

Exchange bias coupling in MnCr/Co bilayers

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The Exchange bias (H_{ex}) coupling in MnCr/Co bilayers has been analyzed. The samples with structure Si (100)/MnCr/Co were deposited by sputtering method with conditions following: based pressure of 10^{-6} mbar; Ar pressure of 10^{-3} mbar. An antiferromagnetic (AF) layer MnCr and a ferromagnetic (FM) Co layer was deposited from Cr target with Mn chips bonded and Co target with input power of 200W and 300W, respectively. The samples were annealed in a vacuum furnace (about 10^{-5} mbar) for an hour and then cooled down room temperature in the magnetic field of 5kOe. The composition of MnCr is Mn₅₄Cr₄₆ analyzed by Energy Dispersive X-ray (EDX). The magnetic properties were measured by vibrating sample magnetometer (VSM). It was shown that the exchange bias (H_{ex}) and a coercivity (H_c) of the samples alter as a function of temperature and reach the largest value at annealing temperature of 300°C and measuring temperature of 123K. Moreover, the H_{ex} and H_c also exhibited a dependence on the thickness of FM and AF layer.

References

- W.H. Meiklejohn, C.P. Bean, Phys. Rev. 102 (1956) 1413, *ibid.* 105 (1957) 904
D. Mauri, E. Kay, D. Scholl, J.K. Howard, J. Appl. Phys. 62 (1987) 2929
R. Jungblut, R. Coerhoorn, M.T. Johnson, Ch. Sauer, P.J. Vanderzagg, A.R. Ball, Th. G.S.M Rijks, J. Ann de stegge, A. Reiders, J. Magn. Magn.148 (1995) 300
S. Soeya, H. Hoshiya, R. Arai, M. Fuyama, J. Appl.Phys . 81(1997) 6488