[TP-13]

Oscillatory Magnetic Anisotropy in Fe/Cr/Fe Trilayers

Ki-Yeon Kim, Dong-Hyun Kim, Chun-Yeol You*, Sung-Chul Shin
Department of Physics and Center for Nanospinics of Spintronic Materials, KAIST
*Department of Physics, Inha University

Fe/Cr/Fe trilayers have attracted much interest from both theoretical and experimental aspects due to many novel magnetic properties such as giant magnetoresistance and interlayer exchange coupling.[1] In this work, we report the experimental finding that there exists an oscillation of magnetic anisotropy with varying Cr intervening layer thickness in Fe/Cr/Fe trilayers. Samples were prepared by sputtering on Si substrate and easy axis of sample was induced by the magnetic field applied along the film plane during film growth. XRD measurement showed that Fe and Cr had polycrystalline structure with (110) preferred growth orientation. Kerr Hysteresis loops reveal that the squareness, defined by a ratio of the remnant value vs. the saturation value, is one for all samples when the applied field is parallel to the easy axis, while the squareness exhibits an oscillatory behavior with varying Cr thickness for the applied field direction transverse to the easy axis. The oscillation period is found to be approximately 5~6 Å. We also witness that the magnetic anisotropy measured using a torque magnetometer shows the oscillating behavior with the same periodicity. To investigate microscopic details, domain evolution configuration was studied using a time-resolved magneto-optical Kerr microscope, which revealed that domain configuration correspondingly oscillated between simple 180 type and complex non-180 type with varying Cr thickness. Since our system has polycrystalline structure, the oscillation period of about 5~6 Å have no bearing on well-known short period (2ML) of Fe/Cr/Fe system observed only in highly epitaxial and smooth sample.[2]

[REFERENCES]

1. S.S.P. Parkin, N. More, and K. P. Roche, Phys. Rev. Lett. **64**, 2304 (1990).
2. W. Weber *et al.*, Phys. Rev. Lett, **76**, 3234 (1996).