

BOOK REVIEW

ATLAS OF NON-SILICATE MINERALS IN THIN SECTION
by Joan Carles Melgarejo and Robert F. Martin. (2011) The Canadian Mineralogist Special Publication 7, 522 p. hard-cover, DVD-ROM, Mineralogical Association of Canada, Québec. US\$125.00 (outside Canada), CDN\$125.00 (in Canada) (member price US\$100.00/CDN\$100.00) Price for students US\$100.00 (outside Canada), CDN\$100.00 (in Canada) (member price US\$80.00/CDN\$80.00). ISBN: 978-0-921294-51-1.

The atlas is an impressive large format (11.5 × 8.5") volume and is No. 7 of *The Canadian Mineralogist's* series of Special Publications. It builds on an existing atlas written in both Spanish and Catalan languages. On its more than 500 pages, the atlas presents chemical, structural, optical, and paragenetical information plus thin-section micrographs for 408 different mineral species, all of which are non-opaque non-silicates. The atlas includes a DVD-ROM with all micrographs.

The authors, Joan Carles Melgarejo (Barcelona, Spain) and Robert F. Martin (Montreal, Canada), are recognized and experienced mineralogists, who revised this book in cooperation with several other authors, mostly affiliated to the University of Barcelona. The introductory chapter presents the motivation for this atlas. Its initial edition was funded by the Folch Foundation, Barcelona (Spain). This foundation traces back to Dr. Joaquim Folch I. Girona, an import mineral collector and private researcher of the 20th century. Within this first chapter, symbols and abbreviations used throughout the atlas are given. It took me a while to find these—a more eye-catching table or list of abbreviations might have been a better choice. Readers who are inexperienced in mineral optics and its terminology are referred to relevant textbooks at this point. Many individuals and institutions are credited for sample contributions that were used to complement the large collection of rock samples and thin sections available at the Department of Crystallography, Mineralogy, and Ore Deposits at the University of Barcelona.

Minerals are grouped into 16 chapters according to “Dana’s New Mineralogy” classification from 1997. Each chapter is preceded by some general considerations concerning the respective Dana class and the list of minerals selected. Chapters comprise “Native Elements” (2 minerals), “Sulfides and Sulfosalts” (6), “Oxides and Hydroxides” (56), “Halides” (19), “Carbonates” (56), “Nitrates” (4), “Iodates” (2), “Borates” (26), “Sulfates” (51), “Selenates, Tellurates, Selenites, Tellurites, and Sulfites” (7, no selenates, no sulfites), “Chromates” (3), “Phosphates, Arsenates, and Vanadates” (151), “Antimonates, Antimonites, and Arsenites” (9, no antimonites), “Vanadium Oxysalts” (4), “Tungstates and Molybdates” (5), and “Ionic and Molecular Organic Minerals” (4). As stated in chapter 1, minerals were chosen according to “overall interest and importance, be it petrographic, economic or environmental.” It is certainly a matter of one’s own

subjective point of view if “overall interest and importance” are met with the choice of minerals in each case. I was wondering, for instance, why whewellite is listed while weddellite is not, given that both occur in similar amounts in human kidney stones.

Each mineral is presented on a single page with its mineral formula, basic crystallographic parameters, three or four most intense peaks of its powder diffraction pattern, several optical parameters, a listing of the occurrences of the mineral’s most characteristic parageneses, which are linked up to a large number of relevant and most helpful bibliographic references, and two to three thin section micrographs. A handful of more common minerals are presented on two pages that include a few more micrographs. All the mineral examples are reported to have been verified by means of SEM-EDS or electron microprobe analyses. A list of chemical elements that may be present in the minerals is given under the keyword “Analysis.”

A special focus lies on the optical data, which have been compiled from specific publications as well as from other comprehensive data collections. The atlas lists the following parameters: “Optical Constants” (refractive indexes and optic angle), “Habit,” “Relief,” “Color,” “Pleochroism,” “Cleavage,” “Alteration,” optical “Orientation,” maximum “Interference Color,” “Extinction,” and category of “Interference Figure.” For some minerals, the categories “Elongation,” “Twinning,” and/or “Zoning” are added. Although not specifically stated, the latter three categories appear to be omitted where nothing is known or reported, but, for consistency it might have been better to state that the features have not been observed. As a long-time teacher of optical mineralogy, I feel very uneasy seeing maximum interference colors described, because these depend on thin section thickness. A standard thickness of 30 μm has been assumed throughout the book, but has not been explicitly stated, in fact, several of the micrographs show that some of the thin sections are of non-standard thicknesses, e.g., micrographs for ice, nyerereite, cryolite, and several more. A color-based description is easier to understand for an inexperienced reader, but using birefringence values rather than maximum interference colors would have avoided the problematic dependency of interference color on thickness. Although compositional variation is reported for most of the minerals (lists of substituting elements), the variation of refractive indices that accompany compositional variation is reported only for few minerals.

Optical data are complemented by photomicrographs of the minerals in representative assemblages. For most minerals two pictures of the same section are presented: one with plane-polarized light and one with crossed polarizers. For pleochroitic minerals, another picture with plane-polarized light but with polarizer turned 90° is added. For weakly pleochroitic minerals, the effect is not always easily detectable, especially because in practice microscopists rotate the stage rather than the polarizer. The procedure adopted here however has the advantage that the

aspect ratio of the picture remains the same, leading to a nicer presentation format. In the case of non-pleochroitic minerals commonly a second photo of a different section or assemblage is added. All thin section photomicrographs are high quality, very well in focus, and the vast majority are brightly and evenly illuminated. Unfortunately, quite several photomicrographs have a yellowish tint that is especially noticeable in plane-polarized light. These might have benefited from a more rigorous use of white-balance correction.

The text describing multiple photomicrographs is collected in a text section. These sections are readable, but the presentation would have been improved by placing line breaks between top, middle, and bottom picture descriptions. In some cases, the remaining minerals discernible in the photomicrographs are not sufficiently described. To interpret all pictured mineral assemblages, a reader would need to be quite familiar with their microoptical appearance. The width of field of view (more rarely a scale bar) for all micrographs, and the sample location are given. Sample locations are mostly well characterized by location, village or town, and country. In a few entries distinguishing mine names from geographic locality names is problematic, but generally good information is given. Inevitably with a volume this large, there are a few typos and minor errors in the body of the atlas, but again it is generally good.

The atlas closes with an index of minerals and an index of sample localities for thin sections. The sample locality index, however, suffers from inconsistencies and typos. The sample locality index does not appear to be derived from the locality descriptions given in this updated version of the atlas; instead, it appears to be a relict from an earlier version. Just checking German localities, I found multiple spellings, e.g., "Thuringia" alongside "Thuringen," and vague or archaic locality references, e.g., "Bayern Wals," "Schwarzwalde" given without further details.

Usually I am skeptical of the value of thin section "picture books" to microscopists, because by their nature, image collections cannot represent the variability in appearance of a specific mineral in thin section. This can be particularly misleading for inexperienced microscopists. However, this collection of thin-section photomicrographs is unique. It presents images of mineral species that are rarely encountered or seen in thin section, and,

as a result, this atlas is an extremely valuable reference. The inclusion of a DVD-ROM with all the micrographs in a reasonable resolution of 200 dpi (1.5–1.9 MB) is an added bonus. The authors and their colleagues should also be commended for the effort of producing and amassing such a wealth of high-quality thin sections containing many minerals that are easily abraded or that are in some cases highly water soluble.

This compilation of thin section photomicrographs, basic chemical, structural, optical parameters, and references really fills a gap. While structural and compositional data even for exotic minerals can be obtained from various free online databases, retrieving optical data commonly requires a tedious search. Thin section photos, especially of rare minerals or minerals from very specific environments, can rarely if ever be found. However it should be kept in mind that this volume is an atlas and not a determination table, i.e., the user should be seeking to confirm rather than make an initial identification.

Despite the minor issues mentioned above, I would recommend the atlas as a most useful reference book for researchers and advanced students interested in non-silicate minerals in thin section. There is nothing comparable on the market. Without much doubt, most "ordinary hard-rock petrologists" will never come across many of these minerals in their lifetime, but the atlas could also serve the purpose of guiding the reader's view and consideration of non-silicate phases that might have been overlooked. It cannot be stressed enough that the study of spatial relationships and textures among minerals in thin section is an indispensable prerequisite for the correct interpretation of physical-chemical analyses done on them. The book will be most valuable for researchers working on alteration products of ore minerals, minerals associated with mine waste, or environmental mineralogy. The wealth of beautiful images in this book also has the potential to attract hobby mineralogists to its esthetics and perhaps underscore the usefulness of thin section microscopy to those not familiar with the technique.

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