Nanostructured surfaces

Temperature range of helium retention from austenitic stainless steel implanted helium at RT

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Helium thermal desorption spectra were investigated on the samples of austenitic steel 18Cr10NiTi pre-implanted with 24 keV helium ions at current density 5 μA/cm^2 in the dose range from 5 × 10^{16} to 4 × 10^{18} He/cm^2 at the sample temperature T_{irr} ~ 295 K.

The spectrum of helium thermodesorption from the samples exposed to doses ~ 5 × 10^{16} He/cm^2 represents the temperature-scale smeared region of helium desorption with maxima in the temperature ~1470 K.

The increase in a dose of the implanted helium is accompanied by advancement of a spectrum of allocation of helium in a direction of fall of temperature. For a dose 4×10^{16} He/см^2 the spectrum helium thermodesorption represents to the area washed away on a temperature scale desorption with badly divided peaks in a range of temperatures 1000 – 1400 K.

At the further increase in a dose of the implanted helium there is a qualitative change of a spectrum thermodesorption the helium, shown in formation of peak to maximum temperature at T_m ~ 1000 K. The further increase in a dose of the implanted helium leads to growth of intensity of this peak of a spectrum thermodesorption and it becomes prevailing.

At doses above 1×10^{18} He/cm^2 is formed low temperature region helium desorption in a kind washed away on a temperature scale of desorption region with a maximum at T_m~450 K. The quantity of the implanted helium is decreases.

Proceeding from representation that atoms of helium in a crystal lattice of a steel form vacancy – helium complexes, peak with temperature of a maximum ~1000 K corresponds to temperature of disintegration of such complexes. Thus the quantity of atoms of helium in a complex is strictly defined. Further energy of activation desorption helium will be calculated, the analysis of the received results of research is offered.