

Near-Infrared Observation and Microthermometry of Pyrite-Hosted Fluid Inclusions

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Abstract

Pyrite occurs in many types of ore deposits. Although opaque to visible light, some pyrite samples are sufficiently transparent in infrared light to reveal fluid inclusions and other internal features. For a reconnaissance study, 166 doubly polished thick sections of pyrite from 64 deposits worldwide were examined using an infrared microscope. Pyrite transparency varies between deposits, with low-temperature deposits showing the least transparency. Many samples, transparent at room temperature, gradually became opaque upon heating. Pyrite Fourier Transform Infrared (FTIR) spectra, taken in the temperature range from 28° to 400°C, demonstrate that the degradation of pyrite transparency, with an increase in temperature, is caused by a gradual shift of the main absorption edge of pyrite towards longer wavelengths.

Recognizable fluid inclusions in pyrite are generally scarcer than fluid inclusions in quartz and microthermometric measurements are more difficult to obtain. In the 64 occurrences studied, about one quarter contained transparent fluid inclusions. Of the 37 analyzed fluid inclusions, about two thirds yielded salinity measurements and about one quarter yielded homogenization temperatures. Microthermometric analysis on pyrite-hosted fluid inclusions is possible; however, workable fluid inclusions are limited in occurrence.