ORDERING UNDER HEATING OF COLD WORKED AND IRRADIATED IN REACTOR Fe_3Al ALLOY.

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It was determined earlier that the irradiation in reactor of ordered intermetallic compound Fe_3Al causes its disordering . Such effect can be also achieved by cold deformation . The nature of disordering process is different for these cases: during neutron irradiation the process of atoms' mixing begins and proceeds in the range of displacement cascades according to heterogeneous mechanism, and during cold deformation it occur according to shifting mechanism.

Here we are presenting results of structure changes processes investigations taking place in preliminary ordered intermetallic compound Fe_3Al at cold worked(deformation degree >80%), cold worked samples' irradiation in reactor VVR-K (fluences from 1×10^{18} up to 5×10^{19} n sm^{-2} , $E \geq 0.1$ MeV, $T_{irr} < 80^0$ C) and postirradiation annealing in temperature range 20-800^0 C (the time of samples exposition at definite temperature was 2 hours). The structure characteristics were investigated by the means of high temperature X-ray analysis in UVVT-2500 chamber of DRON-3,0 apparatus and by Messbauer spectroscopy on the cooled to a definite temperature powder samples.

It was determined that both cold worked and cold worked and irradiated up to the fluencies not more than 5×10^{18} nsm^{-2} samples have completely disordered structure. Under the heating process the ordering takes place in both set of samples but it begins at different temperatures: at 300^0 C for cold worked samples and at 350^0 C for cold worked and irradiated ones. After the achievement of the maximum value of long-range order degree at 425^0 C there was thermal softening observed which was finished in cold worked sample at 700^0 C and in cold worked and irradiated at 650^0 C. The cold worked and irradiated by fluence 5×10^{19} nsm^{-2} sample after the irradiation was in partially ordered state. Under heating up to 400^0 C the order degree increased and if the temperature increased -the thermal disordering occurred up to zero value of order degree at 600^0 C.

The results are interpreted on the base of the model of atoms' separation in the region of displacement cascades.