

SPECTRAL EVOLUTION

Epidote as a Hydrothermal Alteration Mineral for Porphyry Copper

Epidote is a silicate mineral with the chemical formula $\text{Ca}_2(\text{Al}_2, \text{Fe})(\text{SiO}_4)(\text{Si}_2\text{O}_7)\text{O}(\text{OH})$. Epidote usually ranges between yellowish green to pistachio green in color. It is a hydrothermal alteration mineral often found in propylitic alteration of porphyry copper systems. Epidote veins can define an outer stockwork around a central quartz-rich stockwork. Mapping of epidote veins can be used to vector toward a porphyry center.

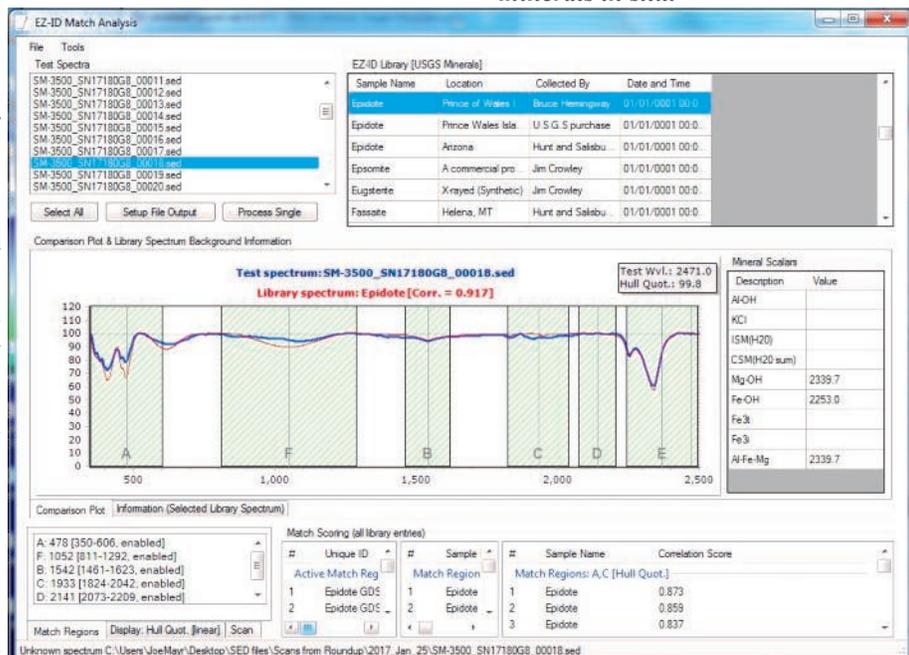
An NIR field spectrometer such as the oreXpress, oreXplorer or oreXpert can be used with EZ-ID mineral identification software to identify epidote in the field. Epidote's NIR spectra has absorption features at 440, 600, 830, 1040, 1550, 2253 and 2340nm. The most distinguishing feature is at 1550nm. The absorption features at 440 and 600nm are indicative of a small amount of Fe^{3+} . The absorption features at 830 and 1040 are indicative of Fe^{2+} . The 1550nm absorption feature is distinct to epidote and represents O-H bending. The absorption feature at 2253 represents Fe-OH and the absorption at 2340nm indicates Mg-OH.

The oreXpress, oreXplorer and oreXpert spectrometers cover the spectral range from 350-2500nm. The oreXpress offers high resolution/high sensitivity, the oreXplorer offers higher resolution, while the oreXpert is the highest resolution field instrument available. They are designed for field use with a rugged and durable chassis, battery power for a full day of scanning and a backpack for portability. They can be equipped with a 3mm spot size Miniprobe or a 10mm spot size contact probe to provide consistent illumination for scanning your samples. A benchtop probe with sample compactor is also available for chips and powder samples.

oreXpress, oreXplorer, oreXpert and EZ-ID software are trademarks of Spectral Evolution, Inc.

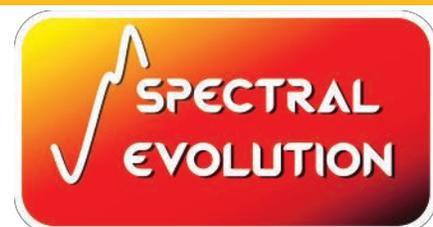


The oreXpress, oreXplorer and oreXpert are rugged field spectrometers for identifying minerals in situ.



Epidote sample matched to the USGS library in EZ-ID.

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These spectrometers are available with EZ-ID mineral identification software and access to three mineral spectral libraries: the USGS library and the optional SpecMIN and GeoSPEC libraries for a total of 2600 spectra of over 1100 minerals. EZ-ID allows a geologist to perform un-mixing of minerals in a sample using match regions to focus on different absorption features for different minerals. These match regions can be saved as pre-sets for exploring for similar mineral assemblages. EZ-ID also includes scalars. Spectral scalars can enhance the geologist's understanding of crystallinity changes, alteration pattern shifts and geochemical conditions.

EZ-ID supports spectral scalars for Al-OH bonds, kaolinite crystallinity (Kx), illite spectral maturity (ISM), chlorite spectral maturity (CSM), Mg-OH bonds, Fe-OH bonds, Fe_{3t} (mineral type), Fe_{3i} (mineral intensity), and Al-Fe-Mg bonds.

The scalars for epidote include the Mg-OH scalar which senses the presence of Mg-OH at the 2339.7nm wavelength and provides an indicator of geochemical conditions at the time of the alteration event which can be used to figure out mineral lithology. The Mg-OH scalar is reported whenever an Mg-OH bond is discovered in the spectra

There is also a scalar for Fe-OH at the 2253nm wavelength that indicates the presence of Fe-OH and is indicative of the chemistry of fluids present at the time of the alteration event. The Fe-OH bond is reported whenever an Fe-OH bond is discovered in the spectra.

The Al-Fe-Mg scalar reports the wavelength of the deepest absorption feature of these three and can provide an indication of geochemical conditions.

Mineral Scalars	
Description	Value
Al-OH	
KCl	
ISM(H ₂ O)	
CSM(H ₂ O sum)	
Mg-OH	2339.7
Fe-OH	2253.0
Fe _{3t}	
Fe _{3i}	
Al-Fe-Mg	2339.7

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