American Mineralogist, Volume 104, page 1531, 2019

Book Review

Book Review: A Practical Guide to Rock Microstructure, 2nd edition. By Ron H. Vernon. (2019) Cambridge University Press, 440 p. $105, ISBN: 9781108427241.

One might expect a book entitled *A Practical Guide to Rock Microstructure* to consist mainly of polarized light microscope images with brief figure captions describing textures. Instead, this volume contains detailed descriptions of multiple hypotheses on the generation of each texture where they exist and provides extensive references for exploring the origin of textures in even more depth. Illustrations of microscale structures and processes such as dislocation slip and crystal growth morphology add context to the discussions and images of thin sections. In the second edition the author has updated references, included additional images, and replaced some photomicrographs with better-quality images.

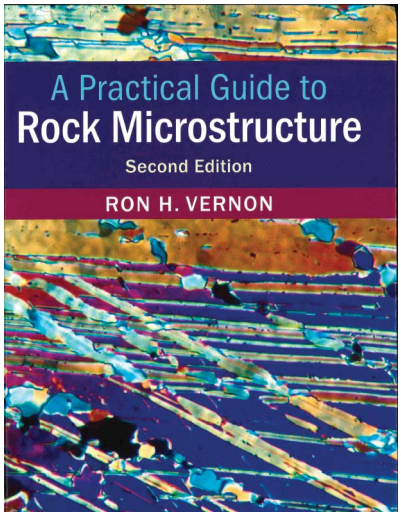
The volume is subdivided according to the three major rock classes. It includes an introductory chapter that briefly surveys the history of thin section microscopy and use of thin sections with various analytical techniques, and ends with a specific chapter dedicated to microstructures of deformed rocks.

The section on sedimentary microstructures is by far the shortest at 21 pages in length, and includes sections on detrital, pyroclastic, organic/bioclastic, and chemical sedimentary rocks. Within each of these subsections, brief descriptions of important textural features are provided along with some relevant images.

The first part of the igneous rocks chapter covers melt structure and composition and delves into the details of crystal nucleation and growth processes, concepts which are carried through the metamorphic and deformation texture chapters. Subsequent sections describe grain shapes and sizes, crystallization order, magmatic reaction and intergrowth textures, magmatic flow, enclaves, zoning, twinning, and embayments. The chapter concludes by describing textures associated with vesiculation and magma immiscibility.

Metamorphic rock textures are treated separately from deformation textures. A discussion of energy, dihedral angle, and grain boundaries is included in the summary of processes affecting grain shapes in metamorphic rocks. Textures discussed in the metamorphic rocks chapter include fluid inclusions, the influence of fluids on crystal faces, growth twinning, zoning, symplectites, the criteria for establishing a metamorphic reaction, evidence of relict microstructures inherited from the protolith, and those textures caused by melting.

Themes on microstructures, stress-strain relationships, deformation mechanisms, and dislocations are established at the beginning of the chapter on deformation textures. Sections on metamorphic reactions during deformation, partitioning, foliation and lineation, fluids and mass transfer, and porphyroblast-matrix textures follow. The end of this chapter is dedicated to deformation textures in specific rock types, namely migmatites, peridotites, eclogites, and blueschists.



If the reader is most concerned with learning textural vocabulary, it is advisable and quite easy to navigate the book through the glossary. Each entry within the glossary contains a definition of the term, plus references to sections and figures within the book that describe or show the texture. There is also a detailed index for locating specific terms within the volume, including rock types. Because each chapter is generally organized by process rather than composition, some frustration may occur if the user is attempting to quickly identify textures that can exist within a specific mineral group.

A Practical Guide to Rock Microstructure is best used as a reference for graduate students, professionals, or undergraduate research projects. The detailed debates on texture formation such as the nucleation-to-growth ratio in cumulate textures are important to document but might be discouraging to some students in an undergraduate course with learning outcomes restricted to fundamental identification of rock textures and preliminary use of phase diagrams. It is not a comprehensive guide to identifying minerals and rocks in thin section, so users should have previous experience with polarizing light microscopy before delving into the book.

The biggest strength of this publication is not in the number of images provided, though there are hundreds of figures provided in the book. Instead, the comprehensive reference list and detailed review of existing literature, plus the cross-indexed glossary of textural terms, make *A Practical Guide to Rock Microstructure* a unique and invaluable resource for researchers and students alike.

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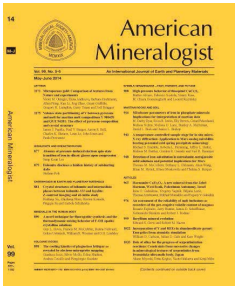

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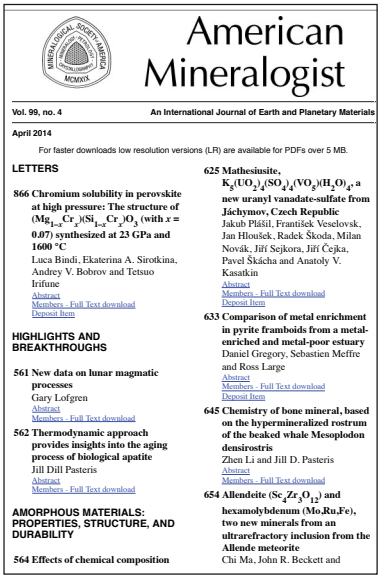

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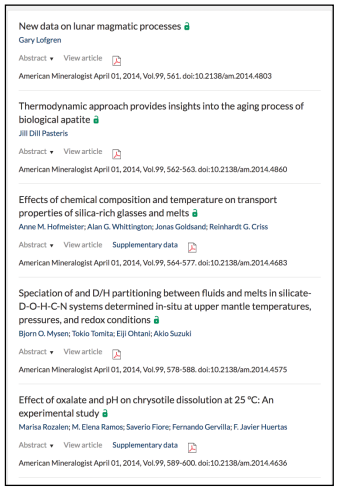

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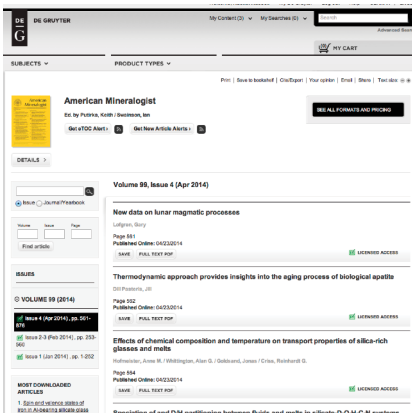

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