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Infrared Hall effect measurement of correlated metal $Na_{0.75}CoO_2$[1]

E.J. CHOI, Department of Physics, Univ. of Seoul, 130-743, Korea , A. ZIMMERS, Department of Physics and Center of Superconductor Research, University of Maryland, College Park, MD 20742, L. SHI, A. SOUSHKOV, H.D. DREW, J.H. CHO, Department of Physics, Pusan National University, Pusan, Korea — Na_xCoO_2 has a layered Co-O plane where Co ions form a triangular bonding block in contrast with the square Cu moments of HTSC Cu-O plane. With varying x, the compound exhibits rich phases like superconductivity (x=0.3, H_2O intercalted), charge-ordering (x=0.5) and Curie-Weiss metal (x$\sim$0.7). Na_xCoO_2 thin film (x=0.75) was grown on $SrTiO_3$ substrate using PLD method. Resistivity and dc-Hall effect show same temperature dependence as those of single crystal. We studied ac Hall effect by measuring the complex Faraday rotation θ_F at infrared frequency (1100 cm^{-1}) for 30K>T<300K and in magnetic fields up to 8 Tesla. As T decreases, real part of θ_F shows a slop change where dRe(θ_F)/dT from negative to positive sign at T=100K. At the same T, Im(θ_F)shows a dispersive structure. This anomaly comes from σ_xy while σ_xx is monotonic with T. Possible origin of the unusual infrared Hall conductivity sigma$_xy$ is considered in terms of spin density wave, Na-ordering, and electronic Kagome lattice.

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