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【111】Characterization of high-purity nickel single crystals by mechanical spectroscopy

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Mechanical spectroscopy tests of high-purity nickel single crystal, with different lattice orientations, were performed in a forced oscillation pendulum, under high vacuum, at different frequencies. The temperature was varied from room temperature up to 500 ℃. A periodic strain of amplitude 5x10−5 was applied. Internal friction spectrum reveals 3 mechanical loss peaks: P0 (transient peak), P1 and P2. P1 and P2 might be related to a motion of dislocations controlled by the migration of 2 types of jogs. Activation energies in the range 1.5 - 2 eV were found for both P1 and P2 peaks. These are comparable to pipe diffusion. TEM analyses confirmed the presence of dislocation jogs.

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