

Books

Solid State Physics: Advances in Research and Applications, Vol. 6. Edited by Frederick Seitz and David Turnbull. 429 pp. Academic Press Inc., New York, 1958. \$12.00. *Reviewed by D. J. E. Ingram, University of Southampton.*

THE high standard set by the previous volumes in this series is well maintained in the present case. The subjects dealt with in this sixth volume cover a relatively wide field from the general treatment of the macroscopic properties of solids to the detailed consideration of secondary electron emission.

The first two articles, "Compression of Solids by Strong Shock Waves" by Rice, McQueen, and Walsh and "Changes of State of Simple Solid and Liquid Metals" by Borelius, are quite closely related and deal with the general problem of compression. The first is mainly experimental in character but the general theory required for an understanding of the shock-wave methods is included. Quite a large proportion of the article is devoted to tables or graphs summarizing numerical data, which seems a little out of place in a review of this type. There is, however, a good comparison of the work of different groups in the field and it forms a useful introduction to the possibilities of these techniques.

The second article is of a more theoretical nature and deals with the general energy and entropy relations governing the process of melting and other order-disorder transformations. Such basic theory is essentially limited to simple solids, and cubic metals alone can be treated in detail. The general theme of this work is a division of energy, entropy, and volume into vibrational and structural parts and the calculation of the changes in these quantities with temperature and pressure. The comparison of these calculations with the experimental results obtained on the different cubic metals is then presented in a precise and impressive manner.

The other article concerned with macroscopic properties is by C. S. Smith on general symmetry relations in crystals. This introduces a rather abstract and difficult subject in a very logical and coherent manner and endeavors to work through from basic concepts without assuming any specialized knowledge of the subject. It is essentially of a theoretical nature although some reference to experimental work on elastic constants and the like is included at the end.

Two articles on electron behavior in solids are included, one on electroluminescence by Piper and Williams and one on secondary electron emission by

Dekker. Both of these are well written and easy to read and should form a useful introduction to the large number of publications now appearing on these subjects. The former presents its subject from a more physical point of view and detailed mathematical treatment is avoided, whereas in the latter both the simple and more sophisticated theories of secondary emission are summarized in some detail.

Finally, two articles on optical properties are included. The first, by Parker Givens, introduces the general theory of the optical properties of metals and summarizes the experimental techniques that have been used, whereas the second, by D. C. Dexter, is concerned with imperfections in nonmetals. The general formalism of the subject is presented somewhat abruptly in this case, but its application to different types of defects is explained carefully in the succeeding sections.

The volume can in fact be said to contain seven authoritative articles and should find its place with others of the Series on the shelves of most solid-state specialists.

Solid State Physics: Advances in Research and Applications, Vol. 7. Edited by Frederick Seitz and David Turnbull. 525 pp. Academic Press Inc., New York, 1958. \$14.00. *Reviewed by A. A. Maradudin, University of Maryland.*

THREE long articles dominate the present volume. They are, in order, "Lattice Thermal Conductivity" by P. G. Klemens, "Electron Energy Bands in Solids" by Joseph Callaway, and "The Elastic Constants of Crystals" by H. B. Huntington. These articles have one feature in common: each can in a sense be regarded as an appraisal of the theory underlying the experimental aspects of its subject. This, however, is but one of their features. The article which will probably be found to be the most useful from a practical point of view is the one by Huntington. After a summary of the formalism of elasticity theory to which a discussion of topics such as the recent Laval-Raman theory of elasticity, third-order elastic constants, and the effect on elastic properties of other matter tensors, e.g., piezoelectric, pyroelectric, is added, a good review of the various experimental techniques available for the determination of elastic constants is given. A tabulation of the elastic moduli and moduli of compliance is presented for about eighty different crystals arranged according to the various crystal systems. A survey of theoretical treatments of the elastic constants and the equation of state of metals and of the alkali halides completes the article. No less valuable is the review by Callaway in which he confines himself to a discussion of theoretical and experimental results for the band structures of some forty materials which have been well studied. This article is thus complementary to the more theoretical reviews by Reitz, Ham, and Woodruff which appeared in preceding volumes of this series. Klemens's article, on the other hand, is quite similar to his recent article in the Flügge *Handbuch der Physik* and differs