

Book Reviews

Bonding, Energy Levels and Bands in Inorganic Solids, by J.A. Duffy, Longman Scientific and Technical, 1990, 249 pp., Paperback \$43.95. ISBN 0-582-03495-7.

The preface notes that inorganic chemistry is now moving in the direction of advanced materials in which the solid state as a thin film or vitreous form or as single crystals plays an important role. Nevertheless, inorganic chemistry has developed primarily in terms of problems of chemical bonding, and inorganic chemists tend to deal specifically with molecules or complex ions rather than with the solid state, which has been left more to physicists to investigate. This book therefore strives to present solid state chemistry to inorganic chemists to facilitate their understanding of these advanced materials.

The book is designed for the advanced undergraduate and for research workers beginning studies of inorganic solids. Early chapters deal with some of the basic spectroscopy, symmetry and bonding theory. The account is fairly general and reference to specific research work is largely absent. The author has also decided not to include a large number of references to the primary literature but there is a selection of books or review articles at the end of each chapter.

The book begins at a relatively low level with a discussion of spectroscopic terms, microstates, symmetry and character tables. This is presented in a fashion that is also covered in many other textbooks and one might question whether it was, in fact, necessary to repeat this basis here.

Chapter 2 presents the optical spectra of metal ions at a somewhat higher level, including the spectra of non-transition metal ions which are poorly covered in other texts, together with additional topics such as stimulated emission. This chapter includes solid state examples such as the spectra of thin films of metal halides.

Chapter 3 discusses polarizability, the application of polarized light, specular reflection, etc.

Chapter 4 moves into bonding with special emphasis on bonding in the solid state and the extension of simple ideas of bonding to band structures.

Chapter 5 takes simple ideas in charge transfer spectra and optical electronegativity and shows how these can be applied to the solid state and discusses, for example, the band gaps in semiconductors.

The remaining chapters deal with properties of the oxide ion, semiconductors, glasses and the magnetic properties of solids.

This is a very introductory book which deals with quite a large number of topics but at a relatively superficial level. It is a good primer for solid state

inorganic chemistry and could easily be the first book that a new researcher in the field reads before moving on to more sophisticated treatments. Overall, I believe the author has been successful in writing a text which will provide some basic ideas in the field and stimulate a thirst for further knowledge.

The Editor's Desk

Dioxygen Activation and Homogeneous Catalytic Oxidation, Proceedings of the 4th International Symposium in Hungary, (Studies in Surface Science and Catalysis, Vol. 66), edited by L.I. Simandi, Elsevier Science Publishers, Amsterdam, 1991, 700 pp., US \$225.50, Dfl.395.00. ISBN 0-444-88876-4.

This is the fourth of a series of conferences, the first of which took place in 1979 in France. There followed conferences in Italy in 1984 and in Japan in 1987. The book covers the invited lectures and the posters at the 1991 conference. Many of these are short articles such as might appear in the original journal literature. In general, however, they lack a detailed experimental section.

There are some 76 contributions included in this volume of 687 pages of text covering the activation of dioxygen in the selective oxidation of hydrocarbons, in biomimetic oxidations involving metalloporphyrins and their analogues, polyoxometalates and the synthesis and characterization of dioxygen complexes, etc.

Some of the articles, however, are more general and present a more detailed overview of the topic area. In particular, the following contributions are worthy of comment here: Selective functionalization of saturated hydrocarbons, by Barton and Doller; Catalytic oxidation of hydrocarbons, by Shilov; A perspective of catalytic oxidation, by Read; Selective oxidations with dioxygen catalyzed by ruthenium and rhodium complexes, by James; Biomimetic binding and activation of dioxygen with copper complexes, by Tyeklar and Karlin; Iron and cobalt induced activation of HOOH and of dioxygen, by Sawyer and co-workers; Electronic structural correlations of dioxygen binding of binuclear copper and cobalt complexes, by Solomon and co-workers; and An overview of industrial catalytic oxidations, by Sheldon.

Overall, this book presents a wide survey of topics of current interest in the field and is certainly worthy of purchase, not only for those specifically in the field of dioxygen activation, but also for those with an interest in the field of catalysis in general. The book is prepared as camera-ready copy and overall is well presented.

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