

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 LS2 9JT, England). As far as practicable books will be reviewed in a country different from that of publication.

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Information and innovation. Edited by B. T. STERN.
Pp. viii + 191. Amsterdam: North-Holland, 1982.
Price Dfl. 90, US\$ 41.75.

The ICSU Abstracting Board held its 1982 meetings in Amsterdam, and organized a two-day seminar on the *Role of information in the innovative process* immediately preceding the business sessions. The present book, produced in commendably quick time, contains slightly edited versions of the papers, followed by remarks by 'hecklers' and a panel discussion. The papers are aimed at an industrial rather than an academic audience, but there is much of incidental interest, particularly on costs and techniques of information transfer and acquisition. A brief review cannot do justice to the many contributions, but I particularly enjoyed *Economic and societal consequences of informatization* (H. Krupp), both in its spoken and its written form. A readable essay by Bacon decorates the cover.

The book is reproduced from typescript, and is about as good as can be expected from this unaesthetic process. It suffers greatly from the lack of any index.

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(generally of mineralogical significance) and the author is always careful to introduce the relevant physical picture before filling in the mathematical background.

The only reservation one might have concerns the breadth of coverage: some might feel that the title implies a broader treatment than the subject actually receives in the book. For example, one will search in vain between its covers for any discussion of physical properties such as conductivity or ferroelectricity, or for any mention of organic crystallography, and this is perhaps a little disappointing in view of the emphasis in the preface on the interdisciplinary nature of crystallography.

The coverage is indeed implied both by the fact that the book forms part of an Intermediate Geology Series, and by the author's own background. Should anyone remark that it ought not to be necessary to know the author to guess the coverage of his book, one can only reply that this is in fact the way that most of us select our reading matter in the wider sense (e.g. novels). Knowing the author, neither the topics covered nor the masterly treatment of them should be in the least surprising. For a thorough grounding in classical mineralogical crystallography, this book is to be heartily recommended.

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Geometrical and structural crystallography. By J. V. SMITH. Pp. xiii + 450. London: John Wiley, 1982.
Price £18.75.

I enjoyed this book; insofar as the author ends his preface with the words 'Enjoy yourself too', he has plainly succeeded in his aims in respect of at least one reader. It is a beautifully produced, well written and clearly illustrated account of classical crystallography of the sort normally associated with mineralogy courses. The treatment of the topics covered is thorough, and a particularly appealing feature is the inclusion of copious exercises at the end of each chapter.

The book begins with a treatment of packing considerations, and from this develops the ideas of pattern, unit cell and crystal shape and symmetry, introducing in two dimensions concepts later treated more fully in three. Polyhedra and crystal drawing are thoroughly and clearly treated, and finally the reader is gently led towards a full discussion of space-group considerations. At each stage the concepts are illustrated by reference to real structures

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Phonons: theory and experiment, I. By P. BRÜESCH.
Pp. xii + 261. Berlin: Springer Verlag, 1982. Price
DM 63.50, US \$29.50.

This book is a compendium of various topics in lattice dynamics and phonons, designed to serve a wide spectrum of scientists interested in different aspects of phonon physics. The book, in the words of the author, 'is written by an experimentalist with some interest in theory, and is addressed mainly to experimentalists, but also to theoreticians interested in experiments'.

How many experimentalists will derive a benefit from reading this book has to be seen. Truly, the author has made a genuine effort in trying to bridge the gap between the level of the more abstract and theoretical treatments and that of a more practical and simple-minded approach, more suitable for experimentalists and non-physics scientists, such as chemists and crystallographers. The results are difficult to assess, however, since the treatment is uneven and sometimes hard to follow. Certainly, this is not the best place to learn lattice dynamics from scratch. The reader is supposed to already have a working knowledge of the field.

A rather extensive chapter is dedicated to the dynamics of the linear diatomic chain, which includes a quantum-mechanical formulation. It may appear a good idea to introduce all the basic concepts and the quantum-mechanical formulation in one dimension. The formalism is, however, quite elaborate, and a not-so-experienced reader will easily get lost in the symbols. Creation and annihilation operators are introduced at this stage, and extensively used hereafter. Such operators are needed for a quantum-mechanical description of the phonon field. The physical picture of what is actually happening in the crystal is not always clear, though.

A rather complete discussion of three-dimensional lattice dynamics, interatomic forces and phonon dispersion curves is given in the following two chapters, with some discussion of the shell model and phonons in metals, and some specialized topics such as the bond charge and the valence force models, molecular crystals and screening. These two chapters have good informative value, except for some sections, like the one on the theory of elasticity, for example, in which many results are given without any attempt to provide derivations and physical insights. The same applies to the sections dedicated to the alkali halides and the shell model.

A full chapter is then dedicated to anharmonicity, with a description of the self-consistent harmonic approximation (SCHA), response functions and perturbations theory of phonon-phonon interactions. A nice and instructive description is given of the anharmonic properties of the diatomic molecule and the linear chain. These sections are probably among the best in the book.

A compact list of seventeen Appendices is given at the end, with short but useful derivations. Every chapter has a list of problems with hints and actual solutions given in some cases. These problems are well articulated and are not commonly found in books of this kind. They are one of the best parts of the book, along with the extensive and updated bibliography given at the end.

The book is written with great competence. The problem is, however, that many results are given without derivation, which makes the reader feel uncomfortable and slightly irritated at times. The inexperienced reader will feel the need for a more elementary level, whereas the professional lattice dynamicist will not use this book to learn new material.

It is true that one cannot give all the derivations in a book of reasonable size. There is, however, a way of conveying the truth, in science, 'by telling little lies', in other words, by using persuasive and oversimplified reasons that may not be rigorous but convey the gist of the argument in a simple and direct way. The reader is fooled into believing that he really understands and masters the material. This is not true, of course. He is, however, happy with this feeling, develops an enthusiastic attitude toward the topic, and feels motivated to go further.

This virtue, of 'telling little lies', is not present in this book. The derivations are either skipped altogether, or given semi-rigorously with heavy emphasis on formalism, to a point at which the physical significance of the results slips out of the way.

The book may be used as an excellent source for lectures in a graduate course at an advanced level on lattice dynamics. This is, in fact, the genesis of the book – it was developed by the author for a course he gave at the Ecole Polytechnique Fédérale de Lausanne – and most shortcomings actually stem from this original format.

In conclusion, Brüesch's book is a competently written compendium on lattice dynamics, which may not be ideal for all kinds of readers, but fills certain needs and should not be missing from institutional libraries and our office bookshelves.

The author has promised us a second volume on the same topic, centered on the experimental aspects of lattice dynamics. We are all waiting for it.

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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.

Advances in physical geochemistry. Vol. 2. Edited by S. K. SAXENA. Pp. x + 353. Springer, 1982. Price DM 94.00, US \$41.80.

Semiconductor physics. By K. SEEGER. Pp. xii + 462. Springer, 1982. Price DM 88.00, US \$39.00.

An introduction to crystal optics. By P. GAY. Pp. ix + 262. Longman, 1982. Price £6.95. This is the paperback edition of the book originally published in 1967. The bibliography has been updated but the book is otherwise unchanged.

Light scattering in solids. I. 2nd ed. Edited by M. CARDONA. Pp. xv + 363. Springer, 1983. Price DM 70.00, US \$29.00. This book is the up-dated version of the first of a four-volumes series (*Light scattering in solids*, Vols. I–IV), already published by Springer (1975–1981). It contains numerous references to, as well as a detailed summary of, the contents of the other three volumes.