SSHADE Users Newsletter – December 2024 –

Focus on Minerals

Dear SSHADE users,

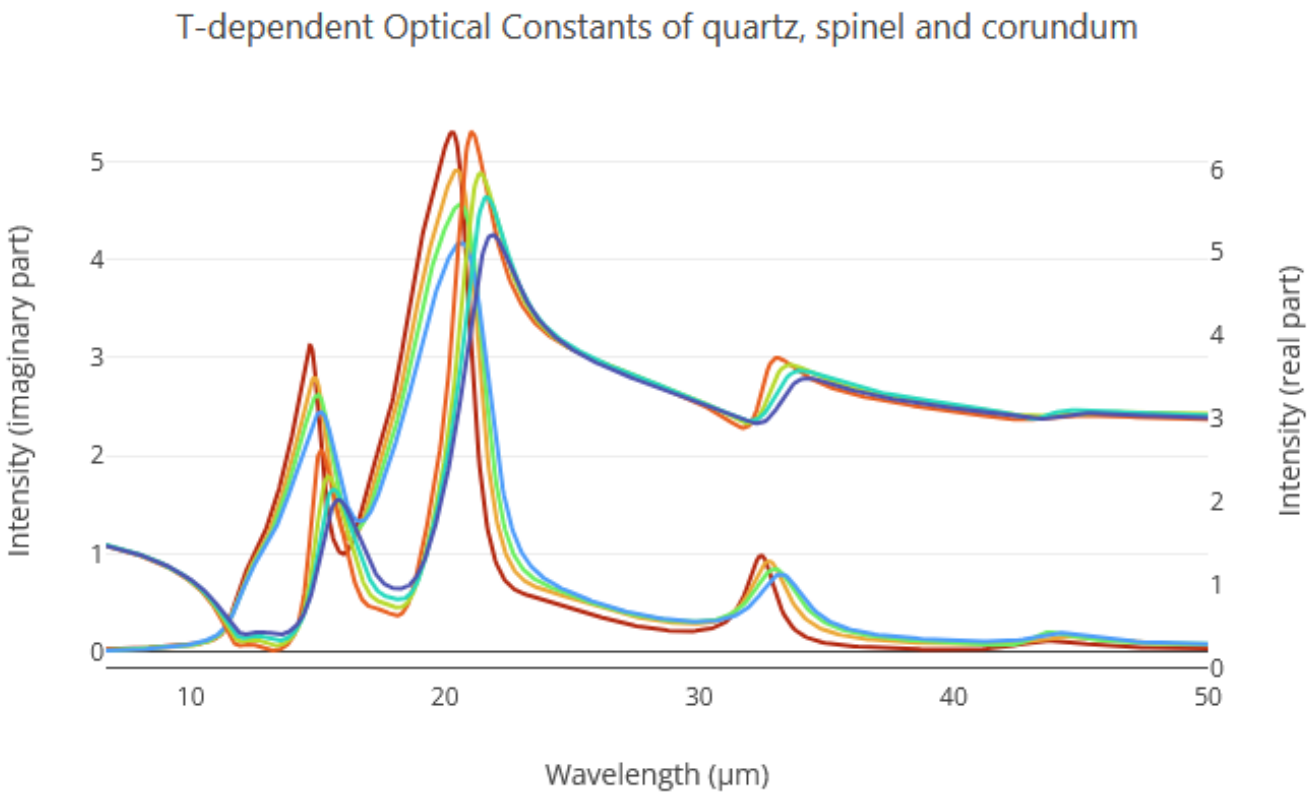
This month, we're diving into a crucial type of material available in SSHADE: minerals.

Minerals play a fundamental role in many scientific fields, from geology and planetary science to environmental studies and material science. One of SSHADE's key strengths lies in its detailed documentation of experimental conditions, including variations in pressure and temperature. This is particularly important when comparing laboratory mineral spectra to extraterrestrial objects, as spectral bands can shift significantly from those measured under standard Earth atmospheric conditions. SSHADE hosts an extensive collection of mineral spectra, covering a wide range of spectral types and measurement conditions. Whether you're studying planetary surfaces, terrestrial geology, or extraterrestrial samples, SSHADE's mineral data offers valuable insights.

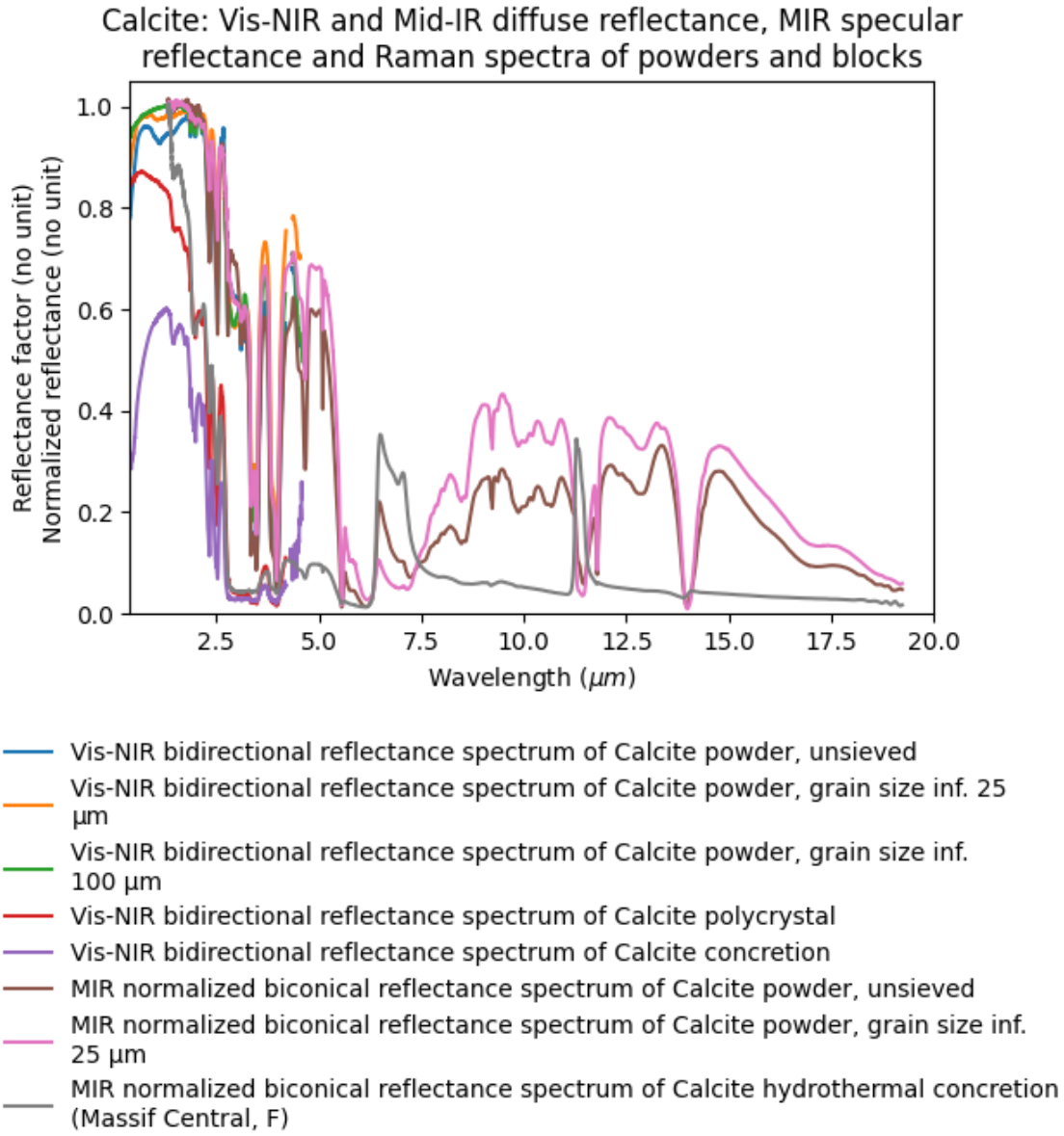
Mineral Data Available in SSHADE: In SSHADE, you can explore over thousands of natural or synthetic mineral spectra, including:

- ***Silicates***: SSHADE includes spectra for common silicates like olivine, pyroxenes, and feldspars, which are key to understanding planetary surfaces and processes.

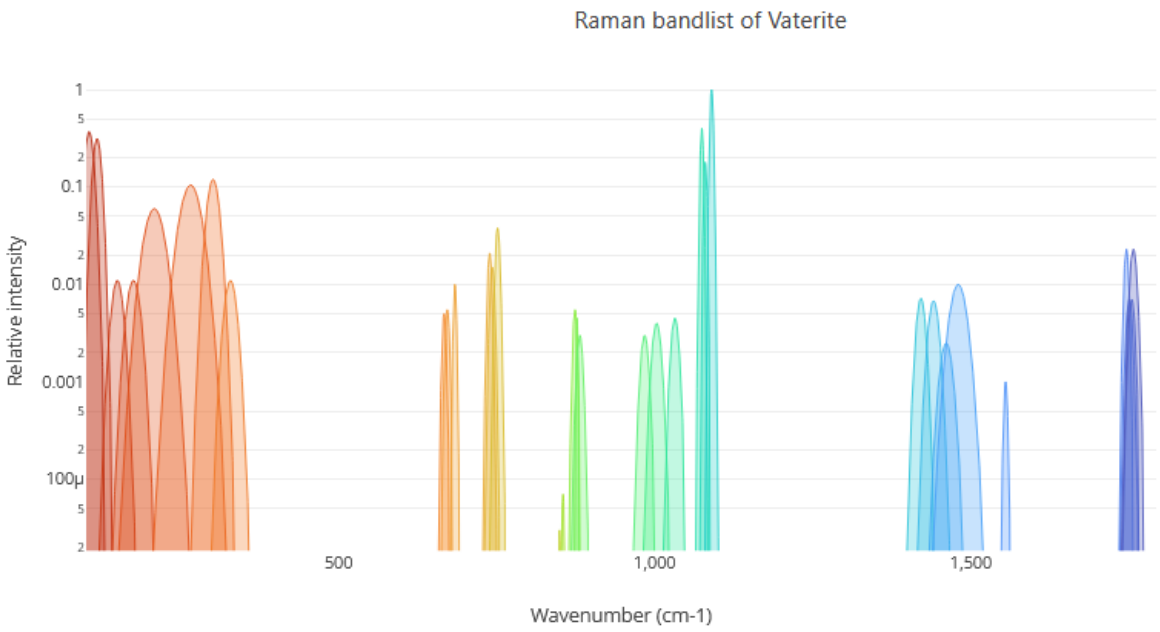
- ***Oxides:*** Minerals like hematite, magnetite, and spinel are critical for studying the oxidation conditions of planetary surfaces and determining the presence of water. Optical constants of oxide are available on SSHADE as illustrated below with the optical constants of spinel.



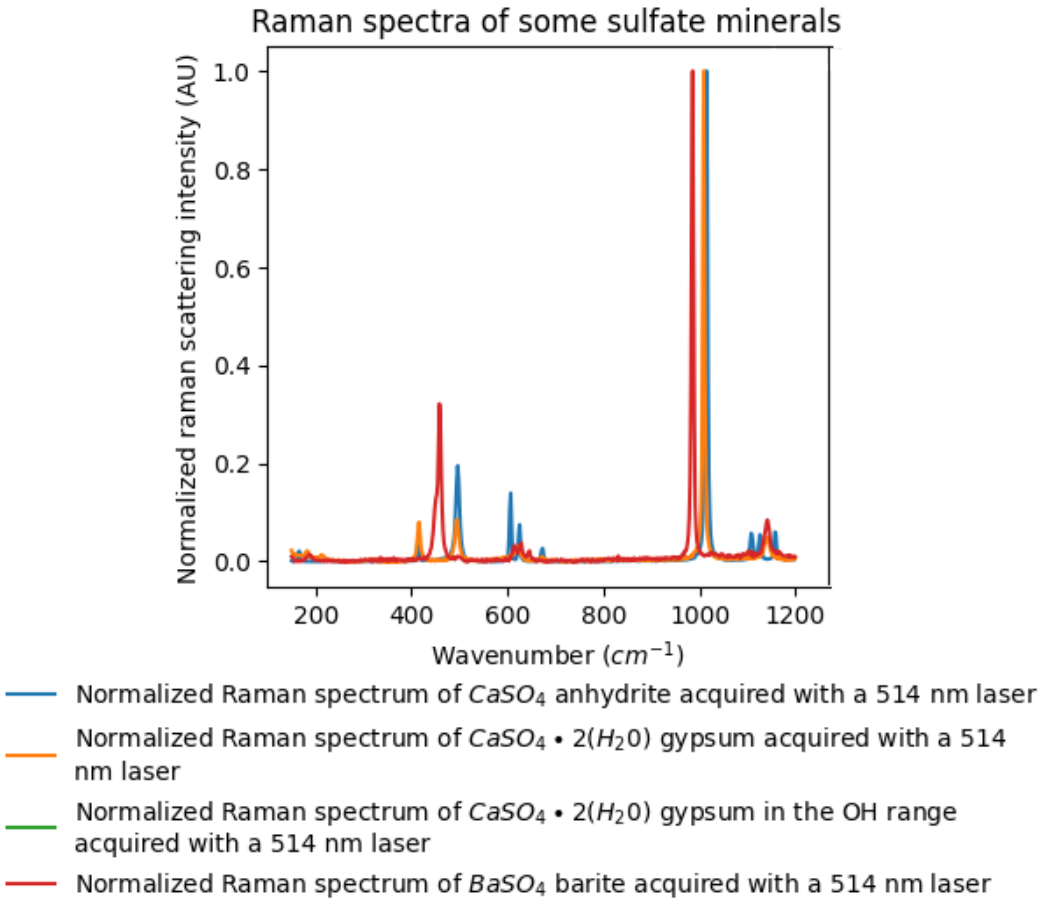
- ***Carbonates:*** Calcite, aragonite, dolomite and the magnesite-siderite series are essential for studying carbonate-bearing rocks and sediments. SSHADE provides absorption, reflectance and Raman spectra for these minerals, which are valuable in detecting carbonates on Earth and Mars. Here you can find examples of calcite spectra measured in various states and over various wavelength ranges: Vis-NIR and Mid-IR diffuse reflectance, MIR specular reflectance and Raman.



SSHADE also host a large database (30 bandlists) of critically reviewed Raman band lists of anhydrous carbonates containing over 400 bands. As an example, we show the Raman band list of vaterite, an unstable polymorph of calcite and aragonite but likely a precursor phase during biomineralization of calcite by certain marine species.



- ***Sulfates:*** These minerals, such as gypsum and jarosite, are indicators of aqueous environments. They are particularly relevant in the study of Mars, where sulfate-rich terrains have been identified as evidence of past water activity. You can find for example [spectra of sulfate measured by Raman spectroscopy:]



Using Mineral Spectra in SSHADE: To explore natural mineral spectra in SSHADE, use the 'Materials / Family' filter in the “by sample” tab and select 'mineral'. But there are also numerous synthetic minerals you can found by filtering with 'solid'. From there, you can refine your search by mineral group (carbonate, sulfate, phyllosilicate, …) with the ‘Constituents / Compound type’ filter in the “By composition” search tab. You can then narrow your search by spectral type (reflectance, transmission, etc.) with the ‘Spectrum / Type’ filter in the “By experiment type”, or by experimental conditions (temperature, pressure, etc.). in the “By environment” tab.

Using Mineral Bandlist in SSHADE: To explore mineral band lists in SSHADE, use the 'Mineral compound type’ filter in the “by Constituent” tab, or the name or IMA code of a specific mineral.

Stay tuned for future data.

Have fun with SSHADE data!

The SSHADE Team

All previous user newsletters are stored in the dedicated **'News' page** of the SSHADE Wiki

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