Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Systematic Investigation of Exchange Coupled Fe_xCo_{1-x}/CoPt Magnetic Bilayers Using the High-Throughput Approach H. OGUCHI, Univ. of MD, M. YU, Univ. of New Orleans, J. HATTRICK-SIMPERS, Univ. of MD, A. ZAMBANO, I. TAKEUCHI, Univ. of MD, S. LOFLAND, Rowan Univ., D. JOSELL, L.A. BENDERSKY, NIST, J.P. LI, Univ. of Texas at Arlington — Exchange-coupled magnetic nanocomposites are being pursued for future permanent magnets with high energy products. To gain better understanding of the exchange coupling behavior between the soft and hard magnetic layers, we are using the high-throughput approach. Fe_xCo_{1-x}/CoPt magnetic bilayers are grown on MgO(110) substrates using the combinatorial electron-beam deposition. CoPt hard magnetic layer is epitaxially grown at 600° C. The Fe_xCo_{1-x} soft layer is deposited at 200° C. To study the effect of changing soft phase parameters on exchange coupling, we have fabricated libraries where in one direction the composition of the soft-phase is continuously changing from Fe to Co and the thickness of the soft layer is changing in the other direction. The magnetic hysteresis loop for each soft layer composition and the thickness is measured using a magneto-optical Kerr effect system. From systematically changing hysteresis loops, we calculate the exchange field (H_{ex}) as a function of anisotropy and magnetization of the soft phase. Observed dependence of H_{ex} on soft phase parameters are directly compared against theoretical models of the exchange mechanism. ONR N00014-05-1-0497, NSF DMR -0520471.

H. Oguchi

Date submitted: 06 Dec 2005 Electronic form version 1.4