$(\partial C_p/\partial T)_p$ ($\times 10^3$ J/g·deg^{-2})
0.110
0.110
0.099
0.099
0.099
0.418
1.80

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47ᵃ	7.43ᵃ
47	7.47
41	7.32

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of $dc_{\mu\nu}/dp$. In such a case, the calculation of the acoustic Grüneisen constant is simplified and easily tractable in the procedure; it gives "*mean*" Grüneisen's mode gammas (longitudinal and transverse). The detail of this subject will constitute a topic of a later publication.

Another important use of the theoretical scheme is that, for anisotropic noncubic solids, the values of K_0^* and $[(dK^*/dp)_T]_{p=0}$ calculated from single-crystal acoustic data should be used as the constants in the Murnaghan equation of state. Although a subsequent communication will discuss this subject in some detail, it is noted here that the use of the usual K_R and its first pressure derivative at $p=0$ as the Murnaghan constants is inaccurate procedure.[20]

(d) In conclusion, the present work suggests an important implication that the acoustic data measured on *fully dense* polycrystalline specimens may be as useful as their single-crystal acoustic data in the study of the equation of state of solids, for example. And further, when anisotropic single-crystal acoustic data are available, these can be converted into isotropic polycrystalline acoustic data so that in their applications the use of the acoustic data becomes more practical.

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[20] (unpublished).

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Temperature Effects on Several Fluorescence Pair Lines in Ruby

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The widths and positions of several lines in the fluorescence spectrum of ruby with 0.94 at.% Cr^{3+} belonging to the second (N_1) and the fourth (N_2) nearest neighbor pair systems have been measured between 20° and 270°K. The linewidths are explained in terms of microscopic strains, Raman scattering of phonons, and direct phonon processes. The lineshifts with temperature are due to the absorption and emission of virtual phonons, and are approximately the same for all the lines investigated. A Debye model of phonons was used with different effective Debye temperatures for linewidth and lineshift processes.

We have investigated the temperature dependence of the widths and positions of several lines in the fluorescence spectrum of ruby, with 0.94 at. % Cr^{3+}, belonging to the second nearest neighbor (N_1) and fourth nearest neighbor (N_2) pair systems[1] in order to compare the effects of strains and various phonon processes on different transitions within the same pair system. These measurements were done in the temperature range from 20° to 270°K, and the results are compared with those obtained previously for different lines on the same sample.[2] The lines investigated are due to the transitions shown in Fig. 1, and at 70°K appear at 6948.6, 7058.2, 6987.7, 6989.4, and 7001.8 Å.[3] The first two lines belong to the same pair system as the N_1 (7040.6-Å) line, the latter three to the same pair system as the N_2 (7008.8-Å) line.

The details of the experimental apparatus have been described in a previous paper.[2] For these measurements a McPherson model 213 1-m monochromator was used in first order with a slit width of 20 μ to achieve a resolution of 0.60 cm^{-1}.

The experimental results and the theoretical fittings of the thermal variation of the fluorescence widths of the lines investigated are shown in Fig. 2. The curves for the linewidths are similar to each other and to those of the N_1 and N_2 lines in that they are constant up to about 80°K and then increase rapidly

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