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Magnetoelastic Spin Flip in $La_{1.4}Sr_{1.6}Mn_2O_7$ K.-T. KO, H. JANG, J.-H. PARK, Dept. Physics, Pohang University of Science and Technology, Korea, B.-G. PARK, J.-Y. KIM, Pohang Accelerator Laboratory, SUNG BAEK KIM, The College of General Education, Konyang University, Korea, S-W. CHEONG, Dept. Physics and Astronomy, Rutgers University, USA — The magnetoelastic coupling in a bilayer manganite was investigated by using x-ray absorption spectroscopy (XAS) and resonant soft x-ray scattering (RSXS) at Mn $L_{2,3}$-edge. Huge occupation reversal of e_g level from $d_{3z^2-r^2}$ to $d_{x^2-y^2}$ was observed at the temperature and magnetic field induced phase transition in $La_{1.4}Sr_{1.6}Mn_2O_7$. The CI model calculation indicated that the direction of magnetocrystalline anisotropy is affected by the configuration of e_g level, and the sharp spin flip transition was expected. The field dependent RSXS measurements demonstrated a strong magnetoelastic coupling in $La_{1.4}Sr_{1.6}Mn_2O_7$, where the AFM spin axis was changed from out-of-plane to in-plane as a result of the field induced change of e_g orbital occupation. Finally, we discuss the spin-orbital-lattice coupling in bilayer manganites.

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