This is the best account of the petrology of the Earth as a whole, as opposed to its outer layers, and a remarkable proportion of our knowledge on the subject has been contributed by Ringwood himself. This book is therefore very much *the* authoritative account of the subject, comparable with Bragg's *Atomic structure of minerals* or Goldschmidt's *Geochemistry*. It is not only authoritative but also very readable, despite the many technicalities that are discussed, and the author has been very successful in writing an account that will be useful to students and specialists alike. What a pity it is that he has not found a publisher able and willing to price this work within reach of the average student. A. HALL

Wenk (H.-R.), Champness (P. E.), Christie (J. M.), Cowley (J. M.), Heuer (A. H.), Thomas (G.), and Tighe (N. J.), Editors. *Electron Microscopy in Mineralogy*. Berlin, Heidelberg, and New York (Springer-Verlag), 1976. xiv+ 564 pp., 277 figs. Price DM 96.00; $39.40.

The publication of this book constitutes an important landmark not only in relation to the development of electron-optical techniques as applied in mineralogy but also in the integration of such studies with similar problems in inorganic chemistry and materials science. It owes its origin to an extremely successful TEM conference organized, under the auspices of the American Crystallographic Association, by H.-R. Wenk and G. Thomas at Berkeley in 1974.

Wisely the editors of this volume decided that it should be split into sections each dealing with one aspect of the use of the electron microscope in mineralogical studies [M.A. 76–3157]. Apart from the fact that, in such a scheme, there is bound to be a certain amount of overlap the final result is extremely satisfactory and each of the sections is largely self-contained.

The first major section (section 2) deals with the basic principles of electron microscopy under the neat title of 'contrast'. In this section I was particularly impressed with the chapter contributed by Cowley and Iijima which deals with the direct imaging of crystal structures, This is extremely clearly written and provides the mineralogist at large with a very readable account of the art and its limitations. By contrast the chapter on contrast effects at planar interfaces makes few concessions to the uninitiated and lacks follow-up in relation to simple worked-out mineralogical examples. Section 3 deals with experimental techniques and contains a substantial bibliography.

The next major section (section 4) deals with exsolution phenomena, is prefaced with a good account of the relevant theory, and is well illustrated with a large number of examples chosen from the feldspar and pyroxene mineral groups. In addition to a number of minor contributions on exsolution in a range of mineral systems this section also contains an elegant account of spinodal decomposition in the system TiO_2–SnO_2 (chapter 4.2), which should be studied carefully by mineralogists interested in this topic.

Section 5 deals with polymorphic transitions and again a thorough review of the principles is included with particular emphasis on the distinction between transitions involving non-glissile and glissile interfaces. Examples of transitions involving glissile interfaces (martensitic transitions) have not been much studied in mineralogy although they are of considerable importance in materials science. Examples chosen by way of illustration include baddeleyite (ZrO_2) and the ortho–clinoenstatite transition, which may or may not belong to this class. Included in section 5 is a short contribution by B. G. Hyde (chapter 5.3) on the behaviour of non-stoichiometric rutiles, which fulfils an important function in introducing the mineralogist to a wealth of electron-optical data currently existing in inorganic chemistry on ordering in terms of crystallographic shear mechanisms.

The penultimate section of this volume deals with the study of deformation microstructures in minerals and in the review article on this topic an account of the theory of dislocations and

their associated electron-diffraction contrast effects is presented. Illustrative examples of deformation microstructures observed in quartz, the pyroxenes, and the olivines are provided, and the review article includes an extensive bibliography. Among the research contributions in this section is included an account of deformation in the olivines of peridotites, which is likely to be of particular interest and significance to petrologists.

The final section of the book deals with special applications and techniques and includes a review on the origin of contrast effects in amorphous materials.

This book shows evidence of careful planning and the figures and illustrations are of a very high standard. I believe that the objectives defined by its authors have been largely successful since it does summarize current achievements, provides in most parts a good introduction to the topics of interest, and will certainly provide good selected reading for students of advanced mineralogy. The authors and publisher are to be congratulated.

J. D. C. McCONNELL

Nicol (A. W.), Editor. *Physicochemical methods of mineral analysis.* New York and London (Plenum Press), 1975. xvi+508 pp., 151 figs. Price $41.76.

This book is aimed at the mineralogist or mineral technologist who wants to know something of the potentialities and limitations of modern instrumental methods of mineral analysis and the principles underlying them. The term 'mineral analysis' is used broadly, to include a good selection of methods for various aspects of mineral investigation. After an introduction by Nicol and Lakshmanan, the next four chapters deal primarily with methods for bulk elemental analysis. Lawson deals with optical spectrometry, including optical absorption, flame emission, and atomic absorption, and Hendry with X-ray fluorescence. Lakshmanan and Lawson cover radiotracer methods, including neutron activation and isotope dilution analysis, while Nicholls and Wood deal with mass spectroscopy. In the next chapter, Carr-Brion describes the adaptation of X-ray fluorescence and X-ray diffractometry as on-stream methods for process control. The next four chapters deal with methods for the identification, investigation, and quantitative determination of individual phases: X-ray diffraction (Nicol), electron microscopy, including selected-area diffraction (Loretto), infra-red spectroscopy (Farmer), and thermal analysis, including differential thermal analysis, thermogravimetry, and evolved gas analysis (Mackenzie). Southworth deals with the electron microprobe, scanning electron microscope, and related techniques. In the final chapter, Bennett reviews the various methods, mainly for elemental analysis, and summarizes the merits and demerits of each.

The chapters are well written and, unlike too many edited works, the book hangs together well. Inevitably in a book of this type and length, the space given to any one method will probably rarely be sufficient to meet the needs of the person who has already specialized in it. The chief use of the book is probably for the person who wants to know what a particular method is capable of, or whether it will satisfy his own requirements; it should also be useful as a reference book for advanced undergraduate students. For these and perhaps other classes of users it can be heartily recommended. It is expensive. H. F. W. TAYLOR

Baumann (L.). *Introduction to Ore Deposits.* Edinburgh and London (Scottish Acad. Press: Chatto & Windus), 1976. viii+131 pp., 65 figs. Price £6·00.

Based on a course of ten lectures given in 1969, this book is intended to convey basic knowledge on ore deposits to students in various branches of earth science. Its three major divisions