AN APPEAL FOR PETROGRAPHY

AUBREY LEE
Senior Geologist

Consider this fact – many university geology departments no longer offer optical mineralogy and petrography courses. In fact, teaching the fine art of ore microscopy in the classroom went the way of cursive and wood shop long ago. The good news is, one must look no further than the minerals industry to find the study of rocks in thin section alive and well.

Any mining geologist will agree that the most challenging mineral assemblages to classify are those related to the formation, alteration, and weathering of an ore deposit. Petrographers collect a variety of data from thin sections including primary and secondary mineralization, alteration, structure, and textures related to these events. These criteria are essential to constructing paragenesis, mineralization timing, and deformational events. Petrography can help to build a regional alteration and structural framework and reveal mineral zonation pathfinders to target a deposit. Finally, petrographic work is a requisite first step to selecting samples for more advanced analytical methods such as laser ablation (LA-ICP-MS), SIMS, or synchrotron-based studies.

While the common rock-forming minerals – a small subset of the mineral kingdom – provide criteria for rock-classification, the accessory mineral species must be equally regarded. Since ore deposits are generated through various physiochemical reactions, identifying all products of these reactions is key to elucidating their conditions of formation. Hand sample and drill core analysis relies on the naked eye and is often supplemented with very expensive analytical techniques. At relatively low-cost, one can adhere a 30 micron-thick slice of rock to a microscope slide and reveal a wealth of information to boost exploration.

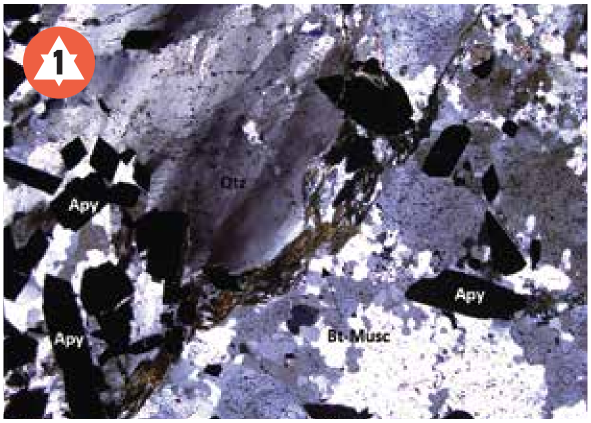

Fig. 1: Trans_photomicrograph: Photomicrograph image of quartz-rich rock showing quartz deformation textures, muscovite alteration, and arsenopyrite mineralization. 4x magnification. Cross-polarized transmitted light. Qtz = quartz. Bt-Musc = biotite and muscovite. Apy = arsenopyrite.

At Big Rock, we use our petrographic microscope to study rocks from a variety of ore deposit types. A typical petrographic microscope passes transmitted light through a slice of rock to highlight the transparent silicate minerals while an ore microscope reflects light off the thin section to illuminate the opaque metallic minerals. Big Rock's scope has both capabilities. This allows us to study whole-rock crystallography and textures as well as metallic ore and accessory minerals.

In conjunction with other exploration tools, we've found that petrography can add great value to an exploration program and is crucial to understanding the formation of an ore deposit. Petrographic study of minerals in thin section is also employed in other industries including manufactured materials like cement and ceramics, and in medicine to image kidney stones and bones. Using microscope technology to analyze rocks and minerals is a proven method to explore and discover future resources.

Fig. 2: Refl_photomicrograph: Photomicrograph image of gold-bearing rock showing multiple metallic minerals in a carbonate matrix with trace gold mineralization. 40x magnification. Plane-polarized reflected light. Ank = ankerite. Py = pyrite. Sph = sphalerite. Au = gold.

A group of Big Rock geologists gather around the microscope to discuss an interesting mineral assemblage.