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Stability of Structure and Magnetic Properties of Gd-Fe Films

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Thin films of Gd-Fe compounds were obtained by means of a thermal vacuum evaporation of polycrystal mix material of a corresponding composition. The films with by thickness of 50-60 nanometers were evaporated on splitting of NaCl, then NaCl dissolved in water. The part of films was picked up at once on copper electron diffraction grids. The second series of films transplanted on copper grids, prestressly coated thin collodion supports and in such way was maintained 3-6 years. Then recurring researches were carried out. The temperature of substrates had two values 300 and 500 K. For structural investigation the electron microscope UEMV-100K and high-temperature attachment PRON-2 were used. Angle dependence of atomic factors of electron scattering was considered by atoms of gadolinium and iron. All measurements were repeated in 3-6 years after the first stage of measurings.

Electron diffraction examinations of structure of films of Gd-Fe system specify that the given films are condensed in amorphous-crystalline state. Structure formation essentially depends on requirements of condensation of films. Substrate rise in temperature leads to magnification of a polycrystalline phase.

It is known that the given compounds belong to the class soft magnetic material. We had been spent measurings of some magnetic performances of films and massive samples of Gd-Fe system. Hysteresis curves and numerical values of a coercive force are gained for massive and thin films samples. For this samples the Curie temperature also is determined. Influence of formation of a polycrystalline phase on absolute value of a coercive force is studied. Temperature dependences of magnetic saturation and curve magnetisations for films and compounds of Gd-Fe system are gained [1].

By us it is explored structure and magnetic properties of Gd-Fe films in the range of 3-6 years. It is revealed high temporary durability of physical performances of Gd-Fe films and lack of an oxidizing.

1. *В.Присяжнюк О.Миколайчук Структурні перетворення та магнітні властивості аморфних плівок системи Gd-Fe // Вісник Львівського університету. Серія фізична. – 2016. – Вип.51. – С. 44-51.*