

# Book news

## 1. Mintek publications

The following are available from Mintek (Private Bag X3015, Randburg, 2125 South Africa) at R35 (including GST) per copy to purchasers in South Africa and US\$30 (including airmail postage) to purchasers elsewhere.

### ● Report M402

*The preparation of synthetic fusion standards for use in the X-ray-fluorescence analysis of rocks and minerals*, by B.T. Eddy and J.J. Jacobs. Apr. 1990. 19 pp.

This report describes the preparation of a suite of fused calibration standards for use in the X-ray-fluorescence analysis of rocks and ores. The suite of standards covers the minerals, ores, and slags of the elements magnesium, aluminium, silicon, calcium, titanium, vanadium, chromium, manganese, iron, and zirconium in calibration ranges from 0 to 80 or 100 per cent. The calibration standards are used in a single method for all these elements and materials. The suitability of the calibration standards, and their ability to cope with the very wide range of materials and concentration ranges, is demonstrated by the analysis of international and in-house reference materials. A detailed analysis of the factors affecting the precision of the results is also described.

This set of standards is the third set that has been prepared, and many of the shortcomings and less obvious pitfalls encountered in the preparation of synthetic fusion standards have been overcome. Although the calibration standards have been designed for a particular method, they will be useful for the analysis of similar materials by other X-ray techniques.

### ● Report M405

*Slag-metal equilibria in the system Fe-Cr-Si-C-Ca-Mg-Al-O*, by R.H. Eric and M. Akyüzlü. Aug. 1990. 29 pp.

The equilibrium between carbon-saturated Fe-Cr-Si-C alloys and SiO<sub>2</sub>-CaO-MgO-Al<sub>2</sub>O<sub>3</sub>-CrO<sub>x</sub>-FeO<sub>y</sub> slags was studied under argon and carbon monoxide atmospheres at 1500 and 1600°C. The equilibrium distribution of chromium, silicon, and iron between the slag and metal phases was determined for different compositions of both phases under different atmospheres and at different temperatures.

The samples were equilibrated for approximately 11 hours, and then quenched to room temperature. The slag phases were then analysed for silica, lime, magnesia, alumina, total chromium, and total iron. The metal phases were analysed for iron, chromium, silicon, and carbon.

The results of the investigation show that the transfer of silicon from the slag to the metal increases with increasing temperature, decreasing carbon content of the metal, increasing chromium-to-iron ratio of the metal, increasing silica content of the slag, and decreasing lime-to-alumina ratio of the slag. The results are presented graphically on quaternary diagrams as lines representing metals of constant silicon content in equilibrium with the slags. These are also lines of constant silica activity in the slag. Some activity calculations were carried out for

experiments at 1600°C in carbon monoxide atmospheres.

It is also shown that an increasing iron oxide content and slag basicity decrease the chromium content of the slag. Most of the chromium present in the slags under the highly reducing conditions of the tests were found to be in the divalent state. These results are also shown as lines of constant chromium content in the slag on SiO<sub>2</sub>-CaO-MgO-25% Al<sub>2</sub>O<sub>3</sub> quaternary diagrams.

### ● Application Report no. 8

*The development of a process for the recovery of gold from gold-bearing solutions by means of activated carbon or resin in a NIMCIX column*. 1990. 19 pp.

This report describes the work done by Mintek in the development of a process for the recovery of gold from solutions that contain very low concentrations of the metal, such as return-dam solutions, as well as from solutions with higher concentrations, such as those obtained from heap-leaching operations.

The work done by the Hydrometallurgy and Process Chemistry Divisions is based on the use of ion-exchange resins or carbon granules in a continuous ion-exchange column (the patented NIMCIX column). This had been developed in collaboration with the Atomic Energy Corporation for South African uranium plants.

The work covered evaluation of the alternative adsorbents available, laboratory and pilot-plant work, and modifications that were made to the NIMCIX column to ensure continuous, reliable operation in the gold-plant environment, and for the treatment of dilute pulps.

This report describes the significant pilot-plant results, the transfer of the technology, and the results obtained from two commercial installations.

The cost of the research-and-development project over 15 years is given and an estimate made of the potential for additional gold recovery in the South African industry.

## 2. New publications from Trans Tech

The following are available from Trans Tech Publications Ltd, Old Post Road, Brookfield VT05036, USA.

● *Effect of iron and silicon in aluminium and its alloys*, edited by I. Kovacs. 1990. 450 pp. \$124.

This volume contains the proceedings of an international conference that was held in Balatonfüred (Hungary) in May 1989.

Iron and silicon are the main impurities in aluminium: they are always present in alloys made from commercially pure base materials. Both impurities form various intermetallic compounds. These particles can cause basic changes in the macroscopic properties of the aluminium alloys and are thus of special technological interest. The aim of the conference was to clarify the present knowledge of the subject and to discuss the needs for future research.

● *Martensitic transformations*, edited by B.C. Muddle. 1990. 714 pp. \$190.

This volume, the Proceedings of ICOMAT '89 (held

in Sydney in July 1989), contains a collection of 9 invited and 114 contributed papers covering key areas of research ranging from fundamental transformation mechanisms to practical applications of martensitic transformations in both metallic and ceramic alloys. A majority of the papers (60) are devoted to martensitic transformations and the shape memory effect in Cu-based, NiTi, and Fe-based alloys, and the application of shape memory alloys. However, there are reports of important new contributions in the traditional field of ferrous martensites, and an excellent collection of papers on martensitic transformations in ceramics.

- *Ferrites*, edited by C.M. Srivastava. 1989. 2 vols. 1280 pp. \$254.

These volumes contain the proceedings of the 5th International Conference on Ferrites, which was held in Bombay (India) in 1989.

- *Properties and characterization of amorphous carbon films*, edited by J.J. Pouch and S.A. Alterovitz. 1990. 714 pp. \$152.

Amorphous, hydrogenated carbon (AHC) films can be deposited on various substrates using several techniques, e.g. plasma deposition and ion-beam deposition. The resulting films can be hard, wear-resistant, and transparent. The films can be utilized as protective coatings for a variety of components and as dielectrics for microelectronics. The chapters describe, in detail, the film synthesis, characterization methods, properties, and potential applications.

- *Synthesis and properties of boron nitride*, edited by J.J. Pouch and S.A. Alterovitz. 1990. 426 pp. \$192.

Boron nitride thin films can be deposited on different substrates using several techniques including plasma deposition, ion-beam deposition, and reactive sputter deposition. The films can be hard, wear-resistant, and transparent. The films can be useful for tribology, high-temperature applications, chemical protection, passivation, and insulation in microelectronics. Furthermore, devices and masks in X-ray lithography can be based on boron nitride. The chapters describe the methods for synthesizing boron nitride films, the resulting properties, and the applications.

- *Electronic structure and lattice defects in alloys*, edited by R.W. Siegel and F.E. Fujita. 1989. 320 pp. \$78.

This volume contains the proceedings of the US-Japan Seminar held in Hawaii in May 1987. The Seminar centred on the three subject areas: Bulk and Defect Electronic Structure, Electronic Structure and Phase Stability, and New Materials.

### 3. A new edition

- *Tomorrow's materials*, by K.E. Easterling. London, The Institute of Metals (1 Carlton House Terrace, London SW1Y 5DB, England), 1990. 2nd ed. 170 pp. US\$29.

Examples of new materials dealt with in the second edition of this well-established text include aluminium-

lithium alloys and fibre-polymer composites for aircraft and sports equipment; rolled structural beams made of toughened concrete; new engineering polymers that may soon displace metals; advanced ceramics that promise to revolutionize the machine tool, electrical, and automobile engine industries; fibre optical materials, networks of which will shortly span the world; new generations of transistors; and a 'warm' superconducting ceramic with applications in computing, medical scanners, and levitating trains.

### 4. Books for exploration geologists

The following books are obtainable from Elsevier Science Publishers, P.O. Box 211, 1000 AE Amsterdam, The Netherlands.

- *Lateritic bauxites*, by G. Bardossy and G.J.J. Aleva. 1990. 624 pp. Dfl. 295.

Bauxite is the main raw material for the production of metallic aluminium. The majority of the world bauxite resources belong to lateritic bauxite deposits. The authors of this book spent most of their life in bauxite exploration and in scientific bauxite research, and have visited most of the lateritic bauxite areas of the world. In this book they present both their scientific and practical experiences, together with all available information on the deposits, thus providing a comprehensive geologic-genetic and economic evaluation of these deposits on a world-wide scale.

- *Platinum-group element exploration*, by D.L. Buchanan. 1988. 186 pp. Dfl. 150.

This book gives a practical set of guidelines for implementing a programme of PGE exploration, detecting subtle indications of mineralization, and assessing the economic potential of a group of mafic or ultramafic rocks.

- *Lead isotopes in mineral exploration*, by B.L. Gulson. 1986. 246 pp. Dfl. 160.

Written specifically for those working in the mineral industry, this book provides an up-to-date state-of-the-art review of lead isotopes in mineral exploration.

- *Prospecting and exploration of mineral deposits*, by M. Kuzvart and M. Böhmer. Dfl. 285.

### 5. Journal for earth scientists

- *Ore Geology Reviews*, published by Elsevier Science Publishers, P.O. Box 211, 1000 AE Amsterdam, The Netherlands. 6 issues per year. Annual subscription Dfl. 453 including postage.

This journal, described as the 'Journal for comprehensive studies of ore genesis and ore exploration', aims to familiarize all earth scientists with recent advances in a number of interconnected disciplines related to the study of, and search for, ore deposits. The reviews range from brief to longer contributions, but the journal preferentially publishes manuscripts that fill the niche between the commonly shorter journal article and the comprehensive book coverage.