Abstract Submitted
for the MAR08 Meeting of
The American Physical Society

Sorting Category: 06.6 (E)

Interplay of Magnetic and Structural Anisotropy in Co|Ni Multilayer Thin Films JOSEPH DVORAK, NSLS, BNL, KATHRYN KRYCKA, NCNR, NIST, JEAN-MARC BEAUJOUR, WENYU CHEN, ANDREW KENT, New York University, CHI-CHANG KAO, NSLS, BNL — Interfacial perpendicular magnetic anisotropy (PMA) is important for spin transfer devices and has been predicted to overcome dipolar shape anisotropy for [t Co|2t Ni] multilayers with thicknesses, t, of 4 $\mathring{A}$ or less [1]. layered between Cu, however, thickness dependent PMA (t=1, 2, 3, 4 and 6 $\mathring{A}$) is not sufficiently strong to produce perpendicular magnetization. Anomalous diffraction reveals that the Co and Ni are expansively strained by the Cu within the sample plane. As calculated in reference 2 this trigonal strain would be sufficient to overcome the PMA. Ferromagnetic resonance measurements [3] indicate that the net Lande g-factors are enhanced above bulk for all thicknesses, and increase further with decreasing layer thickness. By applying element-specific x-ray magnetic circular dichroism (XMCD) we have been able to study the Co and Ni individually. Both elements show increasing spin to orbit ratios with decreasing thickness magnetized either in-plane or along sample normal. In all cases the spin to orbit ratio is enhanced along the sample normal compared with the in-plane direction.

[1] Phys. Rev. Lett. 68, 682 (1992)
[2] Phys. Rev. B 69, 104426 (2004)
[3] Eur. Phys. J. B 59, 475 (2007)

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[X] Prefer Oral Session
[ ] Prefer Poster Session

Date submitted: 05 Dec 2007 Electronic form version 1.4