

Notes and News

Announcements and other items of crystallographic interest will be published under this heading at the discretion of the Editorial Board. The notes (in duplicate) should be sent to the Executive Secretary of the International Union of Crystallography (J. N. King, International Union of Crystallography, 13 White Friars, Chester CH1 1NZ, England).

New Volume of

International Tables for X-ray Crystallography

Volume IV, entitled *Revised and Supplementary Tables* and edited by James A. Ibers and the late Walter C. Hamilton, has just been published for the Union by the Kynoch Press, Witton, Birmingham B6 7BA, England, at a price of £10.00. Orders may be placed direct with the Kynoch Press, with Polycrystal Book Service, P.O. Box 11567, Pittsburgh, Pa. 15238, U.S.A., or with any bookseller.

Since the publication of Volume III in 1962, experimental and theoretical activity in all areas of crystallography has greatly increased. The principle motivation for a new volume was to provide revised values for atomic scattering factors, X-ray wavelengths and atomic absorption coefficients.

Volume IV has a cumulative index for all four volumes. When specific information included in Volume IV supersedes material in an earlier volume, the reference to the earlier volume is included in parentheses. In such cases, the numerical values given in Volume IV should be used, but the earlier volume should also be consulted for the sometimes extensive textual material accompanying the tables.

A number of special topics, mainly mathematical in content, which were not included in Volume II, have developed considerably and have been incorporated in Volume IV. Such new material, selected by the Editors, includes diffractometer calculations, analysis of thermal motion in crystals, and some aspects of direct methods for phase determination. Although some of this material is more textual than tabular, it has been included because of its great importance to most structural crystallographers. Omission of other topics should not be taken as indicative of their relative unimportance. Selection had to be made by the Editors. The Union is greatly indebted to the Editors and to all the contributing authors for making the publication of this volume possible.

Volumes I, II and III in this series are

still available but it has been necessary to increase the price slightly to £8.00 per volume. Prospectuses for all volumes and details of preferential prices for personal subscribers may be obtained from the Kynoch Press or from Polycrystal Book Service.

Crystallographers

This section is intended to be a series of short paragraphs dealing with the activities of crystallographers, such as their changes of position, promotions, assumption of significant new duties, honours, etc. Items for inclusion, subject to the approval of the Editorial Board, should be sent to the Executive Secretary of the International Union of Crystallography (J. N. King, International Union of Crystallography, 13 White Friars, Chester CH1 1NZ, England).

Dr **William L. Fink** has retired as Chairman of the Joint Committee on Powder Diffraction Standards and has been succeeded by Mr **LeRoy L. Wyman Sr**, former Treasurer of the JCPDS. Mr **J. W. Caum** has been elected Vice-Chairman and Dr **J. D. Hanawalt** has been elected to the Board of Directors. Mr **Andrew W. Danko** has been appointed Secretary and General Manager on the retirement of Dr **Roger G. Simard**.

Dr **R. D. Heidenreich**, Bell Telephone Laboratories, Murray Hill, U.S.A., has resigned as a Co-editor of the *Journal of Applied Crystallography*. He has been a Co-editor since the journal was first published in 1968.

Dr **George A. Jeffrey** has left the Department of Crystallography, University of Pittsburgh, to take up the appointment of Senior Scientist at the Chemistry Department of the Brookhaven National Laboratory. Dr Jeffrey continues to be a Co-editor of *Acta Crystallographica*.

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.

Electron optics. By P. GRIVET, translated by P. W. HAWKES, and revised by A. SEPTIER. Pp. lvii + 870, Figs. 323. Oxford: Pergamon Press, 1972. Price £12.00.

It is now nine years since the first edition of Grivet appeared in English and it

remains one of the best books on the subject today, treating as it does not only the principles of electron optics but also their application in the electron microscope and other instruments. In this new edition the chapters dealing with the calculation of the field and potential in both electrostatic and magnetic lenses have been considerably expanded. However, despite the 1972 publication date the powerful methods developed by Read are not mentioned. The emphasis of the book is on high-energy optics, but this is rarely explicit or obtrusive though the instrumental examples are all of high-energy devices. A complete chapter has been added on prism optics and this includes a discussion of the fringing field problem in both the magnetic and electrostatic cases. The treatment is fairly general, but does not mention some of the fairly recent advances in the use of parallel-plane or coaxial-cylinder geometries nor the very important work of Purcell on spherical electrostatic systems.

An edition in two parts, *Optics and Instruments*, is available. For readers who are less interested in instruments there are possibly better, though more expensive, choices, but for those who need the full coverage this book is excellent.

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Kristallzüchtung. By K.-Th. WILKE with the assistance of J. BOHM. Pp. 923, Figs. 440, Tables 145. Leipzig: VEB Deutscher Verlag, 1973. Price: 160.00 M.

This book is not simply a second edition of the book *Methoden der Kristallzüchtung*, also written by K.-Th. Wilke and published in 1963. On the contrary, it is a completely new edition giving in its nearly a thousand pages a wealth of information. It is interesting to see how in the last ten years crystal growth methods have developed. Growth from the gas phase, from fluxes and from the melt have become increasingly important, no doubt as a result of the demands of solid-state technology.

The book starts with a theoretical chapter on the fundamentals of crystal

growth: thermodynamics of phase equilibria, kinetics of nucleation and growth (this latter restricted to the bare minimum, as it should be in this type of book), morphological characteristics, altogether condensed into 68 pages. Then follow chapters on the various methods of crystal growth: from the gas phase (168 pp.), from solution (70 pp.), hydrothermal growth (41 pp.), from fluxes (99 pp.), from the melt (277 pp.) and from the solid state (12 pp.). Thereafter some special methods are treated: growth under conditions of high pressure, high and low temperature, and growth of dendrites, whiskers and polymers. The next chapter deals with all types of defects that grown crystals may have, while the last chapter contains a survey of practical problems: materials for ampoules and crucibles, heating methods, temperature measurement, preparations of pure substances and where to get commercially available crystal growth equipment.

Every method is introduced by a general and theoretical treatment, just enough to understand what exactly one is doing. Then the equipment is described in an extremely clear and detailed manner, while several hints for appropriate manipulation are given. Substances that have been grown by the method under discussion are put together in extensive tables (often 20 pages or more) with details about the methods and the results. Other tables follow covering investigations carried out with the grown crystals on special topics such as condensation coefficients, dislocation structures, morphology, growth rates, etching, nucleation, polymorphism and impurity contents.

Sometimes the theory is incorporated in a different chapter, for example the zone-melting theory is treated in the chapter on the defect structures. Extensive indexes of subjects and substances, the latter with about 1700 entries, greatly facilitate the search for information. The literature is reviewed up to 1970 and the 4000 references have been assembled in a separate booklet.

In general the text is very clear and the illustrations have been very carefully designed, although the photographs sometimes lack the clarity they need, owing to the quality of the paper. Very few errors have been found; their number must be of the same order of magnitude as the number of defects in the purest dislocation-free crystal ever grown.

Anyone who has to grow crystals will feel indebted to K.-Th. Wilke, who, assisted by J. Bohm, undertook the tre-

mendous work of preparing this compilation. This book is a must for the library of every crystal growth laboratory.

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Titanium – science & technology, Vols. 1, 2, 3, and 4. Edited by R. I. JAFFEE and H. M. BURTE. Vol. 1: Pp.xxvii+767, Figs. 346, Tables 98. Vol. 2: Pp. 656, Figs. 304, Tables 75. Vol. 3: Pp. 689, Figs. 326, Tables 84. Vol. 4: Pp. 613, Figs. 242, Tables 76. New York: Plenum Press, 1973. Price \$132.50 per 4 volumes.

The Second International Conference on Titanium was held at the Massachusetts Institute of Technology in May 1972, four years after the inaugural conference in London. It was concerned to relate science and practical application, and covered the spectrum from fundamental research to service experience: it ranged through extraction and fabrication metallurgy to structure, properties and structure/property relationships. Major contributions were made from the countries of the sponsoring organisations – the U.S.A., the USSR, Japan and Great Britain. The presentation of the research papers (totalling nearly 200) involved a rapporteur system, and critical reviews of the major fields were also presented. The conference proceedings include the full text of the papers and reviews and also brief reports of the discussions. The format of the proceedings involves reproduction of typed manuscripts, with a range of type styles. Diagrams and photographs are clearly reproduced and there is a name index and a subject index. The adoption of a single system of units throughout the volumes was not a feature of the conference organization.

In reviewing such an extensive compilation of papers it is not possible to deal critically and in detail with the individual contributions, but rather it is appropriate to survey the overall contents of the volumes. Concerning the balance between the main fields of study, a large part of the conference dealt with structure/property relation-

ships, with the control of structure and properties through processing, and the relation to service applications. In these areas there is much to interest the materials scientist, physical metallurgist and solid-state physicist, including detailed structural investigations, for example, using electron microscopy. The key to the control of many properties lies in the understanding of the phase transformations derived from the α/β allotropic change in titanium. Developments in this complex area have been substantial and it is interesting to note the considerable effort devoted to the study of the best established of commercial alloys, *i.e.* Ti-6Al-4V, as well as to the newer alloys such as those of the β -type.

Section I of the proceedings is entitled *Introductory Papers* and Section II *Current Uses and Future Possibilities, including Economics and Materials Policy*. In this latter section the review shows the importance of economic aspects and in the papers, various fields of application, with specific examples, are considered, *e.g.* in the aircraft and automobile industries. Section III, entitled *Winning and Refining* includes a review of technological developments since 1965, and refers to the increasing need to use sources of lower quality than rutile. The research papers deal with various extraction procedures, powder production, interaction with refractory oxides and scrap reclamation. Section IV, *Consolidation, Primary and Secondary Fabrication*, contains a review of developments in the U.S.A. and papers dealing with melting, casting, powder metallurgy, isostatic pressing, extrusion, forging and machining. In Section V, *Joining, Quality Assurance and Inspection*, the review and papers are concerned with a range of welding and inspection topics, such as electron-beam welding, diffusion bonding and ultrasonic inspection.

In Vol. 2, Section VI, *Physical Properties, Electronic Structure, Phase Stability and Phase Equilibria*, the review paper deals with calculations of phase stability and solubility limits in binary and ternary systems. Other papers in this section are concerned with electronic and mechanical properties and structure/property relationships (*e.g.*, superconductivity); elastic properties; internal friction in α and β alloys; lattice defects, electronic structure and diffusion mobility; interaction of oxygen and hydrogen in titanium; thermodynamics of α -stabilized Ti-X-Y systems and phase equilibria in certain titanium alloys.