One of us[4] has put forward an alternative theory in which the anisotropy is attributed to the relief of magnetostrictive stresses by gliding during the process of cooling in a magnetic field. According to this theory it is possible that the magnetic field influences embryos well below the critical size for stable nuclei. The presence of fully developed nuclei is improbable since most of the temperature range in which the field is effective lies in a single phase field.

Further work will be required to decide whether either or both of these processes occur.

[1] Kittel, Nesbitt, and Shockley, Phys. Rev. **77**, 839 (1950).
[2] At about 800°C, if there are two phases with a $\Delta J_s = 500$ c.g.s. units, one phase must be practically non-magnetic.
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[4] M. McCaig, Nature **165**, 969 (1950).

Susceptibility and Magnetic Anisotropy of Indium Single Crystals

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IT is well known that small quantities of impurities have a great influence on the magnetic properties of metallic single crystals. Some interesting measurements have been made in this respect by Goetz and Focke,[1] Hart,[2] Rao and Sriraman,[3] Rao and Narayanaswami,[4] who investigated, respectively, single crystals of Bi, Sb, Cd, and Tl. For the same purpose we have made susceptibility measurements on indium single crystals.

Since no data of susceptibility of In have been published except those of Honda and Owen,[5] we want to give the results of our measurements on the susceptibility and anisotropy of that element.

The In, obtained from a Belgian firm, being impure, was purified several times by an electrolytic process. From the material obtained we made samples in the form of thin cylinders by melting in vacuum and molding in pure graphite. Following the Gouy method we determined the magnetic susceptibility by use of a microbalance. Since even after such a procedure the rods showed slight paramagnetism, we had to reheat them several times in their molds, bringing the temperature slightly below the melting point and etching their surfaces after each process. Thus we were able to remove almost all remaining impurities and we obtained reproducible results for the diamagnetic susceptibility.

A difficulty arose from the fact that we were unable to find the crystal axes by splitting the single crystals, owing to the softness of the metal, even after cooling in liquid air.

If ϕ represents the angle between the principal crystalline axis and the axis of the rod, θ the angle between the field and the vertical plane going through the principal crystalline axis, then the expression:

$$K_H = (K_{\parallel} \sin^2\phi + K_{\perp} \cos^2\phi) \cos^2\theta + K_{\perp} \sin^2\theta$$

enables us to find the value of $K_{\perp}$ by measurements on different samples. We also made polycrystalline samples and by measurement of their susceptibility, which is the same in all directions, we obtained $K_{\parallel}$ by using the formula:

$$K_H = \tfrac{1}{3}(2K_{\perp} + K_{\parallel}).$$

Our results are as follows:

Indium single crystals, density:	7.3082.
Polycrystalline material, density:	7.2985.
Principal susceptibilities:	$K_{\parallel} = -0.886 \times 10^{-6}$,
	$K_{\perp} = -0.398 \times 10^{-6}$.
Magnetic anisotropy:	$K_{\parallel} - K_{\perp} = -0.488 \times 10^{-6}$.

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[3] Rao and Sriraman, Proc. Roy. Soc. London **A166**, 325 (1938).
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[5] Honda and Owen, Ann. Physik **32**, 1027 (1910); **37**, 657 (1912).

The Ca^{45} Beta-Distribution Obtained in a Split Crystal Scintillation Spectrometer*

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WITHIN the last year scintillation spectrometry has been improved to the point where it is possible to determine beta-distribution end points with fair precision, and when the maximum energy of the distribution is great, the high energy portion of the distribution appears to fit the shape of the theoretical curves. However, one always observes an excess of low energy betas relative to those of higher energy. This is presumably due to high energy betas giving up only part of their energy within the scintillation medium before being scattered out. Thus one not only observes a small light pulse but he fails to record one which should have been large. In spite of this difficulty, Bell *et al.*[1,2] have been able to obtain useful information concerning the beta-spectra of Be^{10} and K^{40}. However, as the maximum energy of the beta-distribution under study is reduced, the difficulties of studying its shape increase. Figure 1 shows an extreme example in the Kurie plot of Ca^{45} which was obtained using a detection arrangement shown in the insert. The source was mounted on a Formvar film 25 $\mu g/cm^2$ thick placed against the crystal with a 0.2 mg/cm^2 aluminum foil reflector surrounding the optical system. The electronic equipment is similar to that previously described.[3] In Fig. 1 the solid squares represent the original data and the solid circles are the results after correction for the resolution of the instrument, using the method of Owen and Primakoff.[4] Macklin *et al.*[5] have shown that the Ca^{45} disintegration gives an allowed beta-distribution with an end point at 254±3 kev. The straight line in Fig. 1 is drawn from this end point through the high energy experimental points. If the end point were not known, one would be unable to obtain a satisfactory value from this set of data. Also, the discrepancy between the experimental points and the straight line demonstrates the problem of studying the shape of the distribution of such a low energy beta.

Since the resolution correction is large only near the ends of the distribution, it would be desirable to utilize the data in the midregion for determining the end-point energy. Furthermore, these data can be obtained with better counting statistics. However, this can be done only if the extraneous low energy pulses can be eliminated. If the above explanation of their origin is correct, it should be possible to eliminate the difficulty by placing the source between two crystals in such a manner that the probability of observation of the scattered beta in the second crystal is great. Whereas this might be accomplished by using two crystals and two photo-multipliers, the arrangement shown in the insert of Fig. 2 has been used. The two anthracene crystals were matched to give equal pulse heights and resolution individually for the Cs^{137} conversion line. When this source was placed between the crystals, the observed number of pulses doubled, but the pulse height of the peak was unchanged and the resolution remained

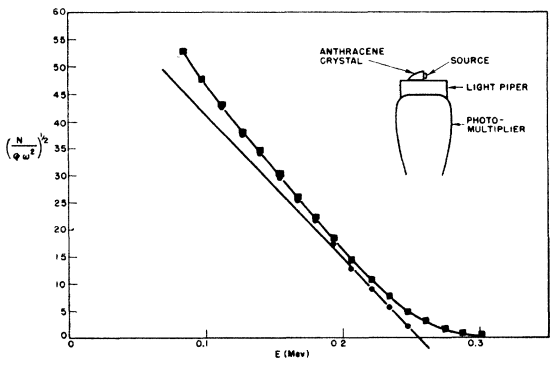

FIG. 1. Kurie plot of Ca^{45} obtained with the apparatus shown on the figure.