

Since the mid-1970s there has been a remarkable culmination of studies of properties correlated with dislocations; therefore, it is quite appropriate to have this publication. This book is unique in that it is an exclusive dislocation review.

In the first chapter, *The application of dislocation concepts in friction and wear*, by Hirth & Rigney, friction and wear behaviour of steady-state conditions are treated, and the importance of the dislocation cell structures and the channels between the cells is indicated – as also in the case of fatigue. The next chapter, by Laird, is devoted mainly to low-strain fatigue. The initial stages of the phenomenon are explained by the multiplication of dislocations, the formation of edge-dislocation dipole patches, and the 'to-and-fro' motion of screw dislocations that traverse the channels between the patches.

In the third chapter, Ball & Van der Merwe explain how to avoid or eliminate dislocations in the production of semiconductor or other electronic devices. The long fourth chapter, by Startsev, treats the physically interesting problems of the strength of metals at very low temperatures in relation to superconductivity. Athermal activation mechanisms, *i.e.* quantum tunnelling and zero-point vibration, softening during the n - s transition, and non-zero creep, are also discussed.

In the fifth chapter, Anderson explains concisely the present status of research on phonon-dislocation interaction in several materials, and suggests additional future experiments. In the sixth chapter, by Byrne, various experimental techniques are reviewed, and comparison is made with positron annihilation data and hardness and other plasticity data. The discussion is mainly of data obtained in his laboratory, and the necessity for the accumulation of exclusively dislocation-correlated data is stressed.

In the seventh chapter, Neuhäuser reviews the mechanisms of slip band formation in relation to bulk dislocation structure, *i.e.* the activation of dislocation sources, the propagation of dislocations and dislocation groups, slip-zone formation and the termination of slip source and the activation of new sources. The collective motion of dislocations is also covered in relation to the heterogeneity of slip bands.

In the last chapter, De Hosson, Kanert & Sleswyk discuss nuclear magnetic resonance as a tool for the investigation of dislocations as a bulk property. They introduce the electric field gradient tensor, discuss the dislocation perturbation, and then take up the relaxation mechanisms adapted to the dislocation motion.

The topics in this book are varied, so it is too demanding for general readers to read all the chapters thoroughly. However, selected chapters will provide a good overview of the relevant field.

This book will be useful for all who are interested in dislocations and is especially recommended for young researchers and engineers who are at the start of their careers.

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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.

Die Farbe von Mineralen und ihre Aussagefähigkeit für die Kristallchemie. By K. LANGER. Pp. 53. Wiesbaden: Westdeutscher Verlag, 1984. Price DM 24.00. This useful article comprises half of the publication N 332 of the Rheinisch-Westfälische Akademie der Wissenschaften. Attention is particularly given to the silicates, and to the effects of crystal fields on transition-metal cations; there is also an interesting section on the spectroscopic effects of high pressures (to 200 bar) on mineral specimens.

Crystals. Growth, properties and applications. Vol. 10. Managing Editor H. C. FREYHARDT. Pp. 150. Berlin: Springer, 1984. Price DM 126.00. Successive volumes in this series are published approximately annually, usually containing articles of a highly specialized character, focusing on a considerable range of topics. The previous issue (Vol. 9, 1983) was on the single subject of current theory of crystal growth and was reviewed in some depth by G. A. Wolff [*Acta Cryst.* (1984), **A40**, 727–728], who pronounced it 'excellent'. This one, Vol. 10, is less coherent, having three quite unrelated themes (polytypic crystals; spectroscopic studies; and heat and mass transfer) but has the interest of being entirely by Russian authors. As usual, the standard of production is impeccable, and the price correspondingly high.

Recent advances in field theory and statistical mechanics. Edited by Z.-B. ZUBER and R. STORA. Pp. xxx+870. Amsterdam: North-Holland, 1984. Price US \$173.00, Dfl 450.00.

Structure determination by X-ray crystallography. 2nd ed. By M. F. C. LADD and R. A. PALMER. Pp. xxii+502. New York: Plenum Press, 1985. Price US \$39.50. This book was reviewed, when its first edition appeared in 1977, by G. B. Carpenter [*Acta Cryst.* (1978), **B34**, 1400]. The second edition does not differ from the first in general character (it still makes use of many examples, treated in close detail, and it still includes some 100 or so problems, and their solutions) but it has been judiciously expanded in selected parts. Thus, direct methods, previously covered in about 15 pages, now run to nearly 40 pages; a new section (10 pages) on Patterson search methods is included, and there are quite a number of new appendices. The net effect is an increase of about 100 pages (25%). The corresponding increase of the price, \$4.50 (13%), must surely be, in effect, a significant decrease, when eight years of inflation are considered. While all this is laudable, there will be some disappointment that the opportunity for up-dating was not better used. The four-circle diffractometer, now employed all over the world for hundreds of structures annually, is still confined to an appendix; synchrotron radiation is now mentioned but, despite its superlative value for structure determinations, especially for biological macromolecules, is given less than a page. However, this book is primarily