EFFECT OF TEMPERATURE AND PULSED ELECTRON BEAM IRRADIATION ON THE GRAIN BOUNDARY ENSEMBLE OF THE ULTRAFINE-GRAINED MOLYBDENUM

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Comparison studies of grain boundary ensemble evolution of the ultrafine-grained molybdenum were performed under free annealing and pulsed electron beam exposure.

Grain-subgrain ultrafine-grained structure with an average element size 0.4 micrometers and nonequilibrium grain boundaries was formed in molybdenum by the method of torsion under hydrostatic pressure (THP). Misorientation spectrum of grain boundaries at the grain boundary ensemble of the ultrafine-grained molybdenum after THP has a pronounced bimodal character. The first peak is in the misorientation range $\theta < 4°$, the second one is blurred within the angles 30–60°. Total fraction of low angle boundaries at the molybdenum grain boundary ensemble amounts to 25 %.

Transition of grain boundaries of molybdenum ultrafine-grained structure to the equilibrium state is found to observe during annealing at temperatures of 773–1023 K for 30–60 min. Character of grain boundary ensemble remains unchanged. Pulsed electron beam irradiation for 30 min in the indicated temperature range leads to decrease in the fraction of the low angle boundaries with misorientations $\theta < 4°$ and increase in fraction of high angle boundaries with misorientations $\theta = 60°$ in the molybdenum grain boundary ensemble. Misorientation spectrum of grain boundaries at the grain boundary ensemble becomes unimodal.

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