TEMPERATURE DEPENDENCE OF THE HIGHER ORDER MAGNETIC ANISOTROPY IN Co/Au LAYERED STRUCTURES

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9.7 cm

Uniaxial perpendicular anisotropy (PMA) can be as high as 1 MJ/m^3 in superlattices composed of Co and nonmagnetic transition metals (Pt, Pd, Au) and studies of these materials are of interest both for fundamental understanding of magnetism and for potential applications. Only few data on the temperature dependence of the higher order anisotropy constants in ultrathin films have been published.
We report detailed ferromagnetic resonance (FMR) studies of temperature dependence (100 - 600 K) of the second (K_{U2}) and fourth (K_{U4}) order constants of the magnetic anisotropy in Co ultrathin layers in Co/Au layered structures. We found that K_{U2} of the order of 1 MJ/m^3 monotonically decreases with temperature and saturates at 500 - 600 K. We estimated that the volume and the surface contribution to the PMA are of the same order. The fourth order anisotropy K_{U4} is almost temperature independent and amounts to about 10^{-2} of K_{U2}. Additionally, a substantial increase in surface anisotropy was observed on temperature cycling to about 600 K, possibly due to increasing perfection of Co layers.

13.4 cm

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