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ENJOY ANSWERING

Radiation Damage of Structural Materials for Fast Reactor Fuel Assembly

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ENJOY ANSWERING:

1. In a lab expt., conducted at 10 C below the melting point of copper, 0.02% of atom sites are vacant. At 500 C, the vacant atom fraction was $5.8 \times 10^{(-8)}$). What is vacancy formation energy and concentration of vacancies at 800 C ?

2. You are given three tensile samples of a material. Two were irradiated in a reactor to 10^{21} n/cm^2 at 300 C($> T_m/3$). One was left unirradiated. The three samples are tested in a tensile test as follows: (a) one irradiated sample tested at room temperatue, (b) another irradiated sample tested at 300 C and the (c) unirraidated sample tested at 300 C. The strain rate while testing is the same for three tests. Draw engineering stress vs. engg. Strain curve and label yield stress, UTS, fracture stress and fracture strain. Justify the relative positions of the curves.

3. Helium bubbles of 100nm are located on a grain boundary. Two of the bubbles coalesce. What is the equllibrium size of the new bubble ?

4. Magnitude of relaxation volume is greater than 1.0 for interstitials and less than 1.0 for vacancies. Explain why.

5. Explain why line compounds or intermetallic compounds for fixed stoichiometry can be amorphised easily under irradiation than solid solutions.