

DEPENDENCE OF GMR EFFECT AND INTERLAYER COUPLING ON THE NiFe THICKNESS IN Si(100)/NiFe(x)/CoFe/Cu/CoFe/IrMn/Ta SPINVALE STRUCTURE

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Spin-valve structure of the Si(100)/NiFe(x)/CoFe/Cu/CoFe/IrMn/Ta (x: free layer thickness) with different x for GMR effect and the interlayer coupling between pinned and free layer have investigated. The samples were deposited by radio frequency reactive magnetron sputtering at room temperature on silicon (100) wafer in a uniform magnetic field of 100 Oe was applied parallel to plane of samples, which was used to induce a uniaxial magnetic anisotropy of ferromagnetic layers and to align the pinning direction of the IrMn layers. The base pressure was less than of 10^{-9} Torr. The sputtering gas pressure of Ar was 1.0×10^{-3} Torr for all layers. The interlayer coupling was determined by Vibrating Sample Magnetometer (VSM) and GMR effect was measured by GMR measurement system. The experimental and calculated results have shown that the GMR ratio is a strong dependent on x and reached the highest value of GMR ratio of 9.0 % (Fig.1) for the Si(100)/NiFe(15 Å)/CoFe/Cu/CoFe/IrMn/Ta. In addition, the interlayer coupling of these structures was observed to be related to NiFe thickness. Taken together, NiFe thickness is suggested to play an important role in physical properties of these spin-valve structures.

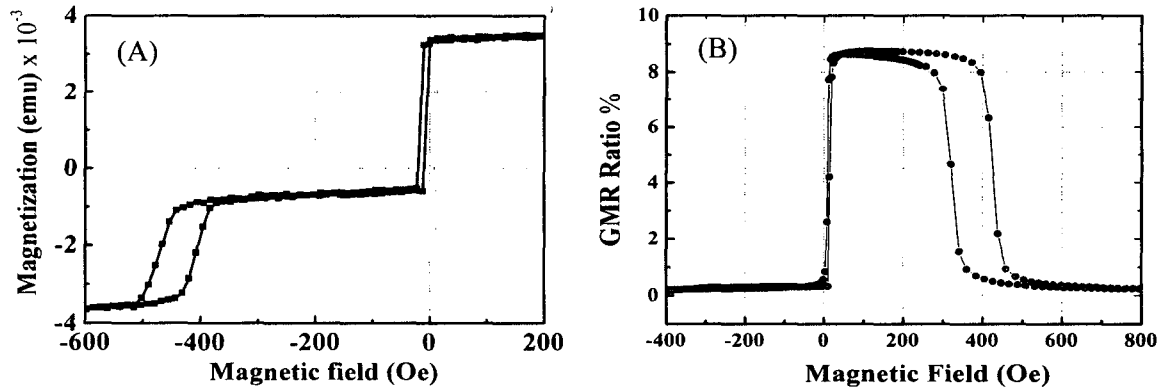


Fig. 1. Hysteresis loop (A) and GMR profile (B) of the Si(100)/NiFe(15Å)/CoFe/Cu/CoFe/IrMn/Ta.

References

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