

BOOK REVIEWS

Micas: Crystal Chemistry and Metamorphic Petrology, edited by A. Mottana, F. Sassi, J.B. Thompson Jr and S. Guggenheim. *Reviews in Mineralogy and Geochemistry* **46**, 2002; 499 pp. [ISBN 0-939950-58-8]. Price \$32 (\$24 for CMS, MSA and GS members)

At first sight, a second book dedicated to micas in the *Reviews in Mineralogy* series might seem excessive. *Micas: Crystal Chemistry and Metamorphic Petrology* has its origins in an international meeting convened in Rome in 2000 by the Italian National Academy. While many of the presentations were published in a thematic issue of the *European Journal of Mineralogy* (2001), the plenary lectures were expanded, very extensively in some cases, to form this book. My initial scepticism was quickly dispelled by the presentation and editing of the book as I began to appreciate the level of detail that has been skillfully arranged in almost 500 pages of text. It is clear that 18 years has seen a considerable increase in our knowledge of this important group of minerals, and this addition to *Reviews in Mineralogy and Geochemistry* easily justifies itself.

The preface rightly reminds us that micas are amongst the more common minerals in the Earth's crust, forming an estimated 4.5% by volume. However, after a further reminder of how widespread the micas are in sedimentary, metamorphic and igneous rocks, I was dismayed to be told that micas 'form in the upper greenschist facies', implying that they are absent at lower grades. Happily for any clay mineralogists and low-grade metamorphic petrologists who are eager to acquire this book, chapter 11 corrects any misunderstanding.

By way of 12 chapters the reader is conducted through the mineralogy of micas from atoms (chapters 1 and 3), through crystals (chapters 4 and 5) to rocks (chapters 9, 10 and 11), and finally to the history of mica research. In many ways chapter 1 sets out the rationale for the book, starting with the structure and crystal chemistry of some 200 micas including new species (since 1984) and some synthetic varieties. It concludes with the dehydroxylation characteristics of micas, which are used to explore atomistic models and the origin of *trans*- and *cis*-vacant structures. The behavior of micas at high pressures and temperatures is explored in chapter 2, followed by a review of the structural features of micas in chapter 3, including a valuable description of the oblique-texture electron diffraction technique. By far the largest section, chapter 4, is devoted to polytypism and twinning, and

here the 'magic' of trigonal symmetry and pseudo-symmetry is first simplified and then elaborated. Some superb lattice fringe images are found in chapter 5, which reviews the most recent high-resolution transmission electron microscope techniques, particularly the application to polytypism and defect analysis.

The optical and Mössbauer spectroscopy of iron in micas is reviewed in chapter 6, while chapter 7 deals with the infrared spectroscopy of micas, but will disappoint clay mineralogists by the omission of illite and glauconite. A useful summary of X-ray absorption spectroscopy (XAS) methods is given in chapter 8, including extended X-ray extended absorption fine structures (EXAFS) and X-ray extended absorption near-edge structures (XANES) spectroscopy, and it also lists published XAS data on micas. Chapter 9 focuses on dioctahedral K-Na white mica found in metamorphic rocks, especially on their rock-forming properties and use for petrogenetic studies. Micas are considered in terms of mineral assemblages in pelitic schists in chapter 10. Here the concept of modal space is used to demonstrate changes in modal abundance of minerals as net-transfer reactions proceed. Micas in the realm of diagenesis and very low-grade metamorphism are considered in chapter 11, especially the concepts of illite crystallinity and reaction progress, and the techniques used in their evaluation. Finally, chapter 12 provides a fascinating history of the micas from the writings of Plinius, through the early crystallography of the 17th century to the present.

This is not bedtime reading – indeed browsing anywhere between the preface and the final chapter without a sound knowledge of sheet silicates could be unsettling. But if you need to delve deeply into the cryptic magic of the micas, this book is for you.

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Layered Double Hydroxides: Present and Future, edited by Vicente Rives. Nova Science Publishers, New York, 2001, ix + 439 pages. [ISBN: 1-59033-060-9]. Price \$89.

The layered double hydroxides (LDH) are a diverse group of materials, well represented in nature but also readily synthesized in the laboratory. They are in general derived from divalent metal hydroxides by partial incorporation of a trivalent metal, leaving a