

SURFACE SPIN-VALVE WITH AN EXCHANGE BIAS

L.Yu. Tryputen¹, V.V. Fisun¹, O.P. Balkashin¹, Yu.G. Naidyuk¹,
I.K. Yanson¹ S. Andersson², V. Korenivski², Yu.I. Yanson³ and H. Zabel³

¹Verkin Institute for Low temperature Physics and Engineering of National Academy
of Sciences of Ukraine, Kharkiv, Ukraine

²Nanostructure Physics, Royal Institute of Technology, Stockholm, Sweden

³Lehrstuhl für Experimentalphysik/Festkörperphysik, Ruhr-Universität Bochum,
Bochum, Germany

Magnetoresistance $R(H)$ at $V=0$ and differential resistance $R(V)$ ($R=dV/dI$) at $H=0$ of point contacts between nonmagnetic Cu tips and single ferromagnetic films (FM - Co) exchange-pinned by antiferromagnetic films (AFM Fe₅₀Mn₅₀) have been investigated. Analysis of measured $R(V)$ and $R(H)$ characteristics confirms recently proposed model of the point contact surface spin-valve (SSV). Magnetoresistance $R(H)$ of SSV in the point contacts to ferromagnetic films exchange-pinned by antiferromagnets shows an exchange offset that depends on a mutual orientation of the applied magnetic field in respect to a pinned magnetization of the AFM/FM layer. We have found that switching of this ferromagnet bulk occurs at lower fields than switching of surface spin layer. Origin of such higher switching field can be caused by a higher coercivity due to morphological imperfections and defects in the contact core. In addition, it has been shown that point contact SSVs based on an amorphous alloy Co₄₀Fe₄₀B₂₀ (3,6,9,20 nm) also have the same properties as spin-valves with a geometrically controlled structure. The experiments showed that an increase of an exchange bias under decreasing of CoFeB films thickness is observed both at the surface and in the SSV bulk. A negative magnetoresistance of such point-contact SSVs based on CoFeB was also observed.

9.7 cm

13.4 cm

Subject category :

4. Spin Electronics and Magneto-Transport

Presentation mode :

poster

Corresponding author :

Larysa Tryputen

Address for correspondence :

47 Lenin Ave., Kharkov 61103 , Ukraine

Email address :

triputen@ilt.kharkov.ua