초청강연 I-3

Orbitally ordered state in $Y_{1-x}Ca_xTiO_3$ studied by resonant x-ray scattering

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The resonant x-ray scattering (RXS) technique has experimentally and theoretically developed in the research of the orbitally ordered state in manganite system. To extend the RXS technique to t_{2g} electron system, we have studied the orbital ordering in $Y_{1-x}Ca_xTiO_3$ using the RXS near Ti *K*-edge. The RXS intensities at 1s → 3d transition energy (pre-edge) reflecting the 3d-orbital ordering markedly decrease with increasing Ca concentration toward the ferromagnetic-paramagnetic phase boundary ($x_{FP} \sim 0.15$). The intensity remaining above x_{FP} decreases gradually and almost disappears at the metal-insulator transition ($x_{MI} \sim 0.4$). Namely, the orbital ordering is strongly suppressed toward x_{FP}, and vanishes at x_{MI}. To confirm the orbital state by the Jahn-Teller distortion, we have also performed the powder x-ray diffraction. The hole concentration dependence of Jahn-Teller distortion is consistent with that of the orbitally ordered state.