Nanocomposites and nanomaterials

Physical properties of film alloys based on ferromagnetic and noble metals

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Despite the fact that the film materials based on Au and Fe for a long time investigated, the correct interpretation of the phase composition was performed recently in works [1-3]. Experimental studies [1-3] have concluded that these films are stabilized disordered solid solutions (s.s.) with fcc lattice or ordered s.s. with fct lattice when the concentration c_{Fe} < 65 at.%, at the c_{Fe} > 65 at.% s.s. formed base on bcc-Fe. In this work presents the results of the research phase formation in single films that were obtained by simultaneous condensation of Au and Fe atoms, and their strain properties. The methodology of the research strain effect is detail described in work [4].

During phase transition fcc s.s. (Au) → bcc s.s. (Fe) dispersion of the crystal structure takes place supersaturated Fe atoms s.s. (Au) and it becomes a quasiamorphous. This effect causes a sharp increase in grain-boundary scattering of electrons and, consequently, increase the value of the integral strain coefficient $(_l)_{int.}$. The figure shows this anomaly concentration dependence of the value integral longitudinal strain coefficient at the plastic strain (2) of the samples compared with $(_l)_{int.}$ at the elastic strain (1). This significant increase of the value $(_l)_{int}$ can be explained largely grain-boundary scattering of electrons at the dispersion of the crystal structure.

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