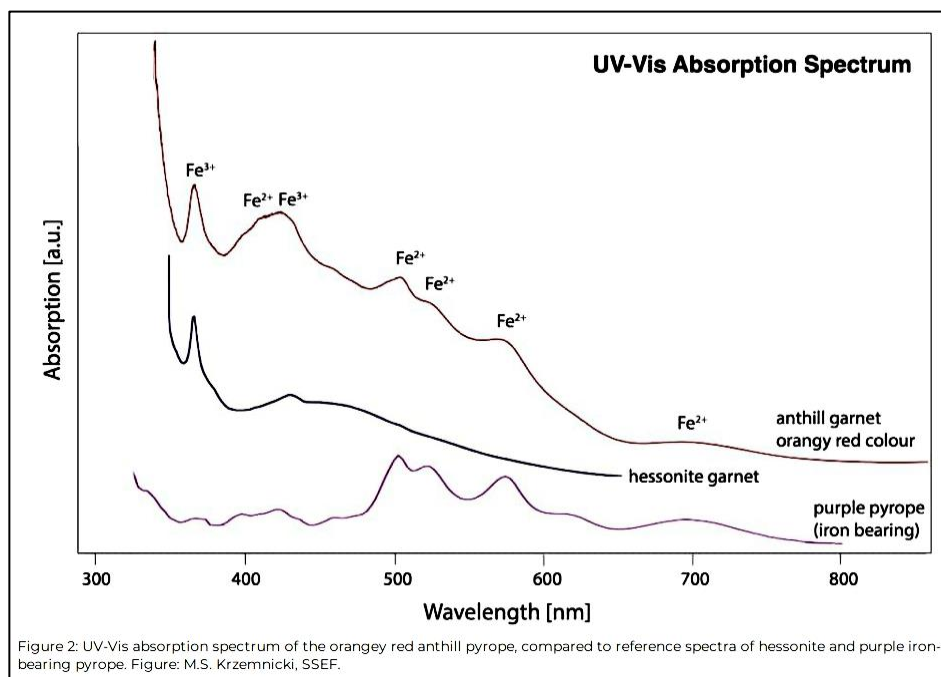


Study of the Ant Hill, Arizona Pyrope Garnets

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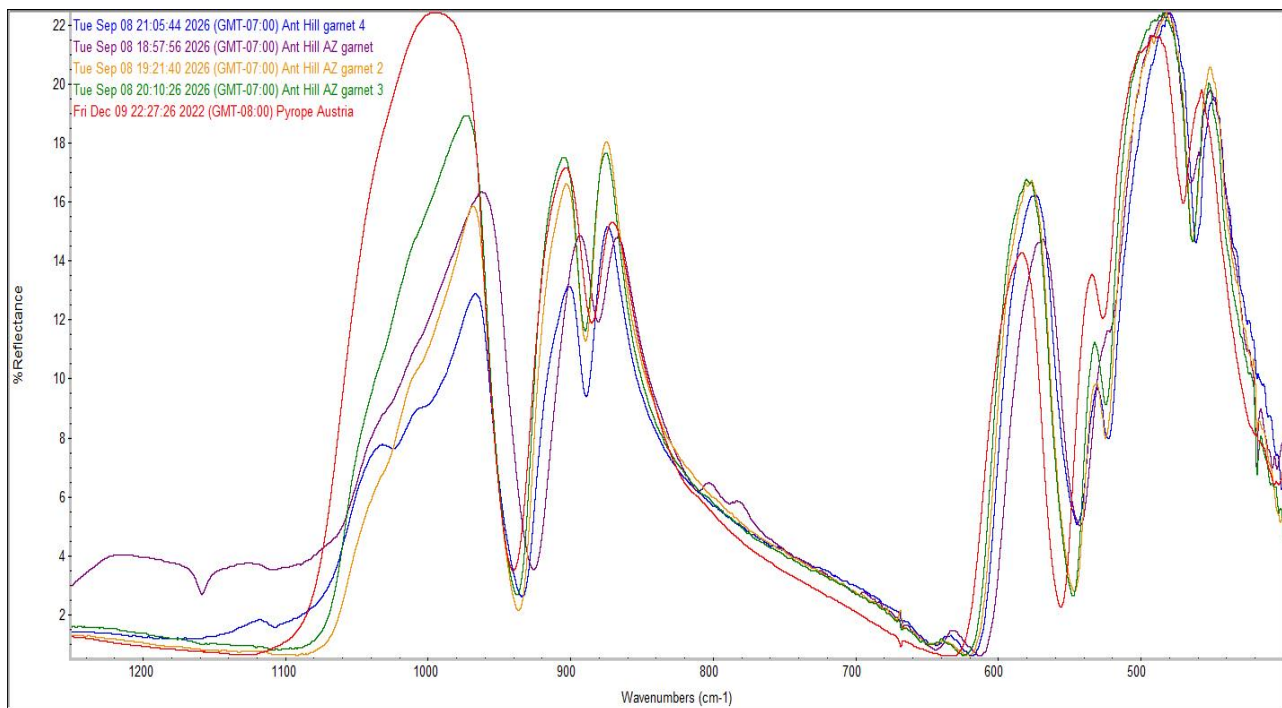
It is widely quoted online that the site called “Ant Hill, Arizona” where extremely tiny garnets are collected for Navajo Indians, are pyrope. This is supported by the report of SSEF, a Swiss gemmological organization that reports on pyrope from that site as proven by UV-VIS (ultraviolet-visible light) spectrophotometers. This is where light is passed through a transparent object and recorded peaks are assigned to various elements at some particular ionic state like Fe^{2+} versus Fe^{3+} . Here is the analysis spectrum from their one-page report on the Ant Hill material:



From: Facette Magazine, No. 29, May 2024, Pg. 37.

The one serious problem with UV-VIS reports or perhaps call it a problem with their reporters, is that they constantly confuse trace element light effects of colorants with the bulk composition, which are not necessarily and typically not the same thing. In this report, they conclude the Ant Hill garnets are chromium pyrope, almandine, and grossular.

In reflectance infrared spectroscopy the spectral bands are quite distinct showing end members and mixes. The author's purchase and scan of the 4 largest (0.1g ea) of a batch of these garnets shows three are almandine with one showing another unidentified mineral, and the fourth specimen is spessartine and quartz. Compared to a pyrope reference, none show any pyrope. Mixed garnet specimens are not seen.



Reflectance infrared spectra of 4 Ant Hill, AZ garnets compared to a reference pyrope.

Notice the troughs at around 950 cm^{-1} . These are highly indicative of the garnet species and their trough positions in sample populations have not overlapped yet by the author's study. Pyrope trough (red) is to the left of the three almandines (green, yellow, blue), and the spessartine (violet) is to their right. The pyrope to almandine shift is about 5 cm , and the almandine to spessartine shift is about 10 cm . The 1159 cm^{-1} trough in a shallow peak doublet for the spessartine specimen, is quartz, as well as the doublet at 800 cm^{-1} .

Conclusion:

UV-VIS does not validate bulk composition so cannot identify minerals but it can apparently identify trace colorants. However, a large amount of chromium as chromite in garnets from Clear Cr., CA provided by a mining interest clearly show chromite bands, so when in sufficient amount, it can be seen in garnets, and with that, no chromite is detected here with infrared spectroscopy.