Smart Notes

Why is it important to be able to accommodate large samples on an FTIR microscope?

The Mona Lisa. The Shroud of Turin. Space rocks. Ancient Roman coins. There are any number of precious samples that simply cannot be modified, which makes the non-destructive nature of infrared spectroscopy indispensable for examining precious samples. Fourier-transform infrared spectroscopy (FTIR) microscopy allows users to perform chemical analysis on small sample areas, but how can you move forward if the samples themselves are not small? That's why it can be critical for FTIR microscopes to be able to handle oversize and heavy samples.

The Thermo Scientific™ Nicolet™ RaptIR™ FTIR Microscope offers a heavy-duty stage with open access for loading samples up to 40 mm thick and weighing up to 5 kg. This allows users to analyze many heavy or large-size samples, as well as use large sampling accessories such as heated and cooled stages or electrochemical cells. See Figure 1.

Once a large sample is loaded onto an FTIR microscope, it can take a considerable amount of time to search the entire sample for areas of interest. The Nicolet RaptIR FTIR Microscope can efficiently scan a wide portion of the large sample and create a mosaic to locate areas of interest. It then allows users to home in on a particular area of interest with high-resolution images. A wide area overview, simple navigation tools, and exceptionally clear and sharp video images provide an efficient workflow to rapidly locate and analyze the target areas.

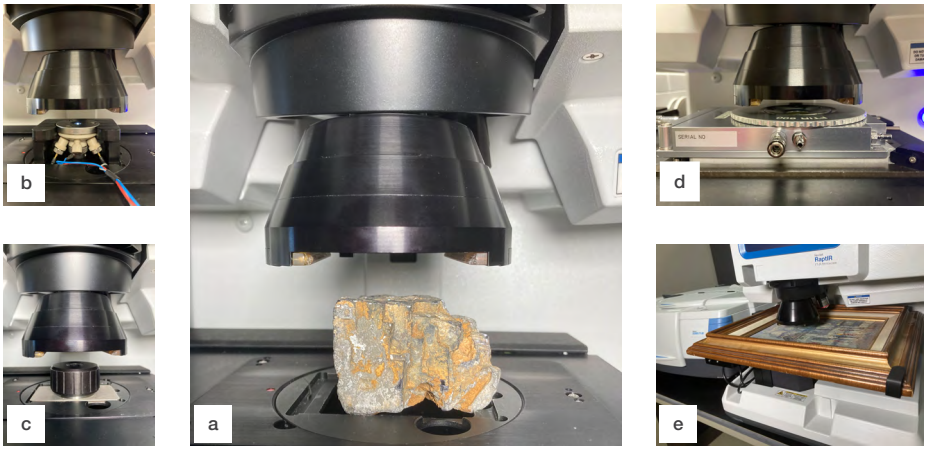

Figure 1: (a) Large mineral sample on the Nicolet RaptIR FTIR Microscope stage with the 15X infrared objective in position, (b) electrochemical cell, (c) inert atmosphere cell, (d) heating/cooling stage, (e) painting

As an example, a 40 mm thick irregularly shaped rock weighing 563 g was examined with the microscope. This sample came nowhere near the 5 kg stage weight limit of the microscope, but it was unusually heavy for its size.

After a wide-area mosaic was collected, an area of interest was located that was identified as lead carbonate ($PbCO_3$). See Figure 2. Lead carbonate is a known byproduct of the weathering of the mineral galena (PbS). While PbS does not have a mid-infrared spectrum itself, the mineral can be identified from the presence of known weathering byproducts and the density of the rock. Galena is not water-soluble so it can be handled safely, but weathering of the surface can result in the release of lead ions into the environment. Lead is generally toxic when inhaled, ingested, or absorbed into the body which makes it an environmental concern.

Summary

It is extremely important for FTIR microscopes to accommodate larger, heavier samples so users can efficiently analyze precious materials where surface integrity must be preserved, or the sample cannot be altered in any way. The Nicolet RaptIR FTIR Microscope accomplishes this with ease.

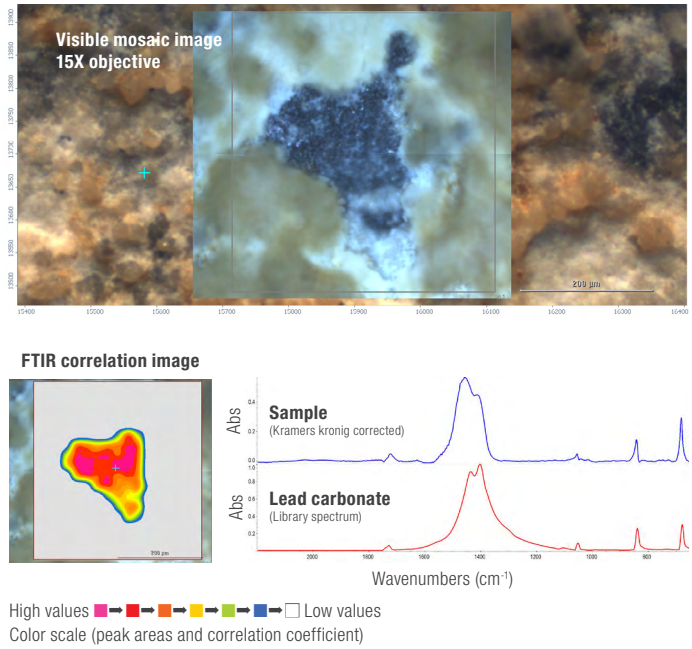

Figure 2: Visible mosaic showing an area of interest on the large sample and the corresponding infrared correlation image based on the spectrum of lead carbonate.

Learn more about the FTIR microscope that allows users to analyze large samples efficiently at **thermofisher.com/raptir**