ABSTRACT

Dissertation work: 99 p., 34 fig., 14 table, 44 literature sources.

COERCIVITY, MAGNETIC RECORDING, MAGNETOCRYSTALLINE ANISOTROPY, PHASE FORMATION, ORDERED PHASE $L1_0$ FePd, ULTRATHIN FILM

Subject of the study: the processes of structure and phase composition formation in ultrathin films $Fe_{50}Pd_{50}$ (5-x nm)/Ag (x nm), де x = 0 nm, 0,3 nm, 0,6 nm, 0,9 nm, during heat treatment.

Objective of the study: to investigate the effect of an additional Ag layer and annealing conditions (temperature and time of annealing) in vacuum and hydrogen atmosphere on the formation of magnetic hard ordered phase $L1_0$ FePd in nanoscale $Fe_{50}Pd_{50}$ (5-x nm)/ Ag (x nm) films, where x = 0 nm 0,3 nm 0,6 nm 0,9 nm; deposited on the SiO_2 (100 nm)/ Si (001) substrate.

Methods of the study: X-ray phase analysis, atomic-force microscopy, SQUID magnetometry, Rutherford backscattering spectrometry.

Scientific novelty:

For the first time the research of phase formation processes in nanoscale films $Fe_{50}Pd_{50}$ (4,7 nm) / Ag (0,3 nm) after annealing in hydrogen atmosphere was carried out. Established that annealing in hydrogen accelerates diffusion processes of ordering in films FePd-Ag compared to annealing in vacuum, and leads to a significant reduction of annealing time, which is necessary to $L1_0$ FePd phase formation with lower coercivity.

Found that the optimum heat treatment regime for ordered phase $L1_0$ FePd formation is annealing in hydrogen atmosphere at temperature 650 °C for 1 h. and Ag layer adding with thikness of 0,3 nm. Increase of silver layer thikness and annealing temperature leads to the destruction of magnetic hard $L1_0$ FePd crystal lattice.

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The results have a practical importance for new materials developmen for use in ultra-dense magnetic recording.