Temperature and Frequency Dependences of Line Width of Antiferromagnetic Resonance in Europium Telluride(Physics)

Abstracts of Papers Published in Other Journals

Physics

Theory of the Giant Magnetostriction in Fe_2TiO_4

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The anomalous properties of Fe_2TiO_4, i.e. (i) the giant magnetostriction ($(c-a)/a=7.5\times10^{-3}$ at 77 K), (ii) the anomalously small elastic constant $(c_{11}-c_{12})$, and (iii) the positive magnetic anisotropy constant, are explained by taking into account both the Jahn-Teller effect of Fe^{2+} ions in the A-sites of the spinel structure and the spin-lattice coupling of Fe^{2+} ions in the B-sites. It is shown that when the direction of the Jahn-Teller distortion is determined so as to lower the energy of the coupling between the spins in the B-sites and local distortions due to the Jahn-Teller effect, the Jahn-Teller distortion itself behaves as if it were a giant magnetostriction. The temperature dependences of the distortion, elastic constants and the specific heat are calculated. It is found that $(c_{11}-c_{12})$ has a minimum and the excess specific heat due to the Jahn-Teller ions has a maximum below the Néel temperature. Discussions on the magnetic anisotropy constant are also given.

Temperature and Frequency Dependences of Line Width of Antiferromagnetic Resonance in Europium Telluride

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EuTe is a second kind f.c.c. antiferromagnet. The line width of the antiferromagnetic resonance of the single crystal has been measured at frequencies of 9.20, 22.12, and 33.99 GHz in the temperature range between 1.25 and 4.20 K. The measurements have been performed on the spin-flop mode with the resonance field applied in the easy plane (111). The results show that the temperature dependence of the line width strongly depends on the used frequency. The line width at 9.20 GHz increases with temperature as $\exp(-5/T)$, the one at 22.12 GHz increases linearly with T, and at 33.99 GHz it increases very slowly with T. The essential behavior of the temperature and frequency dependences is theoretically explained in terms of the three-magnon process derived from the exchange interaction.

Effects of Growth Rates and Cooling Rates on Defect Generation in Melt-Grown Copper Crystals

Tetsuo INOUE, Jirô WATANABÉ and Mikio YAMAMOTO

J. Cryst. Growth, **24/25** (1974), 418.

Single crystals of zone-refined Cu were grown from the melt at growth rates