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Short Notices

Modern Physical Metallurgy

R. E. Smallman

544 p. 3rd edition (Butterworths) £3.00.

This book represents an expanded and considerably updated version of the previously well-received edition. Much has been accomplished in the science of metals in the past decade and this is reflected in the extended treatment of the microstructural aspects of metals and the influence they have upon the mechanical properties. The book unashamedly deals only with metals, but the author's style and his overall plan of relating the fundamental principles to the properties, use and problems encountered with metals, together with its price and breadth of contents will appeal to students who are taking degrees and advanced courses in metallurgy.

The initial chapters are devoted to atomic and crystal structures, metallurgical tools, thermodynamics, and the structure of metals and alloys. Mechanical properties are fully covered in terms of the dislocation theory with great emphasis being placed on the application of this theory. The final chapters of the book cover precipitation and eutectoid transformations, the failure of metals by fracture, fatigue and creep and a new section devoted to corrosion and oxidation reactions. The omission of examples from this edition is a pity as their inclusion would have added to the value of the book for teaching purposes.

R.A.F.

Elements of Advanced Quantum Theory

J. M. Ziman

(Cambridge University Press, 1969). 55s

Professor Ziman's concern in writing this book has been to help research workers in physics to comprehend more adequately the research activities and techniques centred upon quantum mechanics used by the more mathematical of their colleagues. The starting point assumed is that of a good physics graduate of a British university in his first or second year of research, having some acquaintance with quantum mechanics in the Dirac von Neumann formalism – matrix representations, orthogonal functions, operators, eigenvalues, and the like.

From this basis, the book attempts to explain the essentials of a variety of advanced quantum mechanical concepts, ranging over field operators graphs, propagators, Green's functions, S-matrices, irreducible representations and so on. The path is not an easy one and calls for quite a high degree of application from the graduate student. However, given a field of physics in which the theoreticians express their results and analyses in such advanced terms, the student needs such a text as this to follow exactly what methods have been used and what assumptions made if he is not to be reduced to the level of merely lifting the apparently relevant equation from the end of the theoretician's paper. Even one hard read through the book gives an experimentalist confidence that on the next time around he will understand more of the arguments. In the context of other available texts on advanced quantum theory, this is indeed praise for the work that Professor Ziman has done here.

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Electron Optical Applications in Materials Science

Lawrence E. Murr

McGraw Hill Series in Materials Science and Engineering,
Pp. 544 $25.00.

Here at last is a book which covers all the principal electron optical techniques available and in such a manner as to appeal both to research workers and undergraduate students. The inclusion of problems at the end of each chapter makes the book eminently suitable for teaching purposes.

The author develops each section from first principles and indicates the way the technique has been applied or could be applied in various real problems. Following an introduction dealing with the basic properties of electrons and the emission properties of electrons from solids, there is a detailed chapter devoted to principal features of electron optics and electron optical systems. Techniques such as transmission electron microscopy (including high voltage microscopy), microprobe analysis, scanning electron microscopy and electron diffraction (including LEED) are then covered in separate chapters. This is a very good book, well produced and including many excellent photographs and figures which will certainly appeal to a very wide readership.

R.A.F.

Phase Diagrams: Materials Science and Technology

Volume I: Theory Principles and Techniques of Phase Diagrams

Edited by A. M. Alper

(This is volume 6 of Refractory Materials edited by J. L. Margrave.)

Academic Press $16.00.

As the title implies this is an introductory volume of a three volume work dealing with all aspects of the phase diagrams of refractory metals. This first volume will, however, appeal to a wider readership as it represents a collection of articles that cover the recent developments in the basic theory of the subject. There is an excellent chapter which deals with the ideal solution calculations for liquid-solid phase equilibria and the interaction between regular solid solutions and the Laves compounds. There are further chapters covering the thermodynamics and interpretation of phase diagrams.

The final chapters of the book are rather more specialised and deal with the application of phase diagrams to solidification, high pressure studies and glass forming ceramics (including a useful section phase separation and liquid immiscibility).

The book together with its companion volumes would be a valuable addition to the reference shelf of a library.

R.A.F.