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BOOK REVIEWS

Surface-Enhanced Vibrational Spectroscopy. By Ricardo Aroca (University of Windsor, Canada). John Wiley & Sons, Ltd: Chichester. 2006. xxvi + 234 pp. $130. ISBN 0-471-60731-2.

The concepts and applications of surface enhancement have continued to be a point of contention and debate among spectroscopists over the past few decades. The complexity of its origin and implementation toward an array of scientific problems is not only recognized but also overlooked. Given the overwhelming volume of work already published on the subject, it is understandable for practitioners to become both perplexed and discouraged. Fortunately, this book offers a remarkably clear and concise development of surface enhancement for any level of understanding across several disciplines. From the beginning, the author acknowledges the pitfalls and limitations of embarking on such a task. However, by establishing a narrow definition of surface enhancement using the electromagnetic effect, he is able to create a common platform of discussion for an otherwise constantly evolving topic.

Recently, focus on the analytical development of surface enhancement as an optical probe has taken precedence over understanding the basic theories associated with the event itself. This book attempts to rectify that issue. While acknowledging the challenging nature of this controversial subject, the author encourages the reader to appreciate and comprehend the practical uses of surface-enhanced vibrational spectroscopy, while maintaining a reasonable definition of its mechanisms and selectivity. In my opinion, a comprehensive text of this quality is long overdue.

The targeted audience of this book ranges from the novice to the most advanced researcher. The text is clear, and the organization, inherent. The figures and diagrams are effectively presented, and the text is well referenced. The initial chapters are dedicated to developing a fundamental awareness of vibrational spectroscopy as it relates to theory and light using mathematical reasoning. Subsequent ones delve into distinguishing those factors that contribute and impact whether surface enhancement occurs based on theoretical treatment and experimental interpretation. Chapters pertaining to its application toward Raman and infrared techniques follow with an emphasis on analysis and the insights these methods provide. Thus, a connection between the theory and the experimental considerations is argued in a style that it is both logical and instinctive to the reader.

This book should serve as an invaluable tool for research and specialized teaching. Its contents are skillfully documented and written in a straightforward and introductory manner. Whether you favor the electromagnetic or chemical contentions of surface enhancement, the author's efforts toward surveying the literature and organizing the arguments are both thorough and laudable. As this field continues to develop, the theoretical estimations and general perception of the material will remain unchanged. Overall, this book is a solid investment and an excellent resource for the novice or expert who is interested in a well-developed and acute understanding of the concepts and challenges surrounding surface-enhanced vibrational spectroscopy.

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Bioorganometallic Chemistry, Topics in Organometallic Chemistry, 17. Edited by Gerard Simonneaux (DR CNRS, Rennes, France). Springer: Berlin, Heidelberg, New York. 2006. x + 222 pp. $199.00. ISBN 3-540-33047-X.

As far as chemistry monographs go, this book is a good read, and each of the six chapters conveys an excitement that is infectious. It has something for everyone, from the researcher active in bioorganometallic chemistry to those with an interest in this emerging field. Simonneaux presents a good selection of topics that have come to define bioorganometallic chemistry over the years and has selected specialists in the field who have the necessary diligence to summarize each topic authoritatively and concisely while at the same time remaining very accessible. The chapters are didactically written, providing plenty of material for an advanced undergraduate or graduate class without sacrificing the necessary depth needed for an advanced monograph. It is important to note that each of the chapters presents a variety of applications of bioorganometallic compounds. Materials that once were thought to be sensitive and of limited use now find applications as catalysts, sensors, or therapeutic drugs—biorganometallic chemistry has become part of the chemistry landscape. After two major international conferences devoted to bioorganometallic chemistry and an excellent recent monograph by Jaouen, Simonneaux's monograph could not be more timely.

The book begins with a chapter by Butler and Kräutler on B_{12}-coenzymes, an area that has historically served as the biological example for organometallic chemistry. As you would expect from one of the godfathers of B_{12} chemistry, Kräutler and co-worker go far beyond presenting a cursory overview of this chemistry found in textbooks and provide an in-depth analysis of the structural and electrochemical properties of B_{12}. They then move on to some studies of reactivity and finally discuss reactivity in enzyme systems.

I was absolutely smitten by the second chapter written by Volbeda and Fontecilla-Camps on nickel−iron−sulfur clusters. I grew up seeing iron−sulfur clusters as interesting examples of inorganic clusters that have a biological role. But right from the start, Fontecilla-Camps and his co-worker take it a step further and make the connection between the biotic and abiotic world, putting a spin on the topic that I find delightful and exciting. Links to ground-breaking work by Wächtershäuser and others on the role of metal sulfides in chemical and early biological evolution are made, and their reactivities are linked to some of the biological [NiFe]-clusters. This is, of course,

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coupled with a thorough discussion of the structural and mechanistic details of the biological systems.

I was also delighted to see work on metallo-porphyrins, an area so vast that one could easily get lost in the details. Simonneaux and Le Maux, however, expertly capture the spirit of the work and focus their attention on important topics ranging from the catalytic role of P450, hemoglobin, and myoglobin to some fascinating model chemistry. I was particularly happy to see model chemistry forming such a prominent part of the chapter since it contributed so significantly to the understanding of biological systems and also paved the way for their use in organic synthesis.

When I first leafed through the pages of the book I asked myself what I might expect from a chapter entitled "Organometallic Receptors for Biologically Interesting Molecules". I was captured very quickly by the fascinating host−guest chemistry described by Severin. The chapter starts with some classic examples of trinuclear half-sandwich complexes and provides some examples of organometallic-biological host−guest type interactions, including the recognition of amino acids, peptides, and some ions, notably Li^+ and F^-. Severin adds his own twist to the chapter and describes in detail the indicator displacement assay for the detection of peptide analytes.

It was nice to see a chapter on bioconjugates of ferrocene peptides included in this book, and I thoroughly enjoyed reading it. Moriuchi and Hirao have been active in this area for the past decade and have summarized the achievements of the Hirao group and other research groups in the area with a particular focus on chiral supramolecular helicates. This chapter is well presented with a number of good illustrations that made it easy to follow the line of argument. It also contains a brief discussion of the potential application of these conjugates for the study of electron transfer in peptides and their use to study peptide−protein interactions. Personally, I would have liked to have seen a more in-depth discussion of this area, but at the same time I recognize that this would probably go beyond the aims of this book.

The book closes with a chapter on the medicinal properties of organometallic compounds by Allardyce and Dyson. They do an outstanding job of shattering the myth of organometallic compounds being sensitive and of limited use and provide a range of examples beginning with anticancer compounds, including *cis*-platin and some of the second-generation drugs, antiproliferants, antimalarials, imaging agents, and others. This is an important chapter because it reveals the potential solutions that organometallic chemistry has to offer to discovery-based drug research.

This is a useful book and I am confident that it will achieve what Simonneaux set out to do: to generate excitement about the field and draw new people into this young and rapidly expanding area of research.

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Light-Associated Reactions of Synthetic Polymers. By A. Ravve (Consultant, Niles, IL). Springer Science + Business Media, LLC: New York. 2006. x + 370 pp. $99.00. ISBN 0-387-31803-8.

This book comprises six chapters, all of which are aimed at providing a clear understanding of the mechanisms of light-associated reactions of synthetic polymers. The first chapter is a short description of photochemistry and photophysics for beginners in the field. Chapter 2 is the longest and provides an excellent description of various types of photosensitizers and photoinitiators (radical, cationic, anionic, and two-photon-induced) that are the central elements for all photochemical reactions. Chapter 3 is a good discussion of the chemistry of photocurable compositions that have a multitude of applications ranging from coatings and ink to contact lenses in modern technology. The next chapter outlines the mechanisms for the synthesis of crosslinked polymers by using various photolabile functional groups, and Chapters 5 and 6 focus on photoresponsive polymers, including polymers for harvesting solar energy, and photorefractive polymers for nonlinear optical properties that have great potential in the fields of optical data storage and information processing, respectively. A short subject index completes the book. The literature coverage is excellent: most of the references in each chapter are current to either 2004 or 2005, except those in Chapter 1, which date between 1947 and 1991.

Although the utmost care in the presentation of in-depth materials for each of these chapters is apparent throughout the book, regrettably it is replete with many typographical errors, such as journal titles, authors' names, and even chemical structures that could have been avoided with careful editing. Nonetheless, I strongly recommend this book to newcomers and researchers alike in this important field of photochemistry of synthetic polymers. In summary, the book contains a wealth of information for the avid photochemist and should be a welcome addition to most libraries.

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Annual Review of Materials Research, Volume 36, 2006. Edited by Venkatraman Gopalan (Pennsylvania State University), Gerhard Wegner (Max-Planck Institute, Mainz), David R. Clarke (University of California, Santa Barbara), Manfred Rühle (Max-Planck Institute, Stuttgart), and John C. Bravman (Stanford University). Annual Reviews: Palo Alto, CA. 2006. xii + 636 pp. $85.00. ISBN 0-8243-1736-X.

This book is a collection of reviews in different areas of materials research, with a special section, assembled by guest editors, Gopalan and Wegner, on porous and colloidal materials. A sampling of some of the papers in this volume include "Microgels: Old Materials with New Applications"; "The Use of Polymer Design in Resorbable Colloids"; and "Hydrogen in Semiconductors". The book concludes with a subject index, a cumulative index of contributing authors for Volumes 32−36, and a cumulative index of chapter titles for Volumes 32−36.

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