MAGNETIZATION OF Co/Ti MULTILAYERS

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9.7 cm

We have studied experimentally and theoretically the magnetization behaviour in the Co/Ti multilayers (MLs). The samples ($0 < d_{Co} < 10$ nm, $d_{Ti} = 0.35$ and 2 nm) were prepared onto SiO_2 (101) / Si (111) substrates using an UHV (5×10^{-10} mbar) DC/RF magnetron sputtering. The chemical composition and the planar growth of the MLs was revealed in–situ, immediately after deposition, transfering the sample to an UHV (4×10^{-11} mbar) analyse chamber equipped with Auger and X–ray photoelectron spectroscopy (AES, XPS). From the exponential variation of the XPS Co–2p and Ti–2p integral intensities we conclude that the Co and Ti sublayer grow homogeneously. The artificial periodicity of the MLs was confirmed by the intense satellite lines in the small angle X–ray diffraction patterns. The total magnetic moment of the MLs was measured by a vibrating sample magnetometer at 4.2 K and room temperature. The experimentally determined magnetization of the Co/Ti MLs was fitted using a model with rectangular or trapezoidal shape of the Co–Ti interface. Results showed that the width of the Co–Ti interface strongly depends on the structure of the Co sublayers.
The theoretical magnetic moments on the Co and Ti atoms in the Co/Ti MLs were calculated using ab initio self–consistent tight binding linear muffin tin orbital method. The values of the magnetic moments on Co atoms strongly depend on the local environment and shape of the Co–Ti interface profile.

13.4 cm

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