J|A|C|S
BOOK REVIEWS

Non-Covalent Multi-Porphyrin Assemblies: Synthesis and Properties. Structure and Bonding, 121. Edited by Enzo Alessio (Università di Trieste, Italy). Series Edited by D. M. P. Mingos. Springer: Berlin, Heidelberg, New York. 2006. xi + 307 pp. $309.00. ISBN 3-540-32542-5.

This book presents an overview of the synthesis, structure, and properties of molecules obtained by connecting several porphyrins or metalloporphyrins through a variety of chemical linkages. This handsomely produced book gives the reader a broad introduction to this popular and important field. Much of the work encompassed in this area is inspired by the desire to obtain photochemically responsive molecules capable of mimicking various aspects of photosynthesis.

The initial chapter "Axial Coordination to Metalloporphyrins Leading to Multinuclear Assemblies" by Bouamaied et al. presents background information involving elementary aspects of axial ligand binding. This is an area that has seen decades of thorough study, and the authors merely give a quick overview of the area and then move on to demonstrate how axial ligation can be utilized to connect several porphyrins. In the second chapter, "Porphyrin Supramolecules by Self-Complementary Coordination", Kobuke reviews research inspired by the macrocyclic arrays found in photosynthetic reaction centers. Much of the work described here concerns molecules that are designed to self-associate into dimers or high oligomers through attachment of ligating units on the porphyrin periphery. Iengo et al. examine the utilization of metal ion coordination to ligating groups appended to the exterior of various porphyrins to form polyporphyrin containing species in the third chapter, "Metal-Mediated Multi-Porphyrin Discrete Assemblies and Their Photoinduced Properties", and Hupp narrows the focus to dimers and molecular squares obtained by joining peripherally modified porphyrins through *fac*-$Re(CO)_3Cl$ groups in the succeeding chapter, "Rhenium-Linked Multiporphyrin Assemblies: Synthesis and Properties". Chapter 5, "Thermodynamics of Metal-Mediated Assemblies of Porphyrins" by Ercolani, is an examination of the stabilities of acyclic, cyclic, and multicyclic systems with emphasis on the stabilities of these assemblies, and Chapter 6, "Porphyrin Rotaxanes and Catenanes: Copper (I)-Templated Synthesis and Photoinduced Processes" by Flamingni et al., is a description of the preparation and photoinducd behavior of both porphyrin-stoppered rotaxanes and porphyrin-containing catenanes. In the final chapter, "Multiporphyrin Arrays Assembled Through Hydrogen Bonding", Gunter reviews work where moieties capable of hydrogen bonding are placed in the *meso* positions of synthetic porphyrins and used to connect these porphyrins into larger arrays.

As with many edited volumes of this type, there is a certain amount of duplicate coverage of some topics. Also the focus is largely on the methods used to generate the multiporphyrin arrays, and in some cases less attention is given to the properties, other than the structural properties, of these arrays. This book can be recommended to readers interested in an up-to-date overview of the multiporphyrin arrays already synthesized, provided that these readers have access to a well-funded library.

Alan L. Balch, *University of California, Davis*

JA069775J
10.1021/ja069775j

Emissive Materials: Nanomaterials. Advances in Polymer Science, 199 Springer: Berlin, Heidelberg, New York. 2006. x + 290pp. $279.00. ISBN 3-540-31250-1.

This review book, although uneven, will play a role in guiding scientists who are thinking about working in the fields generally lumped together as "emissive nanomaterials". It is carefully referenced, and each of the four chapters includes a long list of abbreviations used therein, which should make it easier for student use. It is appropriate for acquisition by libraries.

The first chapter is entitled "Polyphenylene-type Emissive Materials: Poly(para-phenylene)s, Polyfluorenes and Ladder Polymers" by Grimsdale and Müllen. Polyphenylenes have been around long enough to warrant a chapter on their emissive properties only. This chapter is exhaustive in its coverage of the topic, although it is a bit too much of a "synthetic catalog" to be as instructive as it could be. More than 300 references are cited, and this, in itself, is a valuable service.

The second chapter, "Spiro Compounds for Organic Electroluminescence and Related Applications" by Pudzich et al., gives fundamental synthetic approaches to the different classes of spiro compounds and their functionalization. Anyone interested in using spiro compounds in various applications, such as in electroluminescent devices or solar cells, might find it helpful to read this chapter. The general optical properties and electrochemical properties of the compounds discussed are quite useful, and those interested in the developing research concerning these compounds would be well served by reading this chapter.

Chapter 3, "Charge Transport and Catalysis by Molecules Confined in Polymeric Materials and Application to Future Nanodevices for Energy Conversion" by Yagi and Kaneko, is relatively short and has more mechanistic detail than the other chapters, which may make it the most useful. Polymeric materials confining functional molecules *sic* are promising in the design of solar cells, fuel cells, and artificial synthetic devices. Charge transport and catalysis are both reviewed. The authors then deal with each of the applications of these materials and provide numerous first-reading references.

The final chapter by Jang covers "Conducting Polymer Nanomaterials and Their Applications". Nanomaterials with different properties from those of bulk materials have been paid considerable attention by scientific researchers, and conducting polymers have been widely applied. In contrast, the preparations and applications of conductive polymeric nanomaterials have

Unsigned book reviews are by the Book Review Editor.

been relatively unexploited. This review provides general information on recent achievements in the fabrication and application of conducting nanomaterials. The author focuses especially on the following five conducting polymers: polypyrrole (PPy), polyaniline (PANI), polythiophene (PT), poly(3,4-ethyelenedioxythiophene) (PEDOT), and poly(*p*-phenylene vinylene) (PPV). These were selected for discussion to illuminate the fabrication of conducting polymer nanomaterials in detail. The methods termed "soft template", "hard template", and "template free" are described. For each conducting polymer, nanoparticles as core−shell nanomaterials, hollow nanospheres, nanofibers, nanotubes, nanopatterns, and nanocomposites are introduced. The figures, schemes, and images make the concepts easy to understand. Because conducting polymer nanomaterials is a novel research area, it is difficult to cover all of the fields in a single chapter. Therefore, the reader may not get the full impact of the research in this area from this offering. Nevertheless, this chapter is a good introduction to the field.

This book is generally useful and could be an important addition for most research university libraries. Given that the field is emerging, one must continue to watch developments closely.

D. C. Neckers, *Bowling Green State University*

JA069780N

10.1021/ja069780n

A Guide to Chalcogen−Nitrogen Chemistry. By Tristram Chivers (University of Calgary, Canada). World Scientific: New Jersey, London, Singapore. 2005. xx + 318 pp. $86.00. ISBN 981-256-095-5.

A Guide to Chalcogen−Nitrogen Chemistry is a detailed account of the preparation, structure and bonding, and physical properties of N−S/Se/Te compounds. The book focuses on complexes in which the number of heteroatoms is greater than the number of nonperipheral carbon atoms, and it is divided into 15 chapters, each of which details one aspect of this area of chemistry. They thus range in length from a few pages to approximately 20, and each chapter is nicely prefaced with an outline of the chemistry contained therein. The preliminary chapters provide an overview of nitrogen−chalcogen bond formation, the physical characterization methods used, and the electronic structures of nitrogen−chalcogen complexes. Later chapters offer details of specific areas of N−S/Se/Te chemistry, including those of binary systems, chalcogen−nitrogen−halides and chalcogen−nitrogen−oxides, metal complexes, cyclic carbon−nitrogen−chalcogen compounds, and the materials chemistry of paramagnetic cyclic systems. There is also a chapter devoted to chains and polymeric materials. The strength of these chapters is that they each provide a useful, comprehensive listing of reactions. Although the survey is comprehensive, some details that are likely to be important for less experienced researchers are not included in this book; e.g., there is no introductory material on polymer chemistry before the discussion of the chemistry of $(SN)_x$ and related polymers.

Although each chapter is designed to be self-contained, there is detailed cross-referencing between them. The book contains several hundred references through 2004 with ~15% of them from 2000 and beyond. This number reflects the rapid development in the field of S−N chemistry in the 1980s and 1990s. References are conveniently located at the end of each chapter, although cross-referenced material is generally cited in one location. Only occasionally is general material presented without a representative reference.

The text is virtually free of typographical errors, and the diagrams of the chemical structures, schemes, and virtually every figure have been produced by the author, which results in homogeneity among all chapters. In the same vein, the roughly equal length of each chapter gives a good balance to the reader. Although no comprehensive formula index is provided, the focused nature of the chapters together with an adequate subject index makes finding particular compounds relatively easy.

The publisher indicates that this book is meant for "scientists interested in the chemistry of sulfur, selenium or tellurium compounds, and upper level undergraduates in inorganic (main group) chemistry courses". In this respect, the introductory chapters will be of significant interest to the latter group as well as to graduate students. Here, background information is provided to explain the general electronic, structural properties, and reactivity patterns of these systems. The comprehensive listing of reactions and reaction types found in the later chapters will be of more benefit to specialists in the arena of main group chemistry. This modestly priced resource should be a welcome addition to researchers in the field or to those interested in entering the area.

John F. Corrigan, *The University of Western Ontario*

JA069834T

10.1021/ja069834t

Principles of Protein X-Ray Crystallography, 3rd Edition. By Jan Drenth (University of Groningen, The Netherlands). With a major contribution from Jeroen Mester (University of Lübeck, Germany). Springer Science + Business Media LLC: New York. 2007. xiv + 332 pp. $89.95. ISBN 0-387-33334-7.

Protein crystallography is a mainstay of the field that has come to be called structural biology. Its impact remains very high in all areas of biological sciences, a fact recently alluded to in *Science* (*Science* **2007**, *315*, 40−41). Protein crystallography was once a very specialized discipline. The practitioners were professionals dedicated to the science and trained in what was viewed as an arcane methodology. Today, crystallography is widespread in academia and industry. It has become quite common that a laboratory interested in the biochemistry or biology of a particular macromolecular system will want to solve a protein structure, as a one-off occurrence, for that program. My own institution has four professional structural biology laboratories, but there are at least a half dozen other groups working with us on particular structural problems. The significance of protein crystallography to the biological sciences and the changing landscape of practitioners raise the question about textbooks on the subject: What resources exist for professional and more casual users?

For many years *Protein Crystallography* by Blundell and Johnson was the definitive text, but this book has not been updated since its release in 1976 and does not address many modern techniques in the field. Since then a number of more compact books have been released. Some, like *Practical Protein Crystallography* by McRee, are very applied and might not be suitable as classroom texts. *Crystallography Made Crystal Clear: A Guide for Users of Macromolecular Models* by Rhodes is aimed at users of structural biology who are primarily interested in analyzing protein structures but want a basic understanding of where these structures come from. This book, *Principles of Protein X-ray Crystallography*, aims to satisfy nearly everyone; it is rigorous enough for professionals but still accessible to those with a more casual interest. The third edition has been aimed at keeping pace with the latest developments in the field.

This volume is well organized. It begins with a discussion of crystal growth (Chapter 1) and then moves toward the topic of crystal symmetry (Chapter 3). The theory of X-ray scattering (Chapter 4) is discussed before the solution of the phase problem is described (Chapter 7). More advanced topics like phase improvement, anomalous scattering, and molecular replacement are then developed, building as they should on the phasing fundamentals. Some chapters are more specialized, like Chapters 5 and 6, which deal with intensity distributions and special form factors. These are short and can be read by hard-core crystallographers but can be easily skipped over by more casual readers interested in the general problems and methods of the field. This third edition also brings the reader up to the state-of-the-art in solving macromolecular structures. Drenth discusses the theory and practice of multiple wavelength anomalous diffraction (MAD), which is so commonly used today, particularly with selenomethionine derivatives. The book also has chapters on direct methods for protein work and on Laue diffraction for time-resolved crystallography. In short, *Principles of Protein X-ray Crystallography* covers all the topics that would be of interest to casual users or professional practitioners of the art.

Although content is significant, it is also important that the information in a book be easily accessible to its readers. Drenth seems to take pains to be clear in his exposition. He has a conversational style and often initiates a section by asking leading questions to begin an engagement with the reader. In spite of these efforts, however, the book can be faulted slightly on its clarity. This generally occurs when steps are implied, rather than explicitly stated, in mathematical segments. For example, a key idea in crystallography is the development of Bragg's law in reciprocal space. Drenth generally did well in setting up and explaining the main ideas, but the proof could have been better. He uses the common Ewald sphere construction (Figure 4.19), but it is pedagogically incomplete. Traditionally the figure contains a point where the X-ray beam enters the sphere. This creates a right triangle inscribed in a semicircle, and the obvious geometry of that figure leads easily to Bragg's law. Without this construction, and putting myself in the mind of a new student, I found it necessary to sketch in the missing point and work out the trigonometry in the book margin to understand the derivation.

In summary, this is a solid book by an experienced protein crystallographer. It covers the full spectrum of subjects for a professional structural biologist. Specialized subjects are kept in separate chapters so the book can be parsed by those interested in the big picture of the method. Our laboratory has several copies of earlier editions of this useful book for reference by students and researchers. The book could be made somewhat clearer by filling in skipped steps in some of the mathematical derivations, although this would make it a bit longer. Even so, it is probably the most definitive work that is currently available for structural biologists.

Jon Robertus, *University of Texas at Austin*

JA076922K

10.1021/ja076922k

Computer Simulations in Condensed Matter: From Materials to Chemical Biology - Volume 1. Edited by Mauro Ferrario (Università di Modena e Reggio Emilia, Modena, Italy), Giovanni Ciccotti (Università di Roma La Sapienza, Rome, Italy), and Kurt Binder (Universität Mainz, Germany). Springer: Berlin, Heidelberg, New York. 2006. xvi + 712 pp. $99.00. ISBN 978-3-540-35270-9.

The two volumes chronicle the lectures given in a two-week period at the Ettore Majorana Foundation and Center for Scientific Culture in Erice, Sicily in July 2005. The goal of the lectures was to provide a current overview of technical advances of computer simulation methods and their application in condensed matter systems. Volume 1 covers a variety of computational techniques for statistical mechanical systems, while Volume 2 is "a state-of-the-art survey on numerical experiments carried out for a great number of systems, ranging from materials sciences to chemical biology, such as supercooled liquids, spin glasses, colloids, polymers, liquid crystals, biological membranes and folding proteins", to quote from the back cover. Although the books are sold separately and not as a set, each lists the Table of Contents of the other. Only one subject index is provided for each volume.

JA0769189

10.1021/ja0769189

Computer Simulations in Condensed Matter: From Materials to Chemical Biology - Volume 2. Edited by Mauro Ferrario (Università di Modena e Reggio Emilia, Modena, Italy), Giovanni Ciccotti (Università di Roma La Sapienza, Rome, Italy), and Kurt Binder (Universität Mainz, Germany). Springer: Berlin, Heidelberg, New York. 2006. xvi + 598 pp. $99.00. ISBN 978-3-540-35283-9.

The two volumes chronicle the lectures given in a two-week period at the Ettore Majorana Foundation and Center for Scientific Culture in Erice, Sicily in July 2005. The goal of the lectures was to provide a current overview of technical advances of computer simulation methods and their application in condensed matter systems. Volume 2 is "a state-of-the-art survey on numerical experiments carried out for a great number of systems, ranging from materials sciences to chemical biology, such as supercooled liquids, spin glasses, colloids, polymers, liquid crystals, biological membranes and folding proteins", to quote from the back cover, while Volume 1 covers a variety of computational techniques for statistical mechanical systems. Although the books are sold separately and not as a set, each lists the Table of Contents of the other. Only one subject index is provided for each volume.

JA0769191

10.1021/ja0769191

Degenerative Transfer Processes. An author and a subject index complete the book.

JA076932L

10.1021/ja076932l

Controlled/Living Radical Polymerization: From Synthesis to Materials, ACS Symposium Series 944. Edited by Krzysztof Matyjaszewski (Carnegie Mellon University, Pittsburgh, PA). American Chemical Society: Washington, DC (distributed by Oxford University Press). 2006. xvi + 672 pp. $199.50. ISBN 0-8412-3991-6.

This book is a collection of many of the reviews and papers presented at the ACS symposium “Advances in Controlled/Living Radical Polymerization” held in Washington, DC in Fall, 2005. The first chapter is an overview of the state-of-the-art in the field in 2005, and the remaining chapters are grouped into the following thematic areas: Atom Transfer Radical Polymerization Mechanisms and Materials; Nitroxide Mediated Polymerization and Other Stable Free Radical Polymerization; and Reversible Addition Fragmentation Chain Transfer and Other

Film Formation: Process and Morphology. ACS Symposium Series 941. Edited by Theodore Provder (Eastern Michigan University, Ypsilanti, MI). American Chemical Society: Washington, DC (distributed by Oxford University Press). 2006. xii + 184 pp. $154.50. ISBN 0-8412-3961-4.

This book, which is part of the ACS Symposium series, features 11 chapters on the kinetics and mechanism of film formation and the resulting morphologies. The first five chapters concern “Kinetics and Mechanism”, whereas the remaining six cover “Morphology Characterization, Novel Morphologies, and Film Structures”. An author and a subject index complete the book.

JA076931T

10.1021/ja076931t