

SPECTRAL EVOLUTION

Using a field spectrometer for diatomite exploration

Diatomite, a siliceous sedimentary rock, is composed mainly of the fossilized skeletal remains of diatoms—single celled organisms related to algae. With a porous structure, diatomite is used for insulation, as a filtration medium, a filler in paints and coatings, and as an absorbent for industrial spills and pet litter. Dry diatomite has the appearance of chalk but is much lighter and chemically inert.

Opal-CT is an essential mineral for diatomite. Diatoms are composed of amorphous colloidal silica—the Opal A phase of silica mineralogy. Opal A becomes unstable and changes diagenetically into Opal-CT. Opal-CT and diatomite have spectra that exhibit a shallow absorption band near 2250 nanometers resulting from Si-OH vibrations. The prominent absorptions at 1400 and 1900nm are related to O-H and H-O-H molecular features and are common indications of loosely bound water in the mineral.

Using EZ-ID with its three libraries, a geologist can quickly identify an alteration mineral that may not be readily identifiable by sight, matching an unknown sample against a known spectral library. With EZ-ID the geologist can select specific spectral regions to fine-tune the matching process for a more precise ID. If the geologist wants to look at a particular absorption feature, the geologist can highlight that or other features and EZ-ID provides new matches. EZ-ID includes a Library Builder module for the inclusion of project and location specific scans of known samples for comparison with target samples. By ordering EZ-ID with three libraries, a geologist has access to a wide range of match possibilities—more than 2600 spectra—for exploration projects.

EZ-ID works right from the DARWin SP Data Acquisition software included with all SPECTRAL EVOLUTION spectrometers and spectroradiometers. All spectra collected with an oreXpress are saved ASCII files for easy import into other 3rd party analysis software for mine planning, mineral mapping and 3D imaging.

oreXpress spectrometers are designed for single-user operation in the field. They are rugged and reliable with fixed optics and no moving parts to avoid breakdowns. They capture high resolution spectra very quickly so that a geologist can scan more and collect more data for planning a drilling strategy that will maximize return on investment.

In the core shack, the speed of the instruments is ideal for core logging. In some cases, a single geologist has been able to log as much 400 meters of core in a day. The data can be used to show mineralogy versus alteration type versus mineral assay.

For applications that require higher resolution, the SR-6500 ultra-high resolution spectroradiometer is available. Resolution is:

- ◆ 1.5nm @ 700nm
- ◆ 3.0nm @ 1500nm
- ◆ 3.8nm @ 2100nm

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oreXpress spectrometers are used to better understand and map mineral alteration zones in the field during exploration.



EZ-ID software identifies minerals in real-time by matching your target spectra against two known spectral libraries. Above is a sample of an Opal-CT scan in the library showing the 1400 and 1900 nm water features as well as the Si-OH vibrational feature at 2250nm.

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