Internal Friction in Deformed Indium Antimonide Crystals(Physics)

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explained on the basis of the present theory.

Ultrasonic Identification of a New Spin-Ordering Phase Transition in Holmium

M. Tachiki, M.C. Lee, R.A. Treder and M. Levy

Solid State Commun., **15** (1974), 1071.

A new tilted spiral phase has been identified in holmium by associating it with an anomalous peak in the shear wave attenuation at 24°K. When a magnetic field is applied in the basal plane the peak moves up in temperature; when it is applied parallel to the *c*-axis the peak moves down. We propose a model which predicts the observed experimental results.

Ultrasonic Mean Free Path in a Granular Aluminum Film

M. Tachiki, H. Salvo, Jr., D.A. Robinson and M. Levy

Solid State Commun., **17** (1975), 653.

The ultrasonic mean free path has been measured and compared to the electrical mean free path of a thin granular aluminum film. They have been found to differ by an order of magnitude which is believed to indicate that mean free path determined ultrasonically is for the Al metal while the one determined electrically is for the Al-Al_2O_3 matrix structure.

Criterion for the Appearance of Critical Attenuation of Shear Waves in Magnetic Materials

M. Tachiki, S. Maekawa, R. Treder and M. Levy

Phys. Rev. Lett., **34** (1975), 1579.

The magnetic anisotropy energy makes spin fluctuations extremely anisotropic near the Curie and Néel temperatures. Because of this anisotropy of the fluctuations and the symmetry of the shear-wave phonon-spin interaction, only shear waves with both propagation and polarization vectors in the easy directions of magnetization have critical attenuation at the phase transition temperatures and other shear waves do not have it. Experimental results on the heavy rare-earth metals are in agreement with these theoretical predictions.

Internal Friction in Deformed Indium Antimonide Crystals

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Phys. Status Solidi a, **21** (1974), 217.

The internal friction in deformed InSb single crystals is investigated in the temperature range from 4.2 to 503 K. Three relaxation peaks, denoted by P_1, P_2, and P_3, with activation energies of (0.05±0.01), (0.08±0.01), and (0.36±0.02) eV, respectively, are observed to develop upon deformation. The heights of these peaks decrease gradually upon annealing. Peaks P_1 and P_2 are interpreted to be associated with the stress-induced motion of geometrical kinds on In-dislocations and Sb-dislocations, respectively, passing over the Peierls potential barrier of the second kind. Peak P_3 is interpreted to be due to the interaction of geometrical kinks with jogs located on dislocation lines.

Effect of Dislocations on the Low Temperature Thermal Conductivity in Germanium

Masayoshi SATO and Koji SUMINO

J. Phys. Soc. Japan, **36** (1974), 1075.

The thermal conductivity vs temperature relation in deformed germanium single crystals is measured in the temperature range from 1.5 to 30 K. The results are analysed on the basis of the Callaway model. Klemens' theory on the scattering of phonons due to the static strain field of dislocations accounts for the experimental results reasonably well. The dislocation densities deduced from the thermal conductivity data are greater than those counted by direct observation of dislocations by factors less than 3.7 and 2.1 in specimens deformed to stage I and stage II, respectively. Discrepancies between the theoretical curves and the experimental curves are found at temperatures around 20 K and below 2.2 K. The former is accounted for by assuming that point-defect like imperfections have been introduced into the specimens during deformation, while the latter could be attributed to the scattering of phonons due to dangling electrons located at the dislcoation core.

Dynamical State of Dislocations in Germanium Crystals during Deformation

Koji SUMINO, Shoichi KODAKA and Ken-ichi KOJIMA

Mater. Sci. Eng., **13** (1974), 263.

Experimental results in the strain-rate change tests on germanium single crystals done in a previous paper are analysed with the use of new velocity data for isolated dislocations. An equilibrium stationary state of moving dislocations appears in the deformation stage beyond the middle of stage 0 of the stress—strain curve. The velocity $\bar{v}$ and the density N_m of moving dislocations in the equilibrium state are observed to depend on the strain rate $\dot{\epsilon}$ as $\bar{v} \propto \dot{\epsilon}^{0.42}$ and $N_m \propto \dot{\epsilon}^{0.58}$, respectively, at 600°C. Transition of the state of dislocation motion from one equilibrium state to another by a sudden change of the strain rate during deformation is also investigated. It is concluded that the values of $\bar{v}$ and N_m in the equilibrium state at a certain temperature are determined completely by the strain rate and do not depend on the density of total dislocations in the crystal nor