Magneto-optical Studying of Magnetic Nanoparticle Arrays, Obtained by Thin Metal Films Thermal Treatment

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Magnetic nanoparticle assemblies were obtained using thermal annealing of thin Co films (initial effective film thickness 1,5-1,8 nm), condensed by thermal evaporation on Si_3N_4/Si substrates. After condensation samples were annealed (T = 1020 K) in vacuum (residual gas pressure $P = 10^{-7}$ Pa). Magneto-optical properties of samples before and after thermal annealing were studied using MOKE in longitudinal measurement geometry. Fig. 1a, b gives MOKE data for non-annealed and annealed samples with different initial Co thickness.

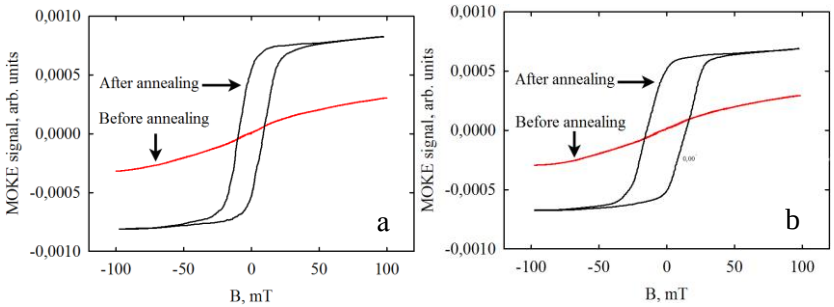

Figure 2 – MOKE hysteresis loops, measured from Co nanoparticle arrays (initial effective thickness of metal film 1,5 nm (a) and 1,8 nm (b), annealing temperature T = 1020 K). Inserts on figures a and b shows AFM images of samples after thermal annealing

MOKE curves clearly indicate appearance of MOKE hysteresis loops after annealing. Also AFM image inserts on figure shows increasing in nanoparticle sizes with increasing of initial metal film thickness. Average particle size, measured from AFM data excluding convolution contribution amounts 7,2 and 10,4 nm (horizontal), 3,3 and 3,6 nm (vertical) for samples a and b respectively. Furthermore spectroscopy ellipsometry calculations well correlates with this values (calculated Co thickness of annealed samples amounts 3,5 and 3,7 nm for sample a and b respectively).