INTERRELATION BETWEEN MAGNETIC PROPERTIES AND PHASE COMPOSITION FOR THE SURFACE OF (111) FACE OF $FeNi_3$ PERMALLOY

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S u m m a r y

The investigation of the influence of the atomic structure and the element and phase compositions on the superficial magnetic properties of (111) face of $FeNi_3$ alloy has been carried out. It is found that the thermostimulated segregative enrichment of a near-surface layer by iron gives rise to the appearance of a premature atomic disorder and martensitic structural phase transformations $\gamma \Longleftrightarrow (\alpha + \gamma)$ in this layer. As a result of the tight relation of the spontaneous magnetization to the phase composition of a near-surface layer, a complicated character of the temperature dependence of the spin-exchange asymmetry of the scattering for a beam of spin-polarized low-energy electrons is observed. So, as the temperature of a specimen grows starting from room temperature, the spin-exchange asymmetry of the scattering, which reflects the behavior of the spontaneous magnetization of a near-surface layer, changes the sign twice and eventually disappears near the Curie temperature of α-iron. It is established that the double change in the sign of the spin-exchange asymmetry of the scattering originates from the existence of the antiferromagnetic coupling between the magnetic moments of precipitates of the α-phase and those of the γ-phase of $FeNi_3$ permalloy. It is found that the amount of precipitates of the α-phase segregated in the near-surface layer is changed non-monotonously with temperature and reaches the peak values near the points of order–disorder or ferromagnet–paramagnet phase transitions characteristic of the bulk $FeNi_3$ alloy.