

BOOK REVIEW

Book Review: *Understanding Minerals and Crystals* (2015)

By Terence McCarthy and Bruce Cairncross. Struik Nature (Penguin Random House South Africa). ISBN 9781431700844, 312 pages. \$350

The book *Understanding Minerals and Crystals* by Terence McCarthy and Bruce Cairncross provides an overview of the classification and identification of minerals. The book first introduces the nature of atoms and how they bond to form crystals, followed by crystal morphology, physical properties of minerals, mineral classification, and identification.

Chapters 1 to 4 present a thorough examination of crystal chemistry. It introduces the fundamental concepts of atoms, including the structure of the atom, subatomic particles, elements, electron configurations, and the periodic table. Subsequently, it describes the mechanisms of atomic bonding to form crystals. Different types of chemical bonds and associated atomic packing are presented. Other aspects of crystal structures, like the origin of crystal faces, polymorphism, twinning, and ion substitutions are also included. Each chapter has a brief introduction to show readers the goals or background in the beginning.

Chapter 5 provides an introduction to crystal morphology. It focuses on the external symmetry of crystalline solids. Different types of symmetry, symmetry assessment, and the use of symmetry to classify crystals are explained. A variety of crystal forms within each crystallographic system are presented. A section comparing natural crystals with crystal models is also included. Chapters 6 and 7 draw attention to the physical characteristics of minerals, mineral classification, and identification. The physical properties shown in the book, such as specific gravity, hardness, and crystal form, can be evaluated using hand samples and basic testing equipment. Identification flow charts and keys for common minerals are provided.

Chapters 8 to 16 provide detailed information for common minerals in different mineral groups, including native elements, sulfides, oxides and hydroxides, halides, carbonates, sulfates, phosphates and vanadates, and tungstates and silicates. Each chapter includes an introduction about the mineral group followed by descriptions of individual minerals. Mineral data include names, chemical formulas, physical properties, identification keys, localities including mines, and geologic occurrence for each mineral. Chapter 17 focuses on mineraloids including opal and amber.

Two appendixes are included. The first is a table of elemental abundances in the solar system, Earth's mantle, and the continental crust. The second contains cardboard cutouts that can be folded to make 3D crystal models. Further reading and sources are also listed at the end of the book for readers who would like

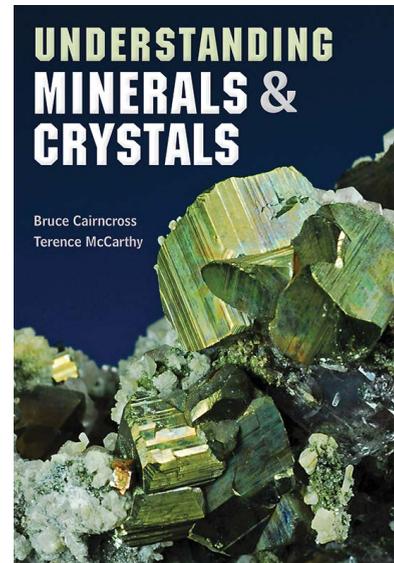
additional references.

This book is sponsored by Exxaro, an energy and heavy mineral mining company based in South Africa. The focus of the book is mineral resources education. The scope of the book does not encompass analytical techniques like optical microscopy or X-ray diffraction. The book distinguishes itself from other mineralogy books by containing rich conceptual and visual content as an introductory guide for

mineralogy. Concepts and terms are well explained and highlighted in the texts. A glossary is provided at the end of the book.

The book uses examples from everyday life to help comprehend difficult terms. The visual appearance of the book is attractive. The whole book is well edited and printed on glossy coated paper. Figures and diagrams are all well illustrated in color. Hundreds of high-quality photographs of excellent mineral specimens are presented in the book. They are from all over the world, with an emphasis on South Africa.

The book *Understanding Minerals and Crystals* is an appropriate guide not only for students majoring in geology, but for any reader who is interested in minerals and crystals. Students will welcome it in introductory mineralogy courses with its well-explained and well-illustrated content related to crystal formation and mineral properties. With this fundamental background, they should be comfortable consulting further resources to learn economic geology, gemology, and geochronology. Instructors will find the color photographs of mineral specimens appealing to show in class. Enthusiasts and collectors will appreciate it as a useful reference with its clear descriptions and images.



YANYING CHEN

Department of Geology and Environmental Science
James Madison University
801 Carrier Drive,
Harrisonburg, Virginia 22807, U.S.A.