Structure of NiFe/Au/Co/Au multilayers with perpendicular anisotropy of Co layers

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In this report we present results of structure investigation of $[Ni_{80}Fe_{20}(2nm)/Au(t_{Au})/Co(t_{Co})/Au(t_{Au})]_{10}$ multilayers (MLs) with t_{Au}= 1.5, 2.0, 3.0 nm and t_{Co}= 0.4, 0.6, 0.8, 1.2 nm. The samples were prepared using UHV magnetron sputtering technique. It is known that in such samples $Ni_{80}Fe_{20}$ layers exhibit in-plane magnetic anisotropy while the Co layers, sandwiched between Au, possess perpendicular anisotropy [1]. It is a reason of specific magnetization configuration in remanence and implicates possible applications as magnetic sensors [2], for instance. Structural characterization of samples was performed by low- and high-angle x-ray diffraction in Bragg-Brentano geometry. Spectra were measured using high resolution XRD 3003 Seifert diffractometer with Cu-K_α radiation. Low and high angle spectra indicate the well defined periodic structure for all samples examined [Figs 1 and 2]. Analysis of XRD spectra of the MLs consisting of "quadrilayers" $[A/B/C/B]_N$ is complicated by lack of suitable simulating programs in contrast to analysis of the MLs consisting of bilayers $[A/B]_N$. Nevertheless, we will present analysis of variation of structural parameters caused by changes of Co and Au thickness.

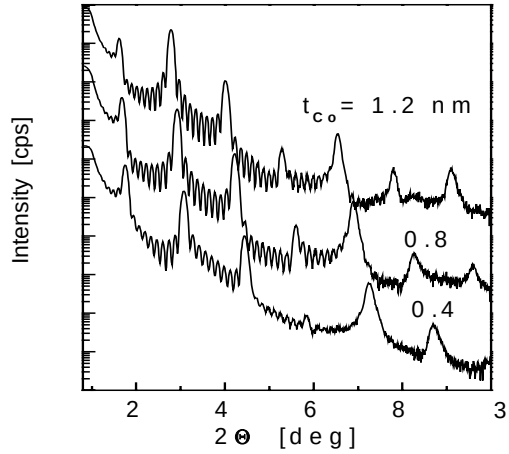

Fig. 1. Exemplary low angle XRD spectra for the MLs with t_{Au}= 2.0 nm and different t_{Co}= 0.4, 0.8, 1.2 nm. The spectra are vertically shifted for clarity.

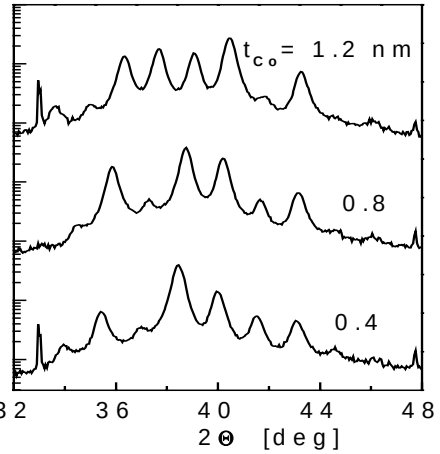

Fig. 2. High angle XRD spectra for the same samples as in Fig. 1.

[1] F. Stobiecki *et al*., J. Magn. Magn. Mater. **239** (2002) 276.
[2] F. Stobiecki *et al*., J. Magn. Magn. Mater. **272** (2004) e1751.

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