sidered 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 deferment 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 both to the 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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Electron optics. By P. GRIVET, translated by P. W. HAWKES and revised by A. SEPTIER. Pp.lvii + 870, Figs. 323. Oxford: Pergamon Press, 1972. Price £12·00.

It is now nine years since the first edition of Grivet appeared in English and it remains one of the best books on the subject today, treating as it does not only the principles of electron optics but also their application in the electron microscope and other instruments. In this new edition the chapters dealing with the calculation of the field and potential in both electrostatic and magnetic lenses have been considerably expanded. However, despite the 1972 publication date the powerful methods developed by Read are not mentioned. The emphasis of the book is on high-energy optics, but this is rarely explicit or obtrusive though the instrumental examples are all on high-energy devices. A complete chapter has been added on prism optics and this includes a discussion of the fringing field problem in both the magnetic and electrostatic cases. The treatment is fairly general, but does not mention some of the fairly recent advances in the use of parallel-plane or coaxial-cylinder geometries nor the very important work of Purcell on spherical electrostatic systems.

An edition in two parts, *Optics* and *Instruments*, is available. For readers who are less interested in instruments there are possibly better, though more expensive, choices but for those who need the full coverage this book is excellent.

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The use of the scanning electron microscope. By J.W. S. HEARLE, J. T. SPARROW and P. M. CROSS. Pp.x + 278, Figs. 140, Tables 12. Oxford: Pergamon Press, 1972. Price £8·80.

Although written with the needs of the practising microscopist in mind this book is more than just a user's handbook. It contains some very good chapters on how to use a scanning microscope and how to prepare specimens for it, but it also contains chapters written by well-known experts in their fields describing the excellent use to which the microscope can be put in metallurgical science, biology, solid-state electronic-device technology and fibre technology. The book is therefore stimulating as well as informative. The breadth of coverage in these chapters on applications serves well to illustrate how widely the scanning microscope is now used in the study of materials. Such widespread use surely could not have been anticipated when the first commercial instruments were introduced only ten years ago.

The chapters describing the techniques for preparing specimens and how to examine them in the various scanning modes are excellently written. They provide clear instructions on the correct procedures to be followed and warn against the pitfalls arising from misuse. The chapters on applications are very comprehensive and well illustrated. In some cases, *Applications to Metallurgy* for example, the author provides a review of the use of scanning microscopy which is not readily available from any other source. There are also chapters dealing with the design of scanning microscopes and the interaction of electrons with solids. Whilst these are by no means exhaustive in their coverage, and are certainly not rigorous in treatment, they do nevertheless serve a useful purpose in providing the microscope user with the background to his art. The book concludes with a look at the future of scanning electron microscopy. This examines the current developments of the instrument towards higher resolution, using field-emission guns, greater sensitivity and consequently more rapid response to dynamic effects in the specimen, and the incorporation of X-ray and electron energy-loss analysis for element identification. It is likely that the next generation of scanning microscope will play a greater role in the quantitative analysis of materials.

This book provides very good reading. Although there are eight separate contributors it has been put together by the three editors to make a coherent text. It should appeal to a large number of users.

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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