ing to the Abrikosov-Gor'kov theory[14,15] magnetic impurities will reduce both T_c and $2\Delta_0/kT_c$. If the reduction in T_c from 6.06 to 5.1°K is assumed to be due to magnetic impurities, then the Abrikosov-Gor'kov theory predicts that $2\Delta_0/kT_c$ would be reduced from 3.5 to 2.6. If Leslie's value for $2\Delta_0/kT_c$ of 2.85 is used for the pure material instead, then the value predicted for $2\Delta_0/kT_c$ of the impure material is 2.08. Both predictions are larger than the observed value of 1.65 ± 0.15. In fact, it is unlikely that 300 ppm of various magnetic impurities could account for the observed depression of T_c.

On the other hand, the small energy gap is consistent with either Kuper's or Kondo's theory. Thus, superconductivity in lanthanum may be strongly influenced by electronic interactions other than the electron-phonon interaction of the BCS theory.

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STRAIN ALONG c AXIS OF SbSI CAUSED BY ILLUMINATION IN dc ELECTRIC FIELD

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SbSI is an interesting material because of the coexistence of the photoconductivity and ferroelectricity.[1] The present work reports a new phenomenon, which is that the length of an SbSI crystal along the c axis is changed when it is illuminated uniformly by visible light, in the presence of a dc electric field along the c axis.

Needle-shaped single crystals 10-30 mm in length were grown by a transport method, which was similar to those of Kern[2] and Hamano et al.[3] Selected single crystals were cut perpendicular to the needle axis, which is the c axis of SbSI, by embedding them in a mixture of resin and paraffin wax, and then the mixture was removed by dissolving with benzene. Pillared crystals 10 mm in length were thus prepared and evaporated silver on both sides [(001)] was used as electrodes. The area of the (001) faces of the specimens used was about 10^{-2}-10^{-3} mm^2, and the Curie temperature (T_C) was about 19.5°C.

First, the relative change in length along the c axis was measured with an optical lever with an accuracy of 1 part in 10^5. Illumination was provided by an Osram HBO-100W/2 mercury lamp through a Toshiba V-V44 filter and infrared light was excluded with a cupric sulfate solution filter.

Curve A in Fig. 1 shows the temperature dependence of the relative change in length ($\Delta L/L$)

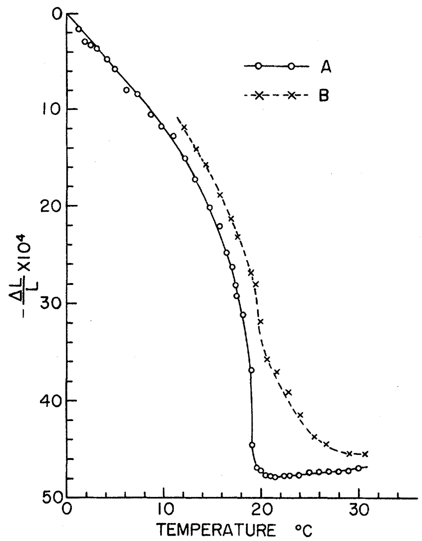

FIG. 1. Curve A shows the relative change in length of the specimen along the c axis versus temperature. Curve B, 1.5-kV/cm dc electric field is applied.

of a specimen along the c axis. It should be noted that the c axis contracts below T_C and elongates above with increasing temperature.[4] The temperature dependence of $\Delta L/L$ along the c axis in the presence of a 1.5-kV/cm dc electric field is shown by curve B. The net strain due to illumination, $\Delta L^i/L$, in the presence of the electric field, is shown in Fig. 2. The net strain $\Delta L^i/L$ is positive above T_C and negative below. The net strain increases with increase of an applied electric field. The temperature at which positive strain takes the place

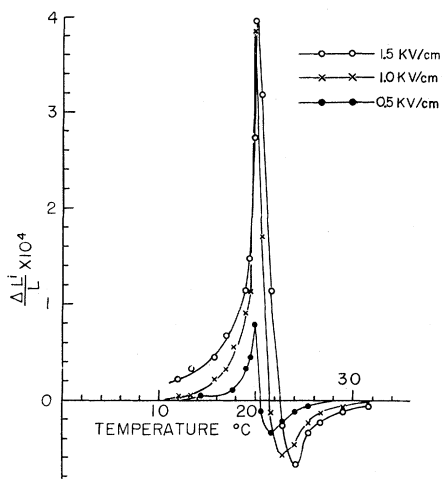

FIG. 2. Net strain due to illumination in the presence of 0.5-, 1.0-, and 1.5-kV/cm dc electric field. Illumination is made by mercury lamp through a Toshiba V-V44 filter. Silver is used as electrode.

of a negative one shifts toward higher temperature with increase of the electric field. The shift would be due to that of T_C caused by the applied electric field. If the specimen had been warmed up by the illumination, the c axis would have contracted below T_C and elongated above as seen from Fig. 1, while the net strain caused by the illumination shows a reverse tendency. The net strain, therefore, is clearly distinguished from that caused by heat.

In order to study the above result in detail, relaxation curves of the net strain $\Delta L^i/L$ were detected through a variation of a capacitance of an electrical condenser so that $\Delta L^i/L$ itself could be measured to an accuracy of the order of 1×10^{-6}. A normal 150-W incandescent lamp was used as a light source and an interference filter was inserted between the specimen and the light source. Evaporated indium and gold were used as electrodes to see whether the phenomenon depends on the nature of the electrode. In these measurements, special attention was paid to screen the neighborhood of the electrodes from direct or scattered light in order to avoid disturbance of space charges around the electrodes. Figure 3 shows relaxation curves of the net strain $\Delta L^i/L$ in the case of the gold electrodes. The time required to reach a steady-state value varies from 5×10^{-2} to 20 sec in different specimens. The steady-state values of the net strain, which were measured at both 450 and 700-mμ wavelength using gold electrodes, are plotted against temperature in Fig. 4. The curves obtained have features similar to those in Fig. 2. Therefore, it is likely that the net strain $\Delta L^i/L$ is indepen-

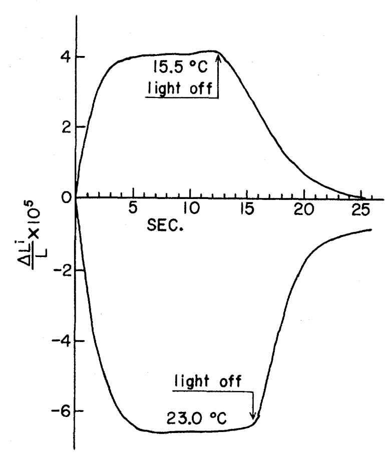

FIG. 3. Representative relaxation curves of the net strain due to illumination in the presence of 1.0 kV/cm. 450-mμ wavelength and gold electrodes are used.

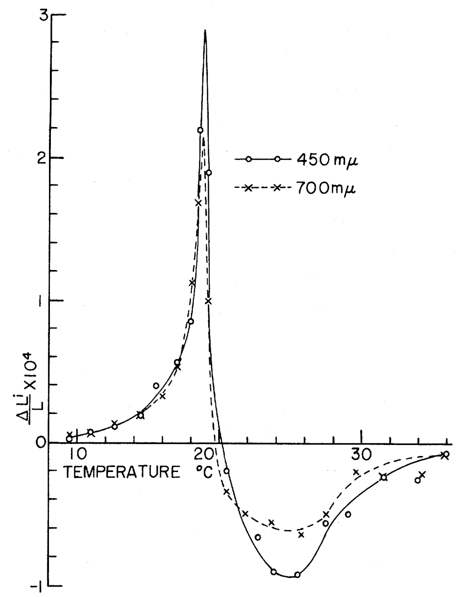

FIG. 4. Steady-state value of the net strain versus temperature, in the presence of 1.0 kV/cm. Illumination is made with 450- and 700-mμ wavelength. Gold electrodes are used.

dent of the nature of the electrode or of the disturbance of space charges.

As far as the authors are aware, similar phenomena are not reported in any solid. At the present stage, it is not possible to conclude definitely about the origin of the new phenomenon.

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ISOSPIN AND FRACTIONAL-PARENTAGE STUDIES WITH NUCLEON TRANSFER REACTIONS

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The prediction that cross-section ratios for single- and two-nucleon transfer reactions leading to the formation of analog final states [e.g., (d,p) and (d,n), (p,t) and (p,He^3), and (He^3,p) and (He^3,n)] should be given in terms of the appropriate isospin Clebsch-Gordan coefficients has been tested in several cases.[1-3] This prediction assumes charge independence (i.e., pure isospin) throughout the reaction and in all reported cases has been found to be in relatively good accord with the experimental results when examined free from the influence of threshold resonances or other well-understood perturbations. These tests have all been carried out with light projectiles on relatively light targets. Under these conditions, it would be anticipated that significant contributions to the reaction amplitude come from the interior regions of the nuclei involved and that, in consequence, these reactions test the isospin purity essentially as averaged over the entire nucleus.

Extensive measurements[4-6] on single-nucleon transfer reactions involving heavy-ion projectiles at energies well above the relevant Coulomb barriers have demonstrated that the transfer proceeds through a surface interaction; the short mean free path of both the projectile and product in the target nucleus precludes appreciable reaction contributions from the nuclear interiors. The possibility has been raised that significant differences exist with respect to isospin mixing in the nuclear interior and in the external or surface regions.[7] We report in this Letter on a measurement which examined the isospin purity selectively in the surface regions. Using the result of this measurement, we have obtained the relative fractional parentage of the B^{11} ground state based on low-lying states in B^{10} and Be^{10} and have compared this parentage with the predictions of the Kurath[8] and Boyarkina[9] wave functions.