Magnetic properties and spin-torque ferromagnetic resonance of Pt/GdFeCo/MgOgo layers

J. H. Kim[1,2*], D. J. Lee[1,3], H. C. Koo[1], B. C. Min[1], K. J. Lee[1,3,4], B. K. Ju[2] and O. J. Lee[1]
[1]Center for Spintronics, Korea Institute of Science and Technology
[2]Graduate School of Electrical Engineering, Korea University
[3]KU-KIST Graduate School of Converging Science and Technology, Korea University
[4]Graduate School of Materials Science and Engineering, Korea University

Ferrimagnetic materials have multiple sub-lattices having antiferromagnetic coupling with different magnitudes of magnetization. Especially the amorphous ferrimagnetic GdFeCo alloy, a rare-earth transition-metal (RE-TM) ferrimagnetic alloy, have attracted large interest over the past few years for academic research and spintronic application. Gd has 4*f* states of half-filled spin electrons, so their orbital momentum and spin-orbit coupling are zero. [1] Therefore it is expected that, little contribute when are Gd were doped to ferromagnetic alloys, the increase of magnetic damping would be negligible [2].

In this study, we investigated magnetic properties, magnetic damping, and spin Hall angle in Pt/GdFeCo/MgO layers using vibrating sample magnetometer (VSM), x-ray photoelectron spectroscopy (XPS), and spin-torque ferromagnetic resonance (ST-FMR). We prepared Si/SiOx/Ta(1 nm)/Pt(5 nm)/GdFeCo(3~20 nm)/MgO(1,2.7 nm)/ Ta(2 nm). All samples were deposited by DC & AC magnetron sputtering with base pressure ~210^{-8} Torr at room temperature. The saturation magnetization (M_s) of the samples decreases exponentially with the thickness of GdFeCo. In addition, the saturation magnetization depends on the thickness of MgO. In this presentation, we shall show the detailed results from our VSM, XPS, and ST-FMR measurements.

References

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