Book Review

Chemical Biology: From Small Molecules to Systems Biology and Drug Design, Volumes 1–3 Edited by Stuart L. Schreiber (Harvard University, Cambridge, MA), Tarun M. Kapoor (Rockefeller University, New York, NY), and Günther Wess (GSF-Forschungszentrum für Umwelt und Gesundheit, Neuherberg, Germany). Wiley-VCH Verlag GmbH & Co. KGaA: Weinheim. 2007. 1280 pp. $625. ISBN 978-3-527-31150-7.

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Photofunctional Transition Metal Complexes. Structure and Bonding, 123. Edited by Vivian W. W. Yam (The University of Hong Kong). Series edited by D. Michael P. Mingos. Springer: Berlin, Heidelberg, New York. 2007 xii + 260 pp. $249.00. ISBN 978-3-540-36809-0.

This volume contains reports on the promise of exploiting the rich spectroscopy, photophysics, and architectures of transition metal complexes to produce useful materials and molecular devices. The field is far too broad to be reviewed in a single volume, so this book is a collection of six well-illustrated, independent chapters devoted to relevant subtopics. Each chapter is well-referenced, with ~40% of the references from 2002 and beyond. A three-page index and the traditional *Structure and Bonding* outline at the beginning of each chapter allow for easy navigation.

The volume begins with a timely and very thoughtfully prepared overview of luminescent two-coordinate gold(I) complexes, and both newcomers and mainstays to the field will appreciate the effort made to identify fertile ground for further investigation. Chapter 2 is more narrowly focused and mostly devoted to iridium(III)-based molecules for photoinduced charge separation; the last third of this chapter is a description of the ligand photodissociation reactions of ruthenium(II)-complexed rotaxanes and catenanes, as well as the implications of this chemistry for the development of light-driven molecular machines. Chapter 3 is an excellent review of photoswitches that are composed of an organic photochromic ligand bonded to a metal center. Particular emphasis is given to the elucidation of the interactions between the photochromic unit and the metal. Chapter 4 is nearly twice as long as the others and could have been split into two. The first half summarizes progress in dye-sensitized solar cell research, and readers who are familiar with other recent reviews in this area will recognize similarities. The second half provides an interesting perspective on cationic and anionic iridium(III) complexes for light-emitting devices. Chapter 5 is a timely update on the use of photoactive metal-diimine molecular wires to probe the conformational states and substrate binding of cytochromes P450 and nitric oxide synthase, as well as to develop highly selective sensors for these enzymes. The final chapter provides a much broader survey of luminescent metal complexes that are useful as probes of proteins or that can be covalently attached to oligonucleotides or proteins.

Overall, this collection of reviews is best suited to specialists, because it delivers less on the fundamentals of luminescent transition metal complexes and more on the exciting developments in selected areas. The emphasis on d^6-electron complexes will be useful to some researchers, but there is no otherwise prevailing sense of continuity across chapters, and many readers are likely to consult this volume in search of a specific high-quality review. In this respect, the volume clearly succeeds by providing up-to-date information on a range of important subtopics in a clear manner that may be expected to inspire new directions in photofunctional inorganic chemistry.

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Chemical Biology: From Small Molecules to Systems Biology and Drug Design, Volumes 1−3. Edited by Stuart L. Schreiber (Harvard University, Cambridge, MA), Tarun M. Kapoor (Rockefeller University, New York, NY), and Günther Wess (GSF-Forschungszentrum für Umwelt und Gesundheit, Neuherberg, Germany). Wiley-VCH Verlag GmbH & Co. KGaA: Weinheim. 2007. 1280 pp. $625. ISBN 978-3-527-31150-7.

Small molecules constitute the core of chemical biology. This emerging field is defined by its use of such molecules to study, perturb, modify, and control biological systems. Chemical biologists seek to understand the natural world from a molecular perspective, applying combinations of techniques from molecular and systems biology, biochemistry, and synthetic chemistry to study biological phenomena. By drawing from the collective experience of scientists from a variety of different disciplines, research in the field of chemical biology exemplifies the power of interdisciplinary approaches to science. Such pioneering efforts in the field are being carried out in both the academic and industrial sectors. The three-volume set *Chemical Biology: From Small Molecules to Systems Biology and Drug Design* is a compilation of contributions from a number of experts, all lending their expertise to develop a full picture of this burgeoning field.

Chemical Biology sets out to "reveal the many ways in which chemical biologists' studies of small molecules in the context of living systems are transforming science and society" (xv). The series accomplishes this task by providing truly comprehensive coverage of the field. Topics in the publication range from the control of transcription to protein−ligand interactions to chemical informatics. Topics are approached from different angles: the focus of the subsections ranges from providing a detailed overview of a key concept, for example, Tan's chapter on diversity-oriented synthesis, to instructive lessons on the application of a technique, such as Peralta−Yahya and Cornish's chapter on chemical complementation, to specific case studies of successful research efforts, including the biarsenical-tetracysteine protein tag presented by Adams. In all cases, the text is meant for an audience relatively well educated in molecular biology and at least the basics of organic chemistry. While expertise is not a prerequisite, background material is often presented as a reminder to those familiar with the general topic and not as a tutorial for the unfamiliar. Exceptions to this rule include Clemons's chapter on chemical informatics that, while providing detailed information from the cutting edge of the field, also serves as a useful introduction to those inexperienced in the area.

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The scope of this work, like the field of chemical biology itself, is broad. Editors Schreiber, Kapoor, and Wess have assembled almost 40 contributions from authors in both academia and industry hailing from three continents and representing the frontiers of chemical biology. The diversity of this group of authors echoes the diversity of the field as a whole. Their contributions are organized among six substantive parts: "Using Small Molecules to Explore Biology," "Discovering Small Molecule Probes for Biological Mechanisms," "Expanding the Scope of Chemical Synthesis," "Chemical Informatics," "Drug Discovery," and "Systems Biology", which are unfortunately misnamed in the Contents section. This categorization is a bit loose, as many early chapters cover comprehensive topics that could easily be included under more than one heading. Many of the chapters and subsections can stand on their own as expert treatises on a specific topic of interest. Most fall within the range of 15−30 pages, and creatively written accounts—a good example is Nestler's presentation of protein target families—are simultaneously informative and easy to read. Many, including Clackson's chapter on the control of protein−protein interactions, contain instructive figures that complement the text and enhance the technical understanding of the nonexpert.

Because the book is a compilation of contributions from many different authors with their own unique styles, the text does contain some inconsistencies in style and redundancies. The level of detail varies from one chapter to the other, and while all contributions give a topic its full due, some are more painstaking in their coverage of the literature than are others. Transitions between chapters are often abrupt, and not all authors provide the useful "Outlook" and "Conclusions" sections found in the most thorough sections. Most notably, key subjects are sometimes repeated in detail in more than one chapter. However, Francis' chapter on bioconjugation, for example, avoids the redundancy pitfall by integrating well the subject at hand with other contributions in the volume.

The diversity of its namesake field is recognized and embraced in *Chemical Biology*, which provides a comprehensive demonstration of the utility of the field to science and society. Its references are timely and complete, and its list of authors is first-rate. The text as a whole gives a thorough picture of the field and would be a welcome addition to the libraries of chemical biologists from the graduate level and up in both academic and industrial settings.

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Vanadium: The Versatile Metal. ACS Symposium Series 974. Edited by Kenneth Kustin (Brandeis University), João Costa Pessoa (IST-Technical University of Lisboa), and Debbie C. Crans (Colorado State University). American Chemical Society: Washington, D.C. (distributed by Oxford University Press). 2007. xliv + 448 pp. $175. ISBN 978-0-8412-7446-4.

This book was developed from the 5th International Symposium on the Chemistry and Biological Chemistry of Vanadium held in September, 2006. Its 30 chapters are grouped under the following headings: Vanadium Catalysis of Synthesis: Organic Compounds and Polymers; Insulin-Enhancing Agents: Compound Design and Mechanism of Action; Haloperoxidases: Mechanism and Model Studies; Enzymology, Toxicology, and Transport; Coordination Chemistry: Speciation and Structure; and New Materials and Processes. An author and subject index complete the book.

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