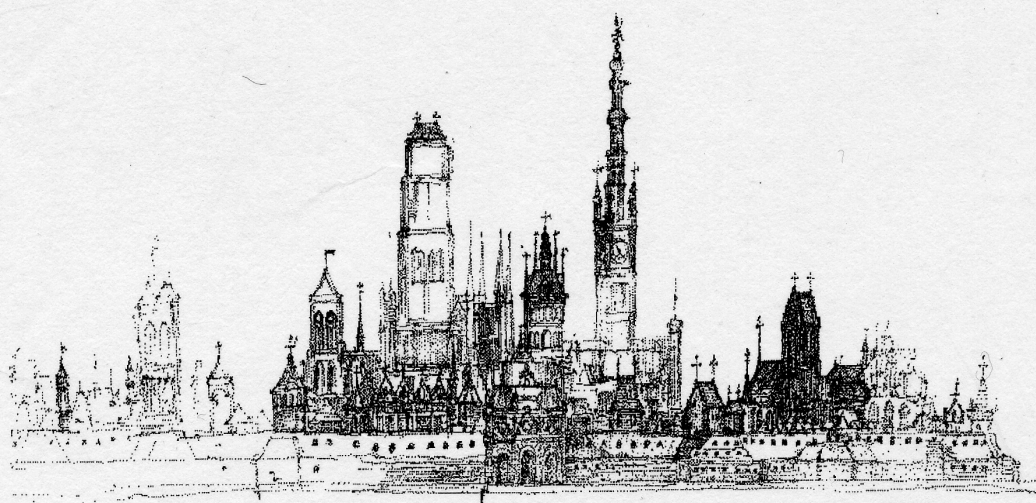


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ABSTRACT BOOK



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## Features of formation of structure in films of Gd-Fe systems

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The structural examinations of  $\text{Gd}_2\text{Fe}_{17}$ ,  $\text{GdFe}_2$  were carried out. The films were prepared by means of thermal evaporation at different temperatures of NaCl-substrates. Annealing of films was occurred in column of microscope, with velocity 10–30K/c. The temperature of substrate carriers changed within range 300–400K, and limits of thermal effect on films considered of 300–800K. Structural studies were carried out with using the electron microscope.

Investigation were carried out in two directions: influence of condition of precipitation (temperature substrate) and influence of annealing (kinetics of crystallization) on formation of structure of films.

Electron diffraction investigations of  $\text{Gd}_2\text{Fe}_{17}$  films, precipitated at  $T_s = 300\text{K}$  have shown that temperature stable amorphous condensates formed under these conditions. It was determined, that thermal annealing of such films lead to the formation of a polycrystal film with phases  $\alpha\text{-Fe}$  and  $\text{Gd}_6\text{Fe}_{23}$ . Initial crystallization phases are crystallites  $\alpha\text{-Fe}$ .

Absolutely different pattern of kinetics of crystallization is observed at film precipitation on heated substrates. With the temperatures range from room and up to  $T_s = 400\text{K}$  the amorphous films are formed. At  $T_s = 500\text{K}$  films become amorphous-crystalline. At further increase of temperature the share of a polycrystal phase increases. Decoding of electron diffraction patterns has shown, that the polycrystal part of films consists of three phases:  $\text{Gd}_2\text{Fe}_{17}$  (60 at. percent) with structural type  $\text{Th}_2\text{Ni}_{17}$  ( $\varphi_1$ -phase),  $\text{Gd}_2\text{Fe}_{17}$  (30 at. percent) with structural type  $\text{Th}_2\text{Zn}_{17}$  ( $\varphi_2$ -phase) and some (about 10 at. percent)  $\text{GdFe}_5$  with structural type of  $\text{CaCu}_5$ .

The presence of crystallites of several phases in explored films results in the mutual blocking of growth of crystallites during crystallization of films. This predetermined a finedispersivity of films and stability of an amorphous phase.

Structural investigation of  $\text{GdFe}_2$  films precipitated at  $T_s = 300\text{K}$  has shown, that these condensates are amorphous. It was determined that at heating of such films in a column of the microscope (heat rate 10K/c) the formation of crystalline structure begins already at 720K. At more high temperatures of substrates amorphous-crystalline films are formed.

Decoding of structure of the given films has proved, that in all cases face-centered cubic structure (structural type  $\text{MgCu}_2$ ) is formed, typical for a massive state.