

Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Effect of Annealing on Extraordinary Hall Effects in Sputtered Granular $\text{Cu}_{80}\text{Co}_{20}$ Thin Films NAM H. WANG, JIAN-QING WANG, SUNY-Binghamton — This work explores the microstructure dependence of extraordinary Hall effect (EHE) in $\text{Cu}_{80}\text{Co}_{20}$ granular thin films. Upon annealing, the Cu-Co films showed anomalous microstructure evolution into two-particle distribution, as evident in measured magnetic susceptibility versus temperature, showing existence of double peak structures in magnetic blocking for annealing temperature above 300 °C. Such unusual nanostructure directly affected the magneto-transport properties, most noticeable in the extraordinary Hall effect (EHE). The measured EHE was compared with Co-Ag films series, with more uniform particle distribution, which was shown to inversely scale with the scattering length and average particle sizes. Such scaling relationship was absent in Cu-Co films. It was concluded that the EHE in Cu-Co annealed films primarily depends on the population of smaller-sized particles. This was evident in independence of EHE saturation field on the annealing temperature. The gradual decrease of EHE with the annealing is a result of two combined effects. The initial linear decrease below 250 °C in EHE is a result of interface change of the Co particles in Cu matrix. As the larger particles began to emerge, further decline in EHE is due to the reducing smaller particle population, while the larger particles do not contribute significantly to the EHE.

Jian-Qing Wang
SUNY-Binghamton

Date submitted: 20 Nov 2006

Electronic form version 1.4