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(ii) Other Publications

Molecular Structures and Dimensions

Volume 1 f 45 (\$14.00 or £5-40)

Early Papers on Diffraction of X-rays by Crystals
(first volume - J. M. Bijvoet, W. G. Burgers & G. Hägg)
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World Directory of Crystallographers, fourth edition
f 17 (\$ 5.00 or £2-00)

Index of Crystallographic Supplies, third edition
f 10 (\$ 3.50 or £1-35)

Bibliographies on X-ray diffraction at high and low temperatures, on methods of obtaining monochromatic X-rays and neutrons and on small-angle scattering, a *Crystallographic Book List* and a *World List of Crystallographic Computer Programs* (second edition) are all priced f 10 (\$3.50 or £1-35).

Book Reviews

Works intended for notice in this column should be sent direct to the Book-Review Editor (M. M. Woolfson, Physics Department, University of York, Heslington, York YO1 5DD, England). As far as practicable books will be reviewed in a country different from that of publication.

Interpretation of X-ray powder diffraction patterns. By H. LIPSON and H. STEEPLE. Pp. viii + 335. London: Macmillan, 1970. Price £4-00.

Powder diffraction may be described as the Cinderella of crystallography, often pushed aside in the urge to get on with structural determination using the more elegant and glamorous single-crystal methods. Powder photographs may be described as the work-horse of crystallography, serving day-to-day uses in the fields of metallurgy, mineralogy and chemistry, often by practitioners who do not recognize the full potential of the method. This book would help them to appreciate more fully the power and limitations of the method.

Teaching the fundamentals of crystallography may be approached from considerations of symmetry, geometrical and optical properties, but the use of X-rays in the study of crystals may well

be approached through basic and elementary concepts of the powder method. As a revised extension of part of the previous undergraduate textbook by Henry, Lipson & Wooster this book aims to be complete in itself, and thus carries introductory chapters on crystal lattices and symmetry and the geometry of X-ray reflexion, as well as one on the nature and generation of X-rays before proceeding to the recording, measuring and interpretation of X-ray powder photographs. In the generation of X-rays, the gas tube is dismissed as no longer of importance in a world where the hot cathode dominates. Yet the appendix, which has a number of useful numeric and atomic property tables, also carries recipes for metal plating - presumably for gas tube targets. It would appear that the decision to revise the section on X-ray tubes did not carry through to these laboratory crafts.

The interpretation of the powder photographs in terms of crystal symmetry

and structure forms the main discussion; lesser sections appear on line broadening and identification of crystalline materials. Considering the importance of identification in applied X-ray photography, it is unfortunate to see this aspect so lightly treated. An assignment to the student to prepare the powder data on a substance not previously recorded would be a healthy educational exercise, and would at the same time extend the data bank which is, at present, a limitation in the use of the method. Of the twenty-five problems given in the text, two concern elementary aspects of identification. As a whole, the problems present an imaginative challenge and a measure of appreciation of the subject. They add considerably to the usefulness of the text in formal or self instruction.

The book carries no standard book number, which is now rarely omitted on books published in Great Britain. The growing importance of this system in

book cataloguing and acquisition suggests to the publishers that they should take this more seriously.

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Physics of $p-n$ junctions and semiconductor devices. Edited by S. M. RYVKIN and YU V. SHMARTSEV. Pp. ix+366. New York: Plenum, Press, 1971. Price \$44.80.

The title may seem vague and this is perhaps in keeping with the book. There is no introduction or other indication of how the book came to be assembled. It was published in Russian in 1969 for the A. F. Ioffe Physicotechnical Institute of the Academy of Sciences of the USSR but there is no indication whether it was associated with a conference or whether, slightly late, it commemorated the 50th anniversary of the Ioffe Institute.

The book consists of 68 articles on topics from $n-p-n-p-n-p$ silicon device structures to strain effects in polycrystalline films of indium antimonide and gallium antimonide. The articles seem almost randomly distributed and, without even an author index, one has to plough through the list of contents to find a particular article or topic.

There is no main theme but half the papers could be classified as concerning either multilayer silicon structures (thyristors *etc.*), optoelectronic properties of $p-n$ junctions in III-V compounds, semiconductor lasers, thin-film properties, or pressure effects in semiconductors. Partly because of the delay in publishing, some of the material or similar work by other authors has appeared in journals elsewhere. However, some of the articles are of interest and do add to some extent to the state of knowledge. For example, though work on thermally stimulated currents in gallium phosphide junctions has been reported elsewhere, more reliable methods of analysis are given in an article in the book.

It is not clear for whom the book is written, as it serves as neither an introduction, authoritative treatise or bibliography concerning $p-n$ junctions and devices, nor as a compendium of recent work on one particular aspect. The final crunch is the cost of the 366 page book, which is only matched by the number of different contributing (158).

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Structural characteristics of materials. Edited by H. M. FINNISTON. Pp. x + 318. Amsterdam: Elsevier, 1971. Price f. 6900 (*ca.* \$19.25)

This book consists of six independent chapters entitled: Crystallography of Materials, H. Lipson and S. G. Lipson; Defect Structures, A. G. Crocker; Mechanical Twinning, D. Hull and E. Roberts; Martensitic Structures, W. S. Owen and F. J. Schoen; Development of Microstructure, R. B. Nicholson and G. J. Davies; Structural Defects in Non-stoichiometric Compounds, B. T. M. Willis and J. Williams. The whole text is plentifully illustrated with optical and electron micrographs. Chapters 1 and 2 are introductory in nature, but each of the others provides an up-to-date, well documented account of its field that will be profitably read by the interested expert. It appears that a genuine insight has been achieved into the atom movements involved in mechanical twinning. However the same cannot be said of martensite formation. This is an inherently more complex phenomenon than twinning, and theories are still getting confounded by the emergence of fresh facts concerning the relaxation of constraints. Thermodynamics remains the key to understanding the development of microstructure, but further progress seems to depend increasingly on the recognition of metastable transition phases that ease the reaction path towards equilibrium. The final chapter essentially constitutes a succinct mathematical appendix to the first.

The various articles present a valuable interim picture of a lively research area, but they hardly support the claim expressed in the blurb that 'there has been a great deal of consolidation of experimental results and a leavening of the multiplicity of theories surrounding new developments'. I certainly missed a general covering chapter that would have expanded the blurb and explained the choice of topics, in particular their virtual restriction to metallurgical systems despite the book's very broad title

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The physics of opto-electronic material. Edited by W. A. ALBERS JR. Pp. xv + 281. New York: Plenum Press, 1972. Price \$18.48.

This book contains selected papers on opto-electronic materials taken from a Symposium held at General Motors Research Laboratories on 4-6 October 1970, and is the first in a G. M. Symposia Series.

Topics include a review of non-linear optics, simple models accounting for the optical properties of semi-conductors and insulators.

Of marginal interest to crystallographers are papers on single-crystal ferroelectrics, the optics of solid state phase transformations and the light-scattering properties of nematic liquid crystals.

The papers selected provide an effective cover of both the theme of the conference and recent research into new electro-optic materials and their applications in such fields as laser beam steering and modulation. This book is aimed primarily at the physicist researching into electro-optic materials and systems.

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