was a critical thrust, but it was short of traversing the energy barrier between the imaginative concepts of one light reaction and two. In overzealous homage the authors have claimed more for him than he, a scientist's scientist, would have accepted.

The authors will not be surprised at the criticisms they receive, and they may well rejoin that if others can do better they should have at it. It is not likely that, for purposes of serving the general reader, a better job will be done soon.

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Sites of Protein Synthesis

The Ribosome. A. S. SPIRIN and L. P. GAVRILOVA. Springer-Verlag, New York, 1969. x, 164 pp., illus. $14.90. Molecular Biology, Biochemistry, and Biophysics, vol. 4.

If one picks up a text or monograph that covers the topic of protein synthesis and looks up the role of the ribosome, one will almost invariably find a representation that has stood for a number of years: that of two truncated spheroids of unequal size, upon whose surfaces are depicted the reaction sequence involved in peptide bond formation. Perhaps most of the enzymatic activities now known to be required for protein synthesis are due to nonribosomal components. Thus we have today a model of protein synthesis written in classic enzymological terms, according to which most of the synthesis takes place rather mysteriously in a "black box," the ribosome. There is no satisfying explanation as yet of the need for this large and very complicated organelle, and we are far from the desired correlation of its structure and function. It is somewhat ironic that this should be the situation, for it has been almost 30 years since the ribosome was first identified from cytological observations, being the first component of the synthetic machinery to be discovered and also the first to suggest the involvement of RNA.

This short monograph is the fourth in a contemplated series of some 60 volumes. Both authors have been active investigators of the ribosome and its role in protein synthesis. The vintage is early 1968, and the book is almost equally divided into two parts: the first half devoted to a consideration of the composition and structure of ribosomes and their components, and the second to the functioning of the ribosome in peptide bond formation. It is indicative of the present state of the art mentioned above that each half of this book could practically stand alone as an independent entity.

The book being a short one, the coverage has been carefully circumscribed. This is not a complete compendium of all the various studies that have been reported on composition, structure, and properties, but rather a selective and limited summary view, with a strong and much needed interpretative flavor to it. Perhaps the major defect in the first half of the book is a very notable omission in a chapter on structural transformations. One of the highlights of recent years, the total reconstitution of one of the ribosomal subunits so elegantly demonstrated by Nomura and co-workers, is not mentioned. Although the full details of this feat were unfolded about the middle of 1968, the authors must surely have been aware of it at the time of the writing, and its omission is to be regretted. The account of reconstitution presented rests heavily on the work of one of the authors and is not a balanced view of this subject. In regard to ribosome function, the latter half of the book is a reasonably succinct account of the enzymological picture, which is about all that can be done at present. There are many facets of protein synthesis that are omitted, such as amino acid activation, polysome structure and function, messenger-RNA turnover and regulatory questions, and the coding problem. Similarly, a chapter at the end devoted to a consideration of antibiotics that interfere with ribosome function leaves a good deal to be desired. Toward the end of the second half of the volume the authors propose a theory for ribosome function, which to this reviewer appears to be not much more than a restatement of the present enzymic picture. The theory still regards the functioning ribosome as a rigid entity, a view which recent evidence suggests may be incorrect, and it cannot account for the great structural complexity. It is probably still too early for a satisfactory theory here.

The chief value of this volume would be as a classroom reference that goes beyond the usual textbook coverage yet presents a reasonably succinct view. It does this admirably. But for a fuller view it will need supplementation as noted above. It will probably have a short half-life of usefulness, being a limited coverage of a field that is experiencing considerable transition at present.

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Materials and Properties

II-VI Compounds. BRIAN RAY. Pergamon, New York, 1969. xvi, 272 pp., illus. $10.50. International Series of Monographs in the Science of the Solid State, vol. 2.

The luminescence and electrical properties of a wide-band-gap material are determined primarily by the defects present in the crystal. II-VI compounds are midway between ionic solids, in which properties are determined by native defects (vacancies and interstitials), and covalent solids, in which these properties are determined by foreign impurities. These compounds will not be well understood until the energy levels and solubilities of the more common native defects and foreign impurities have been determined. At present, many of these properties are unknown, but progress is being made at a linear rate.

The author has attempted to write a concise text on II-VI compounds, to provide the reader with a general idea of how II-VI compounds behave and to serve as a quick reference to the vast literature on these materials. The book is restricted to the tetrahedrally coordinated crystals ZnO, ZnS, ZnSe, ZnTe, CdS, CdSe, CdTe, HgSe, and HgTe. The book is crammed with many useful tables and figures, and the author cites a long list of references in each chapter. There are seven chapters, covering bonding and band structure, crystal growth, fundamental optical properties, luminescence, photoconductivity, transport properties, and applications of II-VI compounds.

All of these subjects, except the applications, have been reviewed previously in a much lengthier and much more complete treatise, edited by Aven and Prener, published in 1967. It is unfortunate that the author chose to write his book so soon after the book edited by Aven and Prener. Many developments which shed considerable light on II-VI compounds are too recent to have been covered in either of

these books. These include the dielectric theory of ionicity, electrical studies of native donors and acceptors in ZnTe, ZeSe, CdTe, and CdSe, detailed studies of the shallow acceptors Li and Na in CdS, and the deep acceptors P in ZnSe and Cu in ZnO, studies of the isoelectronic traps, and experiments in ion implantation.

The author succeeds in his primary goal of providing the reader with a concise summary of electrical and optical phenomena in II-VI compounds and their commercial applications. In order to remain concise, he excludes all discussion of the physical chemistry of defects or the observation of defects by electron spin resonance. This makes it rather difficult for the reader to gain an understanding (insofar as one exists) of the role of native defects in determining why these materials behave the way they do. For instance, no explanation is given why various II-VI compounds will not conduct both *n*-type and *p*-type.

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Film Physics

Thin Film Phenomena. KASTURI L. CHOPRA. McGraw-Hill, New York, 1969. xx, 844 pp., illus. $24.50.

Chopra has set out to write a one-volume review of the research on thin solid films that has been carried out during the last few years. Much of the recent effluence has been stimulated by device-development programs. The quantity has been enormous and the quality mixed. A brave attempt is made in *Thin Film Phenomena* to touch on all significant scientific and technical accomplishments involving films, however prepared. The discussion of individual points is necessarily brief. Typically, there is an outline of the theoretical ideas followed by a recital of experimental results. The treatment is critical ("Wherever disorder exists in the literature, I have declared my own views and provided a reasonable synthesis.") and conservative ("Both the observed . . . effect and the explanation offered need further verification.").

The major theme of the book is that films usually have complicated microstructures which play a role at least comparable to that of the thinness of the samples in determining the observable physical properties. Sections of the book on nucleation and growth give reasonably complete discussions of what is known about the way the special structures found in evaporated and sputtered films come about. The effect of structural details on physical properties is then illustrated in chapters on mechanical properties and on electrical and thermal transport in metal, semiconductor, and insulator films. I find these parts of the book especially satisfying, quite possibly because the areas are ones in which Chopra has himself made numerous research contributions.

A very good chapter discussing ferromagnetism in films has been contributed by M. H. Cohen. It is the one case where Chopra has deviated from his plan of presenting a unified treatment by doing everything himself.

The main part of the book is rounded out with chapters on optical properties of films and on superconductivity. Although not exhaustive, these contain a large amount of material and offer a reasonable entry into the described areas of research.

There is one case in which I would want to quarrel a little with Chopra's insistence on the critical importance of microstructure. Very fortunately, superconducting properties are determined by a spatial average over a region containing thousands of atoms. This largely, though not completely, eliminates the influence of the microstructure and is probably responsible for the considerable success that has been experienced with superconducting film experiments.

Another minor reservation I have about the book concerns the section on experimental technique. Every word is true but there are not enough of them. Film preparation is made to sound simple and straightforward, almost trivial. This is an illusion which could bring forth another flock of complicated measurements on poorly characterized samples, just the sort of thing against which the author does battle throughout most of the book.

Chopra has made a good job of an impossible task. Everyone engaged in research using thin films will want to buy this book. The good sections are too numerous and too long to Xerox. The book is a bargain. Chopra provides a review of over 2000 research papers for about a penny apiece.

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Afro-American Anthropology. Contemporary Perspectives. Norman E. Whitten, Jr., and John F. Szwed, Eds. Free Press, New York; Collier-Macmillan, London, 1970. x + 470 pp. + plates. $5.95.

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