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BOOK REVIEWS

Organic Syntheses. Volume 78. Edited by William R. Roush (University of Michigan, Ann Arbor). John Wiley & Sons, Inc.: New York. xxxiv + 326 pp. $49.95. ISBN 0-471-23580-6.

This volume presents 29 experimental procedures of wide interest and utility to chemists in organic synthesis. As stated by Roush in the preface, "there is no central theme to this Volume". Rather, the procedures fall into four general categories: "(1) reagents and methods for catalytic asymmetric synthesis; (2) organometallic chemistry, ligands, and transformations of organometallic reagents; (3) synthetically useful reagents and intermediates; and (4) useful synthetic transformations." A sampling of some of the procedures described includes the synthesis of (*R*)-2-diphenylphosphino-2′-methoxy-1,1′-binaphthyl, bicyclopropylidene, and methyl (*S*)-2-isocyanato-3-phenylpropanoate.

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Advances in Polymer Science. Volume 157. Degradable Aliphatic Polyesters. Edited by Ann-Christine Albertsson (Royal Institute of Technology, Sweden). Springer-Verlag: New York, Berlin, Heidelberg. 2002. xii + 180 pp. $119.00. ISBN 3-540-42249-8.

This book is particularly timely and relevant owing to the wide-scale commercialization of polylactide, a biodegradable polymer from renewable resources, together with advanced applications for biodegradable/biocompatible polymers in biomedicine. The scope of the book, although broad, is fitting and nicely covers polymer and monomer synthesis, advances in catalysis, new polyester architectures, diverse applications and properties, and degradation of polymers and the mechanisms of these processes.

The book is comprised of five chapters. Three focus on polyester synthesis, with an emphasis on catalysis, available monomers from renewable resources, and copolymers and complex macromolecular architectures. Another chapter comprehensively covers the use of polyesters as scaffolds for drug delivery and describes the different strategies for controlled degradation of polymers. A final chapter reviews polyester degradation and the associated mechanisms in abiotic and biotic environments.

Overall, the book is well written and organized with a high level of technical competence. It thoroughly covers the literature with the majority of the cited references published within the last four years. The editor has avoided significant overlaps between the chapters and has done an excellent job in covering the most important aspects of degradable polyesters. Detailed polymer structure-degradation relationships are discussed throughout the book. This monograph will be a valuable addition to the library of anyone interested in the areas of aliphatic polyesters and controlled degradation of polyesters.

James L. Hedrick, *IBM Almaden Research Center*

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Electrochemistry in Nonaqueous Solutions. By Kosuke Izutsu (Matsumoto, Japan). Wiley-VCH: Weinheim. 2002. xiv + 346 pp. $110.00. ISBN 3-527-30516-5.

Interest in electrochemistry in nonaqueous media (taken, as in this book, in the broader sense to encompass both ionic reactions in electrolytes as well as electron-transfer reactions at electrodes) began in the late 1950's. By moving away from the prevalent aqueous media, chemists could study species insoluble in water and also uncouple proton-transfer reactions from electron transfers. Such studies—for example, of electrode reactions in acetonitrile and DMF—led to a much better understanding of the behavior of organic and organometallic species and the routine incorporation of electrochemical studies into mainstream organic and inorganic chemistry.

A number of books, such as *Electrochemical Reactions in Nonaqueous Solvents* by Mann and Barnes (1970), and data compilations, such as *Nonaqueous Electrolytes Handbook* by Janz and Tomkins (1972−73), reviewed the field. These were later followed by other books dealing with this area. This monograph updates coverage of this active field and provides numerous references to more recent work. The early part of the book (108 pages) is devoted to the fundamental properties of the solvents and ionic solvation and association, as well as acid−base and redox reactions. A long chapter (56 pages) follows that provides an overview of electrochemical techniques, although it is not particularly focused on nonaqueous systems. This chapter covers ground that is treated in many other books, often in more depth, and seems somewhat out of place in this monograph. The coverage is also a little unbalanced, since the topic of dc polarography and the dropping mercury electrode gets eight pages, whereas that of cyclic voltammetry receives barely one. This chapter is followed by ones on potentiometry (with a nice treatment of liquid junction potentials in nonaqueous systems), conductometry, polarography and voltammetry, and a brief chapter on other techniques, like spectroelectrochemistry, ESR, and SECM. Finally, there are chapters on the purification of solvents and supporting electrolytes and a brief chapter on the use of nonaqueous solvents in technology (e.g., Li batteries, capacitors, and electrodeposition).

This monograph concentrates on the more familiar solvents, like MeCN, DMF, and DMSO, and gives little consideration to liquid NH_3 and SO_2 or to electrochemical reactions in some of the more resistive solvents, like benzene/MeCN mixtures, that can now be used for electrochemical investigations with ultramicroelectrodes. Unfortunately, some timely topics such

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as supercritical solvents and ionic liquids are only briefly covered. Overall, however, this monograph is a useful and up-to-date introduction to this important field that should be especially helpful to beginners in this area.

Allen J. Bard, *University of Texas at Austin*

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Advances in Polymer Science 158. Polymers for Photonics Applications I: Nonlinear Optical and Electroluminescence Polymers. Edited by Kwang-Sup Lee (Hannam University, Korea). Springer-Verlag: Berlin, Heidelberg, New York. 2002. xiv + 262 pp. $179.00. ISBN 3-540-42384-2.

This book, which is the first of a two-volume set, contains four chapters entitled "Nonlinear Optical Polymeric Materials: From Chromophore Design to Commercial Applications", "Quadratic Parametric Interactions in Organic Waveguides", "Molecular Design for Third-Order Nonlinear Optics", and "Light-Emitting Characteristics of Conjugated Polymers". Overall, the chapters are well written and cover areas where the authors are active researchers. The literature is generally covered through 2000 with some references to publications from 2001, making the book somewhat out-of-date. The lack of more current references appears to be a consequence of the fact that publication was delayed, according to the editor. This, however, does not detract much from the usefulness of the book.

In the first two chapters, the discussion of nonlinear optic (NLO) polymers involves relatively small molecules dispersed within a (cross-linked) polymer matrix. Chapter 1 by Dalton is informative and provides discussion of the basics of electrooptics, the requirements for generating second harmonics, and the potential uses of these materials in devices. It deals with poled chromophores in a polymer matrix but offers little discussion of other ways to produce second-order NLO materials. There are also excellent discussions of the requirements for producing actual commercial devices using these poled materials, the current state-of-the-art, and what remains to be done to achieve this goal.

In the second chapter, Canva and Stegeman also discuss the requirements for producing NLOs and the technical difficulties involved in making useful devices. There are excellent in-depth discussions of the various wavevector (phase)-matching techniques and the relationship of the characteristics of materials to the second harmonic power.

In the third and fourth chapters, the discussions involve polymers in which the NLO and electroluminescence (EL) properties are produced by groups incorporated into the backbone of the polymer. The third chapter, by Gubler and Bosshard, covers the design of molecules for third-order NLO. There is extensive coverage of third-order NLO and the requirements for its production, including multiphoton absorption, and of the necessary materials for it, including those for practical applications.

The fourth chapter by Shim and Jin is primarily a review of the authors' research involving the relationship between the structure and luminescence properties of poly(phenylene vinylene)s, including electron and hole transport in EL devices. Although the variety of EL polymers is limited, the discussion of the relationship between structure and luminescence is applicable to other systems. There is an extensive review of efficiencies and turn-on voltages of devices but essentially no discussion of their lifetimes, even though the importance of this topic is pointed out. This chapter also contains virtually no discussion of the state-of-the-art of commercially produced organic EL devices, whereas the other chapters all review commercial applications.

The book is relatively free of typographical errors, but there are some, one of which is fairly amusing (see p 193). Not all of the illustrations are uniformly sharp (see Chapter 1, for example); some appear to have been converted from color to black and white, so there are parts that are rather light.

Overall, the book is well done, and each chapter fulfills its objective within the context of what the authors set out to accomplish. I think that the chapters provide excellent discussions of nonlinear optics and electroluminescence, and the use of polymers in these fields. I would recommend this book to those who are new to the field as well as to those actively working in the area.

Martin Pomerantz, *The University of Texas at Arlington*

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Handbook of Applied Surface and Colloid Chemistry. Volumes 1 and 2. Edited by Krister Holmberg (Chalmers University of Technology). John Wiley & Sons: West Sussex. 2002. xii + 1110 pp. $600.00. ISBN 0-471-49083-0.

The colloidal and surface sciences are by their very nature multidisciplinary, combining aspects of organic and inorganic chemistry with condensed matter physics. Because of this, texts on colloid and surface science can be either too general, and therefore lacking in important fundamentals, or too specifically focused on a particular area of this broad field. It is not surprising, therefore, that the answer to this dilemma is this extensive two-volume set, *Handbook of Applied Surface and Colloid Chemistry*. The volumes are subdivided into five parts entitled "Surface Chemistry in Important Technologies", "Surfactants", "Colloidal Systems and Layer Structures at Surfaces", "Phenomena in Surface Chemistry", and "Analysis and Characterization in Surface Chemistry". Although the title suggests that the approach is an applied one, the discussions are not limited to industrial practice. Each section contains chapters that deal effectively with both the influence of surface and colloid science on the application, as well as the fundamental physical chemistry that underlies the topic at hand. For example, the chapter "Surface Chemistry of Paper" encompasses discussions ranging from DLVO theory to the rheology of coatings to the spectroscopic characterization of paper surfaces. This provides the reader with an excellent understanding of why particular applications call for certain chemical approaches. As a whole, the volumes should become invaluable resources to both industrial and academic scientists. No other work covers surface and colloid chemistry with as much breadth and depth.

Although the scope of the two volumes is appropriately extensive, there are some quirks to the set. Many of these arise

naturally from having different authors for each chapter. First, there exists extensive overlap between the chapters with respect to the fundamental underpinnings of colloid and surface science. Each chapter, therefore, can be viewed as separately providing a self-contained vision of each topic without much integration into the volumes as a whole. To the reader looking for information on a single, specialized topic, this may be a welcome trait. However, the work would not be nearly as voluminous if the fundamentals were separated into stand-alone chapters, with each subsequent application being described with the same language and equations. It is possible that such an approach would detract from the individual voice of each author, however. Thus, this shortcoming is only a minor one. More disturbing is the style in which many of the chapters are referenced. Because many students in colloid and surface science may turn to these volumes for information, the value of high-quality referencing cannot be underestimated. The bibliographic content of many chapters is limited to pre-1999 references, which may reflect the length of time it takes to bring such a work to fruition but makes the volumes less current. Other chapters contain bibliographies limited to a few more specialized textbooks with almost no mention of current research. This is not to imply that all chapters suffer from this affliction. Chapter 20 of Volume 2 ("Measuring Interactions between Surfaces") is extensively referenced (237 citations), making it a natural source for students beginning research projects in this area. Finally, some of the schemes and graphs in these volumes are of poor quality, and many should be reproduced in color or redrawn by the authors. This is especially true of optical micrographs intended to show textures due to birefringence. Some excellent color plates are associated with "Identification of Lyotropic Liquid Crystalline Phases", and there are other places in the volumes where such reproductions would be similarly helpful. Despite these drawbacks, the *Handbook of Applied Surface and Colloid Chemistry* is an excellent collection of topical reviews, both fundamental and applied, and is recommended to academic and industrial researchers alike.

L. Andrew Lyon, *Georgia Institute of Technology*

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Modern Aspects of Electrochemistry, No. 35. Edited by Brian E. Conway (University of Ottawa) and Ralph E. White (University of South Carolina). Kluwer Academic/Plenum Publishers: New York. 2002. xx + 330 pp. $140.00. ISBN 0-306-46776-3.

The 35th volume of this long-established series assembles five chapters covering practical aspects and theoretical considerations for both electrode processes and electrolytic solutions. The subjects presented are well documented and serve as excellent reviews and reference sources for graduate students.

The first chapter by Lasia offers a thorough and precise description of the use of electrochemical impedance spectroscopy (EIS) for the study of the adsorption and absorption of hydrogen into metals and its evolution from them. It complements the review of the more fundamental aspects of EIS published in Volume 32 of this series and should be quite interesting to researchers investigating hydrogen reactions. Although EIS has become a mature and well-used technique, the data analysis and approximations associated with it remain complex. However, the 50 pages of this chapter concentrate on giving concise and useful equations for the data validation and modeling of hydrogen reactions, which remain the center of numerous studies in the field of electrochemistry.

Chapter 2, by Djokic, exhibits the most academic content and will complement such classical textbooks as the 3rd and 4th editions of *Modern Electroplating*. This chapter gives a very nice overview of all aspects concerning electroless deposition, despite the increasing number of publications on this topic. It is not simply a compilation of "recipes", but provides detailed mechanisms for the chemical reactions that take place in a plating bath. Djokic's contribution thoroughly documents published work in the field.

The fourth chapter, by Abraham and Abraham, covers thermodynamics and transport properties in systems lying between molten salt and water, called "bridging electrolyte-water systems". It would be perfectly suitable as required reading in graduate-level courses in both solution chemistry and electrochemistry.

The remaining chapters offer perspectives and critical reviews of two fundamental concepts in electrochemistry, authored by two renowned practitioners. The contribution of Bieniasz (Chapter 3) provides a discussion of the relevant mathematical tools for successful computational simulations of all aspects of electrochemical kinetics. That of Conway (Chapter 5) offers a review of the much-discussed issue of the state of ions in solution, wherein he reexamines the application of the Born equation to solvent polarization by ions.

Overall, the emphasis of this volume is on important classical issues rather than on more modern aspects. This book and the series of which it is a part are of continuing value to the electrochemical community and should be a required acquisition for most libraries.

Gessie M. Brisard, *Université de Sherbrooke*

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