Thermal and consentrational effects in electrophysical and magnetoresistive properties of Fe-Pd and Co-Pd thing film alloys

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The rapid development of nanotechnology leads to a drastic reduction in the size of magnetic devices to dimensions below one micron and thus to an increase in the surface area to volume ratio of the system. It is apparent that the surface effects in such low dimensional systems will become very important and will affect the overall magnetic behavior in multiple ways. Nanoparticles and ultra-thin films are examples of the nanoscale magnetic systems where surface effects play an important role in their magnetic properties.

Ultra-thin magnetic films are widely used in the technological applications such as magnetic recording or micro-electromechanical applications.

Palladium-based nanoalloy thin films (CoPd, FePd) are considered to be very promising materials for applications in magneto-optical recording. Recently, these
materials have been prepared by evaporation, sputtering and electrodeposition. It has been reported that Co-Pd nanoalloys exhibit very large negative magnetostriction up to -2×10^{-4} [1]. Furthermore ,Co-Pd alloy thin films have perpendicular magnetic anisotropy (PMA) and large Kerr rotation angles. PMA in Co, Fe, and Pd is generally explained in terms of the surface or interface anisotropy induced by broken symmetry at the interfaces. These alloys are very different from the Co-based hexagonal close-packed alloys utilized for the last two decades or so, in that they are tetragonal in symmetry and are atomically ordered structures.

However, detailed knowledge of nanoscale local structures of alloy films and their direct comparison is still lacking , since investigating microscopic details is
difficult in complicated nanothin structures, where as a variety of structural and magnetic studies have been carried out.

The magnetic and chemical interactions in solid solutions, their interdepen-dence and the role they play in determining the electronic and magnetic properties of transition metal alloys have been the subject of extensive experimental investi-gation. In fact, it has been observed that small variations in these parameters, with emphasis on the residual stress and crystallite size, can change the coercivity and remanence drastically [2].

In this regard, alloy films can be considered as an alternative to the corresponding multilayers since they possibly have similar magnetic properties and they are much easier to produce.

1. Srinivasan K. Thermal effects on the magnetization reversal process and its interpretation in perpendicular magnetic recording media / K. Srinivasan, B.R. Acharya, G. Bertero // J. Appl. Phys. –2010. – V. 107. – P. 113912-1 – 113912
2. Y. Matsuo, J. Phys. Soc. Jpn., 32, 972-978 (1972)

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