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Book review

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BOOK REVIEW

Crystal Design: Structure and Function. "Perspectives in Supramolecular Chemistry," Volume 7. Edited by Gautam R. Desiraju. Chichester: John Wiley and Sons, 2003, $280.00 cloth.

This text is the seventh in the series in "Perspectives in Supramolecular Chemistry" and contains nine independent chapters devoted to topics in self-assembly and crystal engineering. The guest editor (G. R. Desiraju) has tried to provide a broad sampling of significant developments in the field by including the crystal chemistry of materials based on inorganic, aminol, resorcinarene, calixarene, coordination polymers, inorganic hybrids, and cyanometalate frameworks. Significant attention is given to understanding the construction of one-, two-, and three-dimensional crystalline architectures, with many contributions following a modular approach that generates a family of related crystal structures. The utility of this compendium is its attempt to exploit and connect structural features (i.e., hydrogen bonds, molecular recognition, guest encapsulation, and coordination environments) to material function.

The book may be divided into three sections. The first section provides comprehensive reviews of the fundamental aspects of generating crystalline networks from specific structural features. Details of inorganic complexes, such as hydrogen bonding in coordination compounds (chapter 1) and self-assembly of organic–inorganic hybrid materials (chapter 6), follow a rational discussion of key principles responsible for self-assembly. Chapter 2 describes the structures of an arsenal of aminolic compounds and the predictable associations of intermolecular aminoalcohol contacts.

The second section in the text (chapters 3–5) also explores self-assembly in the context of complementary building blocks and interactions by emphasizing the construction of nanoporous cavities and channels. The chemical classes of resorcinarenes (chapter 3) and calixarenes (chapter 5) provide a backdrop for discussion of the design and synthesis of large molecular networks that exhibit encapsulation behavior. This pair of chapters navigates the reader from design strategy to application with interesting insights into the selective recognition process of guest molecules. In a similar manner, the versatility of coordination polymers as porous materials with large cavities/channels is explored (chapter 5). Conceptually derived

from classical zeolites and clays, these materials have seen extensive exposure in the literature in recent years. The content of the chapter is thoroughly analyzed with insight into practical methods to increase material porosity.

From inspection of the book title and editor's preface, one might assume a significant portion of the book is devoted to material function. Although this collection provides valuable supramolecular design methods and structural details, considerably less attention is given to tangible applications. So why then does this book lack full discussions of structure–property relationships, or more importantly, why do crystal engineers in general seem to talk about physical properties without delivering adequate materials? This criticism is addressed on several occasions in the book and stems from the infancy of structure prediction methods. Although the first two-thirds of the book seem less able to demonstrate material functions, the last section (chapters 7–9) provides concrete examples of how the field is transitioning from structure to properties. These chapters are distinct in their approach. Each contribution follows a "function before structure" style and explains the molecular/supramolecular features necessary to generate material property (e.g., magnetism, polymorphism, crystal transformations, solid-state reactions, and chemical sensors).

In conclusion, *Crystal Design: Structure and Function* provides a well-written collection of current topics in the field of supramolecular chemistry. The text is certainly worth reading and will be an asset to any university or industrial research library.

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