

Book Review

Hybrid Materials: Synthesis, Characterization, and Applications.
Edited by Guido Kickelbick (Technische Universität Wien,
Austria). Wiley-VCH Verlag GmbH & Co. KGaA: Weinheim.
2007. xviii + 498 pp. \$200.00. ISBN 978-3-527-31299-3.

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Physical Properties of Polymers Handbook, 2nd ed. Edited by James E. Mark (University of Cincinnati, OH). Springer Science + Business Media, LLC: New York. 2007. xx + 1076 pp. \$349.00. ISBN 978-0-387-31235-4.

This edition of *Physical Properties of Polymers Handbook* is a mammoth undertaking with 63 chapters divided into nine parts and 100 distinguished contributors with affiliations in industry, academia, and governmental agencies.

The objectives of the book are very ambitious. They are to collect in a single compendium an immense amount of information on nearly all aspects of the physical properties of polymeric and polymer-based materials and to provide a critical analysis and survey of this information. Many of the chapters provide a comprehensive review of the literature on the topic, as well as properties and model parameters. The compilations of physical properties are very readable and, depending on one's interests, range from the mundane and practical to the esoteric.

The second edition also includes 11 new chapters on several "hot" areas of physical polymer science, such as novel polymer structures, hybrid ceramic and nanotube composites, and single polymer chains. In general, the new chapters are comprehensive and relevant and contain reviews of journal articles and books with publication dates as late as 2006. Many, but not all, of the chapters from the first edition have been updated.

All in all, this is a very useful compendium and should have a place on every polymer scientist's bookshelf.

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Hybrid Materials: Synthesis, Characterization, and Applications. Edited by Guido Kickelbick (Technische Universität Wien, Austria). Wiley-VCH Verlag GmbH & Co. KGaA: Weinheim. 2007. xviii + 498 pp. \$200.00. ISBN 978-3-527-31299-3.

This book presents a broad look at hybrid materials in general, using the definition of a hybrid material as being something—film, part, structure—composed of both organic and inorganic components. In the Preface, the editors indicate that the book is meant to give an introduction to the topic of hybrid materials and nanocomposites, while assuming that the reader has no previous experience in the field. With that in mind, the absence of coverage of inorganic carbon-based hybrid materials is potentially a serious flaw of the book. The only mention of such materials, i.e., fullerenes, nanotubes, graphite, is in passing in Chapters 1 and 4. Another drawback is the bibliographic system. Although the references are up-to-date, there is no really good

citation system in the book; for example, there are no footnotes or endnotes in any of the chapters (except for Chapter 11), just references at the end of each chapter grouped by category. This will not be helpful to the student or scientist just starting in this field as he or she will have a difficult time finding the right reference to learn more about a targeted topic.

The book is organized into chapters that cover a particular topic on the subject of hybrid materials. The introductory chapter is well written, emphasizing the interfacial issues in hybrid materials and nanocomposites essential to successful design, analyses, and understanding of these materials. Chapter 2, "Nanocomposites of Polymers and Inorganic Particles", is unfortunately not very comprehensive. It barely touches on melt compounding and is deficient in its coverage of *in situ* polymerization techniques used for both thermosets and thermoplastics. The effects of processing on nanocomposite structure are completely overlooked, and the section on the application of mechanical reinforcement and flammability improvements is error-ridden and misses a wealth of data on nanocomposites in these two applications. It is comprehensive in its coverage of the chemistry of nanoparticles and discussions about properties, however. In my opinion, the reader who wants to learn more about polymer nanocomposites should skip this chapter altogether and read some of the good review papers or books currently available.

Chapters 3 and 4 are quite good in their discussion of hybrid organic/inorganic particles and layered/intercalation compounds (clays, double-layered hydroxides), respectively. Both cover the various chemistries in good detail and their applications in making additional hybrids or nanocomposites with those hybrid nanoparticles. Chapters 5 and 6 truly cover "hybrid materials" and provide a very broad look at zeolites and designed synthetic materials with controlled periodicity and sol-gel/silsesquioxane materials. The synthetic routes and chemistry of these materials are discussed in detail. Chapter 6, however, does have a weak bibliography and application section.

Chapters 7 and 8 feature discussions of hybrid natural and artificial biomaterials and the medical application of hybrid man-made materials, respectively, and complement each other nicely. The only drawback to these two chapters is the lack of instructions and guidance on the analytical tools and techniques for this field of research. Chapters 9 and 10 encompass a wide range of structure—property relationships in hybrid materials for optical/electro-optical applications and for fuel cell and electrochemical applications; Chapter 9 is the stronger of the two in terms of guidance and insight on how to prepare, analyze, and improve those hybrid materials. The final chapter provides a very good and detailed explanation of modern coating chemistry and how hybrid organic/inorganic coatings are made and characterized, their specific chemistries, and mechanisms in their particular application. It also has one of the best bibliographies in the book; the references are clearly cited throughout the chapter as endnotes so that the researcher knows exactly where to go for more detail.

Unsigned book reviews are by the Book Review Editor.

Overall, this book only partly serves its role as an introduction to the field of hybrid materials: it has some serious flaws in its lack of coverage of inorganic carbon-based chemistry and in its weak bibliographic sections. Many of the chapters will serve well as both introductions and as future references for various subtopics in the field, while others would just be read once to serve as a stepping stone for future research.

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The Way of Synthesis: Evolution of Design and Methods for Natural Products. By Tomáš Hudlický and Josephine W. Reed (Brock University, St. Catharines, Canada). Wiley-VCH Verlag GmbH & Co. KGaA: Weinheim. 2007. xii + 1004 pp. \$95.00. ISBN 978-3-527-31444-7.

In this book, Hudlický and Reed discuss the history and evolution of the art and craft of total synthesis of natural products spanning more than 50 years. In their effort to define "What makes a good synthesis?" they compare the designs and methods for creating the same targets, offering their personal perspectives and the anecdotes of others. The beginning chapters offer an introduction to synthesis, its history, and evolution and to the strategies and tactics that have contributed to the efficiency of multistep syntheses over time. The remaining sections are on the comparative design for syntheses of terpenes and alkaloids as well as other miscellaneous targets, such as maytansine, brevetoxin B, palytoxin, and indinavir. The final section covers the factors influencing the future of organic synthesis. The references for each chapter are numerous and current, and the subject and author indices are extensive. The book also includes a brief index of "personal recollection" and two appendices: Abbreviations, Acronyms, and Symbols and Guide to the Literature.

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New Avenues to Efficient Chemical Synthesis: Emerging Technologies. Ernst Schering Foundation Symposium Proceedings 2006.3. Edited by P. H. Seeberger (ETH, Zürich) and T. Blume (Bayer Schering Pharma AG, Berlin). Springer-Verlag: Berlin, Heidelberg. 2007. xiv + 242 pp. ISBN 978-3-540-70848-3.

This book presents the lectures given at the Ernst Schering Foundation Workshop on the titled subject held in Berlin in August/September, 2006. Some of the new technologies in chemical synthesis that are discussed here include microreactor chemistry, nanotechnology and catalysis research, microwave-assisted organic synthesis, and new developments in solid supported synthesis. The book was designed to appeal to scientists in the pharmaceutical industry and academics interested in chemical synthesis for drug discovery and development. There is no index.

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Vitamin D Handbook: Structures, Synonyms, and Properties. Edited by G. W. A. Milne (Williamsburg, VA) and Michael Delander (MDs Research Library, Mountain View, CA). John Wiley & Sons, Inc.: Hoboken, NJ. 2007. x + 274 pp. \$115. ISBN 978-0-470-13983-7.

This reference provides information for about 950 derivatives of Vitamins D₂ and D₃, with the record for each compound arranged according to increasing molecular formula. Each entry or record includes the name of the compound and CAS Registry Number, its molecular formula, structure, chemical name, synonyms and other ID numbers, and a summary of its chemical and biological properties and literature references. The book concludes with the following three indexes: CAS Registry Numbers; NLM PubChem Chemical Identification Numbers; and Names and Synonyms.

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