ANISOTROPY DISTRIBUTION IN Ni-Fe/Au/Co/Au MULTILAYERS

J. Dubowik[a], F. Stobiecki[a], I. Gościańska[b], M. Kociemba[a,b], S. Bednarski[a]
[a] Institute of Molecular Physics, Polish Academy of Sciences, 60-179 Poznań, Poland
[b] Department of Physics, A.Mickiewicz University, 61-614 Poznań, Poland

9.7 cm

Multilayers comprising thin exchange decoupled Ni-Fe (2 nm) and Co (0.4, 0.6, 0.8, and 1.2 nm) layers in contact with Au (2 nm) are known to possess alternating in-plane (Ni-Fe) and out-of plane anisotropies (Co). However, little is known how the anisotropy is distributed across these multilayers. In this contribution we investigated anisotropy distribution in $[\text{Ni-Fe/Au/Co/Au}]_{10}$ multilayers grown by sputtering on Si (100) substrates. The samples were studied by means of ferromagnetic resonance at X- and Q-bands. The angular dependent energy density observed can be explained by two main contributions to the magnetic anisotropy: the uniaxial shape anisotropy, K_{sh}, and an effective second order anisotropy, K^U_{eff}. Due to negligible exchange interlayer coupling, the Ni-Fe and Co layers can be regarded as independent. It is concluded that for Ni-Fe layers the uniaxial anisotropy negligible except the first layer(s) next to the substrate. The uniaxial perpendicular anisotropy of Co layers depends on Co thickness in a standard way, $K^U_{eff} \times t \propto t$, and varies as a function of the position from the substrate in a range of $\sim$10% of K^U_{eff} (i.e., $\sim 1.5 \times 10^6$ erg/cm^3). Detailed information on the internal magnetic structure of the multilayers can be inferred from our investigations.

13.4 cm

Subject category :

5. Nano-structure, Surfaces, and Interfaces

Presentation mode :
oral

Corresponding author :
J. Dubowik

Address for correspondence :
Institute of Molecular Physics, Polish Academy of Sciences, ul. M. Smoluchowskiego 17, 60-179 Poznań, Poland

Email address :
dubowik@ifmpan.poznan.pl