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The effect of annealing in magnetic field on ferromagnetic nanoparticles precipitation in Cu-Al-Mn alloys with induced martensitic transformation

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Phase transformations of martensitic type characterize the broad class of materials and alloys. Aging Cu-Mn-Al alloys with original magnetic characteristics undergo thermo-induced martensitic transformation (MT) as well. Nowadays, such type of MTs which occur after solid solution decomposition with ferromagnetic nanoparticles precipitation in nonferromagnetic matrix attract interest [1]. By thermal treatment, the system of ferromagnetic nano-dispersed particles in nonferromagnetic matrix can be formed. Herewith, coherent nanoparticles precipitated during decomposition of high-temperature Cu-Al-Mn $_1$-phase are coherently connected with matrix and do not undergo spontaneous MT at cooling .

The influence of aging regimes of high-temperature phase on subsequent martensitic transformation in Cu-Al-Mn alloy was studied. The morphology of martensitic transformation behavior as a result of alloy aging under an annealing in a constant magnetic field with different sample orientation relatively to the field and without the field was investigated for directly control of the process of martensite induction at cooling. The temperature dependences of electrical resistance, magnetic susceptibility, and the temperature and field dependences of magnetization, phase composition were found. The tendency of oriented growth of the precipitation-phase particles in a direction of applied field and the increase of volume fraction of these particles under thermal magnetic treatment of material what favors a reversibility of induced martensitic transformation [2].

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