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BOOK REVIEWS

Macrocyclic Chemistry: Current Trends and Future Perspectives. Edited by Karsten Gloe (Technische Universität Dresden, Germany). Springer: Dordrecht. 2005. x + 450 pp. $179.00. ISBN 1-4020-3364-8.

This book features "selected aspects of current macrocyclic and supramolecular chemistry"—to quote from the preface—and was conceived in 2004 as a way to celebrate the 30th International Symposium on Macrocyclic Chemistry held in Dresden in July 2005. There are 25 chapters, a sampling of which includes "Signalling Reversible Anion Binding in Aqueous Media"; "Model Systems for Biological Processes"; and "Ligand Design for Base Metal Recovery". An appendix of colored figures and a subject index complete the book.

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Progress in Colloid and Polymer Science: Scattering Methods and the Properties of Polymer Materials, Volume 130. Edited by Norbert Stribeck (University of Hamburg, Germany) and Bernd Smarsly (Max Planck Institute of Colloids and Interfaces, Potsdam-Golm, Germany). Springer: Berlin, Heidelberg, New York. 2005. x + 176 pp. $129.00. ISBN 3-540-25323-8.

There are 19 chapters in this special issue of *Progress in Colloid and Polymer Science*, which commemorates the birthday of Wilhelm Ruland and covers advanced scattering methods and properties of polymer materials. They are organized under the following four sections: Preparation of Advanced Polymer Materials; Focus on Scattering Theory; Concepts for the Study of Structure and its Development 1. Isotropic Materials and Solutions; and Concepts for the Study of Structure and its Development 2. Anisotropic Materials. An Author/Title Index and a Keyword Index complete the book.

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Interphases and Mesophases in Polymer Crystallization I. Advances in Polymer Science, 180. Edited by Giuseppe Allegra (Polyitechnico Di Milano, Italy). Springer: Berlin, Heidelberg, New York. 2005. xiv + 220 pp. $219.00. ISBN 3-540-25345-9.

The goal of this collection of reviews along with two others in this series (specifically Volumes 181 and 191) is to address the question "How do polymer crystals form?" There are five reviews in this issue that approach this problem from different angles: Bassett looks at the role of the hexagonal phase in the crystallization of polyethylene; Lotz explores polymer crystal structures at the individual stem level; Ungar et al. examine the effect of self-poisoning on the morphology and growth rates of crystals; Geil et al. investigate the effect of molecular weight, melt time, and temperature on the morphology of poly(tetrafluoroethylene), and Rastogi and Terry look at the implications of the morphology of the interphase between crystalline and amorphous regions in semicrystalline polymers. An author index of Volumes 101−181 and a subject index complete the book.

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Theoretical Aspects of Transition Metal Catalysis. Topics in Organometallic Chemistry, 12. Edited by Gernot Frenking (Philipps-Universität Marburg). Springer: Berlin, Heidelberg, New York. 2005. x + 266 pp. $239.00. ISBN 3-540-23510-8.

There are seven reviews in this 12th volume of the series, which according to Frenking "demonstrate the strength but also the present limitations of quantum chemical methods for giving insights into the mechanism of transition-metal mediated reactions." As an experimentalist who follows the theoretical literature in several of the topical areas, I was pleasantly surprised with the general readability of the articles, although Springer could have avoided the misspelling of "Theoretical" on the title page.

The first two chapters, "Transition Metal Catalyzed σ-Bond Activation and Formation Reactions" by Musaev and Morokuma and "Theoretical Studies of C−H σ-Bond Activation and Related Reactions by Transition-Metal Complexes" by Sakaki, are related but complementary. The discussion by Musaev and Morokuma of the role of the excited state in oxidative addition reactions was of particular interest to me because it covers a topic that has influenced my own research. I also thought that the chapter on the "Enantioselectivity in Dihydroxylation of Alkenes by Osmium Complexes" by Drudis-Solé et al. tied together well the experimentally developed Sharpless mnemonic for enantioselectivity with molecular mechanical and quantum mechanical calculations largely developed by the Houk group. The approach is claimed "to predict quantitatively the origin of the enantioselectivity."

The article by Deubel, Loschen, and Frenking regarding the possible existence of organometallacycles in the metal-catalyzed oxygenation of olefins is very good and of particular relevance to our work (Goodman/Fackler) on gold catalyzed oxidation of CO. The two chapters on Ziegler−Natta polymerization catalysts are descriptions of co-oligomerization and polymerization largely with Ni. They lend credence to the belief that the mechanistic views of the elementary reactions in the polymerization of olefins and 1,3-butadiene are reasonably well understood. I was disappointed, however, to find no discussion of the role a second or third nearby metal atom plays in controlling product stereochemistry as has been observed,

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for example, in the Bridgestone-patented, high temperature, cluster catalyst synthesis of *cis*-polybutadiene. The chapter by Staemmler on a cluster model approach to the role of metal oxide surfaces, such as ZnO or MgO, used in catalysis was also very informative.

Overall, the book effectively presents current theoretical approaches to understanding several important organometallic catalysis areas.

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Organic Solid State Reactions. Topics in Current Chemistry, 254. Edited by Fumio Toda (Okayama University of Science). Springer: Berlin, Heidelberg, New York. 2005. xii + 314 pp. $289.00. ISBN 3-540-22982-5.

In the preface to this volume, Toda establishes the intent to cover advances in the area of solvent-free organic reactions over the past five years. Sticklers for detail may quibble with the title of the volume if they wish, because as the field of solid-state chemistry has evolved, an important distinction has been made between those reactions that truly proceed in the solid state and those that may be solvent-free, but which in fact proceed via intermediate formation of a liquid state.

Eight chapters covering a variety of solvent-free thermal, photochemical, and mechanochemical (grinding) reactions are presented. Each chapter is clearly and professionally written, and the overall impression is of a high quality monograph prepared with great care. Introductory comments in each chapter nicely establish the broader relevance and perspective, and each chapter provides a well-written and often fascinating overview of recent developments. While this volume does not attempt to provide comprehensive coverage of the entire literature of solvent-free organic reactions, it nonetheless serves as a surprisingly efficient compilation of a significant portion of this literature.

The great diversity of substrates, reaction types, and products presented in this volume is both astonishing and thought-provoking. There are numerous examples that appear to be ideal for introducing both undergraduate and graduate students to the field. Reading all or part of this volume, one would be hard-pressed to avoid coming away with interesting potential applications to one's own research efforts, particularly in the areas of heterocyclic synthesis, asymmetric synthesis, and green chemistry.

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