data on that of $\partial\omega/\partial H$. Here, it is to be noted that $\partial\omega/\partial H$ required in the present discussion is the one obtained for the polycrystal composed of uniformaly distribused grains, in other words, the isotropic volume change. This isotropic volume change may also be obtained from the data for single crystal. In single crystal, however, the existence of the anisotropy in the forced volume magnetostriction has been pointed out[14] and actually been found in Fe for example.[15] The anisotropy in $(\partial\omega/\partial H)_{single}$ means that $(\partial\omega/\partial H)_{single}$ depends on the direction of spontaneous magnetization with respect to the crystallographic axes.[15,16] In the present paper, only the data have been quoted without making the detailed discussions on the derivation of $\partial\omega/\partial H$.

Ni: The values of $\partial\omega/\partial H$ for Ni obtained from the measurements of $\partial\sigma_s/\partial p$ given in Fig. 2 and from the direct measurements, are plotted in Fig. 5 as a function of T/T_c. The measurements of $\partial\omega/\partial H$ quoted in this figure have been made by Stoelinga et al.[17] and Lourens et al.[18] on single crystals. At room temperature, $\partial\omega/\partial H$ obtained by Snoek[19] using polycrstal lies on the curve in this figure and the value, $3\times10^{-10}\,\mathrm{oe}^{-1}$, obtained by Hall[20] using single crystal is omitted from the figure. As is found in Fig. 5, the verification of eq. (6) at various temperatures appears to be qualitatively given.

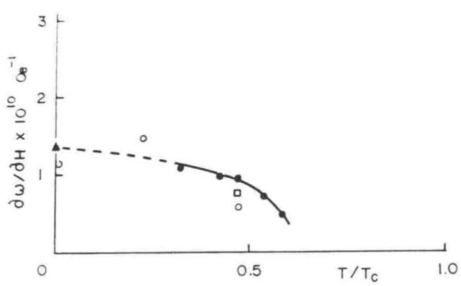

Fig. 5. A plot of $\partial\omega/\partial H$ vs. T/T_c for Ni. The closed circles ● are obtained from the pressure effect on σ_s, by the use of eq. (6). The points ○, □ and × represent measurements made by Stoelinga et al., Lourens et al. and Snoek, respectively.

In polycrystals, the measurements, at room temperature, using dilatometric method such as made by Snoek give the positive sign to $\partial\omega/\partial H$. While previous measurements using strain gauge gave the negative sign opposite to that obtained from $\partial\sigma_s/\partial p$, a recent accurate measurement made by Tange et al.[21] using strain gauge gives the positive sign and also the quantitative verification of eq. (6) given by them appears to be satisfactory. At higher temperatures, it is expected from the data on $\partial\sigma_s/\partial p$ that $\partial\omega/\partial H$ changes the sign from positive to negative, and the adiabatic measurements made by Döring[22] using dilatometric method actually gave the negative sign to the isothermal $(\partial\omega/\partial H)$.[23]

Fe: The data for comparing $\partial\omega/\partial H$ and $\partial\sigma_s/\partial p$ are given in Fig. 6. The pressure effect on σ_s at 4.2°K has been made by Kondorskii et al.[9]. As is shown in this figure, the values of $\partial\omega/\partial H$ observed[15,17,19,24,25] are fairly scattered even at room temperature, independently of using single or polycrystal. Therefore, further examination should be required to the measurements of $\partial\omega/\partial H$, including the derivation of the isotropic volume change from the data on single crystal.

As previously described, the temperature dependence of $\sigma_s^{-1}(\partial\sigma_s/\partial p)$ for Fe[1,2] appears to be type B_3, although the temperature range actually employed was not wide enough. If the curve of $\sigma_s^{-1}(\partial\sigma_s/\partial p)$ versus temperature is type B_1 or B_2, $\partial\omega/\partial H$, at lower temperature range, may be expected to decrease when temperature is increased. However, the results obtained by Stoelinga et al.[17] are temperature independent, as is plotted in Fig. 6, although the investigations of the anisotropy which is associated with the isotropic change in volume have not been made so thoroughly as has been made by Hasuo.[15] The measurements of $\partial\omega/\partial H$ or $\partial\sigma_s/\partial p$ at higher temperatures would also be desired.

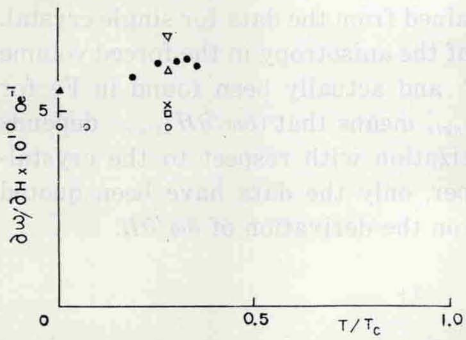

Fig. 6. A plot of $\partial\omega/\partial H$ vs. T/T_c for Fe. The points ● and ▲ are obtained from the pressure effect on σ_s. The points ○, □, ×, △ and ▽ represent measurements made by Stoelinga et al.,[17] Hasuo,[15] Sneok,[19] Kornetzki[24] and Calhoun[25], respectively.

Cu–Ni alloys: For Cu–Ni alloys, the direct comparison of $\partial\sigma_s/\partial p$ with $\partial\omega/\partial H$ can not be made for the specimens with same Cu content. The sign of $\partial\omega/\partial H$ obtained by Kornetzki[24(a)] for 33% Cu is consistent with that expected from the data on $\partial\sigma_s/\partial p$, while the signs obtained by Tsuji[26] for 20 and 30% Cu–Ni alloys are unlikely to be consistent with those expected, except in the neighborhood of T_c. This disagreement in sign may be explained by the remark made be Tange et al.[21].

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