Short Wavelength Infrared Determination of Coffinite ($USiO_4$)

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Coffinite ($USiO_4$) a ubiquitous uranium ore mineral, is difficult / costly to rapidly identify in ore bodies due to it generally being present in very low concentrations and / or being present predominantly in an amorphous form. Recent sudies have shown that coffinite can be identified via Short Wavelength Infrared (SWIR)[1], hence there is the potential for identifying coffinite in ore bodies using an IR based method. In this study a series of synthetic coffinites were analysed via SWIR and compared to X-ray diffraction (XRD) patterns. Particular spectral features (1500 nm and 1550 nm) are observed to correlate with their XRD pattern peak intensities at 32° and 34° from 2θ. Additional studies were also conducted on samples from the Valhalla uranium deposit (Mount Isa, Queensland, Australia) which has been shown to contain the uranium silicate, coffinite. These studies revealed 195 instances of similar SWIR U-Zr silicate features in drill core. The sample population shows two trends in relation to U-Zr chemistry determined via x-ray fluorescence (XRF). One trend displays higher concentrations of Zr relative to a second with lesser concentrations of Zr relative to U (Fig. 1)

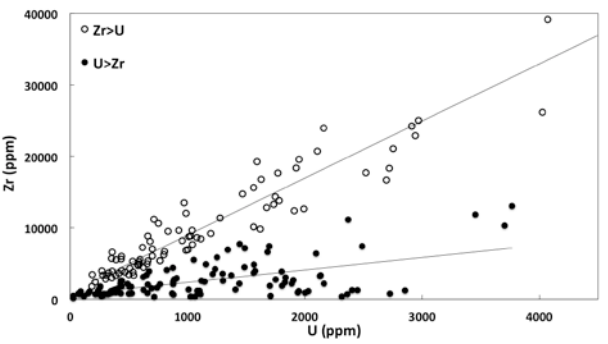

Figure 1: XRF data displaying U-Zr trends.

We present SWIR as a promising base for a method of detecting U-Zr silicates in a natural mineralised system.

[1] Baron et al. (2014) Journal of Near Infrared Spectroscopy, **22**, 149-152.