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Peculiarities of helium desorption from steels depending on ionirradiation temperature

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The peculiarities of ion-implanted helium behavior have been investigated by helium thermal desorption spectrometry (HTDS) in austenitic steels Cr18Ni10Ti and ChS-68, and ferritic-martensitic steel EP-900 irradiated by 40-keV He\(^+\) ions up to a fluence of 10\(^{19}\) m\(^{-2}\) at temperatures of 270, 570, 690, and 920 K. Two main peaks are found to present in the HTDS spectra for austenitic steels irradiated in the 270-690 K temperature range: the low temperature flat peak caused by diffusion gas release from consecutively decomposing helium-vacancy complexes of a different thermal stability during the temperature growth and the main maximum due to the total leaving of bubbles from the grain bodies. Only one main peak is observed for steel ChS-68 irradiated at 920 K. The HTDS spectra for steel EP-900 have an additional maximum caused by polymorphous transformation during the heating. It is found that the effective activation energy of helium desorption increases with irradiation temperature.

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