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

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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 [Ni-Fe/Au/Co/Au]\textsuperscript{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, $K_{Ueff}$. 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, $K_{Ueff} \propto t$, and varies as a function of the position from the substrate in a range of $\sim 10\%$ of $K_{Ueff}$ (i.e., $\sim 1.5 \times 10^6$ erg/cm\textsuperscript{3}). Detailed information on the internal magnetic structure of the multilayers can be inferred from our investigations.

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