J|A|C|S
BOOK REVIEWS

Medicinal Chemistry of Bioactive Natural Products. Edited by Xiao-Tian Liang and Wei-Shuo Fang (Chinese Academy of Medical Sciences, Beijing, China). John Wiley & Sons, Inc.: Hoboken, NJ, 2006. xx + 460 pp. $89.95. ISBN 0-471-66007-8.

I can vividly imagine the exploding tape recorder, which presumably follows the assignment of reviewing the broad subject described in *Medicinal Chemistry of Bioactive Natural Products* in one 460-page text. Similarly "if I chose to accept the mission," I would choose to recruit some help, which is exactly what the editors, Liang and Fang, decided to do. Still the task would be too daunting, and thus the area of coverage would need to be further minimized. To accomplish this mission, they assembled a team of approximately 20 experts in the field to help them write 10 reviews in the area. The editors chose as both an organizing and simplifying principle to cover only a limited number of natural products: epothilones, taxols, huperzines, artemisinins, cembranoids, ginkgolides, acetogenins and two types of anti-HIV coumarins, the calanolides, and kellactones. So, if your natural product is not listed, you might be disappointed. Although this list of 10 classes of natural products cannot presume to be comprehensive, it does cover a range of maladies, e.g., cancer, Alzheimer's, malaria, and AIDS. I was particularly delighted to see how the text showed the strong role that synthesis plays in each of these studies. In conclusion, I can imagine this book being used in an interdisciplinary graduate level course, although the most likely use of this book is as a reference text. It is, certainly, priced right for either need.

George A. O'Doherty, *West Virginia University*

JA069731A

10.1021/ja069731a

Organometallics. Third, Completely Revised and Extended Edition. By Christoph Elschenbroich (Philipps-Universität Marburg). Wiley-VCH Verlag GmbH & Co. KgaA: Weinheim. 2006. xvi + 804 pp. $95.00. ISBN 3-527-29390-6.

"Nobel Prizes awarded to six leading organometallic chemists during the last decade attest" to the tremendous growth and importance of organometallics in the chemical sciences. From this leading phrase in the Preface, the Third Edition of Organometallics launches into a comprehensive, in-depth, up-to-date analysis of the field. All aspects of organometallic chemistry including synthesis, characterization, theory, and contemporary applications are covered. Each topic is clearly presented and extensively supplemented with structures, equations, catalytic cycles, and spectra. Designed to quickly bring novices up-to-speed quickly while refreshing important concepts even the most-experienced practitioner will appreciate, this highly readable text does a superb job at targeting a broad audience.

The book is divided into three main sections: Introduction, Main-Group Organometallics, and Organometallic Compounds of the Transition Metals. The first immediately grabs the reader's attention by chronologically listing major milestones in organometallic chemistry. Ranging from "the cradle of organometallic chemistry" ("Cadet's fuming liquid" in 1760) to the 2005 Nobel Prize in Chemistry, over 75 major advances in the field are noted along with their respective discoverers. This listing is followed by chapters on the fundamental considerations, electronegativity, polarity, reactivity, etc., of a generic metal−carbon bond, intended to provide beginners with a global perspective and solid background for learning more advanced topics.

The section on Main-Group Organometallics covers organometallic compounds formed between carbon and select members of groups 1, 2, and 11−16 in the periodic table. Each chapter is well organized according to the preparation, structure, and reactivity of these compounds. The author does an excellent job of distilling information so the reader can quickly assimilate important concepts. The syntheses include important details, such as solvents, temperatures, reaction time scales, and even color changes, but are acutely moderated to prevent overload and distraction. When combined with the first chapter of this section which surveys the various methods available to prepare organometallic compounds, this book may also function as a valuable reference for the synthetic bench chemist. Another strength is the extensive use of actual examples from the literature, including names of contributors and the year reported. This gives the reader the ability to see the progression of a certain area and then anticipate the next advance. The text also strategically places interesting discussions on relevant controversies, e.g., the character of gallium-metal bonds, and/or applications, e.g., olefin polymerizations using Al/Ti catalysts, that keep the reader tuned to the chapter's main points.

The third section covers organometallic compounds formed between carbon and the transition metals. The introductory chapter to this section gives an excellent overview of the "18-electron rule" and terminology regarding metal-catalyzed processes. This provides the reader with a working knowledge of the elementary steps involved in organometallic-mediated reactions, many of which are beginning to dominate synthetic organic chemistry. The background knowledge serves as a basis for the following in-depth discussions and theory regarding various classes of ligands used to coordinate to transition metals, i.e., σ-donor, σ-donor/π-acceptor, and σ,π-donor/π-acceptor. Attention is directed toward key orbital interactions, structure, kinetics, thermodynamics, and their collective implications on compound reactivity and stability. After short chapters on metal−metal bonding, transition metal clusters, lanthanoids and actinoids relevant to organometallic chemistry, the book concludes with an overview of the utility of organometallics in productive catalysis. Every major process is presented from an organometallic perspective; i.e., catalytic cycles are extensively used, which includes not only state-of-the-art C−C and C-

Unsigned book reviews are by the Book Review Editor.

heteroatom coupling reactions, aminations, oxidations, and isomerizations but also industrial scale reactions and polymerizations. The author does an outstanding job at pointing out which areas are in need of development and alludes to where the next breakthrough may come (as a testament, the cover shows a metal−CH_4 σ-complex as a graphical prelude to C−H activation).

Although the text is historically oriented, the book is timely and the appendix organizes nearly 1000 of the most important up-to-date references by chapter. The appendix also contains short discussions of redox reagents for organometallic synthesis, rules regarding the naming of organometallic compounds, and supplemental citations where the reader may look for additional information. Other strengths of this book are the twelve "excursions" that are offered throughout the text. These sidebars contain useful and fascinating accounts of areas at the frontier of organometallic chemistry including biological relevance, e.g., Excursion 4: Organomercury Compounds in vivo; spectroscopy, e.g., Excursion 6: ^{119}Sn Mössbauer and ^{119}Sn NMR Spectroscopy; and theory, e.g., Excursion 7: Can the VSEPR concept be applied to transition-metal complexes?

This 800+ page edition should be the book of choice when looking to gain knowledge in the field of organometallic chemistry. Combined with its attractive price, it deserves strong consideration as a valued addition to personal and professional collections.

Christopher W. Bielawski, *The University of Texas at Austin*

JA069735F

10.1021/ja069735f

Polymer Analysis, Polymer Theory. Advances in Polymer Science, 182 With Contributions. By S. Anantawaraskul, H. Aoki, A. Blumen, A. A. Gurtovenko, H. Hillborg, S. Ito, H. Schönherr, J. B. P. Soares, G. J. Vancso, and P. M. Wood-Adams. Springer: Berlin, Heidelberg, New York. 2005. x + 308 pp. $269.00. ISBN 3-540-25548-6.

This volume is divided into four sections, each treating particular approaches to the characterization of polymers. The first considers the fractionation of semicrystalline polymers using two techniques: crystallization analysis fractionation (Crystaf) and the more common temperature-rising elution fractionation (TREF). TREF has been very useful for the analysis of poly(olefin) structures, particularly for ethylene/α-olefin copolymers, and the utilization of both techniques in this area is demonstrated. For TREF analysis, the polymer is slowly precipitated at the top of a column filled with an inert packing material. Pure solvent is then passed through the column as the temperature is increased. Polymer is eluted as a function of temperature of dissolution, i.e., from lower to higher crystallizability. The copolymer chemical composition and tacticity can be obtained from the TREF profile using a calibration curve. Crystallization analysis fractionation is also based on the relative crystallizabilities of polymer components and yields results similar to those obtained from TREF. It tends to be less time-consuming than TREF since it involves only the crystallization step. In this case, homogeneous solutions of the polymer are cooled at a very slow, constant rate. Polymer components with the highest crystallizabilities precipitate first at higher temperatures. The solution concentration may be monitored continuously as a function of temperature to generate the Crystaf profile.

A second section deals with the characterization of polymer surfaces using atomic force microscopy (AFM). AFM and other complementary imaging techniques have become hugely important in nanotechnology. Developments are still occurring rapidly, but the technique is becoming much more reliable and almost routine in some areas. An ability to probe and understand polymer surface properties is crucial in many applications, e.g., coatings, adhesives, etc. AFM with chemically functionalized tips—chemical force microscopy—permits the mapping of chemically distinct functionality. The section ends with a brief description of several complementary spectroscopic methods for surface imaging.

The third section is a discussion of nanoimaging of polymers by optical microscopy methods, namely laser scanning confocal microscopy and scanning near-field optical microscopy. These techniques have extended the application range of optical microscopy to nanometer dimensions and are particularly appropriate for the examination of polymer morphology, e.g., phase-separated structures of polymer blends, conformational characteristics of a single polymer chain, and two-dimensional ultrathin polymer films. The applications of these techniques have been greatly expanded over the past decade. Resolution and sensitivity have continuously improved as have methods of sample preparation to permit full utilization of a particular technique.

The fourth section has as a focus the modeling of polymer dynamics. In particular, the use of generalized Gaussian structures to deduce the relationship between the topology of a polymer and its dynamics is emphasized. This approach has been applied to a wide range of structures including dendritic polymers. Although the approach has several limitations, it nonetheless permits valuable insights and analytical solutions to dynamical problems even for complex polymer architectures.

Although the four sections are not equally thorough, all provide an overview of the particular area and should be helpful to those new to the field as well as to current practitioners. All four sections contain listings of numerous references. Many are citations of recent work and will allow those interested in a particular technique to quickly gain access to the most important reports.

Bob A. Howell, *Central Michigan University*

JA0598863

10.1021/ja0598863

Vibrational Spectroscopy of Biological and Polymeric Materials. Edited by Vasilis G. Gregoriou (Foundation of Research and Technology, Hellas, Greece) and Mark S. Braiman (Syracuse University, New York, USA). CRC Press/Taylor and Francis Group: Boca Raton, FL. 2006. xvi + 430 pp. $139.95. ISBN 1-57444-539-1.

As the title suggests, this book provides an overview of selected topics within the broad area of vibrational spectroscopy. It manages to stand out from most compiled texts consisting of contributions from many different authors by having instru

mentation as the cohesive thread connecting the chapters. Emerging topics that are covered in significant detail include chapters on FTIR of surface films and oriented materials by Hasegawa et al. and Gregoriou et al., 2D correlation techniques in FTIR by Ozaki and Šašić, instrumentation for Raman and FTIR microscopy by Bhargava et al., chiral vibrational circular dichroism by Keiderling et al., and time-resolved FTIR by step-scan methods by Braiman and Xiao. Other sections include the characterization of materials by Raman spectroscopy by Galiotis and Parthenios and ligand/substrate protein binding by FTIR by Baenziger et al.

The editors indicated a desire to "give thorough experimental detail, and not just to document recent instrumentation advances". They have largely succeeded in this endeavor, with several of the contributions providing detailed descriptions of instrumentation and the specific requirements of operation. For example, the lengthy discussion by Braiman and Xiao on signal-to-noise issues in step-scan FTIR measurements is a thing of beauty and should be required reading for anyone considering time-resolved measurements by FTIR. Additionally, the discussion of surface infrared absorbance measurements provided an excellent introduction to the field, with well-balanced discussions of the different methods currently used for ultrathin film characterization at metallic and dielectric interfaces. Similarly, the discussion on infrared and Raman microscopy provided a fair and comprehensive overview of recent instrumental advances.

As in the overwhelming majority of edited volumes, the contributions are designed primarily to provide a snapshot of the state-of-the-art in a field of study. In this respect, the choice of topics and contributors does justice to recent advances in the area, with most of the contributions focusing on emerging methods within the past decade. On the downside, virtually all of the references in the book are to papers published before 2001, such that very recent advances are not as well represented. Nevertheless, most of the material is sufficiently timeless that the absence of recent citations is not particularly detrimental.

Garth J. Simpson, *Purdue University*

JA069721+

10.1021/ja069721+

Recent Advances in the Theory of Chemical and Physical Systems. Progress in Theoretical Chemistry and Physics, Volume 15. Edited by Jean-Pierre Julien (CNRS and UJF, Grenoble, France), Jean Maruani (CNRS and UPMC, Paris, France), Didier Mayou (CNRS and UJF, Grenoble), Stephen Wilson (Rutherford Appleton Laboratory, Oxfordshire, UK), and Gerardo Delgado-Barrio (CSIC, Madrid, Spain). Springer: Dordrecht. 2006. xii + 592 pp. $179.00. ISBN 1-4020-4527-1.

This book was developed from the proceedings of the 9th European Workshop on Quantum Systems in Chemistry and Physics, held in Les Houches, France in September 2004. There are 26 chapters, which are organized into the following four sections: Quantum Chemical Methods; Relativistic and Heavy-Element Systems; Complexes and Clusters; and Complex Systems. A subject index completes the book.

JA069765I

10.1021/ja069765i

Radiative Decay Engineering. Topics in Fluorescence Spectroscopy, Volume 8. Edited by Chris D. Geddes (University of Maryland Biotechnology Institute, Baltimore, MD) and Joseph R. Lakowicz (University of Maryland School of Medicine, Baltimore, MD). Springer: New York. 2005. xviii + 458 pp. $149.00. ISBN 0-387-22662-1.

In contrast to the free-space emission properties of fluorophores, modification of the photonic mode density in proximity to a conducting metallic surface or nanostructure (up to 200 nm) affords the opportunity to modulate the radiative decay rate of a fluorophore, frequently with useful changes in its emission characteristics including high directionality, increased rates of excitation, and higher photostability, quantum yield, multiphoton excitation, and resonance energy transfer efficiency, to name a few. Based on the title, one would expect *Radiative Decay Engineering*, the eighth volume in the authoritative *Topics in Fluorescence Spectroscopy* series, to delve into the exciting, emerging, and growing applications of radiative decay engineering. Sadly, the book does not remain true to this objective, as this topic is not the focus throughout. To all prospective buyers, this reviewer issues this important caveat: only the closing two chapters contributed by the editors themselves and two, or perhaps three, additional chapters can reasonably be considered to fall topically under the title of the book. Indeed, not a minor cavil, the term "fluorescence" itself is not even mentioned in the majority of its chapters, an unfortunate observation for a volume housed in the *Topics in Fluorescence Spectroscopy* series. Notwithstanding this major criticism, however, the editors have succeeded in producing a timely and interesting compilation of chapters written by experts in their respective areas and in providing excellent historical perspective and technological breadth to important current strategies and applications within the emerging field of *plasmonics*. Indeed, plasmonics, a closely related area that carries ever-increasing importance in biotechnology and chemosensing, encompasses radiative decay engineering itself. Nevertheless, because of its inaccurate title, this reviewer fears that much of the target audience will fail to give this book its due or to find it at all.

Radiative Decay Engineering contains 14 virtually independent chapters focusing on different aspects of plasmonics followed by a fairly detailed index. Nearly all chapters are duly referenced to original literature sources, although some of the references are dated in some of the sections and inconsistent in format. The chapters are, for the most part, well written; however, the quality and reproduction of figures and illustrations vary greatly. On an aesthetic note, the book is well produced and, in contrast to previous volumes, the publishers have adopted a larger 6.8 × 9.8″ hardbound format.

Liz-Marzán and co-workers set the stage in Chapter 1 with an excellent and concise summary of some of the most established synthetic procedures developed for the preparation of noble metal colloids, giving consideration to both aqueous

and organic media. The second chapter, by Moore-Nichols and Dunn, surveys several probing techniques using near-field scanning optical microscopy that are currently under development. Next, Van Duyne and colleagues offer an account of the exciting progress made to date in the area of fundamental and applied nanoparticle-based tunable localized surface plasmon resonance, with particular emphasis given to his group's many accomplishments in the area. Henglein's nondescriptly titled chapter, "Colloid Surface Chemistry", makes an excellent counterpart to Chapter 1. Here he selectively discusses aspects of nanosized metal nanoparticles, with special attention given to radiolytic methods. Chapter 5 by Mayer and Schalkhammer is particularly topical, as it highlights the substantial breadth of progress made in the many subfields associated with the emerging area of bionanotechnology. In Chapter 6, Gersten describes in depth the theory of radiative and nonradiative modulation in the vicinity of a metallic particle. Certainly not light reading due to the liberal, but justified, use of mathematical formulas, this chapter will be most accessible to physical chemists, physicists, and theoreticians. Chapter 7 by Goulet and Aroca deals in detail with useful practical and theoretical aspects of the phenomenon of surface-enhanced fluorescence, including illustrative examples of several enhancing substrates, e.g., Langmuir−Blodgett films. The importance of surface enhancement is further emphasized in Chapter 8 by Feldmann and co-workers, which includes pertinent discussions of the time-resolved spectroscopy and biophysical applications of metal nanoparticle-bound fluorophores. The next chapter, by Myrick and colleagues, focuses primarily on the utilization of Fourier transform reflection absorption infrared spectroscopy to investigate vapor-deposited copper overlayer films on organic self-assembled monolayers, a model interface of direct fundamental importance to areas ranging from heterogeneous catalysis to light-emitting diodes. Chapter 10 by Knoll et al. provides engaging coverage of the guiding principles of surface plasmon field-enhanced fluorescence spectroscopy and a range of initial sensory applications developed so far, including surface hybridization and protein-binding studies. Oldenburg and Schultz next describe the fabrication, modification, and optical detection of individual metal colloidal particles and their use as labels in bioanalytical and biomedical applications. An excellent Chapter 12 by Nath and Chilkoti provides a rigorous perspective on the topic of silver and gold nanoparticle biosensors, while also establishing the historical context of their prior use in bioanalytical assays. The final two chapters provide a comprehensive treatment of the state-of-the-art in radiative decay engineering with an emphasis on methodologies developed within the Lakowicz laboratories.

On the whole, *Radiative Decay Engineering* is a unique, single source outlining recent developments in this exciting field as well as summarizing selected research themes with potential to advance analytical chemistry, immunoassay, and homeland security, particularly those that fall under the broad umbrella of plasmonics or nanophotonics. This book will prove extremely useful as a reference for scientists and engineers already engaged in research involving fluorophore−metal interactions and as a learning tool for students encountering this and related topics for the first time. It is also well suited to accompany a course on nanoscience or chemical sensors because it covers topics not usually addressed in textbooks typically used for such courses.

Gary A. Baker, *Oak Ridge National Laboratory*

JA0597552

10.1021/ja0597552