

et al.); Ore-forming fluids Nigerian mineral belts (Akande and Kinnaird); oxygen and hydrogen isotope study of skarn-type magnetite deposit, Shinyemi mine, Korea (Mariko and Yang); tungsten-bearing gresien veins, Akchatau deposit, Kazakhstan (Zharikov *et al.*); East Kemptville Sn-(Zn-Cu-Ag), Nova Scotia (Kontak); vein gold deposits, Liaoxi uplift, China (Baoqin *et al.*); Hutti gold deposit, India (Pathan and Riyaz Ulla); fluid, chemical and structural evolution of gold-quartz veins, Patchway Mine, Zimbabwe (Herrington *et al.*); Arkhangelsk diamond province (Sinitsyn).

The number of papers on general techniques is rather small although there are useful articles on ICP-AES for fluid inclusion analysis (Rankin *et al.*), temperature-chloride mixing diagrams (Shibue) and computer aids to ore-mineral identification (Laudon and Hagni). In addition there are papers on the behaviour of pyrite in metamorphism (Craig and Vokes), coupled diffusion in the system ZnS-CuInS₂ (Bente *et al.*) and fluid transport of ore metals in mantle rocks (Ryabchikov).

There are notable (and, it turns out, deliberate) omissions from this volume. Papers given in special sessions on 'Metalliferous Black Shales and Ore Deposits' and 'Precambrian Ore Deposits and Tectonics' have been or are to be published elsewhere. If you were looking for papers on mineral deposit modelling presented at the concurrent IGUS/Unesco Deposit Modelling Program meeting then you would be disappointed, these papers being published separately by the Geological Association of Canada. Nevertheless, there are some articles primarily addressing modelling; these include: geochemistry of formation of five element (Ag-Ni-Co-As-Bi) veins (Kissin); metallogenic concepts to aid exploration for giant Olympic Dam-type deposits (Gandhi and Bell); cyclicity in the formation of mercury deposits (Maslennikov).

Perhaps the most valuable collective feature of the volume is the large number of papers on deposits rarely described in western journals. In particular there are 20 papers describing deposit in the old Soviet Union and China with a further 20 papers on deposits in other Asian countries (notably India), South America, Africa and Eastern Europe.

The quality of presentation of the volume is excellent and the editorial team are to be commended on the final product. The text is enhanced by 448 figures and 117 tables, a contents list and a list of contributors but no index.

As a collection of studies of the ore geology of specific districts or deposits, this volume meets its purpose admirably. At well over £100, this is not a

volume for most peoples' personal collection, however, I would recommend this book as useful reference for libraries requiring such information on a wide variety (both in type and location) of deposits.

D. A. POLYA

Gray, P. J. (Ed.) *Sulphide Deposits - their Origin and Processing*. London (Institution of Mining and Metallurgy), 1990. x + 310 pp., 4 maps. Price £53.00.

Sulphide deposits are hosts to a a major proportion of the world's base and precious metal resources, yet their multi-element content and complex form pose a major challenge to efficient exploitation. There is still a tremendous gap in our understanding of the underlying principles governing the processing of sulphide ores, and this volume aims to record some of the recent progress in this field.

This volume contains 21 papers on the subject of sulphide deposits, but despite the title, the majority focus on the treatment of ores and the extraction of metals, rather than their origin. It is split into three sections: 'Geology, petrology and mineralogy' (5 papers), 'Ore processing and mineralogy' (7 papers), and 'Concentrate processing and tailings disposal' (9 papers). As with all volumes of this nature, the coverage is uneven, although there are also some useful review papers (e.g. 'Compositional and textural variations in major iron and base-metal sulphide minerals'; 'Principles and practice of sulphide mineral flotation'; 'Acid mine drainage from sulphide ore deposits'). The quality of the presentation, although on the whole adequate, is variable, with several disparate styles and layouts.

The value of this volume lies in its descriptions of individual case histories, detailing methods adopted for the recovery of metals from specific sulphide deposits. As such it represents a useful indication of how far metallurgists have progressed in their quest for efficient and reliable techniques for exploiting sulphide deposits.

D. H. M. ALDERTON

Salje, E. K. H. *Phase Transitions in Ferroelastic and co-elastic Crystals: an introduction for mineralogists, materials scientists and physicists*. Cambridge 1993. xiv + 282 pp. Price (paperback) £19.95.

This edition of Professor Salje's previous book with the same title and publisher (1990) has been dedicated specifically to students. A review of the