Additions and Corrections

Mechanism for the Catalytic Activation of Ecteinascidin 743 and Its Subsequent Alkylation of Guanine N2 [*J. Am. Chem. Soc.* **1998**, *120*, 2490−2491]. BOB M. MOORE, II, FREDERICK C. SEAMAN, RICHARD T. WHEELHOUSE, AND LAURENCE H. HURLEY*

Three of the structures in Chart 1 were mislabeled in the text: structure **2** is saframycin S, structure **3** is naphthyridinomycin, and structure **4** is anthramycin.

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Novel Spiro Phosphinite Ligands and Their Application in Homogeneous Catalytic Hydrogenation Reactions [*J. Am. Chem. Soc.* **1997**, *119*, 9570−9571]. ALBERT S. C. CHAN,* WENHAO HU, CHENG-CHAO PAI, CHAK-PO LAU, YAOZHONG JIANG,* AIQIAO MI, MING YAN, JIAN SUN, RONGLIANG LOU, AND JINGEN DENG

Page 9570: in the introduction section (first paragraph) we inadvertently missed citing a paper published by RajanBabu *et al.* (RajanBabu, T. V.; Ayers, T. A.; Casanuovo, A. L. *J. Am. Chem. Soc.* **1994**, *116*, 4101). Through different designs of phosphinite ligands from the same sugar backbone, the authors were able to get both L- and D-isomers of Rh-catalyzed hydrogenation products in good to excellent ee.

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Book Reviews

Surface Diffusion: Atomistic and Collective Processes. NATO ASI Series B: Physics. Volume 360. Edited by M. C. Tringides (Iowa State University). Plenum: New York and London. 1997. xi + 724 pp. $175.00. ISBN 0-306-45613-3.

Surface diffusion is of practical and fundamental importance to various areas of science and technology. Understanding the nature and consequences of the dynamic behavior of atoms and molecules on surfaces is a major objective of many condensed matter physicists, physical chemists, and materials technologists. This book, a collection of lectures and seminars given at a NATO Advanced Study Institute meeting held in Greece in 1996, presents a relatively well-rounded picture of the most recent approaches to the problem of surface diffusion.

The volume starts out after a preface summarizing the general aims and overall significance of the proceedings, which is then followed by an introduction written also by the editor. This introduction contains the fundamentals of the subject and a brief overview of the contents of the book, including a summary list of the different experimental methods used in recent investigations. Newcomers to the field will certainly benefit from the orientation, although they may not be satisfied with the single reference given. The rest of the book consists of 66 chapters grouped into seven categories. Except for one, each category contains 6−10 chapters. Part 1 deals with single-atom diffusion, both theoretically and experimentally. Part 2, Surface Diffusion and Epitaxy, has 23 contributions addressing such topics as nucleation, growth, and effects of surfactants. The third part focuses on large clusters, while part 4 covers measurements of collective diffusion and surface diffusion in connection with phase transitions. The fifth part discusses the effects of substrate, and part 6 deals with diffusion far from equilibrium. Finally, part 7 examines other atomistic processes related to diffusion. The book ends with an index of contributors and a subject index.

A lot of topics covered in this volume are of interest in current research. In particular, the state-of-the-art measurement techniques and computation methods developed are remarkable. A primary aim of the book is to obtain a more unified view and a better understanding of the problem, and this has certainly been achieved. The nearly 2000 citations, of which most (about 60%) are from the 1990s, are definitely a strong point of this volume. It is obvious that the field has been the focus of intensive research efforts and has now reached a state of maturity. One drawback of the book, however, is that more emphasis is placed on the physicists' perspective, even though the research area is generally regarded as being at the crossroads of chemistry and physics. Chemists should find it readable, nonetheless.

Overall, this is a very useful book for anyone who wants to familiarize themselves with the various aspects of the field and for those looking for new perspectives to enlarge their expertise. It is therefore recommended for research libraries as well as personal collections.

T. C. Chan, *The Hong Kong Polytechnic University*

JA985638D

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A Practical Guide to Graphite Furnace Atomic Absorption Spectrometry. By David J. Butcher and Joseph Sneddon. Wiley: New York. 1998. $69.95. 250 pp. ISBN 0-471-12553-9.

This book is volume 149 of the monograph series Chemical Analysis edited by J. D. Winefordner, and provides an up-to-date coverage of the essentials in graphite furnace atomic absorption spectrometry

(GFAAS). The authors are active researchers in the area, have written the book in tutorial fashion, offer their insight into using the technique successfully, and manage to present only important materials in a mere 250 pages. The chapters are very concise and assisted with numerous tables and figures for easy reference.

There are nine chapters and four appendices. Each chapter is self-contained, is supported with references (up to 1996), and may be consulted independently. Chapter 1 is less than two pages, introduces GFAAS, and outlines instrumentation and protocols for achieving accurate results. A table lists later chapters in reference to the pertinent discussions. Chapter 2 briefly covers the basic theory of atomic spectroscopy, the reactions between analytes and the furnace environment, and the shape of the analyte signal. Chapter 3 concerns calibration. The essential understanding of the calibration graph, the methods of standard additions and internal standardization, and absolute analysis are discussed. Chapter 4 covers instrumentation. Light sources, furnace designs and operations spectrometers, background correction methods, and single element and multielement spectrometric designs are considered. This chapter is well presented and easily understood, emphasizing discussions on the important Zeeman background corrections. Chapter 5 lays out methods for minimizing spectral, physical, and chemical interferences. Chapter 6 deals with sample preparation and introduction. Various digestion procedures, liquid matrices, gas sampling, direct solid sampling, preconcentration and separation methods, and speciation are included. Chapter 7 gives some practical hints for employing GFAAS to the analysis of real-world samples. Good laboratory practice and quality control are included here. Results can be accurate only when samples are collected, transported, stored, prepared, and measured properly—discussed in this chapter. The readers are also guided to method developments and troubleshooting. Chapter 8 covers commercial GFAAS instrumentation. Costs and analytical capabilities are compared. Consumables, training, and service are discussed. This chapter will provide the practical considerations in the selection for commercial instruments. Chapter 9 points out two future developments in GFAAS. The first one is to use laser diodes as the line source and the second one is to make the entire instrument portable. Appendix A briefly describes the historical development of GFAAS, with important references cited. Appendix B guides the reader into literature resources. Appendix C provides specific GFAAS operation conditions for a great variety of elements and offers procedures for preparing standard solutions. Finally Appendix D supplies a glossary for the spectroscopic and analytical terms employed. There also is an index for quick-referencing a subject in the book.

In summary, this book has achieved its goal as a practical guide. It will be useful to readers who are serious in learning the technique in detail and in employing the technique in the real world. It is written at a level suitable for readers of all sciences and is well suited as a textbook for an advanced undergraduate topic course, or for a topic workshop. The price also makes the volume an affordable textbook.

Kin C. Ng, *California State University at Fresno*

JA985652Q

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Liquid Interfaces in Chemistry and Biology. By Alexander G. Volkov and David W. Deamer (University of California at Santa Cruz) and Darrell L. Tanelian and Vladislav S. Markin (University of Texas Southwestern Medical Center at Dallas). Wiley-VCH: New York. 1997. $95.00. x + 551 pp. ISBN 0-471-14872-5.

Liquid interfaces are ubiquitous. They play a critical role in many chemical, physical, and biological processes. Compared to bulk liquids, liquid interfaces, including liquid−gas, liquid−liquid, and liquid−solid, are much less understood. This is in part because it is generally difficult to study such liquid interfaces experimentally or theoretically, since the concentration of molecules of interest at the interfaces is extremely low compared to that of the adjacent bulk liquid. The past decade has witnessed a huge increase of research interest in the study of liquid interfaces, fueled in part by new experimental and theoretical methods that allow for more direct and detailed probing of liquid interfaces at the molecular level. These new studies based on, e.g., nonlinear optical spectroscopy and computer simulations have significantly advanced our understanding of the fundamentals underlying liquid interfaces.

This book is the first to present a comprehensive coverage of the fundamental concepts and principal applications of liquid interfaces with emphasis on liquid−liquid interfaces in chemistry and biology. It contains contributions from four leading experts representing bioelectrochemistry, membrane biophysics, and thermodynamics. The book starts with a nice introduction to the thermodynamic aspects of liquid interfaces. Topics covered include a basic introduction to classical thermodynamics, measurement of interfacial tension, and adsorption at liquid interfaces. The second part of the book focuses on electrified interfaces, dealing with topics ranging from internal potentials to electrocapiliarity and energetics of extraction. The third part of the book presents a detailed discussion of the structure of liquid interfaces which includes both experimental measurements and theoretical simulation results. The fourth part focuses on issues related to chemistry at liquid interfaces, with emphasis on two very important subjects: interfacial catalysis and light energy conversion at liquid−liquid interfaces (artificial photosynthetic systems). The last part of the book deals with a biologically significant system, namely, membranes. The discussion centers around membrane thermodynamics and electrostatics and mechanics of interfaces.

The book is well written and organized with many good examples to highlight the basic principles. There is also a good balance between experimental results and theoretical models and analysis. The book presents quite an extensive coverage of liquid−liquid interfaces, which is its primary focus, and deals little with two other important liquid interface systems, namely, liquid−gas and liquid−solid interfaces. This book provids adequate and up-to-date references to a large number of current and earlier publications relevant to the topics covered. The subjects covered are very important to the general chemical and biological communities. It is recommended reading for both practitioners and newcomers who wish to keep up with the rapid developments in liquid interfaces, especially those treading the line between fundamentals and applications.

Jin Z. Zhang, *University of California at Santa Cruz*

JA985615Z

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Functional and Smart Materials: Structural Evolution and Structure Analysis. By Z. L. Wang and Z. C. Kang. Plenum Press: New York and London. 1998. $125.00. xxiii + 514 pp. ISBN 0-306-45651-6.

Functional materials have physical and chemical properties which are sensitive to changes in the environment (e.g., temperature, pressure, electric field, magnetic field, optical wavelength, adsorbed gas molecules, or pH). These include both organic and inorganic materials. *Smart materials* have physical structures which can sense, process, and actuate a response to a change in the environment. These include piezoelectric, magnetostrictive, electrostrictive, and shape-memory alloy devices. The ability to design and synthesize a system with these desired properties is a consequence of the early studies of structure−property relationships (e.g., *Structure-Property Relationships*, R. E. Newnham, Springer-Verlag, 1975). Over the past 20 years, tremendous advances have been made in the theoretical understanding and practical applications of structure−property relationships. The economic potential of these materials and the devices based on them is staggering.

Wang and Kang's book is limited to oxide-based materials and is divided into two parts. The first half contains a systematic discussion of the fundamental and derivative structures of the rutile, perovskite, and fluorite structure types. An excellent and detailed analysis of each of these fundamental structures shows how hundreds of related compounds have been designed and synthesized with very specific properties. The principles of soft chemistry (that is, the ability to prepare new oxides by modifying existing compounds under relatively benign temperature and pressure conditions) and the preparation of nanocrystals with various physical properties conclude Part I.

The second half of the book describes the principles and applications of structure determination using a number of relatively new and very sensitive methods, such as high-resolution transmission electron microscopy (HRTEM), convergent-beam electron diffraction (CBED), electron energy loss spectroscopy (EELS), and atom location by channeling-enhanced microanalysis (ALCHEMI).

References to the original literature are quite up-to-date, but a general bibliography to the many subjects introduced in this text is lacking. The excellent presentation of the various types of crystal structures

and the relationships between them, the many exceptional figures and tables, and the detailed description of the numerous experimental techniques used in these studies more than compensate for the poor index and the numerous annoying, and occasionally amusing, errors in grammar and spelling (e.g., genetic, rather than generic, index of formulas). This volume is an excellent reference book and could be used as a textbook if the instructor provides suitable background material. It is also a very timely book; recent supplementary discussions of sensors and smart devices can be found in several articles in *Physics Today*, July, 1998, and in *Principles of Chemical and Biological Sensors*, D. Diamond, Ed., J. Wiley & Sons, Inc., 1998.

Reuben Rudman, *Adelphi University*

JA9856351

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Supramolecular Chemistry of Anions. Edited by Antonio Bianchi (University Florence), Kristin Bowman-James (University of Kansas), and Enrique Garcia-España (University of Valencia). Wiley-VCH: New York. 1997. $79.95. xiv + 461 pp. ISBN 0-471-18622-8.

Despite the fundamental importance of anionic species in biology and chemistry, interest in the recognition of these species has lagged significantly behind the coordination and recognition chemistry of cations. Nevertheless, interest in anion coordination chemistry has developed rapidly in recent years, to the extent that the time is now ripe for a volume that summarizes the critical aspects of the field. *Supramolecular Chemistry of Anions* constitutes both a good introduction to the topic of anion coordination chemistry for neophytes and a valuable repository of detailed information for the expert practitioner.

The book comprises a series of chapters contributed by an international group of experts in the field, and covers physical, structural, and technological aspects of anion recognition. Since it comprises a series of articles contributed by different authors, it suffers somewhat from an inconsistency of style, and newcomers to the field will find some topics to be more accessibly introduced than others. Overall, *Supramolecular Chemistry of Anions* is a welcome addition to the literature of supramolecular chemistry, complementing the many existing works on cation recognition.

Chapter 1, Physical Factors in Anion Separations, by Bruce A. Moyer and Peter V. Bonnesen, is intended as a description of "presupramolecular anion chemistry": in other words a summary of more classical anion separation techniques such as ion exchange and liquid−liquid extractions. The intention appears to have been to provide benchmarks for evaluating the effectiveness of the supramolecular systems to be described in the remainder of the book. In practice, the chapter comes across as a lengthy treatise on the physical chemistry underlying anion separation techniques. Although the information contained in the chapter will undoubtedly be of interest to advanced readers, the chapter does little to set the stage for the upcoming descriptions of supramolecular chemistry, and seems out of place as the first chapter of the book. Newcomers to the field of supramolecular chemistry would be well advised to skip to the second chapter if they wish to learn what the majority of the book is about.

Chapter 2, Historical View on the Development of Anion Coordination Chemistry, by Bernard Dietrich and Mir Wais Hosseini, provides a succinct and accessible overview of the development of synthetic anion-binding hosts, organized in order of increasing anion complexity, and provides an excellent introduction to the subject matter of the book. Chapter 3, Natural Anion Receptors; Anion Recognition by Proteins, by Stefano Mangani and Marta Ferraroni, uses analyses of the interactions revealed in a number of X-ray crystal structures of protein−anion complexes to describe some of the principles underlying the ability of proteins to act as exquisitely selective hosts for substrates. The idea behind the chapter is well-conceived, showing how nature is able to fine-tune enzyme−substrate interactions to accomplish an incredible degree of specificity for a particular host, providing a paradigm for chemists' efforts to prepare synthetic receptor molecules.

The following two chapters, Artificial Anion Hosts. Concepts for Structure and Guest Binding, by F. P. Schmitchen, and Structural and Topological Aspects of Anion Coordination, by Jerry Atwood and Jonathon W. Steed, cover complementary aspects of essentially the same topic—the architecture of synthetic supramolecular hosts for the binding of anions. The former chapter provides an extensive summary of a wide range of synthetic hosts, organized according to the functional groups involved in the anion−host interactions, while the latter chapter focuses on detailed structural analysis of the host−guest interactions as revealed by X-ray crystallographic data. Between them, these two chapters provide an excellent summary of the types of receptors that have been synthesized to date, and provide a coherent picture of the nature of the host−guest interactions. These two chapters are complemented by the following chapter (Chapter 6), Thermodynamics of Anion Complexation, by Antonio Bianchi and Enrique Garcia-España, which continues to develop the readers' insight into the factors affecting binding strength and selectivity in host−guest interactions. The chapter provides a quantitative description of binding interactions, with plenty of numerical data to illustrate the points being made, without getting too bogged down with equations and physical data. An appendix describing practical methods for determining binding constants provides an excellent overview for the newcomer to the field of supramolecular chemistry.

Chapter 7, Electrochemical Aspects of Anion Chemistry, by Antonio Doménech Carbó, encompasses both the analysis of coordination equilibria by electrochemical methods as well as applications aspects, including electrochemical detection of anionic species and the effects of complexation on electron transfer reactions. The chapter presents a good introduction to electrochemical methods for the reader who is willing to work through the rather large number of equations. A number of specific examples are discussed throughout the chapter, but the scope of these is largely limited to the behavior of one particular type of receptor (polyazamacrocycles). That discussion of other receptor systems is limited to a final catchall section (7.8 - other issues) significantly diminishes the generality and quality of the chapter.

Chapter 8, Photochemistry and Photophysics of Supramolecular Species Containing Anions, by L. Moggi and M. F. Manfrin, provides brief but lucid coverage of an aspect of anion coordination chemistry that is clearly in its infancy. Chapter 9, Anion-Binding Receptors: Theoretical Studies by Joanna Wiórkiewicz-Kuczera and Kristin Bowman-James, summarizes the results of a variety of computational studies. Unlike many of the other chapters in the book, the coverage assumes that the reader is familiar with the language and techniques of computational chemistry, and will be of more use to an expert reader than to a newcomer. Nevertheless, the chapter describes a number of successful studies that help to elucidate some of the most important interactions contributing to the stability of supramolecular complexes.

Chapters 10 and 11 both describe applications of anion recognition. Chapter 10, Application Aspects involving the Supramolecular Chemistry of Anions, by J. L. Sessler, P. I. Sansom, A. Andrievsky, and V. Kral, provides a detailed and engaging review of many applications of supramolecular chemistry in technology. Topics covered include transport of physiologically relevant anions for medical applications, catalysis through supramolecular interactions, and analytical applications, such as ion-selective electrodes and chromatographic methods. Chapter 11, Supramolecular Catalysis of Phosphoryl Anion Transfer Processes, by Mir Was Hosseini, traces the development of a specific application of supramolecular catalysis, from early studies on nucleotide binding through the development and elucidation of a detailed catalytic mechanism. Chapters 10 and 11 end the book on a high note, leaving the reader with a sense that the field of anion recognition is only beginning to realize its full potential.

Stephen P. Watton, *Virginia Commonwealth University*

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Interfacial Aspects of Multicomponent Polymer Materials. Edited by David J. Lohse (Exxon Research and Engineering Co., Annandale, NJ), Thomas P. Russell (University of Massachusetts, Amherst, MA), and L. H. Sperling (Lehigh University, Bethlehem, PA). Plenum: New York. 1997. viii + 303 pp. $95.00. ISBN 0-306-45718-0.

This volume is a written record of many of the presentations made at the workshop and symposium of the same name hosted by the ACS Division of Polymeric Materials: Science and Engineering in 1996 at the Orlando, FL, American Chemical Society meeting. Twenty-one written adaptations of the more than 50 presentations and posters are presented in this book, which includes the recent work of recognized leaders in the field of multicomponent polymers.

According to the editors, despite some early advances in the field, the science of polymer blend and composite interfaces truly began in 1989, and has since exploded, assisted largely by major advances in instrumentation and experimental methods. That interfacial science and research is largely a young science is reflected in the fact that few references in the treatises are older than 1992, with the majority being fewer than 5 years old.

The treatises cover a broad range of topics relevant to the study of interfaces, and most are written in such a way as to be understood by those with a background in polymers but who are not already experts in the analysis of polymer phases or interfaces. The first chapter in the book is an introduction which briefly reviews definitions, instrumental methods of analysis of surfaces and interfaces, and the thermodynamics and kinetics of phase separation. Some chapters are theoretical, and discuss using self-consistent field theories to study the phase behavior of multicomponent systems or modeling fracture in polymer blends. Several chapters describe the use and value of specific instrumental methods of analysis of interfaces with methods ranging from laser scanning confocal microscopy to scanning force microscopy, a brief review of interface characterization using solid-state NMR, and methods of characterization and depth profile analysis of multilayer systems. Yet other chapters deal with such diverse topics as studying the segregation process and growth of wetting layers, studying different aspects of compatibilization, and studying the phase structures and fracture surfaces of a variety of different compatibilized blends. The range of subjects discussed in the book resulting from this symposium should ensure it will have value for anyone interested in the field of multicomponent polymers.

Patricia A. Heiden, *Michigan Technological University*

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Advances in Catalytic Processes, Vol. 2: Asymmetric Catalysis. Edited by Michael P. Doyle (University of Arizona). JAI Press: New York. 1997. 287 pp. ISBN 0-7623-0068-X.

Catalysis and asymmetric synthesis using transition metals dominates much of the current research focus in the area of organic synthesis. This volume, edited by Doyle, highlights some of the recent advances in the field through a series of nine reviews covering a broad range of topics. In several chapters the authors focus primarily on work from their laboratories (e.g., RajanBabu, Nishiyama, and Hayashi) while in other cases a more general review of the field is presented (e.g., Bolm, Burgess, Müller, Tolman, Stanley, and Roos).

The contents of the volume can be roughly divided into two main themes. The primary focus of most chapters is on the design of new ligands and their utility in inducing asymmetry in a variety of reactions. The other contributions examine the utility of various ligands on a specific asymmetric transformation. Some of the chapters incorporate both themes. The volume is remarkably free from typographical errors.

RajanBabu and co-workers present a detailed description of their recent studies in ligand design and tuning (using a sugar as a scaffold) as it relates to the hydrocyanation and hydrogenation reactions. The principles they outline can be generally applied when trying to improve enantioselectivity. Bolm provides a short but informative review of the recent advances in catalyzed Baeyer−Villiger reactions including acid-catalyzed, metal-catalyzed, and enzyme-catalyzed processes. Hayashi describes some of the useful reactions of MOP−palladium complexes and also the thinking that went into the design of this very useful ligand. Asymmetric hydrosilylation, reduction, and hydroboration are all covered. Similarly Nishiyama presents his group's work on the pybox ligand as it applies to the cyclopropanation and hydrosilation of ketones. He also describes how this ligand has been used in other asymmetric processes including enantioselective Meerwein−Pondorf−Verley, Diels−Alder, and Mukaiyama aldol reactions. Keyes and Tolman discuss the synthesis and reactivity of C_3-symmetric ligands in a chapter with a primary emphasis on the preparation and coordination properties of this emerging class of ligands.

The area of metal transfer reactions is described in reviews by Müller on nitrene transfer and Roos and Raab on carbene transfer. There is some overlap between the chapters and also with the Nishiyama chapter, which has a significant component dedicated to carbene transfer. However, this does not detract from the value of the individual contributions. Stanley reports on the recent improvements in the asymmetric rhodium-catalyzed hydroformylation reaction with an emphasis on the work of Nozaki and (the late) Takaya along with his own work on bimetallic rhodium complexes.

Finally Burgess's very brief chapter of approximately 10 pages provides an overview of the emerging use of combinatorial approaches to find new transition metal complexes and improve upon existing transition metal complexes which are useful in organic synthesis. To date most work has focused on building libraries of ligands to rapidly screen their binding properties to metals. One can easily imagine this field will undergo significant growth in the coming years, but a review of this type might help catalyze further applications.

While the upcoming publication of *Comprehensive Asymmetric Catalysis* will undoubtedly be the ultimate reference source for the next few years, the volume assembled by Doyle should be on the bookshelves of scientists in academia and industry interested in asymmetric synthesis.

Mark Lautens, *University of Toronto*

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