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Atomistic modeling of growth and coalescence of helium nano-bubbles in tungsten

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Abstract

The mechanisms of growth and coalescence of helium nano-bubbles in tungsten are investigated using molecular dynamics simulations. It is shown that crystal symmetries and governed by them properties of dislocations, generated by the growing nano-bubbles, are responsible for main nano-bubble features revealed, including non-spherical shape and anisotropy of surrounding stress field. The transport of helium atoms in non-uniform stress field is simulated at different temperatures and the transport coefficients are determined. The implications of the considered dislocation and helium dynamics on nucleation and growth of bubbles in tungsten with implanted helium are discussed.

PACS: 52.40.Hf, 61.72.Qq, 66.30.Pa, 83.10.Rs

PSI-21 Keywords: Tungsten, Helium, Bubble, Molecular dynamics

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