ABSTRACT

In the past few years the quantity of stored information in magnetic media is increased exponentially. The 92% of produced information is stored henceforth in some type of magnetic storage devise. This increased demand led us to the study of multilayer films with concrete magnetic attributes.

In the current thesis we have studied the magnetic properties of Pt/CoCr multilayers. The particular combination of materials in such structure has been presents great scientific interest for two mainly for two reasons. The first reason is the modulation of perpendicular magnetic anisotropy presented in Pt/Co magnetic multilayers together with strong magneto-optic response at higher energies. The second reason is that the CoCr combination in alloy form is currently used in magnetic recording media in a successful way since Cr role is segregation and eventual decoupling between adjacent Co grains.

In an effort to combine both properties $Pt/Co_{1-x}Cr_x$ (x=5% and 30%) multilayer series were prepared with e-beam evaporation under ultra high vacuum conditions on substrates of glass, silicon and kapton.

The structural characterization was performed by X Ray Diffraction. Initially the spectra of Pt/CoCr were analyzed and various parameters of the structural configuration were calculated. As model of comparison, we referred to previous measurements of PtCo. It was also observed, that as long as the thickness of the individual layers grew, the multilayer quality was also improving. Additionally, we calculated the size of grains from the spectra of the X-ray defraction and it was observed that the samples presented a nano-crystalline character.

The subsequent steps were the study of the magnetic and magneto-optic features of the samples with a series of suitable techniques. With the Vibrating Sample Magnetometry, we recorded hysteresis loops and so we were able to outline the primary magnetic characterization of the samples. Afterwards with the measurements of magneto-optic polar Kerr effect we recorded the energy spectra of polar Kerr rotation and hysteresis loops at specific energies. With these two techniques we studied the evolution of perpendicular magnetic anisotropy that the samples exhibit and in which way the concentration of Cr affected the structure and macroscopic magnetic behaviour the multilayer.

The main conclusion is that multilayer periodicity in Pt/CoCr system yields magnetic features at Cr concentrations higher than the corresponding bulk alloys and thin films and thus magnetic features (including perpendicular magnetic anisotropy) may be further tuned to meet the demands of future magnetic recording media.