

that a Fe^{2+} pyroxene is formed'. One is surprised at the author's judgement about the general potentiality of the technique for routine determination of accurate $\text{Fe}^{3+}/\text{Fe}^{2+}$ ratios and again when one reads that a good example of its utility is in showing that manganese nodules contain α - FeOOH or γ - FeOOH , or a mixture of both, or possibly other combinations of ferric oxides or a mixed iron-manganese oxide; one wonders whether a few minutes introspection would not have been a quicker (and cheaper) route to so vague a conclusion. The geochemical section could certainly have been improved by the omission of some of the less relevant passages and some of the wilder flights of optimism. The fact that the author is not on his home ground in mineralogy tends to show through slightly in some of the nomenclature. There are silicate formulae with unbalanced charges on p. 182, and on p. 196, where there also seems to be confusion in the nomenclature of the spectral peaks. However, the number of errors noticed was not excessive and the book will undoubtedly be a useful one.

E. J. W. WHITTAKER

NICKEL (E.). *Grundwissen in Mineralogie. Teil 2: Aufbaukursus Kristallographie. Ein Lehr- und Lernbuch auf elementarer Basis für Kristall-, Mineral- und Gesteinskunde.* Thun and Munchen (Ott Verlag), 1973. 301 pp., 141 figs. Price S.Fr. 27.80.

This book is the second part of a three-volume work. The first part (Grundkursus), published in 1971, contains an introduction to crystals and rocks, and the third part, promised for the end of 1973, is concerned with petrography.

This second part is concerned with crystallography and begins with crystal morphology and then deals with lattice symmetry before describing crystal chemistry and crystal optics. The book concludes with a description in simple terms of X-ray crystallography, and includes a short section on electron and neutron diffraction.

The book is well illustrated and German students should find it valuable.

A. C. BISHOP

ANDERSEN (C. A.), editor. *Microprobe Analysis.* London and New York (Wiley-Interscience), 1973. xiv+571 pp., 166 figs. Price £12.50.

The title of this book, *Microprobe Analysis*, is now used generally to denote techniques that depend for their operation on a focused beam of particles or electro-magnetic radiation impinging on a selected region of a solid specimen, and that provide chemical, structural, and other types of information with a resolution usually less than $\sim 100 \mu\text{m}$. The well-established technique of electron-probe analysis occupies the major part of this volume (421 pp.), which also includes discussions of the more recently developed and less widely used laser-probe (82 pp.) and ion-probe techniques (46 pp.).

The three initial chapters are devoted to the fundamentals of electron-probe instrumentation, X-ray generation, and quantitative analysis, and high-resolution scanning electron microscopy. They are followed by reviews of the application of electron-probe microanalysis in the fields of solid-state electronics, geology, ceramics and glass technology, analysis of biological materials, and the analysis of free particulates. An especially useful feature of these chapters is the extensive bibliographies: there are, for example, some 1000 references to applications in the geological field, classified under the broad headings: analysis of coexisting minerals, new minerals, tektites and impact glasses, etc.

Chapters on soft X-ray spectroscopy, cathodo-luminescence, and the Kossel X-ray diffraction technique complete the section concerned with analytical methods depending on electron excitation.

The comprehensive, though necessarily smaller sections devoted to laser and ion-microprobe techniques give a clear exposition of instrumental development, the complex interaction of the incident beam with the specimen, and of the problems associated with the quantitative interpretation of measured intensities.

In recognizing that coverage of this very wide field of research is an almost impossible task for a single author, one must also accept the practical limitations of an edited collection of specialist articles and inevitably, a degree of incoherence, overlap, and omission. *Microprobe Analysis* is relatively free of these defects, although under this title one would have liked to find an extension of the treatment of high-resolution scanning microscopy to include an assessment of the present performance of electron-microscope-microanalyser combinations in quantitative analysis and a tentative forecast of the analytical possibilities with very thin sections afforded by scanning-transmission electron microscopes using field-emitting electron sources. Further, space devoted to a short review of the situation in the field of proton-probe excitation rather than to electron-beam fabrication techniques might be more appropriate in a volume concerned with analysis. It is clear too, that this volume has been in preparation for some time: an extension of the practice adopted in one chapter of including more recent references at the proof stage would have delayed the need for revision, which in some sections will become necessary in the quite near future.

These are, however, minor criticisms of a useful compilation that can be recommended both to established workers and newcomers to the field.

J. V. P. LONG

DOBRETsov (N. L.), KHLESTOV (V. V.), and SOBOLEV (V. S.). *The facies of regional metamorphism at moderate pressures*. Transl. from the Russian by D. A. BROWN. Canberra (Australian Nat. Univ. Press), 1973. viii+297 pp., 57 figs., 16 tables. Price \$A8.95.

This volume, the third of the four-volume series prepared under the editorship of V. S. Sobolev and translated into English by Professor Brown, must, like its two predecessors, form essential reading for all metamorphic petrologists. The extensive coverage