

Strong and weak interlayer exchange coupling in Fe-V multilayers

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The Fe (0.6 nm) - V (X nm) multilayers with constant thickness sublayers were prepared onto naturally oxidised Si(100) substrate using UHV (5×10^{-10} mbar) DC/RF magnetron sputtering. The samples were covered with 5 nm Pd to prevent oxidation and to ensure fast hydrogen uptake and release. The saturation and coercive fields were determined from the in-plane hysteresis loop measurements at room temperature. Results showed that the saturation field and remanence of the Fe-V multilayers oscillate with antiferromagnetic (AFM) peaks near the V spacer thickness of about 1.3, 1.7, 2.1, 2.9, and 3.6 nm. The positions of the AFM peaks were also revealed by magnetoresistance measurements. The short period of the AFM peak oscillation in the strongly coupled region could be explained by transient ferromagnetic state of V atoms near V - Fe interface due to magnetic polarisation [1].

References:

[1] M.M. Schwickert, R. Coehoorn, M.A. Tomaz, E. Mayo and D. Lederman, W.L. Obrien, Tao Lin, and G.R. Harp, Phys. Rev. B. 57 (1998) 13681.