

Book Reviews

Crystal Chemistry and Refractivity. By Howard W. Jaffe (University of Massachusetts at Amherst). Cambridge University: Cambridge and New York. 1988. xi + 335 pp. \$75.00. ISBN 0-521-25505-8.

Reading this book was an interesting experience since at times I did not know whether it detailed the history of science during the early years of this century or was intended as a modern text for university students. Moreover, reading it was a trying experience since it is full of avoidable errors and annoying idiosyncrasies and is altogether in desperate need of a good editor.

The preface states this book was written in response to the need to provide graduate students at the author's institution with the background needed to understand the core of the monograph—refractivity and its applications to mineralogy. "Most of the incoming graduate students, who have arrived with undergraduate degrees from a representative cross section of American colleges and universities, do not have this adequate background in the aforementioned basic subjects." (sic, chemistry, physics, mathematics, and elementary crystallography). I would prefer to think that such a distinguished group of American graduates would be a bit better prepared than that; however, if the case is fairly presented, they are unlikely to learn them from the material provided in this book, since the fraction of those subjects presented is often inadequate, sometimes misleading, and at times outright wrong.

Finally, I found that topics dealt with, using data from older literature, have since been modified or corrected in newer publications. Thus, erroneous or outdated material could readily have been weeded out by a trip to the library.

Ivan Bernal, *University of Houston*

Side Chain Liquid Crystal Polymers. Edited by C. B. McArdle (Loctite Ltd.). Chapman and Hall: New York. 1989. xiv + 488 pp. \$150.00. ISBN 0-412-01761-X.

Dr. McArdle has assembled an impressive collection of authors for this fine book covering the current state of research in side-chain liquid crystalline polymers (SCLCPs). The text covers most, if not all, of the important areas concerning these unique and important materials. The majority of the chapters deal with reviews of the current literature in this area through 1988. The contents are broadly organized into five areas.

Chapter 2 (M. Warner) presents an overview of the theoretical models for the development of the various mesophases that are displayed by SCLCPs. Also covered in this chapter is the theory of elastomers based on SCLCPs.

Chapter 3 (V. Percec and C. Pugh) provides a survey of the rationale and synthetic methods for generating various SCLCPs, with emphasis on polymers whose backbones are primarily organic (vinyl polymers and polyesters). Chapter 4 (C. W. Gray) deals with these concepts for siloxane based SCLCPs. One area not covered are the recent developments of SCLCPs based on polyphosphazenes.

Several chapters deal with analytical methods for characterizing the structure, morphology, and dynamics of SCLCPs. Chapter 6 (C. Noël) is a review of thermal, microscopic, and diffraction methods for the characterization of SCLCP phases and microstructure. Chapter 7 (C. M. Haws, M. G. Clark, and G. S. Attard) discusses dielectric relaxation of these materials. Chapter 8 (C. Boeffel and H. Spiess) covers solid-state NMR spectroscopic approaches to determination of side-chain and backbone ordering and mobility in SCLCPs. Chapter 11 (W. Haase) deals with the effects of external fields on SCLCPs and how the polymeric materials differ in this behavior from low molar mass liquid crystals.

Another series of chapters deal with the properties that derive from the unique structures found in SCLCPs. Chapter 5 (P. Le Barny and J. C. Dubois) covers the syntheses, characterization, and application of SCLCPs which exhibit the potentially ferroelectric chiral smectic C phase. Chapter 9 (V. P. Shibaev and Ya. S. Freidzon) discusses SCLCP containing chiral mesogens and exhibiting cholesteric liquid-crystalline phases. Chapter 10 (W. Gleim and H. Finkelmann) gives a discussion of the syntheses and properties of SCLCPs which are cross-linked so as to also possess elastomeric properties.

The final set of chapters deal with applications of SCLCPs. Chapter 12 (G. R. Möhlmann and C. P. J. M. van der Vorst) discusses the application of SCLCPs as nonlinear optical media. Chapter 13 (C. B. McArdle) deals with the potential for use of SCLCPs for optical storage media. Finally, Chapter 14 (G. M. Janini et al.) gives a unique example

of the use of these materials as stationary phases for gas-liquid chromatographic separations.

Overall, the book provides an excellent account of this active field of research. Researchers working in this field will find it a handy reference. It also provides a good introduction to scientists wishing to acquaint themselves to this interesting class of polymers.

Steven K. Pollack, *University of Cincinnati*

Atlas of Polymer Morphology. By Arthur E. Woodward (The City University of New York). Hanser: Munich and New York. 1989. x + 531 pp. \$185.00. ISBN 0-19-520758-0.

Polymeric materials exhibit a very wide range of morphologies. These morphologies arise from details of the intrachain structure, interchain packing, and also the processing history of the material. As such, it is possible to infer from morphological study a great deal about the intra- and intermolecular structure and about the thermomechanical history of the material. Inherent in the morphology also are the physical properties of the material. It is for these reasons that morphological characterization and analysis are important in polymer science and engineering.

Morphological interpretation rests in part on the experience of the investigator in comparing the morphology of the material being studied with known morphologies. An atlas of polymer morphologies could be a tool whereby the expertise and experience of the compiler can substitute or augment those of the investigator. It is in this context that such an atlas is very welcome.

The *Atlas of Polymer Morphology* contains 424 figures, all but 23 of which are micrographs collected by Prof. Woodward from experts throughout the world. The scope is broad, as indicated by the chapter headings: Polymers Crystallized from Solution; Crystallization from the Melt; Crystallization during Polymerization; Block Copolymers; Liquid Crystalline Polymers; Processing Effects; Polymer Blends and Composites; Effects of Mechanical Deformation; Fracture; and Effects of Chemicals and Other Agents. The figures are beautifully reproduced, this being important to the usefulness of the book. The preparative history of each specimen has been fully given, and this will be of use to both the careful reader and the scientist attempting to duplicate the work. Prof. Woodward deserves high marks in regard to the attention paid to specimen history.

The Atlas is, however, not without problems. Those problems are generically of two types: those related to coverage and those related to editing.

Regarding coverage, while Prof. Woodward has assembled in an orderly way a large volume and variety of micrographs from many sources, the coverage in any of the areas dealt with is often spotty. In his preface, the author states that "the photographs used emphasize the more recent work ..." and that "the text ... is not a critical review of the material available on this subject". The net effect is that significant areas in which the primary work was done earlier are not well represented. Conversely, areas of minor importance are occasionally overamplified. In order to complete the coverage of many of the areas, the reader must consult earlier compilations, such as those of Geil, Wunderlich, or Ehrenstein.

Regarding editing, one wishes that this had been done much more thoroughly for a book otherwise so finely produced. The problems relate largely to the description of the micrographs. Arrows, other identifying marks, and insets are not uniformly identified. On the other hand, identifying marks alluded to in the text are not always found in the figures. Sometimes features are referred to by appearance ("bands", "focal conic texture", "banded spherulite", "threads"), without reference to the intrinsic nature of the feature. A few figures and captions are apparently mixed. Features claimed to be evident in the text are not always clearly visible in the figure. In some cases, the importance of features is not given (e.g., disclinations in liquid crystals). And sometimes little clue is given on how to identify features referred to in the text. For a book whose impact resides in the figures and their explanations, these editorial problems are annoying.

The *Atlas of Polymer Morphology* will be valuable to the collection of scientific libraries and to some characterization specialists. The Atlas breaks new ground and, although imperfect in some respects, will be useful in the practical identification and characterization of observed morphologies.

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