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BOOK REVIEWS

Chemical Synthesis of Advanced Materials. By DAVID SEGAL. (Vol. 1, *Chemistry of Solid State Materials*. A. R. West and H. Baxter, Eds.). Cambridge University Press, Cambridge, 1989. xv + 182 pp. $59.50.

This slim monograph is the first in a new series edited by West and Baxter dedicated to the *Chemistry of Solid State Materials*.

After a brief introduction to ceramic systems, classical routes (precipitation, powder mixing, fusion, sintering, hot pressing) to the synthesis and fabrication of ceramics are outlined. Significantly more space is devoted to an adequate introduction to important sol-gel processing methods.

The balance of the book covers nonaqueous liquid-phase reactions, polymer processing, hydrothermal synthesis, and gas-phase reactions (including plasmas). A short appendix outlines the principal methods of particle size determination. At each point in the discussion, an adequate, but limited number of references are given, including specific examples of each preparative technique.

This volume will be of most value to the undergraduate or beginning graduate student by providing an introduction to chemistry's contributions to advanced ceramic materials synthesis. As might be expected from its size, specific details will have to be obtained through primary sources.

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Advanced Fibers and Composites. By FRANCIS S. GALASSO. Gordon & Breach Science Publishers, New York, 1989. xvi + 178 pp. $69.00.

The growth in complexity, size, and diversity of markets in the composites industry has introduced the subject to many newcomers to this field. This book on Advanced Fibers and Composites provides a natural answer to the often-asked question: "Where can I get a good review of the materials and options available in composites in one piece of readable literature?" Although the growth of the industry and the introduction of new products and processes have been explosive, Dr. Galasso is able to bring the reader up-to-date (with the few exceptions of changes since 1989) in a comprehensive coverage illustrating the historic development and current status of most composite systems. For the researcher who wants to delve deeper into specifics, the bibliography is comprehensive, including books, articles, and patents. Identification of laboratories and personnel working on specific types of composite systems provides an avenue for further contact in specific areas of interest.

Each major topic in this book (fibers, matrices, composites, coatings, etc.) is sufficiently covered that those whose interests are narrow and specific can be thoroughly satisfied with respect to clearly defined areas (e.g., carbon fibers and carbon/carbon composites). Similarly, there are sufficient details so that comparisons of different fiber systems (e.g., boron vs graphite vs SiC vs Kevlar) or matrix families (organic vs metal vs ceramic) are clearly understood.

Of particular interest is the perspective given by comparison of the characteristics of emerging systems (ca. 1960–1970) with the state-of-the-art in 1989. It is noted that the ideal or theoretical properties of composites are often well above those defined by the available engineering data, leading to the proposition that full understanding of the chemical, thermal, crystal, and micromechanical interrelationships will yield increasingly more valuable and common elements in the many applications and industries opening to composites. For those just entering these fields who expect to encounter composites, this book will provide the introduction they need and should also be retained for many years as a reference.

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The Solid State—From Superconductors to Superalloys. By A. GUINIER AND R. JULLIEN. Oxford University Press, New York, 1989. 288 pp. $75.00 ($29.95, paperback).

This book is a must for almost any practicing chemist who has the need for a background in solid state physics, but who does not have the time to either learn or relearn all the necessary physics. The authors do not assume that the reader is familiar with the subject and introduce each topic in such a way that the reader

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can readily grasp and understand the subject matter. In addition, when mathematical derivations are shown, they are broken down so that they can be followed simply, *i.e.*, none of the proverbial "*left to the reader*" or "*simple substitution yields. . . .*"

This book should make an excellent text for either senior level undergraduates or graduate students who have a chemistry background but now find a need to understand the physical properties of solids. Normally, this would require the creation of a course that unfortunately does not exist in most chemistry curricula. The suggestion that a chemistry student take the Physics Department's ***Solid State Physics*** course usually leads to very unsatisfactory results, since the student does not have the requisite background. Since I received the review copy of this text, it has been the book in my library most borrowed by my graduate students. Most probably, this is true because it is possible to use information available in just one chapter without reading all previous chapters. Therefore, although in the ideal case, the chemistry student should be exposed to a course using this text, at least if the text is available, the student can self-learn the particular subject of interest.

After reading this book, I came to the conclusion that a course using this text as an outline could easily be developed, specifically with either the chemist or the materials scientist in mind. I feel that this type of course would be a definite benefit to the student and should exist. In the meantime, before such a course is available, I strongly recommend that this book be brought to the attention of students and anyone else looking for simple, straightforward explanations of physical phenomena in solids.

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