Book Reviews *

The Laboratory Handbook of Materials, Equipment, and Technique. By Gary S. Coyne. Prentice-Hall, Inc.: Englewood Cliffs, NJ. 1992. xviii + 468 pp. $45.00. ISBN 0-13-126228-9.

This book covers materials, equipment, and techniques required in chemistry laboratories. At the beginning of each chapter, the author includes some history about the particular topic and a number of interesting facts which explain how and why procedures and equipment have evolved. Emphasis is placed on proper methods of selecting, using, cleaning, and maintaining laboratory equipment. For each topic the author generally includes a number of do's and don'ts guidelines. Many of the statements may seem obvious to an experienced user, but for a novice or student, the advice is useful.

In addition to the do's and don'ts, the author has step by step procedures on how to use a variety of items such as volumetric flasks, graduated cylinders, gas regulators, gas-oxygen torches, cryogenic tanks, etc. The procedures teach novice and experienced personnel the proper and safe methods of using the equipment. Discussion is also included about the type of accuracy expected and parameters that can affect measurements.

Chapter 1, Materials in the Lab, gives a comprehensive discussion of materials used in the lab. The author is a scientific glass blower at a university and passes on many practical methods of working with, identifying, and storing glassware as well as safety issues when using glass. He also covers the pros and cons of glass types, such as soft, hard, high temperature, and UV transmission, and in the text and appendix, he includes chemical resistance properties and standard sizes of flexible tubing, stoppers, and O-rings.

Chapter 2, Measurement, starts with a history and discussion of the base units of the metric system for measuring length using rulers, calipers, and micrometers. Historical background, accuracy categories, markings, and tolerance of volumetric ware are discussed. Methods of using, correcting for errors, and storing volumetric flasks, graduated cylinders, pipettes, and burettes are covered in detail. Accuracy, precision, and limitations of spring balances, lever arm balances, beam balances, analytical balances, and top loading balances are discussed. The author also covers the theory and use of expansion thermometers, thermocouples, and resistance thermometers.

Chapter 3, Joints, Stopcocks, Glass Tubing, begins with a discussion of the common types of joints such as standard taper, mercury seal, ball and socket, O-ring, and hybrids. Proper methods of selection, sizing, and clamping and limitations of each are discussed. The section on stopcocks covers glass, Teflon, and rotary seals. The author includes a number of useful charts dealing with various stopcock greases covering melting point, vapor pressure, and temperature range. Also numerous tables on the specifications of glass tubing are included.

Chapter 4, Cleaning Glassware, is a detailed discussion on cleaning glassware with soap and water, ultrasonic cleaner, organic solvents, base, acid, and oxidizer baths. Each section of cleaners covers preparation, materials, safety considerations, disposal, and other useful tips.

Chapter 5, Compressed Gases, begins with an introduction about various types of gases and dangers when using gas. Cross-reference tables have been included to identify common laboratory gas tanks and how to select the proper CGA (Compressed Gas Association) fittings. Detailed diagrams of the fittings have been included. Diagrams and component identification of regulators are covered as well as step by step procedures on how to install and use regulators safely.

Chapter 6, High and Low Temperature, discusses methods of heating and cooling. The chapter begins with a discussion of potential dangers of heating operations, such as Bunsen burners, steam baths, hot air guns, heating tapes, mantles, immersion heaters, hot plates, and drying ovens. The low-temperature section covers ice, ice with salts, dry ice, liquid nitrogen, and slush baths. A slush bath table has been included to select appropriate solvents for a given temperature. Throughout the chapter, safety and step by step procedures are included. Detailed diagrams and procedures using liquid (cryogenic) gas tanks are covered.

Chapter 7, Vacuum Systems, has a useful overview of vacuum science and technology which educates the reader on units of measurement and how to make and maintain a good vacuum. Mechanical and diffusion pumps are covered with thorough discussion of theory of operation, traps, pump oils, start-up procedures, and maintenance. Manometer, McLeod, thermocouple, Pirani, hot-cathode ion, and cold-cathode ion vacuum gauges are thoroughly discussed. The chapter concludes with methods of detecting and locating vacuum leaks.

Chapter 8, Gas-Oxygen Torch, includes detailed drawings which will guide the reader in lighting and using torches to perform simple glass repairs.

This book will be valuable for readers needing to understand the theory and the proper using, cleaning, and storing methods of laboratory equipment. Safety issues are thoroughly covered. The book is a useful "how to use" reference for students, novices, and experienced lab personnel.

Gary S. Kath, *Merck Research Laboratories*

Photodissociation Dynamics. By Reinhard Schinke (Max Planck Institut für Strömungsforschung, Göttingen, Germany). Cambridge University Press: Cambridge and New York. 1993. xvi + 417 pp. $89.95. ISBN 0-521-38368-4.

This book describes the fundamental theoretical approaches used in modern computational chemistry to treat the main observables of photodecomposition—absorption spectra and product state distributions—and how they reflect features of the potential energy surface and the forces and torques that act on the separating fragments. The book concentrates on molecules that undergo direct dissociation along purely repulsive potentials as well as indirect photodissociation processes in which the molecule is trapped in a shallow well on the potential energy surface for a period of time prior to dissociation. Photoinitiated unimolecular reactions taking place on the ground-state surface are mentioned briefly but are best covered in books dealing with statistical theories. For fast photodissociation processes, the book provides comprehensive coverage at a level suitable for graduate students whose research focuses on either experimental or theoretical studies, and is an excellent reference book for more senior experimentalists.

The book covers a wide range of topics on photodissociation. Those which are dealt with in depth include light absorption, time-dependent and time-independent computational methods, the appearance of resonances and periodic orbits, and classical and quantum mechanical descriptions of product internal state distributions. Less detailed coverage is given to the areas of emission and Raman spectroscopy of dissociating molecules, predissociation of van der Waals molecules, nonadiabatic transitions, and real-time studies. However, even for these topics the reader will find the appropriate theoretical framework as well as a brief up-to-date description, amply supported by references to recent work, that can be used as a start to a more detailed study.

The chapters are organized in a way that develops the theoretical concepts first and then illustrates them with well-chosen examples of prototype molecules (e.g., H_2O, CH_3ONO, ClNO) for which theory and experiment address similar issues. On the theoretical side, the book provides an excellent balance between detailed derivations and physical insights. It guides and focuses the reader by punctuating the text with "bullets" that highlight important physical concepts, theoretical assumptions, or key aspects of the derivations. This serves both to reinforce essential points and to help the reader see the forest through the trees. It also enables a reader who is more interested in the interpretation of experimental findings to skip some of the detailed derivations.

The book contains in depth descriptions of the numerical methods used for exact calculations of photodissociation observables and approximate theoretical treatments that can be easily used by experimentalists. The underlying assumptions and applicability of the approximate methods are presented. These models, while not sufficiently accurate for quantitative descriptions, can often serve to identify limiting cases and the relation of the observables to them. For example, "Franck–Condon mapping" of the parent bending wave function in the ground state into product rotational states represents a limiting case where no significant torque acts in the exit channel of a purely repulsive potential energy surface, while the semiclassical "rotational reflection principle" shows how product rotational excitation "maps" the nuclear coordinate distribution in the initial bending motion mediated by the torque generated by the anisotropy of the upper state potential energy surface. The simplified treatments can be included in a course for graduate students based on this book. In addition, classical pictures, which are easier to visualize, are used to highlight the connection between the computations and the actual nuclear motions that lead to dissociation.

The book is very valuable as a textbook. It proceeds in a logical manner, building up from a graduate-student level of knowledge of quantum mechanics to more complex topics such as vector correlations and Λ-doublet propensities. The discussion of time-dependent vs time-independent methods highlights how these two equivalent approaches complement one another, as well as the physical insights that each provides.

*Unsigned book reviews are by the Book Review Editor.

absorption spectrum of a dissociating molecule and the time evolution of a wave packet. Again, the interplay between experiment and theory is stressed throughout and serves to demonstrate the wealth of detailed information that can be obtained with modern research methods. Most importantly, the book clearly illustrates how various experimental observables reflect specific regions of potential energy surfaces. Although the book does not contain problem sets, some of the examples in the text, both theoretical and experimental, can be used in a course in conjunction with the original papers to reinforce and illustrate the concepts. The index is detailed and makes it easy to find both theoretical approaches and specific examples, and references to papers as recent as 1992 are included.

In summary, Reinhard Schinke has written an excellent book covering all the major topics of the modern study of photodissociation dynamics in a lucid and well-balanced manner. It should become an important companion both to graduate students and to senior researchers in the field and can serve also as a textbook for a graduate course in chemical dynamics.

Hanna Reisler, *University of Southern California*
Marsha I. Lester, *University of Pennsylvania*

Fuel Cell Systems. Edited by Leo J. M. J. Blomen (Blomenco B. V., Rotterdam, The Netherlands) and Michael N. Mugerwa (Kinetics Technology International Group B. V., Rome). Plenum Press: New York. 1993. xii + 614 pp. $125.00. ISBN 0-306-44158-6.

This book is a multiauthored volume combining overviews of research and development activities on each type of fuel cell with contributions on fuel cell plant technology. After a preface and an introduction by the editors, there are 13 chapters with the following headings: History, by J. A. A. Ketelaar; Overview of Fuel Cell Technology, by S. Srinivasan, B. B. Davé, K. A. Murugesamoorthi, A. Parthasarathy, and A. J. Appleby; Electrochemistry of Fuel Cells, by Embrecht Barendrecht; Fuel Processing, by P. Pietrogrande and Maurizio Bezzeccheri; Characteristics of Fuel Cell Systems, by A. J. Appleby; System Design and Optimization, by Michael N. Mugerwa and Leo J. M. J. Blomen; Research, Development, and Demonstration of Alkaline Fuel Cell Systems, by Hugo Van den Broeck; Research, Development, and Demonstration of Phosphoric Acid Fuel Cell Systems, by Rioji Anahara; Research, Development, and Demonstration of Molten Carbonate Fuel Cell Systems, by J. R. Selman; Research, Development, and Demonstration of Solid Oxide Fuel Cell Systems, by K. A. Murugesamoorthi, S. Srinivasan, and A. J. Appleby; Research, Development, and Demonstration of Solid Polymer Fuel Cell Systems, by David S. Watkins; Fuel Cell System Economics, by Michael N. Mugerwa and Leo J. M. J. Blomen; and Market, by Diane Traub Hooie. There is also an epilogue by the editors and a subject index.

Environmental Catalysis. ACS Symposium Series 552. Edited by John N. Armor (Air Products and Chemicals, Allentown, PA). American Chemical Society: Washington, DC. 1994. xii + 444 pp. $99.95. ISBN 0-8412-2851-5.

This book was developed from a symposium sponsored by the Catalysis and Surface Science Secretariat at the 205th National Meeting of the American Chemical Society held from 28 March to 2 April 1993 in Denver, CO. After a preface by the editor, there are 34 chapters organized under the following headings: NO_x Removal; Mobile Engine Emission Control; Power Plant Emissions; Future Fuels; Control of Volatile Organic Compounds; and Other Opportunities. There are author, affiliation, and subject indexes.

Capillary Electrophoresis: Principles and Practice. By Reinhard Kuhn and Sabrina Hoffstetter-Kuhn. Springer-Verlag: Berlin, Heidelberg, and New York. x + 375 pp. $69.00. ISBN 3-540-56434-9 (Berlin) and ISBN 0-387-56434-9 (New York).

Capillary electrophoresis (CE) has now established itself as a powerful analytical tool that compliments other electrophoretic and chromatographic techniques. This book addresses the fundamental concepts of CE, provides numerous tables which include specific experimental procedures, and offers a solid reference base through 1992.

The text consists of seven chapters and one appendix. A solid description of the fundamentals of CE are given in the first few chapters, and some very useful practical information for experimenters is given in the later section of the book. The initial three chapters provide a fairly in depth discussion of the principles of CE and provide adequate references to guide the interested reader to the proper literature. Chapter four focuses on the instrumental considerations of CE including modes of injection, types of detection, and the column. Unlike most recent books on this topic, this work offers a table which illustrates the relative merits and shortcomings of commercially available instruments. A short but useful chapter (chapter six) addresses qualitative and quantitative analysis using CE as well as method validation.

Chapter seven and the appendix represent the strength of this work. Chapter seven (71 pages long) has extensive tables referencing specific works by analyte type. Actual experimental protocols are tabulated for quick reference, and the literature citation is in the last column for each set of parameters given. The segment on amino acids, peptides, and proteins offers adequate referencing, but discussions of these separations are not as extensive as in other texts. A very well presented section on separation of chiral compounds rounds out this feature chapter. The appendix lists (in easy-to-ready form) common buffers, derivatization procedures, and symbols that the reader may have encountered in the text and in the literature.

The book has some grammatical errors, but these do not significantly detract from the quality of the whole. Overall, this book offers another fine reference for the student as well as for the user of CE.

Timothy G. Strein, *Bucknell University*

Concise Encyclopedia: Chemistry. Translated and Revised by Mary Eagleson. Walter de Gruyter, Inc.: Berlin and New York. 1994. vii + 1202 pp. $69.95. ISBN 3-11-011451-8.

This book is designed as a reference for chemists, laboratory technicians, instructors, and students with emphasis on chemical elements, important natural substances, synthetics, pharmaceuticals, and dyes, as well as stoichiometry, analysis, catalysis, chemical kinetic reactions, and thermodynamics, electrochemistry, colloid chemistry, carbon chemistry, and petrochemistry. There are approximately 12 000 entries in alphabetical order covering the areas of general, inorganic, organic, physical, and technical chemistry and also numerous figures and tables.

Theoretical Aspects of Physical Organic Chemistry. The S_N2 Mechanism. By S. S. Shaik, H. B. Schlegel, and S. Wolfe. Wiley: New York. 1992. xv + 285 pp. $59.95. ISBN 0-471-84041-6.

Physical organic chemistry and theoretical organic chemistry have traditionally been two fields of endeavor with relatively little overlap. Physical organic chemistry, as it has been practiced over the last fifty years, has largely followed an empirical, non-quantum mechanical approach to problems of structure and reactivity. Theoretical organic chemistry, on the other hand, has utilized both qualitative and quantitative quantum chemistry to examine these same questions.

This unusual and rather radical book attempts to bridge between these two approaches and to demonstrate that the two approaches constitute different faces of one coin. Its other special feature is to attempt to integrate MO and VB theories into a unified theoretical treatment, in contrast to traditional theoretical treatments that have generally relied on one approach or the other. The result is an ambitious book that is likely to prove quite difficult for the undergraduate or beginning graduate student but provocative and stimulating to specialists in the area. It is likely to emerge as a focus for further work in the field.

The first half of the book (Chapters 1–3) provides a theoretical background for the material in the second half (Chapters 4–6). Chapter 1 presents a brief description of the main concepts in physical organic chemistry, Chapter 2 presents an overview of reaction surfaces from a computational perspective, and Chapter 3 presents the theoretical background to the curve-crossing model. Chapters 4–6—the heart of the book—present a detailed theoretical analysis of the S_N2 reaction based on the curve-crossing model using both MO and VB concepts. This section attempts to present a unified picture of S_N2 reactivity which encompasses many of the traditional approaches to the subject. The authors' goal here is to present a comprehensive picture of this most basic of chemical reactions both in the gas phase and in solution and to show how the factors that govern the barrier height in this (and other) reaction may be understood.

Most of the material has appeared in the primary literature in the 1980s, but its compilation into a single volume will make the ideas more accessible to persons interested in pursuing these questions. Together with the extensive literature citations (up to 1990), this volume is an

important addition to any research library and is likely to prove invaluable to researchers in the fields of theoretical and physical organic chemistry.

Addy Pross, *University of Sydney*

Chirotechnology: Industrial Synthesis of Optically Active Compounds. By Roger A. Sheldon (Delft University of Technology). Marcel Dekker, Inc.: New York. 1993. xvii + 423 pp. $145.00. ISBN 0-8247-9143-6.

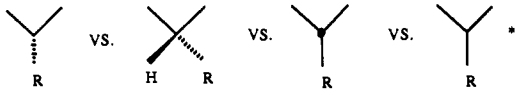
"The major aim of this book is to provide an easy-to-read overview of the various methods that are available for the synthesis of optically pure compounds. Emphasis is placed on practical utility and relevance to industrial synthesis. The relative merits of the various approaches are discussed and compared using commercially relevant examples. Particular importance is attached to discussing the factors that play a role in determining the choice of a certain route for the industrial synthesis of the molecule in question." I have rarely come across a book which so effectively meets its stated purpose, and I highly recommend it to all practicing organic chemists.

This is a book which has appeared at a particularly relevant time, and Roger Sheldon is one of the few people with the breadth of experience to have authored it. The book has many strengths. The nomenclature in this area, which is often the subject of controversy, is explained early and well and then supplemented with an appended glossary of terms. Unfortunately, old habits die hard, and there is still too much use of the phrases "optical purity", "optically stable", and "optical yield" in the text. The text is easy to read and does an excellent job in comparing various technologies for preparing chiral, nonracemic compounds. References through 1992 have ensured that state-of-the-art techniques and technologies are included. One excellent feature is the examples of reaction optimization during industrialization where very significant improvements in enantiomeric excesses have been achieved through modifications in reaction conditions.

The author has done an excellent job in succinctly reviewing the basic principles of each technology and then making a rapid transition to industrially important applications. In most (but unfortunately not all) examples cited, it is clear whether the methodology has been commercialized or is only potentially suited for scale up. The concluding chapter on future prospects is particularly enlightening in this regard.

There are a number of things that keep this book from being all that it could be. While individually they are minor, there are enough of them to form a disturbing pattern.

(i) The rather indescriminant use of various means to indicate stereogenic centers in the structures, e.g.



is disconcerting, as is the (apparently) arbitrary inclusion or exclusion of *R*, *S* descriptors.

(ii) Table 4–4 (page 127) contains several inaccuracies. Vitamin A is retinol, not 11-*cis*-retinal. Virtually all vitamin D is now vitamin D_3 (calciferol), derived from cholesterol by chemical synthesis. α-Tocopherol is available by total synthesis (racemic) and isolation from vegetable oil (one enantiomer). Vitamin C synthesis involves a fermentation, as well as chemical, step.

(iii) Page 159. Phytol is not "the side chain of vitamin E."

(iv) Page 163. The state "while the (+)-content of α-pinene is not more than 35%" is confusing. Does this mean 35% ee?

(v) Figure 7-36 (page 250). The (*R*) and (*S*) chiral descriptors are reversed.

(vi) Figure 8-16 (page 292). The *Z*-enamine does not exist in the exocyclic form shown but only as its endocyclic isomer. The hydrogenation to give (*R*)-tetrahydropapaverine could only have been carried out on an N-acylated, exocyclic enamide analogous to the dextromethorphan precursor.

(vii) Figures 8-19 and 8-34 as well as reaction 8-8 contain structural errors.

(viii) Several references with which I am familiar contain spelling errors: e.g., Raban, not Ralan (p 21); Blaser, not Bläser (p 299); Grüssner, not Grussner (two times); and Saucy, not Sauci (p 170). The citation on page 84 is to ref 16, not 17.

The deficiencies noted above do not, however, detract from this book's basic value. My initial thought after finishing it was that it is a book I wish I had written.

John W. Scott, *Hoffmann-La Roche Inc.*

Spectroscopy in Catalysis: An Introduction. Johannes W. Niemantsverdriet (Eindhoven University of Technology). VCH: Weinheim and New York. 1993. viii + 288 pp. DM 148.00. ISBN 3-527-28593-8.

This is an excellent and up-to-date book on spectroscopic techniques used to investigate heterogeneous catalysts. The various spectroscopic techniques covered in the book are electron spectroscopies (XPS, UPS, AES, EELS), ion spectroscopies (SIMS, SNMS, RBS, LEIS), vibrational spectroscopies (IR, Raman, EELS), temperature-programmed techniques (TPR, TPO, TDS), diffraction (XRD, LEED, EXAFS), and microscopy (TEM, SEM, STEM, STM, AFM, FEM, FIM). The book clearly discusses the theory behind these spectroscopies as well as gives ample relevant examples of their applications. Many of the examples used, from the current literature or from recent unpublished data available to the author, employ applications from both heterogeneous catalysis and surface science. A unique feature of this book is the use of single-crystal model systems to simulate complex heterogeneous catalytic systems. In addition, several excellent case studies in catalyst characterization are presented at the end of the text which serve to further integrate the spectroscopic information via applications. The theories of metal surfaces, chemisorption on metals, and magnetism in small particles are nicely presented in the appendix. It is the balance between theory/application and heterogeneous catalysis/surface science that gives this book a special niche which should appeal to a wide audience.

There are, however, several issues that did not receive sufficient attention, and their inclusion or elaboration would have further strengthened this book. The introduction chapter needs to be more extensive as an introduction for nonspecialists who don't possess familiarity with the subject. It is mentioned in the introduction chapter that NMR and ESR are extensively employed in catalyst characterization, but these two magnetic spectroscopic techniques are not covered in the text. The current importance of these two spectroscopies warrants that they also be included in a text on spectroscopies in catalysis. The text should have also put more emphasis on in situ characterization techniques and molecular spectroscopies which are receiving much attention these days. The concept of surface metal oxide species is lacking and could further contribute to a better understanding of supported metal oxides discussed in the text (especially the various XPS models in Chapter 3). In spite of these few shortcomings, this is an excellent text on spectroscopies in catalysis and I highly recommend it for use as a text for introductory courses on heterogeneous catalysis or as a general introductory monograph.

Israel E. Wachs, *Lehigh University*

Electroanalytical Chemistry: A Series of Advances. Volume 18. Edited by Allen J. Bard (University of Texas at Austin). Marcel Dekker, Inc.: New York. 1994. xii + 400 pp. $165.00. ISBN 0-8247-9092-8.

This volume contains the most recent contributions to a distinguished series of monographs that have described, for nearly 30 years, the latest techniques and active research areas within the field of electroanalytical chemistry. The three chapters comprising Volume 18 continue this tradition, with J. F. Rusling describing Electrochemistry in Micelles, Microemulsions, and Related Microheterogeneous Fluids, G. Inzelt presenting a very broad treatment of the Mechanism of Charge Transport in Polymer-Modified Electrodes, and the series editor A. J. Bard and coauthors F.-R. F. Fan and M. V. Mirkin contributing a thorough discussion of the technique of Scanning Electrochemical Microscopy. These reports are well-organized, well-written, and relatively current, with references to the primary literature extending into 1992. The illustrations and equations included with each chapter are, with few exceptions, quite helpful and adequately explained by accompanying text. Combined with other nice touches of the series, including an extensive subject index, a comprehensive author index, and a helpful chronological list of titles from earlier volumes of the series, this volume will be an indispensable resource to students and researchers wishing a fundamental understanding of the titled areas. It should be a high-priority purchase for any dedicated chemistry library and it certainly deserves a home among the other excellent volumes of the *Electroanalytical Chemistry* series.

In the first chapter of the volume, the electrochemistry of surfactants is treated by J. F. Rusling with the clear intention of educating both experts and beginners to the field. After a brief account of surface agents applied in early electrosynthesis and electroanalytical chemistry, the author

gives a lucid description of surfactant microstructures and dynamics which should serve as an excellent introduction to the nonspecialist. The remainder of the review is focused on modern (post-1970) uses of surfactants in electrochemistry and applications of electroanalytical methods to characterize surfactant aggregates. Extensive treatment is given to micellar solutions and microemulsions, and a brief section is included on lamellar and vesicle dispersions. Key aspects of adsorption, diffusion, and electron transfer are reviewed for each surfactant microstructure, and the electroanalytical and in situ surface spectroscopic methods used to monitor these processes are given some discussion. Also included with the sections on micelles and microemulsions are accounts of how these fluid aggregates ahve been used to influence the outcome of electrochemical reactions. Much of this literature is focused on electroorganic transformations, and the discussions are primarily pitched at the specialist. One disappointment for some readers of this chapter will certainly be the author's emphasis on *fluid* systems which precludes any mention of the rapidly growing research on Langmuir–Blodgett and self-assembled electrode films. Despite the popularity of these areas, the author rightly states that this material is beyond the scope of this intended review.

The second chapter deals with charge transport in polymer-modified electrodes and is by far the largest of Volume 18, with over 290 references. In addition to making a fairly complete sweep of the charge transport literature from the past decade, G. Inzelt has presented the material with an excellent eye toward organization and a pleasant style that is free of lengthy, distracting mathematical treatments. The heart of the review is contained in two sections that address the theory and experimental investigation of charge transport in polymer film electrodes. The section on theory reviews early models for charge propagation and quickly proceeds to contemporary treatments that account for effects such as electron hopping, counterion transport, and migration. Theories for charge transport in electronically conducting polymer films are also reviewed but not discussed in detail. The section detailing experimental investigations of charge transport is the largest, with nearly 100 pages dedicated to reviews of ion-exchange redox polymers, fixed-site redox polymers, and conducting polymer films. Although this summary is very readable, a table collecting the variety of polymer film systems and employed techniques would have made it more helpful as a source of literature. The author concludes the chapter with a brief but helpful discussion of the effect of film morphology on charge transport.

The final chapter of the volume, by A. J. Bard and coauthors, is a detailed and thorough review of the field that has been developing around a relatively new scanning probe instrument called the scanning electrochemical microscope (SECM). The text covers the working principles of the device, its basic apparatus, the theory composed to interpret its electrochemical signals, and finally a comprehensive review of its rather diverse applications. The section on apparatus should be particularly informative to researchers wishing to construct a SECM. It gives the names of component manufacturers as well as a number of important hints on preparing the ultramicroelectrode probes used with the microscope. The theory section that follows is equally informative and is sufficiently annotated with tabulated results and working curves that referral to the original literature is unnecessary for a proper understanding of the material. However, a table systematizing the derived solutions for various electrochemical modes and reaction mechanisms would have improved the utility of this section for nonspecialists. The final section on applications reviews the documented uses of the electrochemical microscope. These include kinetic measurements of electrode processes and their coupled solution reactions, three-dimensional imaging of surface composition and reactivity, and high-resolution surface derivatization. This material is quite comprehensive and provides an excellent overview of tasks that the SECM is capable of performing.

David T. Pierce, *University of North Dakota*

Annual Review of Biophysics and Biomolecular Structure. Volume 22. Edited by Donald M. Engelman (Yale University), Charles R. Cantor (Center for Advanced Biotechnology), and Thomas D. Pollard (The Johns Hopkins University School of Medicine). Annual Reviews: Palo Alto, CA. 1993. x + 524 pp. $59.00. ISBN 0-8243-1822-6

This is a volume of the continuing series published by Annual Reviews Inc., a nonprofit scientific publisher established to promote the advancement of sciences. The volumes are organized by editors and editorial committees who invite qualified authors to contribute critical articles. After a preface by the editorial board, there are 18 chapters organized under the following headings: Structural Principles; Structure and Function; Dynamics; and Emerging Techniques. There are also a subject index, a cumulative index of contributing authors (Volumes 18–22), and a cumulative index of chapter titles (Volumes 18–22).

The Fullerenes: New Horizons for the Chemistry, Physics, and Astrophysics of Carbon. Edited by H. W. Kroto and D. R. M. Walton. Cambridge University Press: Cambridge, U.K. 1993. viii + 154 pp. $24.95. ISBN 0-521-45917-6.

This book contains the text of 14 lectures given at a Discussion Meeting of the Royal Society entitled *A Post-Buckminsterfullerene View of the Chemistry, Physics and Astrophysics of Carbon* held in October of 1992 in Great Britain. There are 14 chapters with discussions written by those who played key roles in the discovery of fullerenes and by others who are currently researching C_{60}. There is no subject index.

Interpenetrating Polymer Networks. Advances in Chemistry Series 239. Edited by D. Klempner (University of Detroit), L. H. Sperling (Lehigh University), and L. A. Utracki (National Research Council). American Chemical Society: Washington, DC. xvi + 638 pp. $139.95. ISBN 0-8412-2528-1.

This book was developed from the symposium sponsored by the Division of Polymeric Materials: Science and Engineering of the American Chemical Society, at the Fourth Chemical Congress of North America (202nd National Meeting of the American Chemical Society), held on 25–30 August 1991 in New York. After a preface by the editors there are 29 chapters organized under the following headings: Reviews; Synthesis and Structure; Miscibility and Morphology; Structure–Property Relationships; Transport and Permeability; and Functionalized Triglyceride Oils. There are author, affiliation, and subject indexes.

Nobel Laureates in Chemistry 1901–1992. History of Modern Chemical Sciences. Edited by Laylin K. James (Lafayette College). American Chemical Society: Washington, DC. 1993. xviii + 798 pp. $34.95. ISBN 0-8412-2690-2.

This book is part of a new series on the "History of Modern Chemical Sciences" published jointly by the American Chemical Society and the Chemical Heritage Foundation documenting the individuals, ideas, institutions, and innovations that have created the modern chemical sciences. After a preface by the editor, there are 115 biographies examining the scientific achievements in chemistry for which the Nobel Prize was given and the personal side of the individuals honored.

Introduction to Microlithography. Second Edition. Edited by Larry F. Thompson (AT&T Bell Laboratories), C. Grant Willson (University of Texas), and Murrae J. Bowden (Bell Communications Research, Inc.). American Chemical Society: Washington, DC. 1994. xiv + 528 pp. $59.95. ISBN 0-8412-2848-5.

This book is designed to be a tutorial, rather than a comprehensive review, of the theory, materials, and processes used in the lithographic process. After a list of contributors and a preface by the editors, there are five chapters with the following headings: An Introduction to Lithography by Larry F. Thompson; The Lithographic Process: The Physics by Murrae J. Bowden; Organic Resist Materials by C. Grant Willson; Resist Processing by Larry F. Thompson; and Plasma Etching by J. A. Mucha, D. W. Hess, and E. S. Aydil. There is also a subject index.

Chronicles of Drug Discovery. Volume 3. Edited by Daniel Lednicer (National Cancer Institute, NIH). American Chemical Society: Washington, DC. 1993. xiv + 426 pp. $84.95. ISBN 0-8412-2523-0.

This is the third volume in an ongoing series which contains the accounts of the discovery of drugs that have recently been approved for sale or are in the late stages of development. The chapters are informal narrative accounts by those who were directly ivolved in the initial discovery. After a preface by the editor, there are 14 chapters with the following headings: Mifepristone by G. Teutsch, R. Deraedt, and D. Pilibert; Ranitidine by John Bradshaw; Loratadine by Allen Barnett and Michael J. Green; Misoporstol by Paul W. Collins; Enalapril and Lisinopril by Arthur A. Patchett; Flecainide by Elden H. Banitt and Jack R. Schmid; Esmolol by Paul W. Erhardt; Diltiazem by Hirozumi Inoue and Taku Nagao; Aztreonam by C. M. Cimarusti; Ganciclovir by Julien P. H. Verheyden; Camptothecin and Taxol by Monroe E. Wall; Etoposide by Albert von Wartburg and Harmann Stähelin; and Amsacrine by William A. Denny. There is a subject index.