BOOK REVIEWS

Cobalt and Its Alloys

Reviewed by D. C. Carlson, manager—applications development, Cabot Corp., Kokomo, IN. Member of ASTM.

REFERENCE: Betteridge, W., *Cobalt and Its Alloys*, Wiley, Halsted Press, New York, ISBN 0470-27342-9, 159 pp., hardcover, $49.95.

Cobalt and Its Alloys by W. Betteridge, former chief scientist, International Nickel Limited, represents the first in a series of eight books planned to be published on the general subject of industrial metals (exclusive of iron and steel).

This book is intended to fit into the overall framework of a systematic study on metallurgy and materials science aimed primarily at the undergraduate college and university student, although engineers and managers in those industries producing or using cobalt and its alloys will find the contents quite useful as reference material. The book in most cases assumes prior knowledge of the basic sciences on which metallurgy is based—namely, chemistry and physics. Knowledge of the interpretations of equilibrium diagrams is assumed, but much of the book can be understood and applied without much background.

As might be expected from a book of this type, the information is not new, although the author brings together under one cover much valuable information and data that had been scattered in a number of different publications. Most of what is presented comes from the now defunct Cobalt Information Center.

In this slim (about 150 pages) but densely packed book, the author summarizes basic properties, outlines the occurrence and extraction of cobalt and its ores, and deals with applications ranging from alloys in which cobalt forms the major constituent to materials and processes where the element may play a minor but nevertheless significant role. Also included is a chapter on the applications of cobalt compounds, which includes mention of catalysts, glass and ceramics, pigments, enamel frits, and nutrition. A chapter on economics ends the book. It is the only chapter that is immediately outdated because the book was published in 1982 and the latest data included are vintage late 1981. However, this does not detract from the usefulness of the chapter on economics or of the overall book.

In summary, this book provides a means for university and college teachers to present in a systematic way one of the minor (in terms of tonnage) but strategically important industrial metals that is sometimes neglected in undergraduate courses in metallurgy and materials science. It also provides an excellent resource book for engineers and managers in industrial environments producing or using cobalt and its alloys.

Treatise on Materials Science and Technology, Vol. 20: Ultrarapid Quenching of Liquid Alloys

Reviewed by Ronald C. Gower, Carpenter Technology Corp., Steel Division, Reading, PA.

REFERENCE: Herman, H., Ed., *Treatise on Materials Science and Technology, Vol. 20: Ultrarapid Quenching of Liquid Alloys*, Academic Press, New York, 1981, 448 pp., $67.00.

The area of rapid solidification has been identified as one of the most important and promising ever for materials research. This position is confirmed by the thousands of patents and technical papers, as well as conferences, dedicated to the subject. Many innovative processes have been developed to allow production of large quantities of materials that have unique properties because of their method of solidification. Commercial exploitation of the properties is occurring in several applications. Given this explosion of information, it is not unexpected that any publication will be outdated before it can be widely disseminated. Although much of the information in *Ultrarapid Quenching of Liquid Alloys* is not current, the book does serve a valuable purpose in providing a thorough review of fundamentals and a complete tabulation of knowledge as it existed at the date of publication.

The book is divided into nine chapters covering the range of methods of production for both metals and nonmetals to properties obtained in the solidified material. An especially important area discussed is annealing effects in metallic glasses. Because of the requirement for rapid cooling, most metallic glasses are produced with one or more small dimensions, and to be useful they must be consolidated to a larger size. This consolidation usually involves heating which can degrade properties significantly.

An especially useful feature of the book is a complete outline at the beginning of each chapter. This feature, plus the complete index, make location of a topic of interest extremely easy. The tables of data and illustrations are well organized and documented. The only area that is not discussed in sufficient detail is electronic and magnetic properties. These are among the most interesting of rapidly solidified materials and probably will result in the most significant commercial application near term.

All in all, *Ultrarapid Quenching of Liquid Alloys* serves as an excellent reference in the timely subject of rapid solidification and should be considered by those who want a thorough review or the knowledge to initiate work in this area.