next few years, the McMath 300-foot-focal-length telescope at Kitt Peak and the 180-foot-focal-length vacuum telescope at Sacramento Peak.

However, despite the misgivings mentioned above, this reviewer feels that this monograph is a fair presentation of observational and theoretical work up to early 1966 and that it will be very valuable not only to students and newcomers to the field but also to experienced solar astronomers, who will find it an excellent reference book because of its extensive bibliography.

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Electrochemistry

Electrochemical Kinetics. Theoretical and Experimental Aspects. KLAUS J. VETTER. Translated, with revisions by the author, from the German edition (Berlin, 1961) by Scripta Technica. Stanley Bruckenstein and Brian Howard, Translation Eds. Academic Press, New York, 1967. xxxiv + 788 pp., illus. $36.

This expanded English version of *Electrochemische Kinetik* is sure to be welcomed by English-speaking electrochemists. The subject is covered in such breadth and detail that this book should prove valuable to every researcher and advanced student in the field. The author has done a commendable job in organizing and writing the book in a readable and understandable way. His mastery of the subject is further evidenced by the frequent citations of the pioneering work he has done.

Starting off with 103 pages of electrochemical thermodynamics, the book reviews many aspects of the various interfacial potentials at electrodes and the theory of the electrical double layer. Important topics pertaining to the double layer, such as adsorption isotherms, are omitted, however. The first chapter gives adequate background for grasping the remainder of the book, and is valuable in placing the various phases of electrode chemistry in proper perspective.

The main part of the book is devoted to (i) the contributions to overvoltage, (ii) the elucidation of reaction mechanisms, and (iii) a summary of experimental results of electrode kinetics. Finally, corrosion and passivity are covered in two short chapters. Overvoltages due to charge-transfer reactions, reactions not involving charge transfer, diffusion, and the various steps in crystallization are treated quantitatively and in detail. Polarization due to ohmic resistance in the cell is also covered. Current and overvoltage are related theoretically for a number of experimental conditions, and the theory is applied to direct-current, alternating-current, and pulse methods used in studying electrode reactions. The application of reaction orders to the determination of electrochemical reaction mechanisms is also discussed. Details of experimental setups are kept to a minimum, with emphasis on the results which are diagnostic for mechanisms. The extensive treatment of the experimental results of redox, gas, metal-ion and metal-film electrodes constitutes an excellent review of the field as well as provides a basis of comparison with theory.

Electrochemical Kinetics is an excellent text for a graduate course in this field.

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Semiconductors

Electrical Properties of Semiconductor Surfaces. DANIEL R. FRANKL. Pergamon, New York, 1967. xvi + 310 pp., illus. $13.50. International Series of Monographs on Semiconductors, vol. 7.

Within the past 35 years a great quantity of theoretical and experimental information about the electrical properties of semiconductor surfaces has appeared in the periodical literature and in the proceedings of various conferences. By far the greatest portion of this work has been done during the last 20 years. Much of it is confusing, some of it is conflicting, and, with few exceptions, none of it is simple or easy to understand. Frankl has courageously, and with a large measure of success, undertaken the difficult task of gathering this information together, sifting through it, and presenting the most significant portions to the reader in a logical and coherent fashion.

The theory of the equilibrium distribution of electrical charges in the bulk semiconductor and in surface space charge layers is reviewed in the first two chapters. This material is largely prologue to the meatier sections of the book.

A theoretical treatment of the nonequilibrium distribution of charges (in both the bulk and surface layers) is presented in chapter 3. Chapter 4 is devoted to a discussion of the various measurable effects that can be produced in the semiconductor surface region (and the information that can be obtained) by application of an external electric field normal to the surface. The various contributions to the periodical literature are systematically considered and evaluated. The author has done an excellent job of establishing for the reader a sense of perspective and of giving him a feeling for the way in which the many bits and pieces fit into the overall picture.

Chapter 5 is devoted to a brief survey of the techniques for the preparation of surfaces for experiments. It is well written and thoroughly readable, and contains some gems of information that are, to this reviewer's knowledge, not otherwise in print. The theory of surface states is given a token treatment in chapter 6. A more thorough account of the theory and its connection (or lack of it) with experiment would have been more desirable. The final chapter is a detailed description and critique of the experimental work on surface states. It emphasizes the present status of investigation and points the way toward future studies that may resolve questions that are as yet unanswered.

The book is not without faults. Some papers to which the reader is referred, by author and date only, in the text are not included in the list of references at the end of the book, some of the figures are confusing, and there are numerous typographical errors throughout the book; fortunately the majority of the errors are of the irritating rather than the perplexing variety. The quality of the binding could also stand some improvement; this reviewer's copy started to come apart before the book was half read. The assets of the book by far outweigh its deficiencies, however, and it should be regarded as "must reading" for anyone seriously interested in semiconductor surfaces.

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