Book Reviews

Works intended for notice in this column should be sent direct to the Book-Review Editor (J. H. Robertson, School of Chemistry, University of Leeds, Leeds LS9 9JT, England) As far as practicable books will be reviewed in a country different from that of publication.

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Crystals: growth, properties and applications. Vol. 7 (148 pp.) and Vol. 8 (226 pp.). Edited by *H. C. Freyhardt*. Berlin, Heidelberg, New York: Springer Verlag, 1982. Price DM 98.00, US $39.20 (Vol. 7) and DM 144.00, US $57.60 (Vol. 8).

It is becoming increasingly difficult for individuals to purchase (because of the cost) and to read (because of the time) the great number of these volumes, variously labelled Series/Topics/Current topics in ..., *etc.*, which are now published in the field of materials science; and the dilemma grows daily. Generally speaking the articles which appear in this volume, and others like it, fall somewhere between the style of a review and a state-of-the-art summary and are directed primarily at solid-state and materials scientists and engineers. The articles often fall short of the masterly up-to-date review, yet limited areas are covered in enough detail to provide for those with special interests and indicate the current state of development. Some of these articles, if suitably shortened, might be better placed in normal journals where they would be more widely read, rather than in these in-house series. In the midst of all this one somehow feels safer in deliberately consulting only the original literature, but perhaps the personal view is not shared by many.

Volume 7, loosely entitled *Analytical methods, high melting metals* contains four rather diverse articles dealing with crystalline materials.

1. *High-resolution electron microscopy of crystals* (Neumann, Pasemann & Heydenreich). This deals with direct-imaging methods capable of yielding structural information at the atomic level. Applications to studies of crystal defects, interfaces and boundaries are also discussed.

2. *In-situ UHV electron microscopy of surfaces* (Yagi, Takayanagi & Honjo). This deals with recent progress in UHV methods which reveal the microtopography of surface structures both in transmission (TEM) and reflection (REM) modes.

3. *EXAFS studies of crystalline materials* (Knapp & Georgopoulos). This chapter focuses attention on EXAFS as a useful and important technique for the study of atomic structure in materials as diverse as ionic and superconductors and dilute alloys.

4. *Single crystals of refractory and rare metals, alloys and compounds* (Savitsky, Burkhanov & Kirillova). This article surveys established methods of growing single crystals, particularly plasma-arc methods, and then deals with analytical techniques for studying the microstructure and other related physicomechanical properties.

On the whole the reviewer was disappointed with the articles in this volume which did not seem to make for a coherent whole, although the up-to-date reference lists were most useful. Individually, there was often a lack of clarity in expression, quite a few misprints and, once, a transposed figure caption; but these are only minor criticisms which are not meant to imply that this volume would not be a useful addition to any physical-science library. The reviewer is happy to recommend it for that purpose.

Volume 8, titled *Silicon, chemical etching*, contains three chapters.

1. *Czochralski-grown silicon* (Zulehner & Huber). This article comprehensively surveys the practical aspects of growing silicon crystals by a method which produces about three quarters of the world's supply. The application of these crystals in solid-state devices is also discussed.

2. *Dendritic web growth of silicon* (Seidensticker). This chapter deals with a ribbon-growth technique for the large-scale production of 'solar cell' silicon.

3. *Principles of chemical etching – the art and science of etching crystals* (Heimann). This chapter deals with both the theory and the practice of etching, a powerful technique used to characterize single crystals in terms of their purity and dislocations.

In contrast to Volume 7 the reviewer enjoyed reading Volume 8 and is happy to recommend it as a worthwhile purchase for all who are interested. The contents of this volume follow closely and complement Volume 5 (*Silicon*) and, in assembling these articles, the editor (Grabmaier) is to be complimented for his appreciation of the scope of activity and general interest in materials of demonstrated technological importance. Without exception the articles gave clear detailed and well presented state-of-the-art summaries of these high-technology methods and, therefore, this book deserves a place in every physical-sciences library.

A paraphrased quotation from the editor's thoughtful foreword best summarises the question which these authors have set out to answer: 'It can no longer be denied that growing silicon crystals has matured from an art to a science... It is not simply a problem of growing a nice looking crystal (with some artistry!) but of growing a crystal that has precisely the properties requested by the engineers'.

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Crystal lattices, interfaces, matrices. By *W. Bollmann*. Pp. vii + 360. Published by the author, 1983. Obtainable in N. America from Polycrystal Book Services, PO Box 27, Western Springs, IL 60558, USA, price US $ 45.00 *plus* mail & handling costs; or, in all other countries, from Professor W. Bollmann, 22 Chemin Vert, CH-1234, Pinchat, Geneva, Switzerland, price (including mail & handling costs): European countries SwF 70.00, non-European countries SwF 80.00.

This volume is edited and published by the author. It may serve as an example of what can be done without the aid of a publisher who might be unwilling to risk investment in a publication of this nature because of the limited audience. The book is handsomely set out with quite legible and attractive type, broad right-hand margins for notes or illustrations, and many diagrams.

The work is divided into three sections: the geometrical aspects of crystal lattices, interface theory and applications, and matrix algebra and its applications to crystallography. The book does not dwell in any explicit way on group theoretical developments in crystallography. It simply refers to literature available in this area; the definition of a group is given in an exercise at the end of a chapter on crystal symmetries. At the end of each chapter there are review questions and helpful exercises. The book is replete with good examples which are very helpful. All in all, this is an impressive effort to do for working crystallographers what classical mathematical crystallographers do not always do, namely, develop practical mathematical tools for applied work.

The primary objective of the text is to present mathematical methods of ana-