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Effect of irradiation by argon ions on hydrogen transport through the surface oxide layer of zirconium

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Abstract

Effect of zirconium irradiation by 1 keV Ar⁺ ions on hydrogen transport through the surface oxide layer is studied. It is shown that deuterium trapping under subsequent irradiation of the Ar-treated sample by deuterium atoms of thermal energies in D₂ + 30at.% O₂ gas mixture is 2 times less than trapping in the untreated sample. Besides, irradiation of the untreated sample by D-atoms provokes desorption of ≈25% of hydrogen contained therein, whereas hydrogen desorption from the ion-treated zirconium surface does not occur. It is proposed that oxygen depletion of the surface oxide layer, caused by ion bombardment, is a reason of mitigation of the hydrogen transport through this layer in both directions.

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