

Abstract Submitted
for the MAR09 Meeting of
The American Physical Society

Electronic approaches on orbital anisotropy and spin configuration in Multiferroic LuFe_2O_4 K.-T. KO, POSTECH, H.-J. NOH, Chonnam National University, B.-G. PARK, POSTECH, J.-Y. KIM, PAL, J.-H. PARK, POSTECH, A. TANAKA, Hiroshima University, SUNG-BAEK KIM, POSTECH, S.-W. CHEONG, Rutgers University — The orbital anisotropy and spin configuration of the multiferroic LuFe_2O_4 are investigated by the x-ray absorption spectroscopy (XAS) at Fe $L_{2,3}$ - and O K-edges, and the theoretical cluster model calculations including the configuration interactions and full multiplets. The x-ray magnetic circular dichroism (XMCD) results show that the system has a surprisingly large orbital moment as large as $m_O \sim 0.8 \mu_B/\text{f.u.}$, which also agrees with the theoretical model calculation result. This result also well explains the observed total magnetic moment of $2.9 \mu_B/\text{f.u.}$. The polarization dependent XAS enables us to identify the orbital level and occupation, which turns out to be rather different from the band structure prediction. We also found that the polar charge ordering plays an essential role for the 0.7 eV charge gap. Finally, we discuss about the local electronic structure, orbital anisotropy, and the spin configuration of LuFe_2O_4 .

Hoyoung Jang
POSTECH

Date submitted: 21 Nov 2008

Electronic form version 1.4