# Elastic Constants of Indium Antimonide*

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By means of an acoustical method, the elastic constants of this compound were measured. At room temperature they are: $C_{11}=(6.6\pm0.3)\times10^{11}$, $C_{12}=(3.8\pm0.2)\times10^{11}$, $C_{44}=(3.0\pm0.1)\times10^{11}$ dynes/cm².

THE elastic constants of indium antimonide at room temperature have been evaluated from measured velocities of sound. The acoustic measurements are based on the general method introduced by Huntington[1]; the apparatus was that previously employed by Lazarus.[2] Quartz transducers were cemented on the appropriate crystal faces by using phenyl salicylate, and 12-Mc/sec pulses of 4 microseconds duration were applied to the crystal.

Two large single crystals of high-purity InSb were used. Parallel faces were ground on crystal *A* in the 110 and 111 directions and on crystal *B* in the 010 direction. Thicknesses in the 110, 111, and 010 directions are 2.33, 2.81, and 1.59 cm respectively. Crystallographic orientations are accurate to within ±1°. A density of 5.78 g/cc, determined from the lattice constant of the zinc-blende-type structure of InSb,[3] is used in the calculations. The values of the elastic constants and velocities are listed in Table I. Seven velocities are measured to determine the three independent elastic constants and to provide four internal checks. In measuring the transit time, only a small number of echoes were usable; this circumstance limited the accuracy with which the velocity of sound could be determined.

TABLE I. Elastic constants and sound velocities for indium antimonide at room temperature.

| Elastic constants (dynes/cm²) | | | |
|---|---|---|---|
| $C_{11}=(6.6\pm0.3)\times10^{11}$ | $C_{12}=(3.8\pm0.2)\times10^{11}$ | $C_{44}=(3.0\pm0.1\times10^{11}$ | |
| **Velocities of sound waves (cm/sec)** | | | |
| Polarization direction \ Direction of propagation | [010] | [110] | [111] |
| Longitudinal | $3.39\times10^5$ | $3.80\times10^5$ | $3.88\times10^5$ |
| Transverse [001] | $2.29\times10^5$ | $2.26\times10^5$ | ··· |
| Transverse [110] | ··· | $1.61\times10^5$ | $1.84\times10^5$ |

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[1] H. B. Huntington, Phys. Rev. **72**, 321 (1947).
[2] D. Lazarus, Phys. Rev. **76**, 545 (1949).
[3] A. Iandelli, Gazz. chim. ital. **71**, 58 (1941).

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