Semiconductors textbook

Semiconductors. Second edition. By R. A. Smith. Pp. 523. (Cambridge University Press: Cambridge, New York and Melbourne, 1978.) Hardback £27.50; paperback £8.95.

THE publication of a second impression of any major textbook provides an indication of its value: its publication twenty years after the original edition in a field that had been developing very rapidly over most of this period gives further proof of the lasting value of the treatment which has not dated significantly. When R. A. Smith's book appeared in 1959 it provided the most detailed text on the then new and rapidly developing subject of semiconductor physics, with special emphasis on transport and optical properties. Now that the subject has reached what might be called mature age, the new edition is to be welcomed as a continuation of this tradition, with some significant modifications in order to introduce new topics and to update the bibliography. With the avowed intention of keeping the total volume constant, this was not an easy task, and the author may be congratulated on having, on the whole, succeeded rather well. As one part of the adopted strategy the reader is increasingly referred to the other major text by the same author, *Wave Mechanics of Crystalline Solids* (Chapman and Hall: London, 1961) and this means that the student will find the use of two textbooks more imperative than with the original edition.

The layout of material departs significantly from the original, partly to accommodate the additional subjects and partly to streamline the treatment. The first four chapters on elementary properties, energy levels, impurities and carrier concentration remain virtually unchanged. The original very extensive chapter on electron transport has been altered in several respects, one of which is the omission of the Boltzmann equation as the basis for the treatment of transport theory—in this reviewer's opinion, a retrograde step at the level aimed at in the book. Scattering mechanisms and high field effects are relegated to separate chapters and a new section is introduced on conduction at very low temperatures. Optical and high-frequency effects have been significantly expanded, the behaviour in high electric fields has been coupled with that in high magnetic fields to take account of recent advances, including the important transferred electron phenomena and carrier freezeout.

The original chapter dealing with the determination of semiconductor properties has been removed; and the chapters describing the properties of elemental and compound semiconductors have been shortened into one, no doubt on the reasonable basis that the volume of information on properties of semiconductors is so vast that it requires reference to specialist texts for any but the most elementary data. Instead, we have a short chapter on band structure and the effective mass approximation describing some recent developments such as the LCAO and the k.p methods and the psuedopotential. Another new chapter on "Some special topics" deals with excitonic molecules, electron-hole droplets, polarons and polaritons, tunneling in heavily doped materials, and the tunnelling spectroscopy and laser action in semiconductors, among others. The book closes with another new chapter on amorphous semiconductors providing a brief outline of this topic on a mainly descriptive basis.

The bibliography has been brought up to date in some of the more important respects but there is no pretence of giving complete listings which would become rapidly dated.

The overall impression is a very favourable one: this is still one of the most authoritative and comprehensive texts on this subject in one volume, with a very detailed treatment of transport and optical properties and with a less detailed discussion of the band structures and of other physical properties of semiconductors. There is no significant discussion of any semiconductor devices, again on the reasonable assumption that this would make the text either much too long or too superficial.

One criticism of the presentation is the relatively inefficient use of diagrams: the information content of many of these is low for their size and some are too closely similar to represent real value—for example, Figures 13.3 and 13.4 giving the temperature dependence of the forbidden gap in germanium and in silicon. More economy in this respect would have permitted the inclusion of a wider range of information.

These are, however, minor criticisms of an otherwise excellent text which will continue to provide the basis of both undergraduate and postgraduate lecture courses and will represent a useful general reference text. The price, especially of the paperback edition, is very reasonable and the presentation is excellent throughout.

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Standard reference work on the plastids

The Plastids: Their Chemistry, Structure, Growth and Inheritance. Second edition. By J. T. O. Kirk and R. A. E. Tilney-Bassett. Pp. 960. (Elsevier/North Holland/Biomedical: Amsterdam, New York and Oxford, 1978.) Dfl337; $149.75.

THE first edition of *The Plastids* has become something of a standard reference book. Because of the great advances which have taken place since this first edition was published, it was already beginning, after only a decade, to show its age. The authors have therefore undertaken a complete revision of their work, and the new enlarged edition contains a vast amount of additional information not earlier available. Each chapter now begins with a useful summary which allows the reader to find his way quickly and easily through the book.

The present volume attempts to cover the whole plastid literature, and therefore necessarily goes over much of the same ground as previously. The text is first class and references to new work are included as appropriate. The figures and diagrams contain much new material clearly set out. But I was greatly disappointed by the re-use of many old electron micrographs; in view of the rapid advances which have taken place in electron microscopical studies of plastids since 1968 I suspect that many of the authors credited with the pictures used would have welcomed the chance to offer new micrographs of material treated by more modern methods of fixation. The quality of printing of the micrographs, in spite of the glossy paper used and in view of the remarkably high price of the book, is generally poor and indistinct and many of the pictures lack the contrast which the originals undoubtedly possessed. The pictures carried forward from the first edition seem to have suffered most in this respect.

Part I, *Chemistry, Structure and Function of Plastids*, is greatly enlarged and now comprises chapters 1–12 (pp.1–250), an increase of 160 pages. This part of the book will be of great value to someone wishing to have a