

Automated mineral mapping in optical ore microscopy : accuracy and limitations.

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Optical microscopy is an extremely valuable tool for any process mineralogist. It is the most affordable technique to gain insight into mineral processing operations by understanding the behavior of individual particles based on their complex mineralogical assemblage. Although a human eye is limited to the appreciation of a relative reflectance and to the perception of a reflectance color, a multispectral imaging system using a CCD sensor and filters allows for spectrophotometric measurements on a pixel by pixel basis (Pirard et al., 2008) . Supervised classification of individual spectra results in a mineral map that can further be processed in terms of modal analysis, liberation analysis or microtextural indices. This technology, based on the well documented specular reflectance of opaque minerals (Criddle & Stanley, 1993) is capable of competing with more sophisticated imaging systems based on backscattered electron intensities or on energy dispersive X-ray mapping (Gu, 2003).

This paper deals with the sample preparation and image segmentation procedures and their impact on the accuracy of the quantitative results.

It illustrates the purpose with a series of case studies concerning stratiform copper mineralisations (Kansanshi), epithermal copper-gold (Chelopech), copper sulfide assemblages (Phalaborwa) and base metal sulfide blends.

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Criddle A.J. and Stanley C.J., 1993, Quantitative Data File for Ore Minerals, 3rd Ed., Chapman & Hall, London, UK, 635 p.

Gu Y., 2003, Automated Scanning Electron Microscope Based Mineral Liberation Analysis, Journal of Minerals & Materials Characterization & Engineering, Vol. 2, No.1, pp33-41.