RB06

Interfacial Structure Among $AlO_x/Co_{84}Fe_{16}$ Layers in TMR: Study on X-Ray Scattering

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Recently, tunneling magnetoresistance (TMR) systems are a subject of great interest in technological applications such as magnetic recording head, sensor, and memory. Therefore, many research groups have studied several control factors, such as ferromagnetic electrode, insulating barrier etc, aimed to improve the performance of TMR. In particular, a interface properties between insulating layer and ferromagnetic electrode has been regared as the crucial factor. However, there are not many detailed studies about interface due to difficulty to characterize [1]. In this work, we investigate the interface of schematic $AlO_x/Co_{84}Fe_{16}$ (insulator/ferromagnetic) structure, using comprehensive x-ray scattering measurements. We found that the unexpected mixing-oxide exists at the interface, which is aluminum ferrite. Besides, it is sparsely distributed all over the interface as cluster of nm size. From these findings, we can speculate that a magnetic role of the unexpected mixing-oxide at interface leads to modify the TMR performance.

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RB07

Perpendicular Magnetic Anisotropy Energy Constant Study for Various MgO Thickness of Tunneling Junction $(Co/Pd)n/MgO/(Co/Pt)_n$

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In recent years, some investigations have reported the perpendicularly magnetic tunnel junctions (pMTJs) fabrication using thin film binary multilayers [1]. These works reported an improvement in the interface uniformity and interface structure of tunnel barrier layer. It is known that a crucial step in the fabrication of pMTJs is the formation of thin insulating barrier layer, since the transport properties mainly depends on the quality of the insulator. On the other hand, anisotropy studies on these kinds of pMTJs have warned on the repeatability of number of bilayers since the perpendicular anisotropy strongly depends on it. In this work, perpendicular magnetic anisotropy energy constant study is carried out on pMTJs by using sputtered (Co/Pd) and (Co/Pt) binary multilayers and various MgO barrier layer thicknesses. The MgO barrier layer thickness was changed from 5 Å to 20 Å. The anisotropy constant of these deposited samples was obtained by extraordinary Hall Effect measurements, which are shown in Fig. 1. Extraordinary Hall Effect measurements were performed by using in plane external magnetic fields [2]. The anisotropy constant as function of MgO layer thickness is shown in Fig. 2. This curve presents an oscillating behaviour around 1×10^6 erg/cc. Besides, oscillation frequency and amplitude are being modified as the MgO thinkness is increased. Hysteresis loop studies on the repeatability of bilayer and magnetic and electrical measurements of pMTJs were also performed and they will be shown in this study.

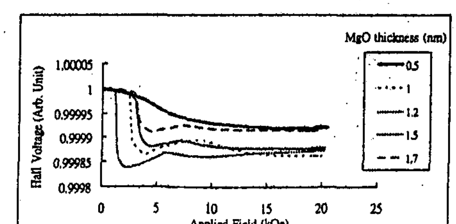

Fig. 1. Extraordinary Hall Effect measurement.

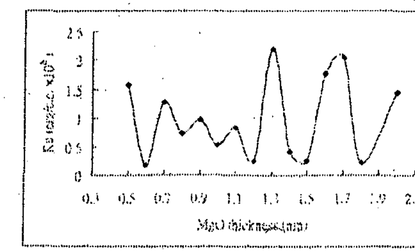
Fig. 2. Anisotropy constant Ku versus with MgO thickness

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