

ties of the feldspars, and a collection of historical notes and old names. The book is profusely and well illustrated and handsomely printed.

Feldspars are a difficult subject on which to write a book. There have been nearly as many advances in our fundamental knowledge of feldspars in the last two or three years as in all previous years, and therefore, although the author provides excellent coverage of the literature through 1967, and although the coverage is not dogmatic and he indicates what problems are in need of further study, the book is out of date.

The book is also flawed by loose organization, uncritical discussion of the cited references, and an imprecise and confusing terminology. Some material is repeated and many subjects are mentioned long before they are fully explained. The chemistry of the feldspars is, for reasons obscure to this reviewer, treated as a separate subject only in the preface. The concept of "structural state" is not treated as such. There is in fact no attempt early in the book to set up a chemical-crystallographic framework in which feldspar composition, phase relations, and crystal chemistry could be discussed. There is hardly any critical synthesis of earlier work. Authors are quoted correctly in context, but contradictions arise from the inclusion of data from papers that supersede earlier work which may be cited elsewhere in the book. There are occasional factual slips, as when the author states (p. 133) that artificially prepared maximum-microcline-low-albite solid solutions will break down in a few days at room temperature. The reader is plagued by the lack of a consistent nomenclature and classification of feldspars, despite the fact that the entire first section is devoted to this topic. Mineral names, particularly those of alkali feldspars, are used loosely, often with meanings based on field occurrence or morphology rather than on strictly applied chemical or x-ray crystallographic characteristics. Many mineral names (clevelandite, anemousite, isomicrocline, and moonstone, to name a few) are defined and used in the text when they would be more properly placed in a separate glossary.

In summary, it is my opinion that the present volume will be of limited use either to the student or to the professional mineralogist. The professional mineralogist will find it useful mainly for the completeness of the bibliography and as a guide to the critical prob-

lems in feldspar mineralogy for which more data are needed. The deliberate omission of determinative tables reduces its usefulness as a text for students. The book is, however, a necessary first step toward synthesizing the knowledge gained so far on feldspars, a task which can approach completion only when feldspar research reaches a breathing point.

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Radiation Detection

Semiconductor Detectors. G. BERTOLINI and A. COCHE, Eds. Interscience (Wiley), New York; North-Holland, Amsterdam, 1968. x + 518 pp., illus. \$22.50.

This book, well and clearly written by the editors and a number of others prominent in the radiation detector field, concerns itself with the uses and study of silicon and germanium radiation detectors having good energy resolution.

The topics covered include semiconductor properties of silicon and germanium; the behavior of lithium in silicon and germanium; theoretical determination of the mean energy for electron-hole pair creation and the Fano factor; characteristics and construction of diffused, surface barrier, and lithium-drifted detectors; low-noise electronics, pulse-shape and time-resolution studies; neutron, heavy-charged-particle, beta-ray, x-ray, and gamma-ray spectroscopy, including particle identification and channeling; and the search for new semiconductor materials for gamma-ray spectroscopy. The chapter on this last subject, by G. W. Mayer, also sheds light on fundamental properties of compound semiconductors.

Considerable information is included from papers presented at the 1966 scintillation and semiconductor counter symposium, the 1966 New York meeting on semiconductor materials for gamma-ray detectors, and the 1967 Gatlinburg meeting on semiconductor detectors.

According to the editors, this volume is directed both to nuclear spectroscopists and to students of physical properties of semiconductors; one would have to agree that these two groups could derive considerable benefit both from a first reading of it and from having it available for reference. The chapters on spectroscopy are alone

worth the price of admission and will be invaluable to the physicist attempting to choose the right detector for his experiment.

The bibliography (including many useful survey articles) is excellent. Delightfully, there are only five "private communications" out of nearly a thousand references.

This book provides instant access to almost everything in the literature through 1967 but does not contain much new information. The editors, of course, cannot be blamed for the absence of information on recent advances in certain fast-moving areas, such as the very-low-noise field effect transistors that became available about a year ago.

The section on low-noise electronics includes a good fundamental discussion of noise in field effect transistors and an analysis of various pulse-shaping networks, but lacks a thorough discussion of how to use d-c restorers and any consideration of practical fine tuning of field-effect-transistor pre-amplifier systems for optimum performance. A full treatment of these subjects would be invaluable to many experimenters.

Although this book may be of only modest value to producers of semiconductor detectors, it will be a valued possession of those who actually employ them.

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Atomic Scattering

Electronic and Ionic Impact Phenomena. H. S. W. MASSEY, E. H. S. BURHOP, and H. B. GILBODY. Second edition, in four volumes. Vol. 1, Collision of Electrons with Atoms. H. S. W. Massey and E. H. S. Burhop. xx + 664 pp., illus. \$32. Vol. 2, Electron Collisions with Molecules and Photo-ionization. H. S. W. Massey. xviii pp. + pp. 665-1316 + plates. \$32. Oxford University Press, New York, 1969. International Series of Monographs on Physics.

It has become customary, in the atomic scattering field, to divide the subject matter roughly into two parts. In the first, the projectile is a light particle such as an electron, a positron, or a photon; in the second, both projectile and target are heavy atoms, ions, or molecules. The division is made because of the natural grouping of experimental and theoretical techniques as well as the historical divi-

sion of the labor among various groups. The second edition of this book, in four volumes, follows this historical convention. Volumes 1 and 2, reviewed here, are concerned with the first part.

Volume 1, by Massey and Burhop, is devoted to electron-atom collisions, with slightly more than half the book devoted to experimental developments in the field. The authors give early 1967 as the closing date for inclusion in the book. The chapters on experimental methods and results seem to me best described as for experts. That is, the great detail and concern with methods seem directed toward a worker who is very much involved in the field or who intends to become so. Much space is devoted to developments subsequent to the first edition, and very many of the results of representative experiments are quoted. Especially gratifying (from a theorist's point of view) are the comments concerning possible sources of error in some of the experiments that have given conflicting results.

The last five chapters of the volume are devoted to theoretical work in the field. Here the book gives a general view of most of the methods currently used, although not as comprehensively as the experimental section does. Perhaps this part was meant to be taken in conjunction with *The Theory of Atomic Collisions* by Mott and Massey. Two omissions seem particularly lamentable. There is no mention, critical or otherwise, of a large body of theoretical calculation described as "optical potential" or "many body" approaches, some of which have been quite successful. Another surprising omission from the section on classical theory is the work of Gryzinski and others on the classical impulse approximation.

Volume 2, by Massey alone, is devoted to electron collisions with molecules and photoionization. The first half describes electron-molecule collisions. The format of this part differs somewhat from that of the first volume. There is no division of chapters here between theoretical and experimental. The reason is no doubt the difference in subject matter. Electron-molecule scattering is much more an experimentalist's field than is electron-atom scattering. Volume 2 reflects this. The general theory and specific applications are embedded in the relevant experimental chapters. By far the longest chapter is devoted to

experimental results on collisions with specific molecules.

The last two chapters deal with photon scattering and photon-induced reactions. Here again experiment dominates theory, and one is impressed with the immense amount of experimental material presented. An inclusion that is somewhat surprising is a section on bremsstrahlung due to electron coupling with collective modes in a plasma.

These books will probably be most valuable as a reference source for experimental results and techniques. An immense amount of labor must have gone into the compilation.

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Limnology and Productivity

Reservoir Fishery Resources Symposium. Athens, Ga., 1967. American Fisheries Society, Washington, D.C., 1969 (order from R. F. Hutton, executive secretary). viii + 570 pp., illus. Paper, \$10.

Including the welcome and the summary, this symposium consists of 40 separate papers. These range from bureaucratic propaganda to highly theoretical discussions of plankton populations. The main burden of the symposium, however, is the limnology of reservoirs, with a good mix of physical and chemical limnology and production ecology.

The rapidly increasing amount of space in the United States being devoted to reservoirs makes the appearance of this book appropriate, if not overdue. The total surface area of reservoirs at the time of the symposium was reported as 8.9 million acres (3.56 million hectares), about equal to the combined area of Connecticut and Maryland. Even the casual observer must be aware of the importance of these reservoirs to flood control, irrigation, shipping, and recreation. Only the initiated would know the extent of the competition among these uses, and the jealous protection of the different interests by the agencies responsible for them. This volume shows a willingness of these agencies now to make accommodation to the other uses. However, the technical language barrier must be broken down before thorough cooperation will be achieved. It is also evident to the reader that each of the professional

groups involved has a contribution to make to the development of optimum reservoir management, but there is no clue to how, or by whom, the integration of the efforts of these groups will be achieved.

A substantial segment of this volume is devoted to water quality, how to predict it before impoundment occurs and how to manage it after impoundment. Among the subjects discussed in this connection are the mechanics of stratified flows (Wunderlich and Elder) and the modification of water quality by destratification (Irwin, Symons, and Robeck). The general concern of nearly all the papers dealing with water quality is for fish or fish food production. Several authors attempt to relate environmental factors to fish production (standing crops, or yields), but the lack of uniformity of methodology renders fruitful comparison difficult. It appears evident, however, that dissolved solids, oxygen levels in the hypolimnion, turbidity, level fluctuation, along with area, mean depth, shoreline development, and storage ratio all influence the production of fishes in reservoirs.

Another important segment of the book is devoted to fish populations and the interactions of predatory with nonpredatory populations. Two clear facts emerge from these studies. They are (i) that reservoir populations behave similarly to populations in farm ponds or natural lakes, and (ii) that current methods of assessing population parameters need improvement.

It is probably too much to expect that a first symposium on reservoir fishery resources would be so well coordinated and integrated that it would provide definitive answers to many of the nagging questions about fish production. There exists in this volume a wealth of information on ecologic succession in reservoirs, but the reader will have to make his own analysis of this matter. Several authors mention the well-known history of the early good fishing for desirable species and its subsequent decline. In the aggregate these papers provide physical, chemical, and biological information on this phenomenon, but it is fragmentary and difficult to evaluate. This is a useful reference work, however, and any fishery biologist and especially those working with reservoirs will want to have it at hand for frequent consultation.

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