

Book Reviews

Works intended for notice in this column should be sent direct to the Book-Review Editor (M. M. Woolfson, Physics Department, University of York, Heslington, York YO1 5DD, England). As far as practicable books will be reviewed in a country different from that of publication.

Solid state chemistry and physics – an introduction.

Vol. 1. Edited by PAUL F. WELLER. Pp.xi + 500, Figs. 165, Tables 23. New York: Marcel Dekker, 1973. Price \$26.50.

Nothing short of Renaissance-quality versatility is nowadays required in order successfully to straddle the vast range of chemical, physical, mathematical and even biological knowledge currently encompassed by solid-state science. This fact would be accepted with more philosophical resignation were it not recognized that contemporary quantal and crystallographic interpretations of the behaviour of solids offer considerable academic excitement, and that the proper technological utilization of various electronic devices requires deep understanding of a variety of unrelated phenomena. A book such as that under review is therefore examined with more than usual thoroughness, particularly as a prospective text for graduate workers, for whom it is primarily intended.

Part I, sub-titled *Concepts and Properties* (pp. 186), serves as a relatively non-mathematical introduction to the concepts used throughout the remainder of the text. Part II, *Physical Properties and Imperfections*, includes chapters on *Electrical Properties of Solids* (pp. 104) by Perlstein, *Magnetic Properties* (pp. 60) by Steger, *Magnetic Resonance* (pp. 51) by Kasai and *Optical Properties* (pp. 88) by Axe. In Volume 2, yet to appear, Part II will be continued to deal with *Point Defects, Diffusion and Surface Chemistry*, and two further parts will deal with *Purification and Crystal Growth, Polymeric Materials and Biology* and *Semiconduction*.

On balance Volume 1, especially the first three chapters, succeeds in what it sets out to achieve. The first chapter, by the editor, is a courageous and competent attempt to interrelate the various principles and concepts which are developed later. In some places, however, notably in discussions of the *F*-centre (p. 50) and application of crystal-field theory to the ruby laser (p. 57), more is promised than is actually delivered in Chapters 7 and 3 respectively. The section on *Crystallography* (Suchow), after summarizing material normally taught at a relatively elementary undergraduate level, includes a lucid account of the structural principles of related, simple inorganic solids (*e.g.* ReO_3 , perovskite and tungsten bronze) and of stacking disorders and polytypism. It misses an opportunity, however, of linking dislocations (which are also very briefly considered) with stacking faults (in terms of partials) and thereby offering insights as to how some of the structural types considered earlier may be interconverted. Crowder's chapter (47 pp.) on *Bonding Models* contains a first-class treatment of elementary band theory, where the nearly-free electron theories and the tight-binding approximations are discussed. It is a pity that this chapter was not extended to deal with other aspects of energy-level diagrams, many of which (*e.g.* semiconductor characteristics) are deferred until they appear, rather unexpectedly, in the *Physical Properties and Imperfections* section.

Apart from relatively minor presentational infelicities – such as the use of the symbol *n* to mean three distinct properties within the space of two pages (226–227), and a rather imprecise use of the term 'activation energy' (pp. 25 and 31) and the unreasonable deferral of the properties of point defects (which are needed anyway in Chapter 7, p. 488) until Volume 2 – this book has much to commend it. It should prove valuable to both experimentalist and theoretician interested in solid-state phenomena.

Like so many modern scientific monographs it lacks a subject index, a regrettable omission.

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Solid state chemistry and physics. Vol. 2. Edited by PAUL F. WELLER. Pp.xi + 434, Figs. 111, Tables 21. New York: Marcel Dekker, 1974. Price \$25.75.

This is the second volume of an introduction to solid state physics and chemistry intended to give undergraduate or graduate students a broad interdisciplinary view of the field. It consists of seven separately authored chapters covering topics in physical properties and imperfections, purification and crystal growth and finishing with two chapters applying the full range of solid state ideas to polymers and biological processes. Mathematical complexity is avoided as far as possible, and the editor has achieved a reasonably consistent narrative style. The individual contributions are often uneasy compromises between text-book treatments and reviews of their field. The references are helpful, but those after 1970 are rare. Though the book gives an interesting blend of solid-state science, the price renders it impossible to recommend students to sample other than a library copy.

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Molecular crystals and molecules. By A. I. KITAIGORODSKII. Pp.xii + 553, Figs. 251, Tables 57. London: Academic Press, 1973. Price £20.70.

During the last ten years, studies of the organic solid state have turned away from a preoccupation with molecular