Arcoptix SA
Rue de la Maladière 71C
CH-2000 Neuchâtel
Switzerland
Phone ++41 (0) 32 731 04 66
Fax ++41 (0) 32 731 04 63

Application note

Mineral identification with the FT-NIR Rocket and Arcsphere-50-Hal

Introduction

Our **FT-NIR Rocket** fibered Fourier-transform spectrometer is a great tool for mineral identification in rock samples. It offers a very broad spectral range of 900 to 2600nm together with a high resolution, both of which are highly desirable features in this application field.
For measuring minerals, a reflection accessory is needed. The measurement area should not be too small, in order to average the measurement on a surface which is larger than the typical granularity. Arcoptix offers the **Arcsphere-50-Hal**, which is an internally illuminated integration sphere (it has a light bulb inside) with a 10mm diameter measurement port. The Arcsphere-50-Hal easily connects to the FT-NIR Rocket using an optical fiber, and a single power supply powers both the spectrometer and the integrating sphere. The internally illuminated integration sphere illumination provides a very bright signal compared to an integrating sphere that is illuminated via an optical fiber, ensuring that you get the best possible signal-to-noise measurement in that shortest possible time.

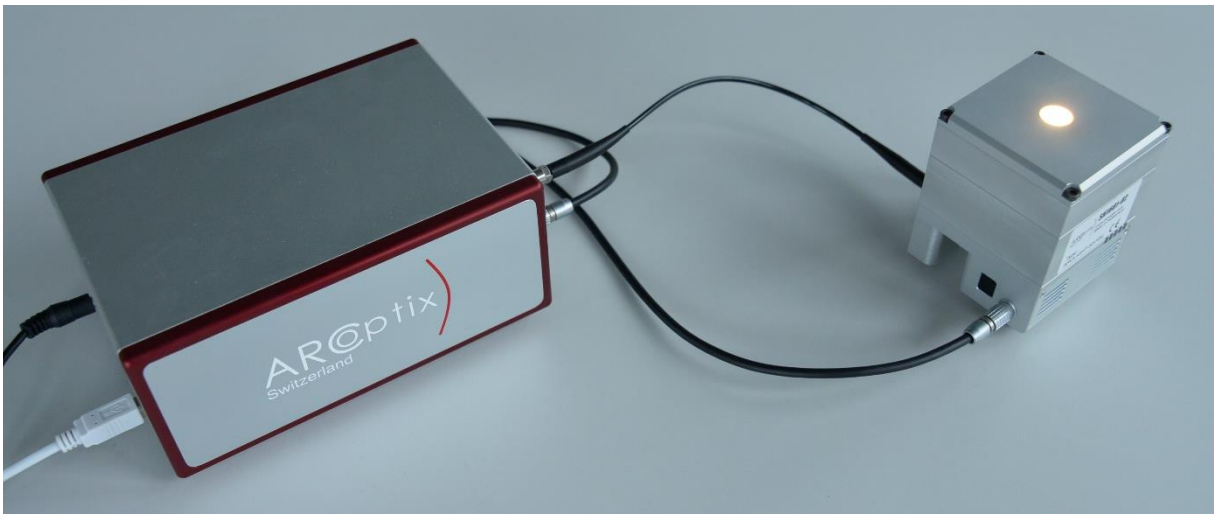


Figure 1 – FT-NIR Rocket 0.9-2.6 microns with the internally illuminated integrating sphere Arcsphere-50-Hal

Note that the spectrometer and light source will run on 12V DC, so they can powered with a portable or car battery instead of an AC/DC converter. You can bring this spectrometer onto the field!

© Arcoptix SA 2016

Arcoptix SA
Rue de la Maladière 71C
CH-2000 Neuchâtel
Switzerland
Phone ++41 (0) 32 731 04 66
Fax ++41 (0) 32 731 04 63

Rock measurements

After taking the usual dark and baseline measurements, the reflection spectrum of the sample rock is easily obtained within a few seconds, simply by placing the rock sample onto the measurement port of the integrating sphere. Note that the integrating sphere measurement port is closed by a sapphire window. This avoids that the inside of the integrating sphere is contaminated, and the window is not scratched easily.

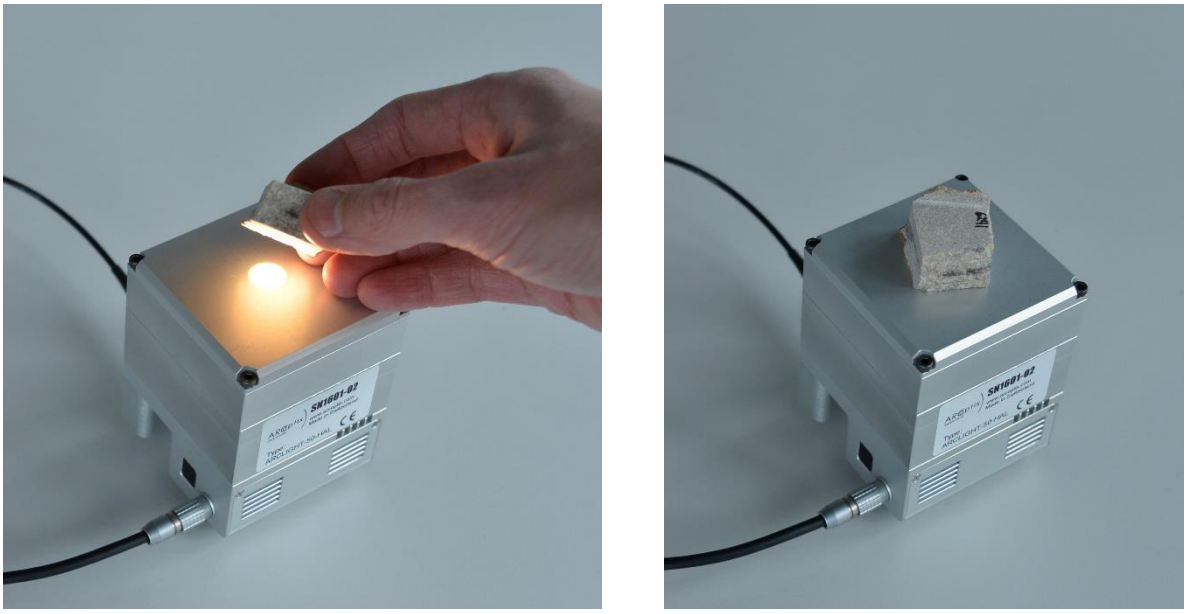


Figure 2 – Measuring a rock sample with the integrating sphere

Below are a few examples of spectra collected in 10 seconds with the above describes system, to give an ides on the signal to noise ratio and resolution.

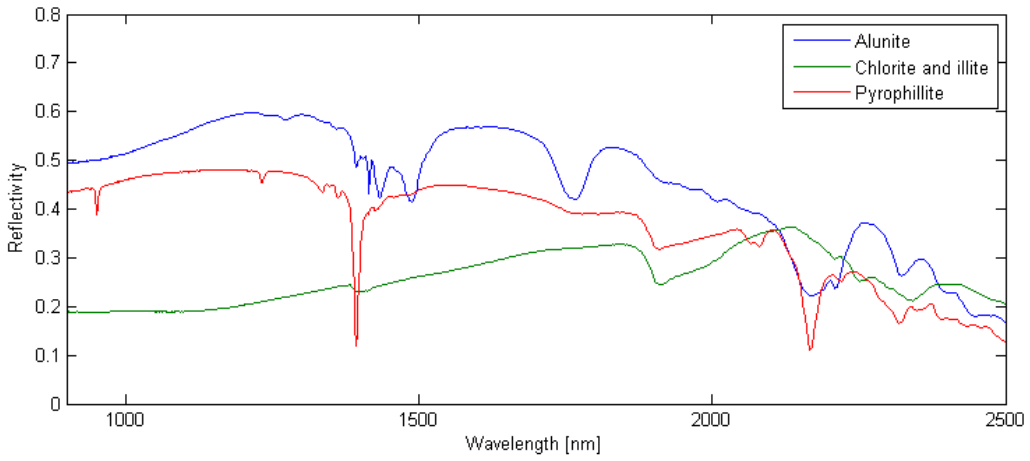


Figure 3 – Reflectivity of rocks - examples

© Arcoptix SA 2016

Arcoptix SA
Rue de la Maladière 71C
CH-2000 Neuchâtel
Switzerland
Phone ++41 (0) 32 731 04 66
Fax ++41 (0) 32 731 04 63

Database search

We performed a library search one the above spectra, using the **Labcognition Panorama** software and the freely available **USGS Digital Spectral Library**.

Our samples were successfully recognized as alunite, chlorite and illite and pyrophillite. A screenshot of the search result for the latter spectrum is shown on Figure 4. It can be remarked that the spectrum from the Arcoptix FT-NIR Rocket (above in blue) has an even higher resolution than the spectrum in the database (below in red), making small spectral feature distinguishable.

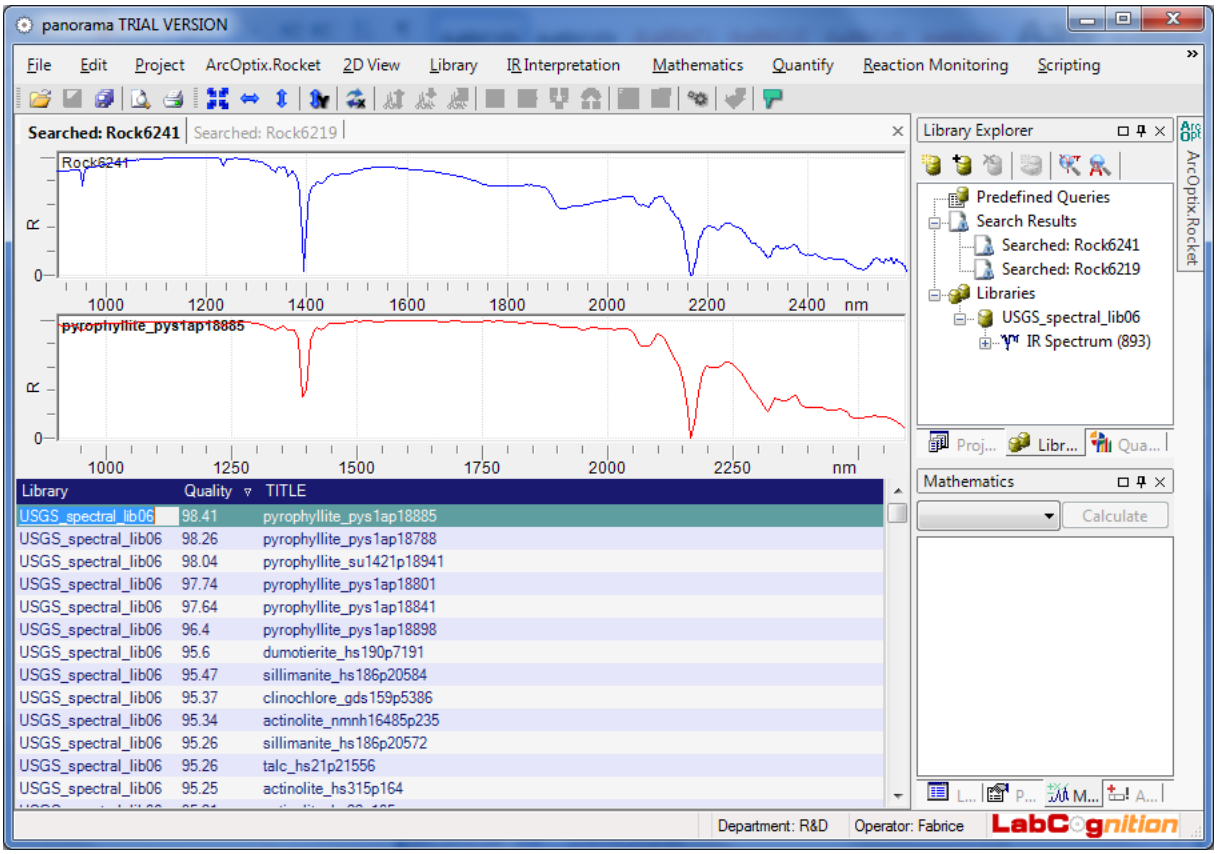


Figure 4 – Spectrum search using the Panorama software and the USGS spectral library with the Arcoptix FT-NIR spectrometer

© Arcoptix SA 2016