Book Reviews

Semiconductors. Their Theory and Practice. G. Goudet and C. Meuleau. Translated by G. King from *Théorie et Pratique des Semiconducteurs* (Editions Eyrolles, Paris). MacDonald & Evans, London, 1957 (order from Essential Books, Fair Lawn, N.J.). xviii + 316 pp. $18.90.

The authors deal with the subject of semiconductors, from basic quantum mechanics through device technology, in one of the first attempts to do this since Shockley's book, *Electrons and Holes in Semiconductors* (Van Nostrand, 1950). Because of the many recent developments in the field of semiconductor technology, this is a welcome addition to the field.

The book is divided into three parts: "General Fundamental Theories"; "The Technology of Semiconductors"; and "The Principal Applications of Semiconductors, Thermistors, and Varistors." The first part gives a concise but clear development of the elements of quantum mechanics, applying the analogy of geometrical and physical optics to classical and quantum mechanics. The band theory of solids is treated in both one and two dimensions, and the Fermi-Dirac statistics are derived as well as discussed. Part 1 concludes with a section on electric current in solids, which includes transition probabilities, conductivity, and the Hall coefficient. All of this occupies only 126 pages but, despite its brevity, the book should provide a useful introduction to the theory of solids, particularly for engineers.

In part 2 the general properties of crystals are discussed. The intermetallic compounds are reviewed, as well as germanium and silicon. A chapter is devoted to the techniques of preparing high-purity crystals, including zone refining and pulling techniques. Another chapter describes measurements used in production and research. Part 2 occupies only 60 pages, but the brief descriptions are clear and, with some 184 references, should be quite useful to both engineers and physicists.

Part 3 discusses semiconductor devices in four chapters, on thermistors and varistors, diodes and rectifiers, crystal triodes and tetrodes, and other devices (photoconductive cells, radioactive batteries, magnetometers, and so on). The basic transistor equations are derived, and equivalent circuits are given. While all of this is done in the short space of 116 pages, the treatments are quite adequate, and a bibliography of 137 papers serves to round out the work.

The authors are to be congratulated; the book provides an excellent introduction to semiconductor physics and technology and should be of use to engineers and physicists, both as an introductory text and as a reference work.

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Excited States in Chemistry and Biology. C. Reid. Academic Press, New York; Butterworths, London, 1957. ix + 215 pp. Illus. $7.50.

"As any area of inquiry develops into exact science it passes through a succession of stages which may be roughly designated Macroscopic, Microscopic, Molecular and Submolecular." This has been fully recognized by chemists who want to have a deeper insight into the mechanism and nature of chemical reactions. Biology is just on the verge of this new development, and the intention of the author is to give a helping hand to both chemists and biologists by outlining "some of the more important physical concepts concerning molecular excitation and interaction." This he does very successfully within a small booklet, which does not overwhelm the reader by its volume and technicality.

Essentially, the book consists of three parts: an outline of quantum mechanics, the discussion of selected biological problems, and an appendix in which the author discusses a few problems of quantum mechanics in more detail.

The first 50 pages are devoted to the mathematical foundations of quantum mechanics, and remain intelligible all the way through, to the well-informed general reader. Then follows the discussion of spectra, excitation mechanisms, and the triplet state, to which latter the author evidently attributes first-rate importance for the understanding of chemical and biological processes. After treating the various mechanisms of inter- and intramolecular energy exchange, the author discusses biological luminescence, vision, and the biological effects of high-energy radiation from the point of view of quantum mechanics. Being a biologist, I cannot help being impressed by the vastness of the field covered and the extent of the underlying information. The physics presented must be of at least equal quality, the author being a physicist and not a biologist.

The appendix deals with the Hamiltonian group theory, the theory of time-dependent perturbations, long-range energy transfer, and transition probabilities. The treatment of group theory is especially welcome, this theory being rather useful in its application and difficult to find in so short and clear a presentation. It is a sound plan to have these subjects covered in an appendix instead of having them break the continuity and reduce the palatability of the main chapters.

The treatment is clear, the outlay simple and transparent. If there is anything to regret, it is that the author did not dwell longer on certain topics and, for instance, give more of a qualitative and symbolistic interpretation of his quantum mechanics. A more detailed treatment of various kinds of spectra might have been useful. The reader should not allow himself to be discouraged by minor shortcomings, such as the sudden appearance of a mathematical symbol which is not explained and which finds no application later or the occasional reference to a wrong equation. Few books are exempt from such minor shortcomings; they detract but little from the value of the service the author has rendered to biologists and chemists by writing this book, lending them a helping hand in their attempt to apply quantum mechanics to their problems.

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Mathematics for Everyman. From Simple Numbers to the Calculus. Egmont Colerus. Translated by B. C. and H. F. Brookes. Emerson, New York, 1957. xi + 255 pp. Illus. $3.95.

This book, subtitled "From Simple Numbers to the Calculus," is a popular introduction to mathematics in which the translators have succeeded in conveying "the spirit and enthusiasm of the original German." It covers, in a more or less descriptive way, elementary algebra, trigonometry, coordinate geometry, and calculus. This is done largely with heuristic arguments rather than exact proofs; for example, "We will not dally at this