Nanocomposites and nanomaterials

Thermo-magnetic switching in spin-valve type three layer structure $Ni_{80}Fe_{20}/Ni_{40}Cu_{60}/(Co_{90}Fe_{10})_{pin}$

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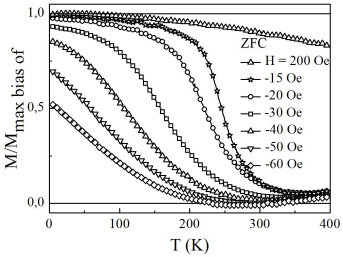

Fig. 1. The temperature dependence of magnetization of $F_1/Ni_{40}Cu_{60}/F_{2pin}$ structure, measured in different fields H_b.

Multilayered films with a temperature-controlled interlayer exchange have been receiving much attention in the field of spintronics. Leyered magnetic nanostructures such as spin valve $Ni_{80}Fe_{20}(F_1)/Ni_{40}Cu_{60}(f)/(Co_{90}Fe_{10})_{pin}(F_{2pin})$ with a temperature-controlled interlayer exchange were prepared by magnetron sputtering of corresponding target on thermally oxidized silicon substrate. The field and temperature dependences of magnetization of obtained structure are studied by SKVYD magnetometry in the range of magnetic fields ± 5 kOe and temperatures 5-400 K respectively. Experimentally demonstrated temperature control of the interlayer exchange interaction in the structure. It is found that while crossing the Curie point for *f* layer the direct ferromagnetic exchange between the outer layers of F_1 and F_{2pin} are disappears and putting a small external magnetic field, the magnetic moments of F1 and F_{2pin} layers are ordered antiparallel (Fig.1). The obtained results allow establishing the influence of magnetic state of the weak ferromagnetic layer on the nature of the exchange interaction for the structures.

1. *Kravets A.F., Timoshevskii A. N., Yanchitsky B. Z., Bergmann M. A. Buhler J., Andersson S. and Korenivski V.* Temperature-controlled interlayer exchange coupling in strong/weak ferromagnetic multilayers: A thermomagnetic Curie switch. // Phys. Rev B.-2012.-**86.**-P. 214413(7pp.).
2. *Andersson S. and Korenivski V.* Exchange coupling and magnetoresistance in CoFe/NiCu/CoFe spin valves near the Curie point of the spacer // J. Appl.Phys.-2010.-**107**.-P. 09D711 (4pp.).