Nanocomposites and nanomaterials

The system of crystal defects formation in Fe-Mn-Si alloy under the cyclic martensitic transformations

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The work represents the regularities of defects accumulation in crystal structure of Fe-17,5 wt.% Mn-2 wt.%Si alloy under the cyclic martensitic transformations. The conditions of disoriented low-angle nanofragments subboundaries accumulation and random packing defects accumulation in the crystal lattice of austenite and ε-martensite were analyzed.

It was shown using X-ray method that the accumulation of lattice disorientation of and phase of Fe -17,5wt.% Mn - 2 wt.% Si as a result of cyclic transformations performed less intense than in iron-nickel alloys with α type of transformations [1] on mono- and polycrystalline samples. Such difference can be explained by the higher reversibility of the direct and reverse transformations [2]. Lattice angle of reverted austenite even under intensive cycling does not exceed (9-10)° in contrast to the high-angle subboundaries with angle (14-15)°. Thereby, as a result of cyclic transformations in Fe-Mn alloys can be formed only a low-angle nanofragments subboundaries of the initial grain and new reverted austenite grains with orientations that differ from the initial grain orientation can't be formed.

1. Sagaradze V.V., Danilchenko V.E., L'Heritier Ph., Shabashov V.A. The structure and properties of Fe-Ni alloys with a nanocrystalline austenite formed under different conditions of gamma-alpha-gamma transformations // Materials Science and Engineering.- 2002.-**337.**-P. 146-159.

2. Lysak L.I., Nickolin B.I. *Physical Basis of Heat Treatment of Steel //* Tehnika: Kiev. - 1975.