

of symbols needs frequent consultation which sometimes tends to disrupt the flow of the argument.

Altmann's monograph will be a very useful text for theoretical chemists and solid-state physicists. The examples and the detailed application of the general theory distinguishes the account from the purely formal and less motivating presentations.

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**Dislocations in crystals.** Edited by F. R. N. NABARRO. Pp. 562. Amsterdam: North Holland, 1979. Price US \$97.50, Dfl 200.00.

This book is the second volume of the five-volume series *Dislocations in Solids*, edited by F. R. N. Nabarro. This volume will undoubtedly be useful for readers who are interested in the problems of taking into account the actual atomic structure of crystals with dislocations.

In the first chapter (*Lattice theories of dislocations* by R. Bullough and V. K. Tewary), a general view is given of the influence of various aspects of the periodicity of the crystal lattice on the properties of dislocations. Considering the atomic models of dislocations, the authors discuss the Peierls–Nabarro and van der Merwe models and apply these to the description of the properties of individual dislocations and the tilt boundary. The Maradudin model is also considered in detail; the calculations of displacement field and strain energy are given for the case of a static lattice and for a lattice with vibrating atoms. The examples of a stationary dislocation and a vibrating one which can absorb or emit phonons are considered. In the latter case the authors omitted the possibility of using the work of V. I. Alshits. A very brief review of the various interatomic potential models is given. These potentials have been used for the energy and simulation calculations of the atomic configurations of dislocation cores. The simulation method for the study of the atomic configurations of dislocation cores is discussed for copper and iron as specific examples of the face-centred and body-centred lattices.

The next chapter (*Dislocations in particular structures* by S. Amelinckx) is a really encyclopaedic review which gives a comprehensive representation of dislocations in many important structures. The formation of various linear and planar defects and their configurations is shown schematically, together with electron micrographs of the corresponding defects. The stacking faults and dislocations in close-packed and body-centred cubic structures are considered in detail: perfect dislocations, Shockley and Frank partials, Lomer–Cottrell locks, stacking-fault tetrahedra, interaction of the intersecting ribbons, geometry of cross-slip, formation of prismatic loops, etc. Some of these defects are described in covalent structures (diamond, wurtzite, sphalerite, tellurium, etc.) and layer structures [CdI<sub>2</sub>, SnS<sub>2</sub>, NiB<sub>2</sub>, graphite,

Bi<sub>2</sub>O<sub>2</sub>(C), etc.] and also in ionic crystals (NaCl, MgO). The calculations of the equilibrium configurations of different ribbons in an isotropic and an anisotropic medium are given; the possible forms of nodes are described. One part of this review is devoted to antiphase boundaries and superdislocations in ordered alloys based on the f.c.c., h.c.p. and b.c.c. structures. The calculations of the energy of the antiphase boundaries and glide superdislocations in these structures are considered. Dislocation networks and geometrical aspects of sub-boundaries consisting of well resolved dislocation lines are discussed.

The last chapter (*Misfit dislocations* by J. W. Matthews) is devoted to the theoretical and experimental consideration of the structure of the interface between two crystals. The consideration is mainly restricted to the cases of crystals having the same structure and orientation but differing slightly in lattice spacing. The model of the Frank and van der Merwe boundary is briefly described, the geometrical peculiarities of this boundary are considered for epitaxial thin films with misfit dislocations, isomorphic precipitates in ageing alloys, etc. The bubble models of interface-boundary structure and the results of electron-microscope investigations of coherent and partly coherent boundaries are given for various materials. The possible mechanisms for the generation of misfit dislocations and the factors which assist or impede their generation are discussed. The effect of misfit dislocations on the diffusion process is considered. One could also have included in such a review the consideration of the cases of misfit dislocation generation when two crystals have different structures and (or) different orientations and, in addition, the latest electron-microscope achievements of the discovery of misfit dislocations by the direct observation of crystal structure.

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**Nobel symposium 47 – Direct imaging of atoms in crystals and molecules.** Edited by LARS KIHLEBORG. Pp. 295. Royal Swedish Academy of Sciences, 1979. Price 300 Sw. Kronor.

Although a technique for resolving single atoms on the surfaces of certain metals, viz field ion microscopy, has been available for more than thirty years, it is not applicable to the study of most systems where resolution at the atomic level is sought. Thus the more indirect diffraction methods of the crystallographer have continued to play a major role where they can be used. There is, however, no doubt that many fields of science would benefit greatly if a direct method of structure observation at the atomic level were to become available and hence there has been growing interest over the last few years in the developments which have taken place in electron microscopy. These have included not only improve-

ments in the design and construction of instruments but also a more complete understanding of image formation and interpretation. There are now several projects around the world aimed at building ultra-high-resolution microscopes and currently point-to-point resolution at about the 2 Å level has been achieved. It is thus appropriate that progress towards the goal of direct imaging of atoms should have been the subject of a symposium in August 1972 sponsored by the Nobel Foundation.

The proceedings of this meeting comprise thirty four contributions of varying length from an international group of experts. The subject matter is wide ranging and covers the theory, the present use of, and the prospects for the conventional transmission electron microscope and its scanning equivalent as instruments capable of resolving atoms in thin specimens. Among the applications of the technique the following systems are discussed: amorphous materials, solid-state reactions, catalytic particles, metal oxides, silicate minerals, ordered alloys and metals, semiconductors, defects in a variety of materials, and biological materials including macromolecules. The final three articles provide a useful summary of the 'state of the art' in the general fields of physics, chemistry and biology. One minor criticism of the contents is a lack of fuller discussions on the influence of radiation damage and on convergent-beam diffraction for electron crystallography. However, the standard of the contributions is generally high. In a proceedings of this type good reproduction of the many micrographs is essential and this has been achieved. The book will prove useful to anyone interested in this developing field of structure determination and will benefit both the newcomer and the experienced practitioner. It is a pity therefore that the price will probably prevent its purchase by many individuals. The subject matter of these proceedings is an area which is still developing and which promises much. It will be interesting to see if that promise is fulfilled when a similar symposium is held in perhaps three or four years time.

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### Books Received

*The following books have been received by the Editor. Brief and generally uncritical notices are given of works of marginal crystallographic interest; occasionally a book of fundamental interest is included under this heading because of difficulty in finding a suitable reviewer without great delay.*

**Computers in activation analysis and gamma-ray spectroscopy.** Edited by B. S. CARPENTER, M. D. D'AGOSTINO and H. P. YULE. Pp. xxii + 879. Published by the Technical Information Center, US Department of Energy, 1979; available as CONF-780421, at US \$15.00, from the National Technical Information Service, US Department of Commerce, Springfield, VA 22161, USA.

**Modern crystallography, Vols. I-IV.** Edited by B. K. VAINSHTEIN, A. A. CHERNOV and L. A. SHUVALOV. This four-volume treatise is appearing currently in Russian, published by Nauka, Moscow, but will be available in due course in English translation, published by Springer-Verlag. Vol. I, on Symmetry and Crystallographic Methods, was published in Russian in 1979; the English edition is expected in January 1981. A review, in English, of this first Russian volume will be published shortly in this journal.

**Crystal growth bibliography. Solid state physics literature guides, Vol. 10.** Compiled by A. M. KEESEE, T. F. CONNOLLY and G. C. BATTLE JR. Pp. viii + 430 (Vol. 10A), pp. iv + 568 (Vol. 10B). New York: Plenum Press, 1979. Price US \$95.00. A review of this book, by T. Ogawa, has been published in the August 1980 issue of *Journal of Applied Crystallography*, page 402.

**Fundamentals of crystal growth 1.** By F. ROSENBERGER. Pp. x + 530. Berlin: Springer, 1979. Price DM 79, US \$39.50, ca £18. A review of this book, by J. C. Brice, has been published in the August 1980 issue of *Journal of Applied Crystallography*, pages 401 to 402.