Such temperature dependences of C_p, β_i and s_{ij}^T can be understood phenomenologically by "Pippard's relations". The important result of the phenomenological theory is that the specific heat at constant volume, C_V, and the adiabatic elastic compliances, s_{ij}^S, remain finite through the phase transition. In fact s_{ij}^S's have been found to show a finite cusp at T_N, and C_V calculated from the value of C_p using a thermodynamic relation appears to show a very small anomaly. These facts must be taken into account in constructing a microscopic theory of the antiferroelectric phase transition in $NaNO_2$.

Anomalous temperature dependences of the electrostrictive constants, Q_{2i} (i = 1, 2, 3), and the interpretation of them in connection with the critical behavior of ϵ_2 will be mentioned also.

On Mechanism of Anomalous Polarization Reversal in $NaNO_2$

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Polarization reversal in $NaNO_2$ is carried out through rotation of NO_2-radical. Such phenomena of ferroelectric polarization reversal caused by the rotation of radicals seem uncommon. In this paper attention is paid to the fact that there is the relation $a_c > a_b > a_a$ among the electronic polarizabilities of the NO_2-radical, where they are given as $a_a = 2.336A^3$, $a_b = 3.128A^3$ and $a_c = 4.909A^3$ (Kinase, Ohi and Ishikawa: J. Phys. Soc. Japan 24 (1968) 431). It is noticed that the electronic polarizability of NO_2 in the direction of P_s becomes maximum by the 90°-rotation of NO_2 round the a-axis, which is caused by the relation $a_c > a_b$ The fact that dipole interaction becomes strong in the region near the point of the 90°-rotation of NO_2 round the a-axis is thought to make the polarization reversal easy. From this point of view the polarization reversal is explained in this paper by using a *complex Ising model* taking account

of the 90°-rotation.

There are two sorts of rotations, namely clockwise and counterclockwise. It is considered that uniformity of the rotations is favorable, because the dipole interaction in the direction of the c-axis will become stronger by the uniform rotation. Moreover taking account of the fact that the refractive index is maximum in the direction of the c-axis, mechanism of the anomalous rapid sidewise propagation of the polarization reversal in $NaNO_2$ will be explained, where the strong internal field is induced in the direction of the c-axis accompanied by the NO_2-rotation round the a-axis.

Soft Zone-Boundary Phonon Modes in $CsPbCl_3$*

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It was previously reported that three successive phase transitions of the perovskite crystal $CsPbCl_3$ (T_C = 47, 42 and 37°C) are caused by the condensation of the zone-boundary phonon modes M_3 and R_{25} at the $M(\frac{1}{2}\frac{1}{2}0)$ and the$(R\ \frac{1}{2}\frac{1}{2}\frac{1}{2})$ points respectively [Y. Fujii, S. Hoshino, Y. Yamada and G. Shirane, Phys. Rev. B9, 4549 (1974)]. Inelastic neutron scattering experiments have been carried out in its cubic phase (T>47°C) in order to investigate properties of these two phonons, both of which correspond to the rotational vibration of the $PbCl_6$ octahedra around the <100> axis.

The temperature dependence of the energy-profile of the M_3 as well as the R_{25} phonons was precisely measured up to the temperature of about 300° above the transition point. Both phonons were found to remain overdamped throughout this temperature range. With a least-squares method, the observed phonon profiles were fitted by a damped-harmonic-oscillator formula convoluted with the resolution function. This analysis gave the value of ω_0^2/Γ (ω_0: harmonic frequency, Γ: damping constant) as a function of