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THE Gd-Fe CONDENSED FILMS (STRUCTURE & PROPERTIES)

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By method of thermal evaporation on fluoroplastic substrates carriers at room temperature it is gained amorphous films $GdFe_2$, $GdFe_5$, Gd_2Fe_{17}. At magnification of temperature of an substrate carrier or at annealing of films the content of a polycrystal phase was incremented. The thickness of films was spotted by means of optical interferometer MIO-1 and made about 200 nanometers.

For investigation of magnetic properties of films and massive compounds the vibrating magnetometer was used. Films were precipitated on fluoroplastic substrates carriers. For martempering of accuracy of measurings from continuous films rings in diameter of 8 mm were cut out and stacked one on another in number of 100 pieces. This construction was then explored in a magnetometer. A measurement accuracy of a vibrating magnetometer depends on accuracy its calibration. For calibration the comparison method has been used. In an etalon role pure not porous nickel with density $\rho = 8{,}9$ г/см^3 was used. For calculation of specific magnetisation of the sample its moment of magnet was used.

Magnetic properties of films and volume samples of binary compounds of Gd-Fe system ($GdFe_2$, $GdFe_5$, Gd_2Fe_{17}) and also agency of formation of structure on magnetic properties were explored. The hysteresis curves for volume and thin-film samples specify in that fact that these materials belong to the class of magneto-soft compounds. It is necessary to score also the significant differences in character of hysteresis loops for volume and thin-film samples of all compounds of this system. Absolute values of a coercive force for amorphous and polycrystalline films, and volume compounds was determinate. Value of a coercive force decreases at formation of amorphous films in comparison with volume samples in 2 times. Formation of a polycrystalline phase in films give rise to increasing coercive force in 1.5 times in comparison with volume samples (polycrystalline films become more magneto-hard) [1].

Specific magnetisation and magnetic saturation of films decreases in comparison with volume samples. It is the fact speaks not disordered structure of films [2].

For conducting of the phase magnetic assaying it has been used properties of ferromagnetics which they gain in the strong magnetic fields (in a state of technical saturation). The weak dependence of a saturation magnetisation and a Curie point from a stressed state and a ferromagnetic degree of dispersion allows

to choose some parametres in the capacity of phase performances. Quantity of a exertion of a magnetic field at conducting of the magnetic phase assaying made 800 ka/m

It is carried out the magnitno-phase assaying of $GdFe_2$, $GdFe_5$, Gd_2Fe_{17} compounds and comparison of its results with the structures explored earlier. Results of the magnitno-phase assaying of compounds of GdFe system coincide with results of a X-ray diffraction analysis, except for $GdFe_3$ compound [2].

[1] V.Prysyazhnyuk. Structural transfomations and magnetic properties of amorphous films of Gd-Fe system / V.Prysyazhnyuk, O.Mykolaychuk // Edition, University Visnyk. Series: Physics. –2016. – Vol.51. –P.44-51.

[2] V.Prysyazhnyuk. The processes of magnetization in films and binary compounds of the Gd-Fe intermetallic system / V.Prysyazhnyuk, O.Mykolaychuk, K.Trach // Edition, University Visnyk. Series: Physics – 2017. –Vol.54. –P.88-99.