

CORUNDUM

By Richard W. Hughes, 314 pp., illus., publ. by Butterworth-Heinemann, London, 1990. US\$39.95*

This is the seventh, and thus far the largest, book in the Butterworth's Gem Book series. Considering recent developments in corundum enhancement and synthesis, this book can also be considered a timely reference.

Following a short section that summarizes corundum's mineralogic and gemological properties, a brief introduction leads into the 11 chapters that comprise the main text. Each chapter has its own bibliography, and there is a subject index to the entire book.

Chapter 1 addresses the history of ruby and sapphire as gems, with references back to 315 B.C. Chemistry and crystallography are discussed in chapter 2, which includes sections on twinning and on crystal morphology as it relates to various localities.

Chapter 3 addresses physical and optical properties. Chapter 4 covers color and luminescence, with sections on absorption spectra and on pleochroism and its importance to the lapidary.

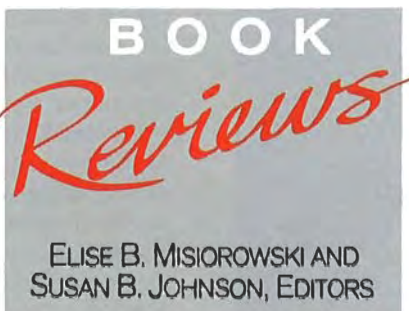
Inclusions in natural rubies and sapphires are the focus of chapter 5. Mr. Hughes discusses the inclusion suites most commonly associated with the gem corundums found at each of the major ruby and sapphire sources.

Chapter 6 devotes 28 pages to the various corundum enhancements. It also addresses color stability, treatment disclosure, specific heat-treatment methods, and detection.

Synthetics and assembled stones are examined in chapter 7. In his discussion of identification techniques, Mr. Hughes focuses on visual characteristics as seen through a microscope.

Chapter 8 illustrates and discusses faceting for best color and brilliance. It also addresses the proper orientation of the rough to produce asterism in a cabochon.

Following a review of notable rubies and sapphires, chapter 9 examines the key variables in determining quality in these stones and placing them in a classification. The chapter concludes with an outline of world-



wide consumer markets that notes each country's general preference for color, proportions, and clarity.

Chapter 10 addresses the gem-corundum deposits, listing the localities and the mode of occurrence at each. The geology of four of the best-known deposits is then summarized.

The last and longest chapter, on world sources of corundum, is also one of the most interesting. Mr. Hughes takes the reader from the Mogok Stone Tract in Burma (Myanmar) to the sapphire-producing areas of Montana.

When he learned I was reviewing *Corundum*, Richard Hughes sent me a 25-page appendix titled "Corrections and Additions." It is too bad that these were not caught soon enough to be properly incorporated into the book. In addition, although there are many black-and-white illustrations, there are only two pages of color photos and photomicrographs.

In spite of these shortcomings, Mr. Hughes is to be congratulated for providing the gemological community with this excellent book.

JOHN I. KOIVULA
Chief Gemologist
GIA, Santa Monica, California

PROPERTIES AND APPLICATIONS OF DIAMOND

By John Wilks and Eileen Wilks, 525 pp., illus., publ. by Butterworth-Heinemann, Oxford, England, 1991. US\$175.00*

Diamond has many unique physical and mechanical properties of both scientific and technological interest, quite

independent of its exceptional gemological characteristics. Consequently, much of the literature on diamonds is found in the domain of physicists, physical chemists, materials scientists, and engineers. This book, written by a world-famous team of physicists, succeeds in bringing together all of the properties and applications of diamond that have scientific and industrial significance.

The book begins with a short introductory chapter on the current status of diamond research that is primarily concerned with diamond synthesis and thin films. The main text is divided into three parts.

Part 1, on structure, will be of the greatest interest to gemologists. It covers such topics as chemical impurities and physical inclusions; optical absorption and causes of color; luminescence; morphology, and geometric defects in the lattice (e.g., twinning, thermal conductivity).

The mechanical properties of diamond are the focus of part 2, which discusses strength, fracture, and plastic deformation; polishing (including polishing rates and directional effects); friction; and laboratory-grown polycrystalline diamond (PCD).

Part 3, on applications and wear, is the largest in the book. Primarily of interest to materials scientists and engineers, it covers a range of topics, including wear and surface characteristics, and the use of diamonds in tools.

This is an excellent, well-illustrated reference book. However, it is written at a level that assumes some familiarity with basic scientific and technological concepts and units, as well as sophisticated instrumentation. Although gemologists should be aware of the availability of this book, it is not an essential part of a basic gemological library.

ALFRED A. LEVINSON
The University of Calgary
Calgary, Alberta, Canada

*This book is available for purchase at the GIA Bookstore, 1660 Stewart Street, Santa Monica, CA 90404. Telephone: (800) 421-7250, ext. 282.