

Internal Friction in Deformed Germanium Crystals at Low Temperatures*

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Abstract

The internal friction in deformed germanium single crystals is investigated in the temperature range from 4.2 to 150 K at resonance frequencies about 70 kHz. Two relaxation peaks, denoted by P_3 and P_4 , with activation energies of (0.08 ± 0.01) and (0.13 ± 0.01) eV, respectively, are observed to develop upon deformation. Peaks P_3 and P_4 are interpreted to be associated with the stress-induced motion of geometrical kinks on screw dislocations and 60° dislocations, respectively, passing over the Peierls potential barrier of the second kind. The results are discussed on the basis of the kink-chain model of abrupt kinks. It is shown that the kink-chain model leads to expressions for the relaxation strength and the relaxation time which are similar to those derived on the extensible string model by Southgate and Attard.

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