

Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Probing the exchange-biased system of Co/ γ -Fe₅₀Mn₅₀ using a large scale micromagnetic model. JYOTIRMOY SAHA, School of Physics and Astronomy, University of Minnesota, RANDALL VICTORA, Department of Electrical and Computer Engineering, University of Minnesota — We have built a micromagnetic model to study the exchange interaction between Co (a ferromagnet) and γ -Fe₅₀Mn₅₀ (an antiferromagnet) that has (111) texturing. The antiferromagnet thickness dependence of exchange bias and enhanced coercivity at two different temperatures were obtained and comparison to experiments showed reasonable agreement. Another aspect of this exchange interaction that we looked into was the grain size dependence of exchange bias. Here we obtain a linear relationship between exchange bias and inverse grain size for nearly thermally stable antiferromagnetic grains. This is the trend that is both predicted by theory and produced in experiments. The plot of exchange bias vs. in-plane field cooling angles exhibits a cosine like symmetry that is set by the thermal stability of the antiferromagnetic grains. Most of the values relating to material characteristics used in our model are taken from literature. One input parameter in our model that needs refinement either from experiments or from band structure calculations is the maximum anisotropy value of the antiferromagnet and its distribution amongst the antiferromagnetic grains.

Jyotirmoy Saha
School of Physics and Astronomy, University of Minnesota

Date submitted: 20 Nov 2006

Electronic form version 1.4