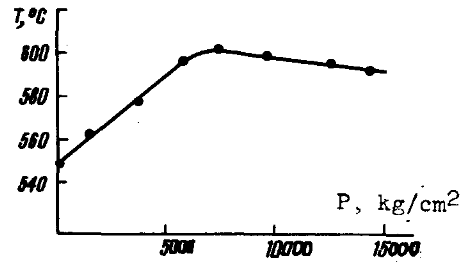
and for the standard was placed inside a channel 25 mm in diameter. The melting temperature at hydrostatic pressures up to 15,000 kg/cm^2 was determined by differential thermal analysis. The emf from a set of ordinary and differential chromel-alumel thermocouples was registered with automatic recorders. The temperature measurement accuracy was ±3°C.



The measurement results are shown in the Figure. It is seen that the melting point rises almost linearly with the pressure (dT/dP = 8 deg/katm) up to 6000 kg/cm^2. Assuming that the melting heat of Sb_2S_3 is 125 J/g [6], we find from the Clausius-Clapeyron formula that the volume effect in the melting of antimonite amounts to 5.5%.

An interesting fact is the observed maximum on the melting point, at 7000 - 7500 kg/cm^2. The maximum melting temperature for Sb_2S_3 is 602°. With further increase in the pressure, a very slow decrease in the melting point to 593° is observed at 14,300 kg/cm^2.

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EVEN ACOUSTO-ELECTRIC EFFECT IN ZINC SULFIDE CRYSTALS

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The passage of a sound wave through a conductor increases the number of carriers in the wave propagation direction and results therefore in a dc voltage (acousto-electric effect[1,2]). In piezoelectric crystals, the acousto-electric emf can reach appreciable values, on the order of several volts or more [3]. It was indicated in [4,5] that the acousto-electric effect in crystals without inversion centers can theoretically be either odd, i.e., reversing sign when the wave direction is reversed, or even. As far as we know, however, the even effect was not observed experimentally.

In this communication we report the existence of an even acousto-electric effect in zinc-sulfide crystals, observed for propagation of a longitudinal sound wave in the direction of the hexagonal axis C.

The experimental setup used to investigate the evenness of the acousto-electric effect is shown in Fig. 1. C_1 and C_2 are X-cut quartz converters, simultaneous operation of which gives rise to a standing-wave mode, and sequential operation to a mode of waves traveling in opposite directions; B are fused-quartz buffers and K the investigated crystal. The measurements were made under pulsed operation at 25 Mc. Photosensitive samples of zinc sulfide, whose conductivity was varied by the additional illumination from a mercury lamp, were investigated.

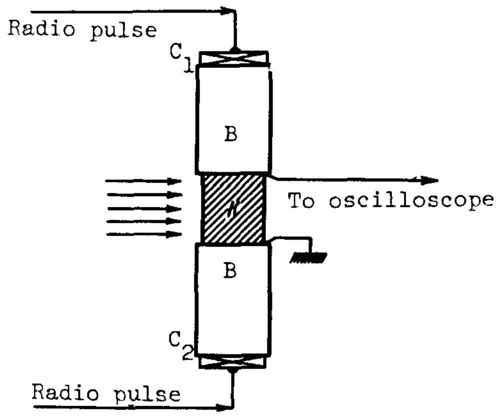

Fig. 1. Diagram of setup used to observe the acousto-electric effect.

Figure 2 shows the acousto-electric voltage pulses V_{ae}, observed on the oscilloscope, for a longitudinal wave propagating along the C axis in a CdS crystal (a) and in a ZnS crystal (b). The lower and upper diagrams correspond to opposite directions of the sound in the sample. We see from the figure that in CdS the acousto-electric pulse voltage reverses polarity with change in wave direction - the effect is odd - whereas in ZnS there is no reversal and the effect is even. We note that when both converters work simultaneously, V_{ae} increases in ZnS and decreases strongly in CdS.

The magnitude of the even effect, like that of the odd effect, increased linearly with the sound intensity. At $\sim$250 V on the converter, the average acousto-electric field in our

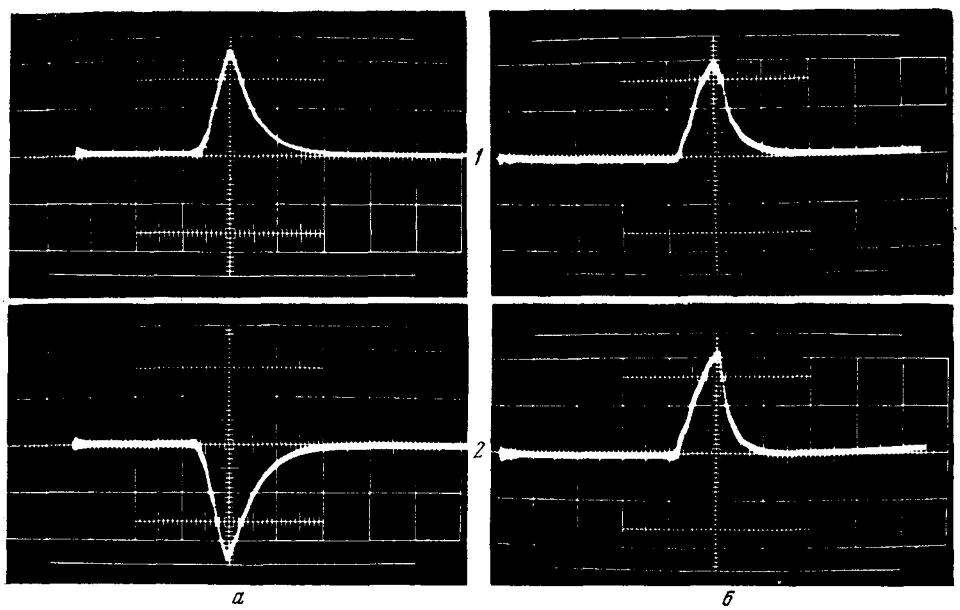

Fig. 2. Acousto-electric voltage pulses. 1 and 2 - different wave directions; a - CdS crystal, scale 20 V/cm; b - ZnS crystal, scale 0.5 V/cm.

experiments exceeded 5 V/cm for a 0.5 Meg load.

The even acousto-electric effect always had a definite polarity, regardless of the surface finish of the sample and of the nature of the contacts. The latter were made by sputtering indium or silver, with or without subsequent heating to 300°C.

Positive voltage always corresponded to the $(000\bar{1})$ plane, and negative to (0001), as determined by us from the shape of etch pits [6]. Crystals in which an even acousto-electric effect was observed displayed strong luminescence under the influence of the mercury lamp radiation.

We have thus observed a strong even acousto-electric effect in zinc sulfide crystals. However, since the even acousto-electric effect, unlike the odd one, can be of diverse nature, its physical causes in the crystals investigated by us call for further explanation.

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RECOMBINATION RADIATION STIMULATED IN SILICON BY LONG-WAVE INFRARED RADIATION

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Optical charge exchange of impurity centers, observed at low temperatures in semiconductors [1], can lead to the appearance of several peculiarities in the behavior of the semiconductors. In particular, under certain conditions the charge exchange should increase the photoresponse of a semiconductor in the region of impurity absorption of light and, a fact we consider especially interesting, cause the appearance of recombination radiation stimulated by light from the impurity-absorption region.

Indeed, let us consider a semiconductor doped with acceptor and donor impurities, and let us assume that the levels of the donors are close to the conduction band and those of the acceptors to the valence band. At sufficiently low temperatures, when the thermal ionization of the acceptors and donors is negligibly small, exposure of the semiconductor to a light that