AC03

Depth Sensitive Exchange Coupling in Top and Bottom Pinned Spin Valve Structures

B. Parvatheeswara Rao[1,2], and CheolGi Kim*[1]
[1] ReCAMM, Chungnam National University, Gung-Dong, Yu-Seong Gu, Daejeon, 305-764, Korea
[2] Physics Department, Andhra University, Visakhapatnam 530 003, India
*Corresponding author: cgkim@cnu.ac.kr, Phone: +82 42 821 6632, Fax: +82 42 822 6272

M-H curve profiles in top and bottom pinned spin valvesystems have been studied using vibration sample magnetometry (VSM) and transverse Kerr effect spectrometry (TKE). The VSM and TKE characterrizations were performed under DC magnetic field and AC magnetic field, respectively. The TKE signal was also examined as a function of wavelength in the range from 300-800 nm by aiming at a depth sensitive exchange coupled magnetic profile in the probed ferromagnetic layer. The spin valve structures examined include as deposited samples and also annealed samples for different thicknesses of spacer layer. The M-H curves of annealed samples have been marked with profound changes in exchange coupling compared to as deposited samples for all depths investigated in both the sample configurations, as shown in figure 1. Interestingly, the characterizations point towards 90ocoupling between F and AF layers near the interface leading to a predominant contribution of biquadratic term in the interface coupling energy close to the interface, and this coupling transforms into a dominant bilinear coupling as the probing surface moves away from the interface in F layer [1]. Based on the obtained data, possible spin structures were proposed and dominant coupling mechanisms were reported as a function of depth.

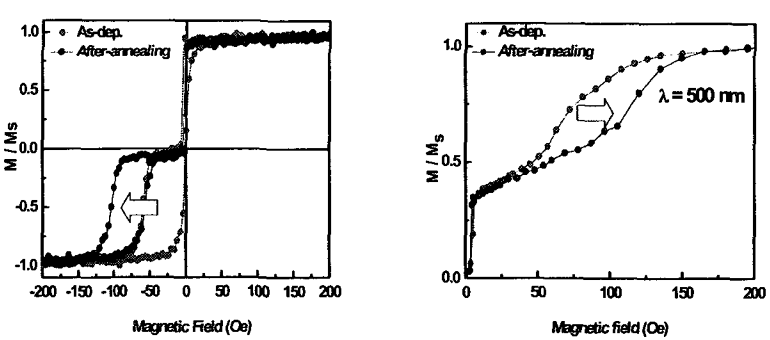

Fig. 1. M-H profiles of bottom pinned (NiFe/FeMn) spin valve structure by VSM and transverse MOKE

REFERENCES
[1] E. Gomonay and Y. Pogoryelov, IEEE trans. Magn. **41**, 2598 (2005).

AC04

Study on Interfacial Uncompensated Spins in Buried Exchange Bias System

J.-S. Lee[1], H. Jang[1], K.-T. Ko[1], J.-H. Park*[1], J.-Y. Kim[2], D. R. Lee[2], K. J. Kim[2], and K. Rhie[3]
[1]eSSC and Department of Physics, Pohang University of Science and Technology, Pohang 790-784, Korea
[2]Pohang Accelerator Laboratory, Pohang University of Science and Technology, Pohang 790-784, Korea
[3]Department of Physics, Korea University, Chungnam 339-700, Korea
*Corresponding author: jhp@postech.ac.kr, Phone: +82-54-279-1426, Fax: +82-54-279-3099

According to exchange bias (EB) mechanism suggested by previous works [1,2], an interfacial uncompensated (UC) antiferromagnetic (AFM) spin in a close proximity of an ferromagnetic (FM) layer introduce an unidirectional anisotropy into the FM layer, which is originated from the so called pinned spin [3,4]. Besides, it has been suggested that not all UC spins contribute to the EB effect, and only the pinned spin of a few % fraction in UC spins creates bias while the other UC spins (so called rotating spin) contributes to the coercivity. These mean that the UC spin at the FM/AFM interfacial region becomes a crucial role to the EB formation. In this work, we investigated the UC spins between FM and AFM of buried EB (CoFe/IrMn/NiFe), using x-ray resonant magnetic scattering. We found that the rotating Mn spins at IrMn/NiFe (EB1) and CoFe/IrMn (EB2) show field dependence coupled with the respective FM layers, resulting in two different bias field H_{EB1}=-10 and H_{EB2}=-40 Oe. The field dependence turns out to be changed by the pinned spins at interfacial UC region through the direct magnetic interactionamong FM and AFM. These results well explain the buried EB system in addition to the interfacial UC spins.

REFERENCES
[1] H. Ohldag, T. J. Regan, J. Stohr, A. Scholl, F. Nolting, J. Luning, C. Stamm, S. Anders, and R. L. White, Phys. Rev. Lett. **87**, 247201 (2001).
[2] S.-K. Kim, K.-S. Lee, J. B. Kortright, and S.-C. Shin, Appl. Phys. Lett. **86**, 102502 (2005).
[3] J. Nogues and I. K. Schuller, J. Magn. Magn. Mater. **192**, 203 (1999).
[4] A. E. Berkowitz and K. Takano, J. Magn. Magn. Mater. **200**, 552 (1999).