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AN EVEN ACOUSTOELECTRIC SEMICONDUCTING DETECTOR

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An even acoustoelectric effect (EAEE) due to the redistribution of the impurity centres by the oscillating lattice has been observed in the semiconducting crystals having pronounced piezoeffect in non-piezoactive crystallographic directions or in the directions with weak piezoeffect. In these cases in propagating the ultrasonic waves (USW) the impurity conductivity prevailed over the conductivity due due to an odd acoustoelectric effect (OAEE). In the CdS, CdS_xSe_{1-x} crystals EAEE both due to the pure and quasilongitudinal and quasi-shear USW has been investigated in the OAEE suppression directions.

The most optimal cuts for each mode have been choosen from the angular dependence of the coupling coefficient. For example, for shear and quasishear modes it corresponds to the direction of the phase velocity vector at an angle $\theta = 0°, \approx 60°$ to the crystallographic axis C_6, respectively, provided the Poynting's vector is considered. It should be mentioned that at $\theta = 0°$ (shear wave) the direction of the displacement vector in the base plane does not influence on the value of EAEE. For longitudinal mode EAEE reaches a high value when it propagate in perpendicular to C_6-axis. The EAEE reached its maximum value in low-photosensitivity specimens of high dark resistance (for instance, in these annealed in sulphur vapours), whereas in high-photosensitivity specimens grown from the melt under pressure at the same conductivities and crystal orientations the OAEE was oftener observed. The dependences of the EAEE on the conductivity, length are given for various frequencies and orientations.

The even acoustoelectric detection (EAED) is shown to be independent of a definite type of USW or a choosen direction of propagating USW. It can be observed with the help of longitudinal, shear and quasi-

longitudinal and quasishear USW propagated in parallel, perpendicular and at an angle to C_6-axis. The orientation dependence of the impurity conductivity, which is not observed experimentally, is possible to speak in favour of the above.

Thus, the acoustoelectric detection at a definite sensibility can be used as a new method of determining certain parameters of the impurities.