Amorphouslike diffraction pattern in solid metallic titanium


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Amorphouslike diffraction patterns of solid elemental titanium have been detected under high pressure and high temperature using in situ energy-dispersive x-ray diffraction and a multi-anvil press. The onset pressure and the temperature of formation of amorphous titanium is found to be close to the $\alpha$-$\beta$-$\omega$ triple point in the $P$-$T$ phase diagram. Amorphous Ti has been found to be thermally stable up to 1250 °C for at least 3 min. at some pressures. By analyzing the conditions for producing amorphous elemental Zr and Ti, we observed a multi-phase-point amorphization phenomenon for preparing single-element bulk amorphous metals. The results reported may open a new way to preparing single-element bulk amorphous metals with a high thermal stability.

References