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BOOK REVIEWS

Polyfluorenes. Edited by Ulrich Scherf (Bergische Universität Wuppertal, Germany) and Dieter Neher(Universität Potsdam, Germany). Springer-Verlag: Berlin, Heidelberg. 2008. xii + 322 pp. $379.00. ISBN 978-3-540-68733-7.

With this book the editors succeed in their aim of presenting an overview of research on polyfluorenes and related heteroanalogues. It covers the literature of the past 20 years through 2007. The first article by Grimsdal and Müllen is a review of the synthetic approaches to polyfluorenes, polyindenofluorenes, and ladder type oligo- and polyphenylenes. Discussions about applications in organic light-emitting diodes (OLEDs) focus on emissive defects, electroluminescence efficiency, band gap tuning, and the incorporation of charge-transfer substituents in the context of hole and electron injection. This is followed by a chapter on applications of devices by Chen et al. who elaborate on incorporating charge-transport moieties by chemical modification of polyfluorene-based polymers and on band gap tuning by physical blending and by chemical means. In addition, they describe how solvent conditioning of polyfluorene thin films can be used to generate β-phase orientation. The roles of hole transport, electron injection layers, and hole-blocking layers in OLED device performance are also discussed.

In Chapter 3, Wong and Holmes summarize the synthesis and physical properties of poly(dibenzosilole)s, emphasizing their potential advantages for use in organic electronic devices. Next, the synthesis and properties of poly(2,7-carbazoles)s and related oligomers and polymers are discussed by Boudreault et al. They also briefly review the performance of these materials in OLEDs, field-effect transistors (FETs), photovoltaic cells, and thermoelectric devices. The fifth chapter by Liu et al. covers polyfluorenes with various metal centers, e.g., Ir(III), Pt(II), Eu(III), Re(I), and Ru(II), covalently linked to the polymer chain. The efficiency of triplet energy transfer from the main polymer chain is reflected by the cited metric of OLED device performances. This is followed by a substantial review of fluorene-based oligomers in organic photonics and electronics by Wallace and Chen. The use of oligomers with a narrow molecular-weight distribution increases the performance of devices. This review covers their synthesis and morphology, including crystallinity and liquid crystallinity, luminescence energy, lifetimes, and effects of polarization. In addition, electrochemistry and charge-transport properties are discussed. Some of the applications considered include solid-state organic lasers, FETs, OLEDs, and organic solar cells.

Chapter 7 by Monkman et al. begins with a detailed description of photophysics related to polyfluorenes, e.g., absorption spectra, emission, and defect emission spectra. Exciton dynamics and exciton−exciton annihilation processes are reviewed. The unique properties of the β-phase are also discussed, most notably its enhanced amplified spontaneous emission. In Chapter 8, Knaapila and Winokur focus on structural ordering of polyfluorenes in solution and the solid state. Most of the examples are from studies of the prototypical systems PF8, i.e., poly(9,9-dioctylfluorene), and PF2/6, i.e., poly(9,9-bis(2-ethylhexyl)fluorine-2,7-diyl. Self-organization in these materials may have a profound effect on the properties of optoelectronic materials. Liquid crystallinity and macroscopic alignment of polyfluorenes are described in detail, and emerging information about nanostructures, including nanofibers, is presented. The penultimate article in the book focuses on characterizing the chemical defects that can give rise to green emission from blue-emitting polyfluorenes. Although the role of green-emitting keto defects, which arise from oxidation of fluorene at the 9-position, is discussed in many other reviews in the book, this article provides detailed spectroscopic and structural evidence, as well as the best methods for circumventing the problem in OLED applications. The final article is an examination of single molecule spectroscopy of polyfluorenes. It has been employed to study conformation and aggregation of polyfluorenes in solution, bending of a fluorene chromophore in the β-phase, and individual keto defect sites in the polymer chain.

One drawback in the collected works is some repetition of synthetic methods, structures, photophysical issues, e.g., defect emission, and OLED applications among the various chapters. However, most review articles are self-contained enough to be read without cross-referencing the others. The book is well edited with few grammatical and typographical errors, and the index is useful. The chapters are particularly strong in summarizing the various synthetic routes to polyfluorenes and their monomers. Research scientists and graduate students interested in the chemistry and properties of polyfluorenes should look at this book.

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Handbook of Asymmetric Heterogeneous Catalysis. Edited by Kuiling Ding (Chinese Academy of Sciences, Shanghai, China) and Yasuhiro Uozumi(Institute of Molecular Science, Okazaki, Japan). Wiley-VCH GmbH & Co. KGaA: Weinheim. 2008. $200. ISBN 978-3-527-31913-8.

This book is a worthwhile collection of articles written by experts in the broad area of phase-separable or phase-separated asymmetric catalysis. However, although the topic as a whole is of much current interest, the value of this book rests more in the individual articles, aside from a short overview chapter written by the editors. In fact, the book would be better described as a collection of individual reviews rather than as an integrated summary of phase-separable asymmetric catalysis. The specific articles themselves are generally 20−40 pages long with little or no cross-referencing. Most areas of importance are covered, including such topics as inorganic supports, ionic liquids, dendrimers, organic polymer supports, phase-transfer catalysts, and heterogeneous (metal surface) catalysts. A very nice short chapter at the end addresses the key issues that relate to the industrial applications of these catalysts and nicely complements the initial overview chapter. Both this last chapter and the overview include a frank discussion of the pluses and minuses associated with reusable chiral catalysts in a nonacademic environment. References in the various chapters include many citations since 2000 and in some cases include important articles from as late as 2007. Earlier references are also included, but these are warranted as they put the discussions in context.

The problem with the book is that the lack of connection among the chapters. The "handbook" aspect is also limited by the index, which is a bit spotty in its coverage. For example, although you can find references to dendrimers in the chapter on dendrimers, other places where dendrimers are mentioned do not appear in the index. Another example would be useful chiral ligands. Someone interested in chiral phosphine ligands can find some references in the index to one chapter but would only find references to the practical use of Josiphos ligands, for example, by looking under the specific term Josiphos. The title is also a bit misleading. The term "heterogeneous" is not usually used for the phase-separated homogeneous catalysts that are the subject of much of the discussion in the individual chapters. It is more commonly used to refer to catalysis involving metals, which receives relatively minor attention in the book.

Overall this book would be useful as a reference for those working in the area of asymmetric catalysis. Chemists interested in specific examples of asymmetric catalysis, e.g., asymmetric phase-transfer catalysis, asymmetric fluorous catalysis, heterogeneized organocatalysts, or hydrogenation with chirally modified metal surfaces, will benefit from the individual chapters. Graduate students beginning work in catalysis would benefit from the overview chapter and the chapter on the industrial applications of asymmetric catalysis because those chapters provide a succinct but well-written introduction to the area.

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Advanced Excel for Scientific Data Analysis, 2nd ed. By Robert de Levie (Bowdoin College, Brunswick, ME). Oxford University Press: New York. 2008. xx + 708 pp. $59.50. ISBN 978-0-19-537022-5.

This book was written for those who are already familiar with Excel but want to use it to perform "numerical analysis of experimental data such as are usually encountered in the physical sciences". The emphasis is not on how to use ready-made templates to solve a problem but rather how to make the tools that will lead to a solution. There are chapters on least-squares methods—"used here almost exclusively as a data-fitting tool"—Fourier transformation, convolution, deconvolution, time-frequency analysis, and the numerical solution of ordinary differential equations, as well as several chapters that cover writing macros, other mathematical operations, matrix operations, and spreadsheet reliability, the last three of which are new to this edition. The book also includes four appendices that provide extra details about Excel, matrices, MacroBundles, and MacroMorsels. It is a very useful book that will help users familiar with Excel exploit its computational capacities to the fullest.

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