ABSTRACT

Master's thesis: 114 pages, 42 figures, 72 literature sources

NANOSCALED FILMS COMPOSITIONS; EASY OF MAGNETIZFTION AXIS; ULTRAHIGH-DENSITY MAGNETIC RECORDING; MAGNETIC ANISOTROPY; PHASE TRANSFORMATION; $L1_0$-FePd PHASE.

Purpose of this work: To investigate the influence of additional Au layer on phase transitions in nanoscale films $Fe_{50}Pd_{50}$-Au after annealing in H_2 atmosphere.

Object of this research: the processes of structure and phase composition formation in nanoscaled $Fe_{50}Pd_{50}$(5-x nm)/Au(x) (x = 0 nm; 0,3 nm; 0,6 nm; 0,9 nm) films sputtered on SiO_2(100 nm)/Si(001) substrate.

Experimental methods: Magnetron sputtering, thermal treatment (annealing), X-ray analysis, SQUID magnetometry, AFM and RBS analysis.

Practical importance: Obtained results have practical importance for the development of new materials for making data mediums with ultrahigh-density magnetic recording density.

Scientific novelty of this research: The annealing in hydrogen atmosphere accelerates the formation of magnetic solids $L1_0$-FePd compared with annealing in vacuum. The formation phase $L1_0$-FePd can be presented in three stages:

I. When annealing at temperatures above 600 °C increases the concentration of hydrogen atoms that penetrate into the crystal lattice of the *A1*-FePd phase and placed mainly in oktayedrychnyh cavities. Lattice distortion phase *A1*-FePd weakens the bonds between atoms of Fe and Pd and promotes partial substitution of palladium atoms of gold atoms.

II. Available palladium atoms are arranged and formed an ordered magnetic solid phase $L1_0$-FePd.

III. A further increase in the annealing temperature above 650 °C and exposure time (> 1 hour) leads to a glut of hydrogen atoms lattice $L1_0$-FePd and its destruction