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Molecular Dynamics Investigation of H/He Behaviors in W XIAO-CHUN LI, GUANG-NAN LUO, Institute of Plasma Physics, Chinese Academy of Sciences, China — Tungsten (W) and W alloys are regarded as the most promising candidates for PFMs because of their good thermal properties, such as high melting temperature and low sputtering erosion, which will be widely used in the next generation of fusion reactors. However, blistering in W-PFM induced by extremely high fluxes of low-energy hydrogen (H) and helium (He) ions irradiation will seriously influences the plasma stability and limits the lifetime of PFM. Based on the W-H-He potential developed by ourselves, we systematically investigate the interaction between H/He and different kinds of defects in W using MD calculations. We have demonstrated the physical origin of H-H repulsion and He-He attraction in W, and given the binding energy dependence of H/He, vacancy and self-interstitial atom to the H/He-vacancy cluster on H/He-vacancy ratio. The formation and growing process of H-vacancy clusters and He-vacancy clusters have been demonstrated, respectively. However, higher H concentration is needed to form the H-vacancy clusters, while the He-vacancy clusters tend to form spontaneously.

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