

## BOOK REVIEWS

Hammond, C. *The Basics of Crystallography and Diffraction*. International Union of Crystallography Texts on Crystallography, Oxford University Press, 1997. xi + 249 pp. Price £14.99 (Paperback) [Also available in hardback]. ISBN 0-19-855945-3.

Crystallography isn't what it used to be or at least it isn't taught that way any more – and what a good thing too! I have occasionally wondered whether students still plotted stereographic projections and worked out interfacial angles for monoclinic crystals as they did thirty and more years ago. The old approach via morphology certainly provided plenty of intellectual challenge but was low on interest and had no very obvious bearing on what crystallography and its methods were actually used for.

The present text follows on from Hammond's earlier text entitled *Introduction to Crystallography* (for the Royal Microscopical Society's Microscopy Handbook Series) and it is hard to imagine anything further from F.C. Phillips' *Introduction to Crystallography*, which was the standard text for a whole generation of crystallographers. Hammond's present book certainly looks set to fill the same enduring role for the next generation of crystallographers.

IUCr publications have always been outstanding for quality of presentation and exposition and this book maintains that high standard.

The book starts with the most fundamental principle, the regularity of internal structure, and deals first with atomic packing and the description of crystal structures. Students seem to find this approach easy to grasp and Hammond subtly brings out its relationships to chemistry, materials science and mineralogy. Lattice geometry and symmetry then follow naturally and the reason for studying them is clear to the student who is gradually eased into the more difficult concepts of symmetry in three dimensions and the mathematics of Miller indices and zone axis notation. Direct and reciprocal lattice geometry is treated using matrix and vector notation, which must now be more familiar to students than it once was – I can still remember how its simplicity came as a revelation compared with traditional lattice geometry.

The second part of the book deals with diffraction and here the approach seems more traditional. To begin with, the subject is discussed in terms of

optical diffraction from masks, which is the best that can be done to give the student a feeling for diffraction from lattices before he starts on the mathematics, which can be daunting. I was pleased to see that the explanation of why the diffraction maxima from a crystal are sharp was not evaded, as it sometimes is, but is carefully presented. The Laue equations, the Bragg law and the Ewald construction are dealt with and related to each other. The calculation of diffracted intensities follows, with enough examples to make the main points. The geometry of single-crystal X-ray and electron diffraction patterns receive the attention they deserve and at about the right level of detail; computer programs can do remarkable things but single-crystal diffraction is still the only way of seeing for yourself and being sure you haven't missed anything. The final chapter is a good introduction to diffraction from polycrystalline materials.

In the book as a whole, I particularly approve of the biographical notes on crystallographers mentioned in the text and the way Hammond describes the emergence of the ideas he is setting out. Students should know that science is practised by people who often had to struggle to work out the concepts which the student is himself struggling to grasp. I had one petty irritation, the use of rotation axis instead of rotation point in discussing symmetry in two dimensions.

The book is aimed at students in all the disciplines which use crystallographic methods. Some sections of it are of most use to metallurgists and materials scientists, for instance, but mineralogists and geologists are by no means neglected. If they are seriously interested in crystallography, this book is as close to ideal as they are likely to get and very good value too. And if, like me, you learnt your crystallography so long ago that you have lost touch with some of the basics, I thoroughly recommend Hammond's book as an enjoyable way of re-visiting old haunts.

J.E. CHISHOLM

Drew, L.J. *Undiscovered Petroleum and Mineral Resources: Assessment and Controversy*. London and New York (Plenum Press), 1997. xiv + 210 pp. Price \$59.50. ISBN 0-306-45524-2.