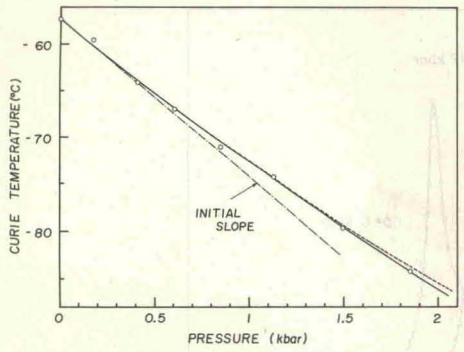

Fig. 3. Hydrostatic pressure dependence of the Curie temperature of GSN. The dott-and-slashed curve represents the initial slope. The slashed curve indicates the calculated curve from eq. (5).

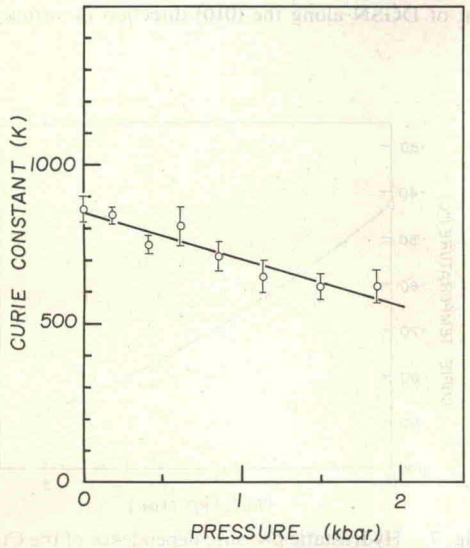

Fig. 4. Hydrostatic pressure dependence of the Curie constant of GSN.

considerably larger than $C=446$ K reported by Mitani,[5] but is comparable with $C=970$ K obtained by Nakamura *et al.*[8] from an analysis of the result by Pepinsky *et al.*[1] As seen in Fig. 4, the Curie constant is markedly pressure dependent. If one approximates the pressure variation of C by a linear function of $C=C_0(1+\beta p)$, one may get the parameter $\beta=-0.17\pm0.02\,\mathrm{kbar}^{-1}$. Here ambiguity in the determination of the Curie constant is brought about from several origins: First, in this work the pressure and temperature variation of the crystal dimension was not measured and then the correction of the dielectric constant from the elastic deformation and thermal expansion was not made. Second, the pressure was slightly changed during temperature variation since the pressure system used was a constant-volume type ($\sim5\%$ of pressure change was typically seen during 50°C of temperature change). However, the correction for the Curie constant due to above origins is expected to be at most few per cent per 1 kbar, and it does not explain the large pressure variation of the Curie constant shown in Fig. 4.

In order to see whether or not there is an another phase of GSN under application of high pressure, we measured the pressure dependence of the dielectric constant at several temperatures above the Curie temperature. The result is shown in Fig. 5. The figure shows that there is no high pressure phase up to above 7 kbar and down to about -30°C. Also it is seen that there is a good reproducibility between the pressure-increasing and decreasing measurements. The pressure dependence of the dielectric constant at a constant temperature is not represented by a simple Curie-Weiss type

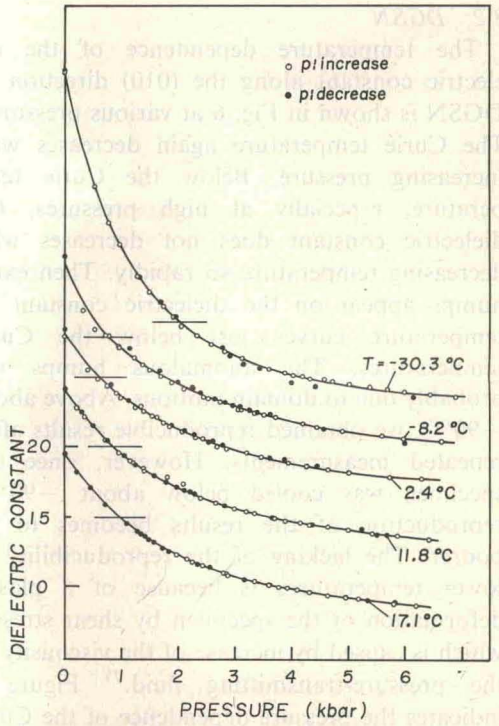

Fig. 5. Hydrostatic pressure dependence of the dielectric constant of GSN along the (010) direction at various temperatures in the paraelectric phase. Frequency: 1 kHz. The curves are shifted each other along the vertical direction in order to avoid confusion. The short horizontal bar attaching each curve shows the level of $\varepsilon=15$.

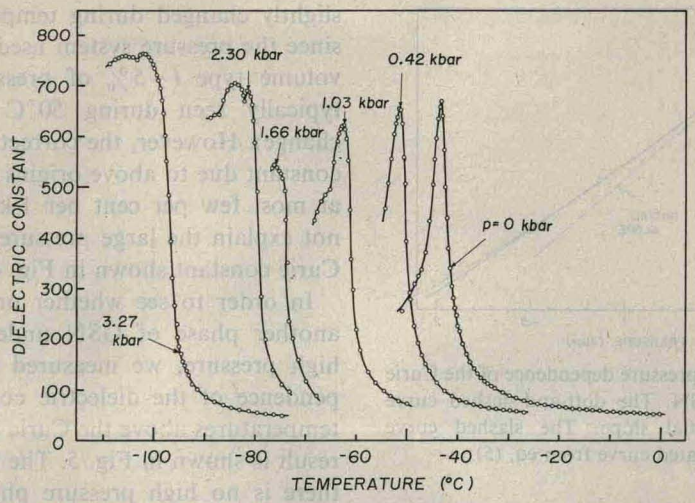

Fig. 6. Temperature dependence of the dielectric constant of DGSN along the (010) direction at various pressures. Frequency: 1 kHz.

law of $\varepsilon=\varepsilon_\infty+C^*/(p-p_0)$ with a constant C^*[4] because of the pressure variation of the Curie constant C.

3.2 DGSN

The temperature dependence of the dielectric constant along the (010) direction of DGSN is shown in Fig. 6 at various pressures. The Curie temperature again decreases with increasing pressure. Below the Curie temperature, especially at high pressures, the dielectric constant does not decreases with decreasing temperature so rapidly. Then extra humps appear on the dielectric constant vs temperature curves just below the Curie temperatures. The anomalous humps are probably due to domain motions. Above about -90°C, we obtained reproducible results after repeated measurements. However, once the specimen was cooled below about -90°C, reproduction of the results becomes to be poorer. The lacking of the reproducibility at lower temperatures is because of a plastic deformation of the specimen by shear stresses which is caused by increase of the viscousity of the pressure-transmitting fluid.[7] Figure 7 indicates the pressure dependence of the Curie temperature of DGSN. The relation between the Curie temperature and pressure is against not linear, and it is approximated by eq. (1) with $T_c^0=-42.7\pm0.5$°C, $K=-20.2\pm0.6$ deg kbar^{-1}, and $\gamma=1.7\pm0.2$ deg kbar^{-2} as indicated by the bold curve in Fig. 7. The pressure dependence

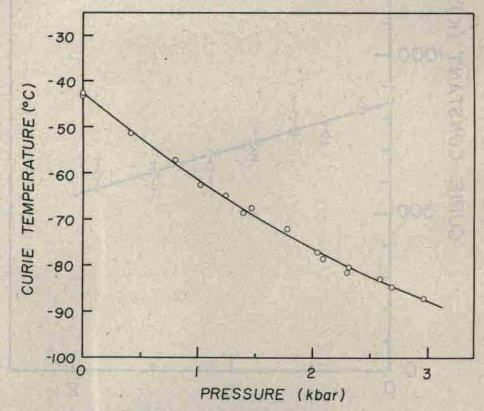

Fig. 7. Hydrostatic pressure dependence of the Curie temperature of DGSN.

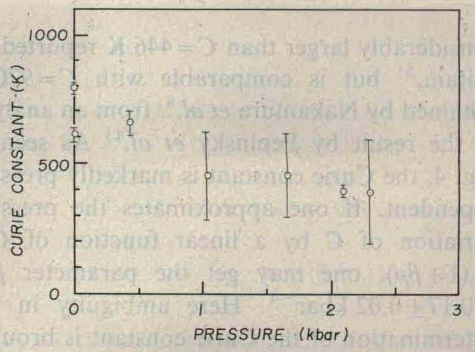

Fig. 8. Hydrostatic pressure dependence of the Curie constant of DGSN.

of the Curie constant is shown in Fig. 8. The Curie constant of DGSN at 1 atm was about $C_0=700$ K although the measured values of the