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Amorphous $Ni_{50}Ti_{50}$ Alloy with Nanoporous Structure Generated by Ultrafast Isobaric Cooling

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Amorphous metallic foams are prospective materials due to unique combination of their mechanical and energy-absorption properties. In the present work, atomistic dynamics simulations are performed under isobaric conditions with the pressure $p = 1.0$ atm in order to study how cooling with extremely high rates ($5 \cdot 10^{13} - 5 \cdot 10^{14}$ K/s) affects the formation of pores in amorphous titanium nickelide. For equilibrium liquid phase, vaporization temperature Tb and the equation of states in the form of $\rho(T)$ are determined. It is found that the porosity of this amorphous solid does not depend on cooling at such high rates, whereas the pore morphology depends on the magnitude of the cooling rate. The obtained results will be in demand in study of mechanical properties of amorphous metallic foams with a nanoporous structure.

Keywords: amorphous titanium nickelide, porosity, cooling rate, atomistic dynamics.