Book Reviews *

Polymer Science and Technology. By Joel R. Fried (University of Cincinnati). Prentice Hall: New Jersey. 1995. xiii + 509 pp. ISBN 0-13-685561-X.

Polymer Science and Technology is Prentice Hall's most recent offering in the field of introductory polymer science. The book is intended as an introductory text in polymer science and engineering for advanced undergraduates or graduate students not previously exposed to polymer science, and it covers the typical topics for texts of this genre. True to its intention, it does present this basic material from a chemical engineering perspective, stressing topics such as thermodynamics and constitutive approaches in its presentation. This does not make it inappropriate for use in the material science or other science and engineering curricula.

Unlike some of the current texts in this field, that are predominantly reference in character, this is a teacher's book. In most cases it provides a rather thoughtful development of the material so as to clearly illustrate a variety of general topics in polymer science. Although specific examples are used, the author focuses on the development of the general concepts rather than allowing the reader to glean these from a variety of specific examples. Given this focus, the book is lacking general descriptions of properties and applications of numerous classes of polymers compared to the more reference-oriented texts. However, this is mediated by a fairly well organized literature section following each chapter. This latter approach is more desirable in a class text as opposed to a reference book.

Given the age of many of the more common polymer science texts, it is proper that the author avails himself of the opportunity to include more recent developments in polymer science. More timely material that is handled reasonably in this book includes environmental issues, biotechnology, and electronic applications. This text provides a more comprehensive treatment of solution thermodynamics than any similar text. However, given the more modern focus of the book, some areas, such as gel permeation chromatography, are a bit sparse. As is typical of first editions, the supplied homework problems are adequate but not particularly interesting or illustrative.

The author fulfills his objective of providing a coherent text in polymer science from the chemical engineering perspective. It ranks among the best texts for introductory courses in polymer science from a teaching point of view. This book is not the kind of book one keeps on the shelf for reference information on specific polymer classes, but for a coherent review of the fundamental concepts in polymer science and engineering.

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Optical Properties of Metal Clusters. By Uwe Kreibig (I. Physikalisches Inst. der RWTH Aachen, Gmermany) and Michael Vollmer (Technische Physik Brandenburg, Germany). Springer: New York. 1994. xvii + 532 pp. $69.00. ISBN 0-387-57836-6.

This book gives a detailed and comprehensive overview of an important and rapid growing interdisciplinary field—metal cluster. The book contains four chapters: (1) Introduction, (2) Theoretical Considerations, (3) Experimental Methods, and (4) Experimental Results and Discussion.

Chapter 1 is a general survey of the book that provides readers with a clear picture of metal clusters and cluster matter. Here, the authors have done a good job by classifying metal clusters into three categories: very small clusters, small clusters, and large clusters. By doing so, the authors have unified terminology used in the field and made further theoretical treatment more concise.

Chapter 2 starts with the electrodynamic theory of large metal clusters. This is followed by a summary of the current quantum mechanic modes of small metal clusters. Then, the electrodynamic models of cluster matter are discussed with emphasis on the effective media theory and aggregated metal cluster complex. An important concept introduced by the authors is that the effective dielectric constant of a small metal cluster is not only a function of the frequency but also a function of its physical dimension.

Chapter 3 discusses a variety of experimental techniques used in the preparation and characterization of metal clusters. Detailed procedures are given for preparing metal clusters in gas phase, on surface, in solid matrix, and in solution. Most commonly used methods for cluster characterization are discussed including time of flight mass spectroscopy (TOF-MS), TEM, SEM, STM, electron diffraction, and X-ray absorption fine structure (EXAFS). The advantages and disadvantages of nondestructive and destructive optical spectroscopic techniques are also discussed.

Chapter 4 summarizes most important experimental results obtained before 1994. The authors have arranged the results in the same order as in Chapter 2: large metal clusters, small and very small metal clusters, and cluster matter. The classical electrodynamic treatment has been quite successful in predicting both resonance frequencies and line shapes of optical spectra of large metal clusters. For small and very small clusters, however, quantum theory must be applied.

Overall, this book provides the theoretical concepts, experimental methods, interesting results, and current status of the field of metal cluster. References are quite extensive (over 2000) through 1993. It is suitable for people in fields of metal thin films, colloid chemistry, heterogeneous catalysis, and, of course, cluster science. For students, it requires knowledge in electrodynamics and quantum mechanics.

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JA955378P

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Symmetry and Structure Readable Group Theory for Chemists, 2nd Edition. By S. F. A. Kettle (University of East Anglia, England). Wiley: New York. 1995. xii + 416 pp. $39.95. ISBN 0-471-95476-4.

This second edition of *Symmetry and Structure* builds on the foundation of the first edition and turns the complex and potentially difficult subject of group theory into an enjoyable and readable account of this major area of chemistry. By using a highly diagrammatical approach and demonstrating the physical principles involved in understanding group theory, this book provides a nonmathematical, yet thorough, treatment of this broad topic.

JA9553866

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Operator Algebraic Methods in Quantum Field Theory: A Series of Lectures. Edited by Hellmut Baumgartel (University of Potsdam, FRG). VCH: New York. 1995. 228 pp. $48.00. ISBN 3-05-501655-6.

This volume represents a series of lectures held from the summer of 1993 to the summer of 1994 at the Humboldt University of Berlin, Technical University of Berlin, and University of Potsdam. The book describes the important results of vacuum representations on the Minkowski space and studies the so-called DHR-superselection theory, first in the automorphism case and then in the general case. The constructions of the field algebra and the symmetry group are included. Vacuum representations on the unit sphere S^1 are also explored.

JA955389I

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Structure and Bonding 83: Iron-Sulphur Proteins/Perovskites. By I. Bertini, S. Ciurli, C. Luchinat, and W. J. A. Maaskant. Springer: New York. 1995. 100 pp. $78.00. ISBN 3-540-59105-2.

This volume contains chapters which discuss the electronic structures of FeS centers in protein and models with a contribution to the understanding of their electron transfer properties. There is also a discussion on helixes resulting from cooperative Jahn—Teller effects in hexagonal perovskites.

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*Unsigned book reviews are by the Book Review Editor.