

Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Current-perpendicular-to-plane magnetoresistance of multilayered Co/Cu nanocolumns by scanning tunneling microscope P. MORROW, A. KAR, X. TANG, T. PARKER, G. -C. WANG, Rensselaer Polytechnic Institute, Troy, NY, T. -M. LU, J. Y. DAI, Hong Kong Polytechnic University, Hong Kong SAR, RPI/HKPU COLLABORATION — In this work we present a method to measure the current-perpendicular-to-plane magnetoresistance (CPP-MR) of a small number of multilayered nanocolumns using a nonmagnetic STM. Samples were grown on Au-coated Si substrates by oblique angle thermal deposition from separate Co and Cu sources. We set the layer thicknesses and column lengths at 5-15 nm and 200-700 nm, respectively. SEM images show column diameters of about 25-100 nm, and the multilayer structure is confirmed by EELS and HR-TEM. VSM analysis gives coercivities of a few tens to several hundred G. In the MR measurement, mechanical contact was established between the STM tip and a small number of as-deposited nanocolumns, and dynamic hysteresis loops of resistance vs. magnetic field (up to 2.5 kG) were then collected in air at room temperature. The observed MR ratio for most samples was on the order of 1%, which is posited to be due to the same physical mechanism as the GMR effect, but with significantly less efficacy. Cautions in the experiment and factors that may facilitate higher MR are also discussed.

P. Morrow
Rensselaer Polytechnic Institute, Troy, NY

Date submitted: 17 Nov 2006

Electronic form version 1.4