Transport Properties and X-ray Absorption Spectroscopy in Layered Cobaltate Na$_x$CoO$_2$ thin films W. J. CHANG, Department of Electrophysics, National Chiao Tung University, J. Y. JUANG, J.-Y. LIN, Institute of Physics, National Chiao Tung University, C. M. LEE, C.-M. HUANG, J. M. CHEN, C.-H. HSU — Na$_x$CoO$_2$ ($x \approx 0.7$) thin films (~200 nm) were fabricated on sapphire (0001) substrates via lateral diffusion of sodium into Co$_3$O$_4$ (111) epitaxial films. From the results of x-ray diffraction and in-plane resistivity $\rho_{ab}$, the single phase and the metallic behaviors of these Na$_x$CoO$_2$ films were identified, and consisting with the results of single crystals [1] and Ohta’s films [2]. The anomalous Hall effect and the magnetoresistance were also measured in Na$_x$CoO$_2$ thin films. In addition, the O 1s x-ray absorption spectra of thin films show different anisotropy to those of single crystals. The electronic structures of Na$_x$CoO$_2$ single crystals and thin films will be discussed to investigate the splitting of $e_g$ and $t_{2g}$ states in Co 3$d$ bands of Na$_x$CoO$_2$ thin films. *This work was supported by the National Science Council of Taiwan, under Grant Nos. NSC-94-2112-M-009-006. [1] Maw Lin Foo et al., Phys. Rev. Lett. 92, 247001 (2004). [2] Hiromichi Ohta et al., Crystal Growth & Design 5, 25 (2005).