(Plenum Press, 1974), which is, in effect, a combination of a popular science book and a serious study including the latest theories in this field. However, the first part of the Soviet authors' book, which is evidently intended for a wide readership, is written in too popular a style, while the second part, in contrast, is difficult to read or to understand without some knowledge of further antisymmetry publications. It is desirable, therefore, that there should be another book, written in a universally acceptable style, and addressed to students of the natural sciences, mainly crystallographers and physicists. This book, *Crystal symmetry: theory of colour crystallography*, by Jaswon, a Professor of mathematics at London University, and Rose, an expert in applied mathematics, fully meets these requirements.

The 190 pages of this book are divided into three logically balanced parts. The first part, *Crystallographic point groups*, contains four chapters: 1. Symmetry patterns; 2. Mathematical formulations; 3. Cubic symmetries; and 4. Colour point groups. There are clear, descriptive, group-theory interpretations of the theory of the 32 crystal classes and 58 Shubnikov classes, which are enumerated in international symbols and their stereograms in this part of the book.

The second part, *Space lattices*, consists of four chapters: 5. Lattice geometry; 6. Seven crystal systems; 7. Non-primitive unit cells; and 8. Translation groups. The geometry of two-dimensional and three-dimensional translation lattices, their properties and symmetry are described in this part. Also, the extension of the classical translation groups to the antitranslation groups by Belov's method is expounded. There are coloured illustrations of the classical and the two-coloured lattices, denoted by international symbols in the text.

The third part, *Space groups*, consists of six chapters: 9. Symmorphic (Bravais) space groups; 10. Screw axes; 11. Principal and secondary screw axes; 12. Glide planes; 13. The diamond glide; and 14. Space groups. This concluding part of the book contains not only the classical space groups, as can be seen from the chapter titles quoted, but also the theory of the Shubnikov space groups, generalizing them, and including direct derivation of the groups. For the sake of brevity, there is no list of the classical and Shubnikov groups themselves. But the book indicates, for each syngony, with what kind of lattices the crystal classes must be combined to obtain, first, all symmorphic space groups, and with what kind of lattices screw and glide groupoints (that is, the sets that result from the 32 crystal classes when their rotation axes and reflection planes are replaced respectively by all the various kinds of screw axes and glide planes) they must be combined to obtain all the nonsymmorphic space groups. In a similar way it is shown here how the list of all 1191 Shubnikov groups can be derived.

The book is written clearly; it has good illustrations and contains appendices with information on group theory and the mosaics of parquet symmetry groups, instructions for making a full list of the two-dimensional two-coloured symmetry groups, and other material, successfully supplementing the main text.

In our opinion, it would be necessary, in a book of this kind, to make reference to the original work of the Soviet authors in the field of antisymmetry and coloured symmetry, published over many years in *Kristallografiya*, and to mention without fail the book *Coloured symmetry*, by Shubnikov, Belov and others (Pergamon Press, 1964), which is the original text on the subject of antisymmetry and colour symmetry in English. Besides this, the title of the book is too broad: the universally accepted concept of colour symmetry in physical and crystallographic publications implies not only two-coloured symmetry, but many-coloured symmetry also. A more suitable title for this book would have been: Crystal symmetry: theory of two-coloured crystallography.

On the whole, however, the reviewed book is a good textbook for students of the natural sciences of various specialities, and for all such persons as wish to become acquainted independently with the theoretical fundamentals of symmetry and antisymmetry.

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Crystals: growth, properties, and applications. Vol. 9. **Modern theory of crystal growth. I.** Edited by A. A. Chernov and H. Müller-Krumbhaar. Pp. 146. Berlin, Heidelberg, New York: Springer-Verlag, 1983. Price DM 88.00, US $38.00.

This is an excellent book with five well written and up-to-date contributions on different subjects of crystal-growth theory. It fills a real need for the advanced or theoretically inclined crystal grower. It is not a book for the uninitiated (beginner or student) in crystal growth, unless interested in the physico-mathematical approach to theoretical modelling.

The first chapter, *Structure of the solid–liquid interface* by A. Bonissent (21 pages) describes the structural and thermodynamic properties of the solid–liquid interface of elements. Bernal random packing of hard spheres, perturbation theory and computer simulations enable description of the resulting density profile and structure of interfacial layers. The specific interface free energy for {111} f.c.c. orientation is estimated. The presentation is lucid.

The second chapter, *Melting and solidification of epitaxial structures and intergrowth compounds* by P. Bak (19 pages) discusses the process of melting and solidification of up to 1·6 monolayers of noble gases on a graphite substrate where solidification is not expected to start from 2D nucleation in the classical sense, but will proceed more uniformly throughout the system as a second-order (commensurate–incommensurate) transition as a function of coverage and size ratio. This is followed by a study of the layer melting in 3D graphite intercalation compounds C_6Li, C_8Rb, $C_{24}Rb$ among others, and of the melting of structural 1D Hg chains in $Hg_{3-\delta}$ AsF_6. A theoretical discussion on the melting and solidification of epitaxial layers is also given.

In the third chapter, on *Microscopic theory of the growth of two-component crystals* (31 pages), W. Haubenreisser and H. Pfeiffer formulate a unified theory of crystal growth utilizing a master-equation approach for the purpose of obtaining rate equations in order to describe the growth of binary crystals in terms of a Kossel lattice model of the solid–liquid interface. Equilibrium and non-equilibrium properties are presented in various statistical approximation methods, such as the single particle, the pair, and the Bragg–Williams approximation, where the pair approximation was found to agree with a Monte-Carlo computer simulation.

The fourth chapter, *Statistics of surfaces, steps, and two-dimensional nuclei; a macroscopic approach* on the phenomenological approach is an attempt by A. A. Voronkov (37 pages) to provide a macroscopic concept as opposed to a microscopic one for defining crystal growth; the properties of singular as well as vicinal planes are given in terms of their specific surface free energy and a kinetic coefficient. This is an extensive and most important contribution to crystal-growth theory.

The fifth chapter, on *Surface and volume diffusion controlling step movement* by J. van der Eerden (32 pages) essentially treats material transport by volume and surface diffusion (as well as convection) and its effect on surface structure. Consecutive deposition of elementary structural particles into kink sites,onto steps and flat surfaces, in effect, represents crystal growth. The latter is normally preceded by surface diffusion of those particles towards steps and kinks (*i.e.* 'growth sinks') and, in turn, by volume diffusion from the adjacent mother phase towards the adsorbed surface layer of the crystal: a realistic model susceptible to meaningful mathematical and good physical interpretation.

A few general comments must now be made: P. Bak's statement that solids cannot be superheated is fundamental. Nevertheless, superheatings *have* been observed – although they are special cases, which in the reviewer's opinion may not, in fact, represent violations of the intended meaning of the author's statement. The latter would then only need to be refined or rephrased to accommodate this particular perspective.

There are a few typographical and related errors in the text, which fortunately do not critically change its meaning.

In summary, the five authors have presented up-to-date reviews on the theoretical interpretation of thermodynamical, statistical and kinetical aspects of solid–liquid interfacial structure, epitaxy, crystal growth, surface and volume diffusion on both a micro- and a macroscale.

As a comprehensive exposition of crystal-growth theory, this book should definitely be valued as a reference for the crystal grower who needs to know the reasons and explanations for what truly caused his latest crystal growth runs to go awry or, better, to succeed so well.

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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.

Electron distributions and the chemical bond. Edited by P. COPPENS and M. B. HALL, Pp. ix + 479. New York and London: Plenum, 1982. Price US$ 55.00. A review of this book, by D. W. J. Cruickshank, has been published in the October 1984 issue of *Acta Crystallographica*, Section *B*, page 520.

Indirect imaging. Edited by J. A. ROBERTS. Pp. xxii + 442. Cambridge University Press, 1984. Price £27.50, US $54.50.

Shock waves in condensed matter. Edited by J. R. ASAY, R. A. GRAHAM and G. K. STRAUB. Pp. xxvi + 647. Amsterdam: North-Holland, 1984. Price US $71.25, Dfl 185.00.

Surfaces and interfaces: physics and electronics. Edited by R. S. BAUER. Pp. xv + 644. Amsterdam: North-Holland, 1983. Price US $113.50, Dfl 295.00.

Electronic and atomic collisions: invited papers. Edited by J. EICHLER, I. V. HERTEL and N. STOLTERFOHT. Pp. xviii + 891. Amsterdam: North-Holland, 1984. Price Dfl 315.00, US $121.25. This book (which stems from the Berlin conference of August 1983) begins with a separately-paginated 50-page article by Jost Lemmerich, very readable, and richly illustrated, on the history of physics in (or associated with) Berlin, from its beginnings up to 1938.

The physics of hydrogenated amorphous silicon II. Electronic and vibrational properties. Edited by J. D. JOANNOPOULOS and G. LUCOVSKY. Pp. xiii + 360. Berlin: Springer-Verlag. Price DM 100.00, US $39.00.

Two-dimensional systems, heterostructures, and superlattices. Edited by G. BAUER, F. KUCHAR and H. HEINRICH. Pp. ix + 293. Berlin: Springer-Verlag, 1984. Price DM 78.00, US $28.00.

X-ray optics and microanalysis: 10th International Congress proceedings. (In French; Supplement to *Journal de Physique.*) Pp. xxxvi + 925. Les Ulis, France: Editions de Physique, 1984. Price F 500.00.

Multicritical phenomena. Edited by R. PYNN and A. SKJELTORP. Pp. xii + 472. New York: Plenum, 1984. Price US $75.00.

Electron-hole droplets in semiconductors. Edited by C. D. JEFFRIES and L. V. KELDYSH. Pp. xxxvii + 656. Amsterdam: North-Holland, 1983. Price US $180.75, Dfl 425.00.