

Abstract Submitted  
for the MAR07 Meeting of  
The American Physical Society

**High-throughput Investigation of Exchange Coupling Interaction in Soft/Hard Magnetic Bilayer Systems** A. ZAMBANO, H. OGUCHI, I. TAKEUCHI, University of Maryland, Y. CHOI, J. S. JIANG, Argonne, J. P. LIU, University of Texas at Arlington, S. LOFLAND, Rowan University, D. JOSELL, L. BENDERSKY, NIST — To enhance the maximum energy product of exchanged coupled hard/soft phase nanocomposite, we need to establish the parameters that govern the exchange coupling interaction (ECI). To this end, on single chips, up to a hundred thin film bilayer samples were grown by e-beam evaporation varying composition and soft layer thicknesses ( $t_s$ ). Magnetic hysteresis loops were taken by magneto-optical Kerr effect measurements. The simultaneous analysis of the samples allows us to delineate subtle variations of the exchange coupling behavior. We will show examples of studies of CoPt/(Fe, Co or Ni) and SmCo/(Fe, Co or Ni) libraries. We characterized ECI by measuring the variations of the coupling length ( $\lambda$ ) and the nucleation field ( $H_N$ ) on various magnetic parameters,  $t_s$ , and interface conditions. The trend indicates that the dominant factors determining  $\lambda$  and  $H_N$  are the hard layer magnetic constants and the saturation magnetization of the soft layer. We will also discuss the role played by other magnetic parameters. The results allow us to predict the behavior of coupled hard/soft magnetic layers in general. Supported by ONR MURI N00014-05-1-0497.

A. Zambano  
University of Maryland

Date submitted: 15 Nov 2006

Electronic form version 1.4