

Impact of plastic deformation on the boson heat capacity peak of metallic glass

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Abstract

Low-temperature heat capacity measurements are performed on bulk Pd₄₀Ni₄₀P₂₀ in as-quenched glassy, deformed (rolled) glassy, annealed glassy and crystallized states. The boson heat capacity peak increases with strain. It is concluded that the shear band formation is accompanied by an increase of the number of low-energy vibrational states. Further annealing at temperatures up to the crystallization temperature shows that the boson heat capacity peak in deformed glass relaxes faster and to a lower level compared to that of the as-quenched state after annealing both below and above the glass transition temperature T_g . Possible reasons of such behavior are discussed.

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