Magnetic properties of Au/Co/$Ni_{80}Fe_{20}$/Co/Au layered structures

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Magnetic thin film layered structures characterized by new magnetic properties are desirable for applications in spintronic devices. This contribution concerns the magnetic properties of Co/$Ni_{80}Fe_{20}$/Co trilayers sandwiched between gold layers. The main goal of this study was to develop a thin film system, characterized by easy plane anisotropy, in which the effective anisotropy field H_K^{eff} (the saturation field for the perpendicular configuration) can be simply tailored in a wide range. This can be realized for systems having a strong perpendicular surface anisotropy, *e.g.* in Au/Co/Au layered systems. In such films, due to the competition between the shape and surface anisotropy, H_K^{eff} monotonically increases with the Co thickness for $t_{Co} > t_{crit}$ (t_{crit} - critical cobalt thickness corresponding to the spin reorientation transition). The substitution of a single Co layer in the Au/Co/Au structure by Co/$Ni_{80}Fe_{20}$/Co trilayer strongly modifies the effective anisotropy. In particular, a thin permalloy layer introduced in the middle of cobalt layer reduces t_{crit} and results in growth of H_K^{eff} (Fig. 1). We will discuss application of Au/Co/$Ni_{80}Fe_{20}$/Co/Au structures with different values of H_K^{eff}, for modification of the magnetoresistance characteristics ($R(H)$ dependencies) in GMR layered films (for preliminary results see [1]).

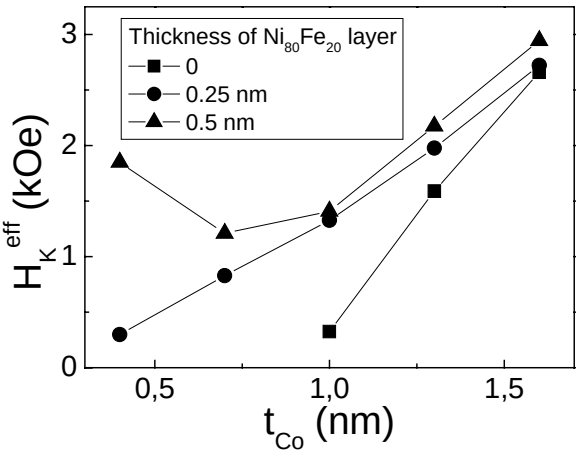

Fig. 1. Effective anisotropy field H_K^{eff} of Au/Co/$Ni_{80}Fe_{20}$/Co/Au films as a function of the total thickness of Co layers and different thickness of permalloy layer.

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