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Effect of Nitriding on Phase Transformations in the Fe-Mn Alloys

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Abstract: We present results concerning the nitriding effects on phase transformations in Fe -- 40 at. % Mn and Fe -- 50 at. % Mn alloys. These alloys were studied by means of X-ray diffraction and Mössbauer-effect spectroscopy methods at room temperature. Results indicate that, after nitriding, in the absorption spectra of these alloys appears lines with hyperfine field H\sim 330 kOe which corresponds to the field on the ^{57} Fe nuclei in the α -Fe. Annealing of the alloys at 650 ^{o}C temperature (nitriding temperature) in argon atmosphere do not change the form of the M\\"{o}ssbauer absorption spectra. It appears that the nitriding process affect the microstructure of these alloys and leads to γ \to α phase transformations in the Fe-Mn alloys. The distribution function of effective hyperfine magnetic field P(H) on the ^{57} Fe nuclei in the Fe-40 at.% Mn alloy after hardening processes has one maximum with H_{eff} \sim 37 kOe, while nitriding processes leads to the appearance of two maxima with H_{eff} \sim 6 kOe and H_{eff} \sim 27 kOe in the P(H) curve of this alloy. Analogical results were obtained after nitriding processes for Fe-50 % Mn alloy.

Key Words: Fe-Mn alloys; Nitriding; Fine atomic structure; Mössbauer-effect spectroscopy

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