

# He bubbles diffusion in aluminum: the role of the gas pressure

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The evolution of gas porosity in irradiated materials is one of the important problems, since helium bubbles are formed in metallic materials of nuclear and thermonuclear reactors. In this work, the influence of the gas pressure on all possible mechanisms of bubble diffusion is studied in detail by the methods of atomistic modeling. Recently the features of the overpressurized xenon bubbles diffusion in bcc UO<sub>2</sub> have been studied [1]. In this work the system under study is helium bubbles in fcc aluminum, for which there are detailed experimental data on diffusion coefficient during annealing at various temperatures. The EAM potential is used to simulate the interaction between aluminum atoms [2], and the “exp-6” potential is used for helium atoms [3].

As a result of this work, the dependence of the surface self-diffusion coefficient, the formation and migration energies of adatoms, surface vacancies, and surface interstitial atoms on the gas pressure was obtained. The results obtained are compared with experimental data.

[1] Antropov A and Stegailov V 2021 *Journal of Nuclear Materials* **551** 152942

[2] Mendelev M, Asta M, Rahman M and Hoyt J 2009 *Phil. Mag.* **89** 3269–3285

[3] Kortbeek P J and Schouten J A 1991 *J. Chem. Phys.* **95** 4519–4524