



Molecular Crystals and Liquid Crystals

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Book review

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BOOK REVIEW

Macromolecules Containing Metal and Metal Like Elements, Vol 1., by A. S. Abd-El-Aziz, C. E. Carraher Jr., C. U. Pittman Jr, J. E. Sheats, and M. Zeldin; Wiley-Interscience, New York, 2003; ISBN: 0-471-45832-5; 268 pages; \$125.00 (cloth).

This slender and interesting monograph (256 pages) deals with the field of organometallic and metal-containing polymers, and metal-containing dendrimeric materials. The authors are experts in the field and have published numerous original articles that deal with organometallic polymers. They are exceedingly well suited to describe this area.

The book is divided up into six chapters. The introductory chapter describes the history of the field, the structures and bonding principles of metal-containing polymers, and the synthetic methodologies that are used in the synthesis of these materials. The introductory chapter is very well written and gives an excellent exposition of the field and shows the essential developments. Particularly interesting is the historical background section showing that the U.S. government had a strong interest in metalloid polymers during the WWII. Otherwise, this chapter is an overview that can be utilized as a primer for a graduate course in polymers for students that are interested in this field. It gives the nonspecialist a feeling for the field of metal-containing polymers.

Chapters 2–6 deal with specific classes of metalloid polymers. Chapters 2 and 3 deal with metallocene polymers and polymers containing 4-6-membered ring π -coordinated to metallic polymers. These two chapters (107 pages together) are the main body of the book. The chapters are related and describe the development in this exciting field in satisfying depth. These chapters could have being fused; the way the authors divided them is not ideal (there is some overlap) but nevertheless is clearly acceptable.

The explosive development of ferrocene-and cyclobutadiene-containing polymers is well represented and accurately described and is an excellent entry for anyone who wants to start to do research in the field. The chapter contains gems, carefully researched facts that surprise even the specialist. Overall a well-rounded treatise of the subject.

Chapter 4 deals with metal moieties that are σ -bonded to or part of the polymer chain. The chapter prominently covers acetylide-containing

polymers and polymers that contain metal–metal single and multiple bonds. These polymers often show unusual electrochemical and electronic properties as well as interesting NLO-type properties. The chapter also covers the interesting work that has been done with Zr-containing prepolymers, which are useful for further elaboration into organic-conjugated macromolecules.

Chapter 5 deals with metallosupramolecular chemistry and its application in the formation of coordination polymers. Classical Schiff base, porphyrin, and phthalocyanine polymers are treated in the first part of the chapter, while the latter part of this chapter is dedicated to pyridine and related self-assembled architectures. The use of these metallo-supramolecular building blocks is powerful and shows a lot of potential for the assembly of novel macromolecular architectures. Particularly interesting is the incorporation of pyridines and bipyridines into conjugated polymers. These manipulations should allow the reader to fine tune the electronic properties of PPVs and related materials.

Chapter 6 is a substantial chapter (50 pages). It deals with the synthesis, properties, and applications of the heavier group 4 containing polymers. The section covers polysilanes, poly(silylenegermylene)s, poly(silyleneethynylene)s, poly(arylenesilylene)s, and partially silicon-substituted polyethylenes. The routes to these types of polymers are varied and include, but are not restricted to, catalytic dehydrogenations, pyrolyses of strained precursors, hydrosilylation reactions, and salt metathesis reactions. The vast literature is well cited. The chapter deals with polysilazanes, polysiloxanes, and polysesquisiloxanes and their rich chemistry. The next part of this chapter also covers germanium-based polymers, including conjugated polymers that incorporate germole units. The section describing tin- and lead-containing polymers is shorter because less is known about these types of materials.

In summary, this concise volume gives an excellent overview over the exciting development of the field of organometallic polymers. While it will be too expensive for a graduate student, researchers in the field of organometallic polymers will find it worthwhile to buy this volume, as will libraries.

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