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A Review of: "Functional Organic Materials, edited by Thomas J.J. Müller and Uwe H. W. Bunz"

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Book Review

Functional Organic Materials, edited by Thomas J.J. Müller and Uwe H. W. Bunz, Wiley-VCH, 2007; xx + 591 pp., $315, cloth bound.

Functional organic materials are materials designed and synthesized for specific physical properties. This particular book edited by Müller and Bunz involves essays on a variety of topics not covered in two recent Wiley-VCH books that deal with functional materials, *Organic Light Emitting Devices*, edited by K. Müllen and U. Scherf, and *Semiconducting Polymers, Chemistry, Physics, and Engineering*, second edition, edited by G. Hadziiannou and G. G. Malliaras.

This volume is divided into four parts: 3-D Carbon-rich π-Systems—Nanotubes and Segments (two chapters); Strategic Advances in Chromophore and Materials Synthesis (five chapters); Molecular Muscles, Switches and Electronics (five chapters); and Electronic Interaction and Structure (four chapters). The national origins of the authors of the various chapters are the United States, U.K., Germany, Denmark, France, the Netherlands, and Japan. A particular strength of this work is the inclusion of experimental procedures in many chapters.

Chapters of particular interest include the following: Hirsch and Vostrowsky give a strong exposition of the diversity of methods available for functionalization of carbon nanotubes. Saha and Stoddart give a good summary of the use of rotaxanes in molecular motors and muscles. Nørgaard, Nielsen, and Bjørnholm present a variety of synthetic methods to introduce thiol groups and a variety of device configurations for molecular electronics applications. Barlow and Marder give a good summary of nonlinear optics and relevant materials for applications in second and third-order nonlinear optics and also for two photon processes.

The presentation in a several chapters could have been stronger. The chapter on electron transfer by Fukuzumi would have been strengthened by a discussion of the parameters sought in an optimal solar cell. Scheme 13.10 in that chapter uses the same symbol for C_{60} and TiO_2. The chapter by Anthony on induced π-stacking in acenes is concerned with the relationship between crystal structure and

electronic transport. Although electronic transport in all materials is limited by impurities, the topic of obtaining rigorously purified materials is not covered. It discussed the issues related to edge-to-face and face-to-face packing in acenes. Although face-to-face packing is thought to lead to stronger electronic coupling, the edge-to-face crystals also have large values of carrier mobility. Indeed, $1\,cm^2$/V-sec is a representative value for the carrier mobility of organic single-crystal molecular crystals. The significant emphasis on the Cambridge Crystallographic Database is a strength of this chapter.

Overall, this volume is a valuable contribution to the literature, especially for readers interested in the diversity of materials chemistry of organic and polymeric materials.

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