however, casts light on the 4p states, because the signals on orbital and magnetic superlattice spots are brought about by the modulation in the 4p states. The 4p states are extending in solids and thereby sensitive to electronic states at neighboring sites. This characteristic determines the mechanism of RXS that the intensity on orbital superlattice spots are mainly generated by the lattice distortion and those on magnetic superlattice spots by the coupling of the 4p states with the orbital polarization in the 3d states at neighboring sites. Taking up typical examples for orbital and magnetic RXS, we demonstrate these mechanisms on the basis of the band structure calculation. Finally, we discuss magnetic circular dichroism spectra at the K-edge, demonstrating that the same mechanism as the magnetic RXS is working.