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Effects of high-energy C ions irradiation on the D retention behavior in V-5Cr-5Ti

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Abstract:

Vanadium alloys are attractive candidate structural materials in future fusion reactors. To evaluate the effects of irradiation on the deuterium retention behavior in vanadium alloys, samples made of V-5Cr-5Ti were irradiated by 5.5 MeV carbon ions. Doppler broadening measurements of the positron annihilation radiation tests were carried out to investigate the defect properties in the irradiated samples. Then the irradiated and virgin samples were implanted with deuterium in an ECR (electron-cyclotron resonance) linear plasma device followed by thermal desorption spectroscopy experiments. It was found that the irradiation process introduced large density of vacancy-type defects and subsequently increased the deuterium retention in the V-5Cr-5Ti, which remains as a serious concern for the vanadium alloys in the application as the structural materials of the fusion blanket.

Key words

Vanadium alloys, hydrogen isotope, retention, irradiation

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