the credit of the editor. It is unlikely that this book would make a suitable graduate text, but it does provide the interested reader with an excellent review of the current status of a rapidly growing and dynamic field of phase transitions.

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Computing in crystallography. Edited by R. DIAMOND, S. RAMASESHAN and K. VENKATESAN. Pp. 450. Bangalore: Indian Academy of Sciences, 1980. Price US $17.00, Rs 125/-; price for individuals US $8.00, Rs 50/-.

Computing in Crystallography contains the text of 29 lectures which were delivered at a Winter School on Crystallographic Computing which was organized in January 1980 in Bangalore, India. The crystallographic techniques described in this volume range from data collection and processing to the refinement and display of completed structures.

The level of prior knowledge expected of the reader by each lecturer varies widely. Many chapters will not be understood unless the reader has a proper grasp of matrix notation. The beginner may be slightly bewildered by the lack of uniformity in the mathematical notation employed. At least three ways of denoting a matrix transpose are used, two of them being employed in one chapter. Many chapters are followed by exercises, sometimes with answers, which often add valuable material to the book.

The first four chapters of the book cover the topics of diffractometry, absorption and extinction corrections and microdensitometry of film data with a good balance between theory and practice. The next five chapters are concerned with the solution of the phase problem. An excellent chapter by Nordman describes automated vector search methods for solving Patterson functions including useful practical advice and illustrations of possible pitfalls. Multisolution methods of solving the phase problem are described in chapters by Main and Woolfson which provide good background reading for users of the packages *MULTAN*, *MAGIC* and *YZARC*.

Three chapters deal with the theory of errors and least squares. The introductory chapter on least squares in crystallography is one of the few disappointing chapters in the book. Poor explanation and typographical errors mean that the chapter is of limited value. Fortunately, Hendrickson & Konnert give a well presented and comprehensive account of restrained least squares, which is now an important technique in the refinement of macromolecules. A chapter on error analysis by Huml discusses the statistical theory of propagation of error and collects together much current wisdom concerning weighting schemes and analysis of weights from least-squares refinement. A chapter by Johnson gives a general survey of thermal motion analysis and two chapters describe charge density studies and the high-precision crystal structure analysis which is required to make them possible.

Four chapters of special interest to protein crystallographers describe heavy-atom refinement, phase determination by multiple isomorphous replacement, and structure factor least squares with fast Fourier algorithms and automated map interpretation.

The last part of the book deals principally with computing. A chapter by Hall & Stewart describes the principles of design of the *XTAL* system and the use of the *RATMAC* preprocessor. Two chapters on mini- and microcomputers are interesting but clearly the information will rapidly become dated. Excellent chapters by Johnson and Diamond describe computer graphics, including methods of molecular displaying and interactive graphics.

In summary this book contains a wealth of information for practising crystallographers and excellent surveys for those wishing to keep up to date with recent developments in crystal structure analysis.

The Indian Academy of Sciences is to be congratulated in producing this volume cheaply enough for every crystallographer to have his own copy.

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Amorphous semiconductors. (Topics in Applied Physics, Vol 36.) Edited by M. H. BRODSKY. Pp. xvi + 337. Berlin: Springer, 1979. Price US $49.50.

This book presents a clear review of the understanding of electronic phenomena in amorphous semiconductors, with the emphasis on those phenomena principally dependent upon energy levels in and near the semiconductor bandgap. Readers can understand those concepts which are novel to the *amorphous* state of semiconductor materials as well as those which are easily described by analogy with the well-established base of knowledge of *crystalline* semiconductors, as the editor has commented in the preface.

The introductory chapters (1–3) present the principal definitions, outline current and future trends, and describe the physical band theory of bandgap and defects in amorphous semiconductors. There are various theoretical approaches relating energy states to the spatial structure of amorphous systems. States in the gap and defects are discussed in three distinct groups: the tetrahedrally coordinated silicon-like materials, the chalcogenide glasses, and the amorphous arsenics.

Optical absorption, electronic transport, luminescence, spin effects, short-range order, doping and solar cells are described in turn (chapters 4–10). Optical absorption from defects in the gap, band tails, and interband transitions are interpreted with experimental observations. Band models are used to classify electrical conduction in amorphous semiconductors. The concept of hard and soft centres, as the origin of the electron spin resonance signals in pure and hydrogenated amorphous silicon, is discussed. Probes of short-