ФІЗИКА І ТЕХНОЛОГІЯ ТОНКИХ ПЛІВОК ТА НАНОСИСТЕМ

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PHYSICS AND TECHNOLOGY OF THIN FILMS AND NANOSYSTEMS

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Structural Transfomations and Magnetic Properties of Amorphous Films of Gd-Fe System

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Magnetic properties of films and volume samples of binary compounds of Gd-Fe system ($GdFe_2$, $GdFe_5$ i Gd_2Fe_{17}) and also agency of formation of structure on magnetic properties were explored. Amorphous films deposited a method of thermal evaporation on teflon substrates. The temperature of substrates had two values 300 and 500 K. At increase of temperature of a substrate or at annealing of films, the percentage ratio of a polycrystalline phase was incremented. A thickness of films measured by means of optical interferometer MIO-1 (it was equal 200 nanometers). For structural studies of films electronic microscope UEMV-100K and high-temperature attachment PRON-2 was used. For magnetic studies the modernised vibrating magnetometer was used.

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). For absolute value of a coercive force does not matter how there is a crystallisation, or in the process of film formation on the warmed-up substrate, or in the process of annealing of amorphous films after their deposition. Though as have shown the previous structural researches in these cases different structures was formatted [1].

1. V.Prysyazhnyuk, O.Mykolaychuk. Structure formation in Gd-Fe thin films// J. of Non-Cristalline Solids. -2006. -Vol.352. -P.4299-4302.