

The HIGP Raman microscope, located on the 5th floor of POST, is a free and easy to use instrument operated by specialists in the field of Raman spectroscopy. Anyone may use the instrument, we only ask that you contact one of the specialists listed below. We will show you how to operate the instrument and, if arrangements are necessary, help you run your samples.



The Instrument

The HIGP Raman instrument is a WITec alphaR 300 Raman microscope. The instrument has both a 532 nm (green) and a 632 nm (red) laser. A confocal microscope is used to focus the laser (we have 20x, 50x, and 100x microscope objectives) and collect the 180° backscattered light. The instrument can be used to identify organic compounds and minerals, with high spatial resolutions (1 micron @ 100x magnification to 10 microns @ 20x magnification), 50 micron depth resolution, high spectral resolution ($\pm 0.5\text{--}3\text{ cm}^{-1}$ depending on the spectrometer used). Point, line, image, and 3D image Raman spectra can be collected. A camera on the microscope records B&W reflected light pictures of the Raman measurement spots.

Location

POST 535, the Microscope room

Samples

We measure minerals, chemicals, rock samples, and other materials. Samples can be single crystals, thin sections, slabs, powders, and hand samples. Sample need to be approx. < 2 cm in height and a few cm on a side to fit under the microscope. The more polished the sample is (or if it is a powder), the better. The 20x objective has an approx. 0.1 cm working distance, so it can handle rough samples. The higher magnification objective sits much closer to the sample and require a very smooth surface.

Preparing to use the Raman

If you are new to the instrument, please contact one of the people listed on this page. They will show you how to use the instrument properly. If you feel comfortable using the instrument by yourself, but you want to learn more, contact them. These people will also help you use the instrument.*

There are a few things that will need to be done to prepare for your day using the Raman instrument:

- 1) Look in the literature for Raman measurements of your type of samples. Aside from the Raman spectra in the paper, you should carefully read the methods section of the paper to determine the laser power, laser wavelength, integration/accumulation times, and other information.
- 2) It is a good idea to have a high resolution grayscale reflected light photomicrograph of your sample at 20x magnification. Samples look very different at this scale and the picture will help you navigate and then you can keep track of where you take your measurements.
- 3) If you have standards that help you identify your sample with other methods, please bring them.
- 4) If you synthesized the sample or you the sample sits on a substrate, it is usually helpful to take spectra of the starting materials and the pure substrate, if possible.
- 5) Some measurements will take a long time to collect, so set aside the proper amount of time so you are not rushed.
 - a. It takes about 30 minutes to turn on the system before it is ready to run
 - b. To collect a publish-quality spectrum, it make take anywhere from < 1 second for transparent single crystals at high laser power to 1 or more hours for dark samples at low laser powers.
 - c. It takes about 20 minutes to complete the shutdown procedure.

It is good to keep in mind that Raman measurements will not always work for many reasons, but we are always willing to try something new. The following are guidelines and tips that may help:

- Raman is really good at measuring molecules, minerals, etc. that are translucent and light colored.
 - Samples that absorb the light at or near the laser wavelength will be hard to measure.
 - Generally dark minerals will have a less intense signal.
 - Opaque materials such as many metal oxides, sulfides, etc. are typically very difficult to measure.
- Crystalline materials give the sharpest Raman lines and amorphous materials give broad peaks, if any. Amorphous materials will require longer integration times.
- Materials that have vibrational excitation at or near the laser wavelength will also be difficult to measure because the sample will fluoresce. Consider switching to another wavelength (talk to an advanced user before attempting this).
- Many native metals/alloys are impossible to measure with Raman (metals don't fit the selection rule criteria for Raman scattering).
- Coatings that are not transparent to (or absorb most of) the visible spectrum will attenuate the Raman signal quite a bit. It is ideal if you can remove carbon or other coatings before a measurement.

*Keep in mind that this is a free instrument to use and the advanced users are volunteers. If you publish Raman spectra using the instrument and/or with our help, you should give us the appropriate amount of acknowledgement in your paper.

Contact Information

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