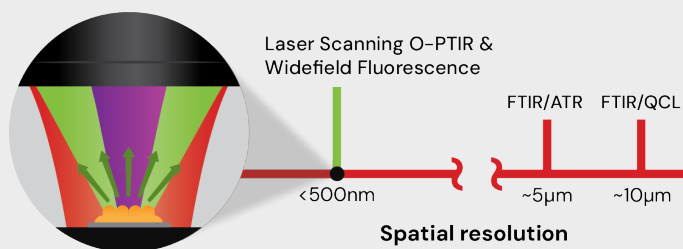


# mIRage<sup>®</sup>-HSi

## Laser Scanning O-PTIR Microscope

- >30x faster IR imaging, using laser-scanning optics, with <500nm IR imaging spatial resolution.
- Hyperspectral IR imaging in minutes and single wavenumber imaging in seconds.
- Non-contact reflection IR measurements with FTIR transmission/ATR-like spectra with no dispersive scattering artifacts.
- “Pan-and-zoom” fast real-time chemical IR imaging to quickly locate features of interest.
- Improved time-to-data and higher data throughput for research & QC.
- Automated submicron particle detection & spectroscopy with FeaturefindIR™.
- Fully integrated with widefield epi fluorescence (FL) imaging for correlative IR + FL measurements.




## mIRage<sup>®</sup>-HSi

The mIRage-HSi is the next evolution of Optical Photothermal Infrared (O-PTIR) spectroscopy and imaging, delivering sub-500 nm IR spatial resolution and FTIR-quality spectra in an easy, reflection-mode format - now with breakthrough speed.

Leveraging fast, synchronized IR and visible laser-scanning optics, the system achieves >30x faster imaging than traditional stage-scanning, reducing hyperspectral acquisition from hours to minutes and single-frequency imaging from minutes to seconds.

This dramatic increase in speed makes dynamic studies, large-area high-resolution cell/ tissue imaging, rapid contaminant detection, and automated submicron particle identification truly practical. By removing mechanical stage-movement overhead, laser scanning pushes acquisition into a low-noise, high-throughput regime while maintaining excellent image quality.

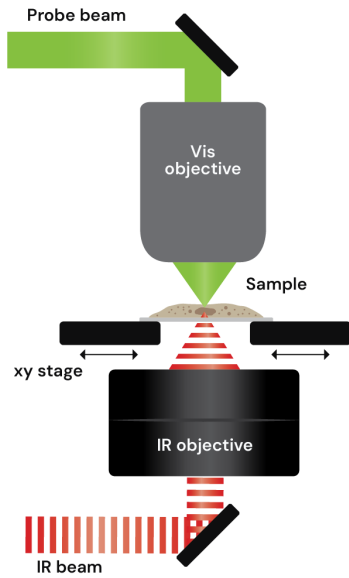
Optional multimodal capabilities include integrated epi-fluorescence imaging, spontaneous Raman spectroscopy, and expansion to Photothermal Stimulated Raman Scattering (PT-SRS) for advanced correlative analysis.

Across microplastics, pharma, life sciences, failure analysis, and materials science, mIRage-HSi accelerates workflows with higher speed, greater automation, and deeper multimodal chemical insight.

## Stage scanning O-PTIR

~1 kg moving mass, 0.6 sec settling time  
= minutes per image

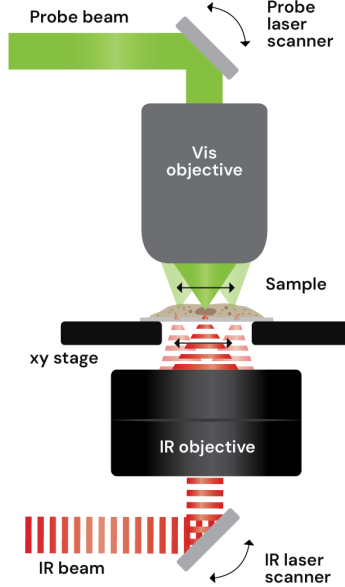
**Counter-propagating**  
IR transparent samples/substrates



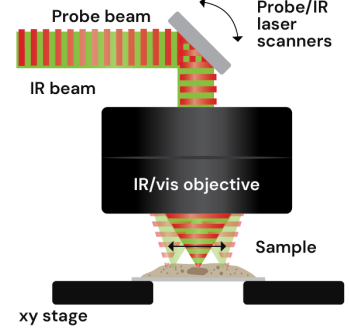
## Laser scanning O-PTIR

<1 g moving mass, microsec settling times  
= images in seconds or less

**Counter-propagating mode**  
IR transparent samples/substrates



**Co-propagating mode**  
IR opaque samples/substrates

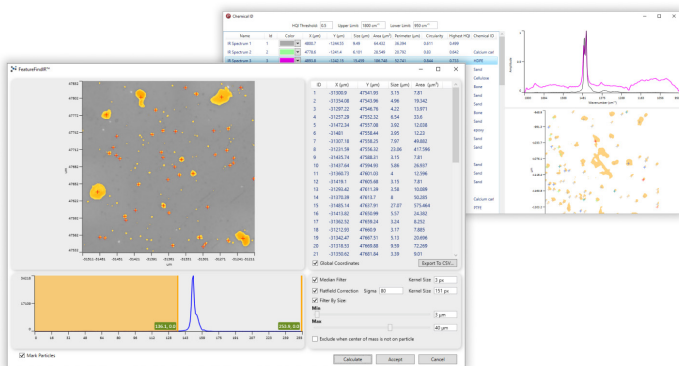


## Laser Scanning O-PTIR

With patent-pending synchronized IR and probe high-speed optics, the system avoids the inherent inefficiencies of heavy mechanical stages, where each directional change adds ~0.6 s of settling time. Instead, lightweight galvo mirrors rapidly steer the beam with microsecond-scale settling, delivering exceptional imaging speed and responsiveness.

## featurefindIR™ - Detect, Select, Measure, Identify

The mIRage featurefindIR capability can accurately and automatically measure and chemically identify particles and microplastics from submicron to mm's in size, overcoming the limitations of conventional FTIR and Raman techniques.



Automatically measure the chemical ID 100's of small microplastics

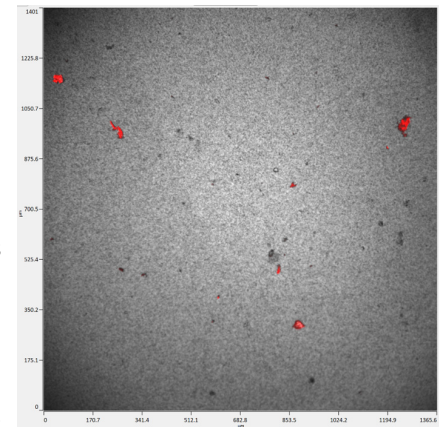
## Using fluorescence to quickly localize O-PTIR measurements

Co-located O-PTIR and Fluorescence imaging combines the excellent specificity of fluorescence imaging (either labeled or intrinsic autofluorescence) to highlight regions of interest, for a deeper chemical characterization with submicron, O-PTIR spectroscopy, which provides critical molecular compositional information of the features of interest. Researchers have significantly improved their productivity in research using these combined techniques.

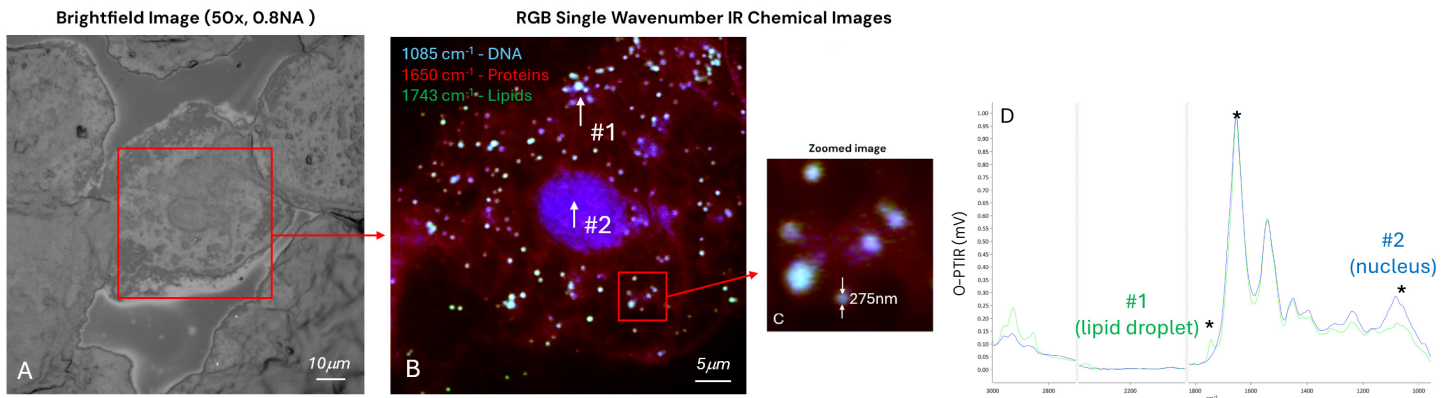
Visit our website to see how the co-located O-PTIR and Fluorescence can support your research into microplastics, pharma, life science, failure analysis and other applications.

Overlay image  
Grey: Brightfield, Red: Autofluorescence (AF)

This image of a filtered biopharma sub-visible sample, provides extra chemical contrast by highlighting the locations of protein aggregates, allowing for a more targeted and efficient spectral measurement process by not collecting spectra from all particles



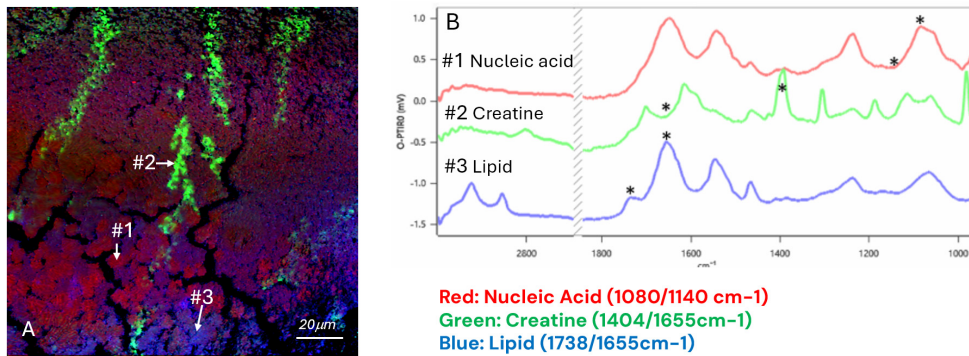
# Applications Overview



**A:** Brightfield image using a 50x, 0.8NA objective **B:** Single wavenumber IR chemical imaging RGB overlay, 1085cm<sup>-1</sup> DNA (blue), 1650 cm<sup>-1</sup> protein (red) and 1743 cm<sup>-1</sup> lipid (green) **C:** Zoomed in image of B, showing detection of lipid droplets as small as 275nm **D:** O-PTIR Spectra (normalised to Amide I) from highlighted locations, spot #1 (lipid droplet) and spot #2 (nucleus). IR single wavenumber images (as in B) are marked

by an asterisks. Spectra are collected from a spot size of ~400nm. **Collection conditions:** 50x50µm measurement FOV, 100nm pixel step size (250,000 pixels), 13 sec per image measurement time, Counter-prop mode. Spectral acquisition total time 8 sec 50x, 0.8NA glass objective, tri-range IR QCL, 532nm probe.

## RGB Single Wavenumber IR Chemical Imaging



**Red: Nucleic Acid (1080/1140 cm<sup>-1</sup>)**  
**Green: Creatine (1404/1655cm<sup>-1</sup>)**  
**Blue: Lipid (1738/1655cm<sup>-1</sup>)**

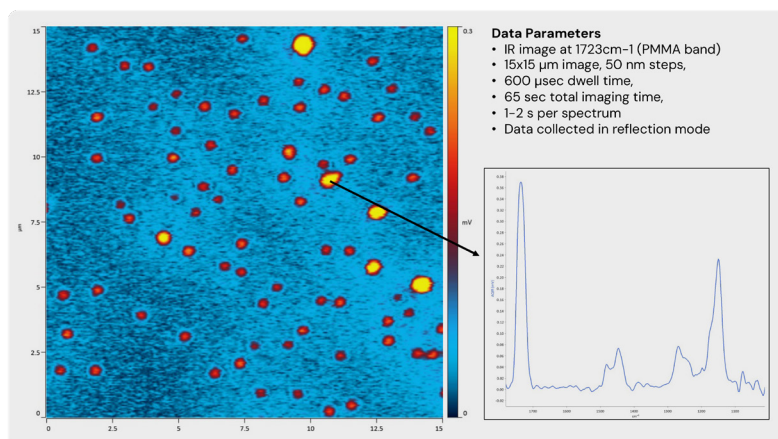
**Collection conditions:** 150x150µm measurement FOV, 250nm pixel step size (600,000 pixels), 17 sec per image measurement time, Counter-prop mode with 50x, 0.8NA glass objective, dual-range IR QCL, 532nm probe.

Sample courtesy of Dr. Mark Hackett, Curtin University, Australia.

## High speed multi-spectral IR imaging of mouse brain tissue (17 sec per image measurement time)

**A:** Automated multiple (5) single wavenumber IR chemical imaging RGB overlay - Green (Creatine) 1404/1655cm<sup>-1</sup>, Red (Nucleic Acid) 1080/1140 cm<sup>-1</sup> and Blue (lipid) 1738/1655cm<sup>-1</sup> **B:** Representative Spectra from the

highlighted locations, highlighting biochemistry from areas of chemical contrast as shown in A. IR image (A) wavenumber positions are marked by an asterisks. Spectra are collected from a spot size of ~400nm.



## FTIR Transmission/ATR-like spectra & imaging of 250 nm Plastic beads

**A:** Single wavelength image of 250nm PMMA beads, 15x15 µm image, 50 nm steps, 600 µsec dwell time, 65 sec total imaging time. **B:** Single spectra of selected bead 1800-1000 cm<sup>-1</sup>. Spectra measured in seconds.

# mIRage-HSi product overview

Capability	mIRage-HSi Specificaton
Laser scanning O-PTIR modes	Submicron O-PTIR co-propagating mode Sub-500nm O-PTIR counter propagating mode
Stage scanning modes (Included with laser scanning mode)	Submicron O-PTIR co-propagating mode Sub-500nm O-PTIR counter propagating mode
QCL IR laser options (cm <sup>-1</sup> )	2990-2700   2300-2000   1800-800
Visible probe options	532 & 785nm
Fluorescence option	Co-located Fluorescence camera and customer selectable filter cubes
Raman option	Simultaneous Raman & O-PTIR for stage scanning modes & co-located Raman for laser scanning modes. Various grating options.
Objectives: 5 selectable positions	40x Cassegrain, 10x Visible standard, 50x 0.8NA Customer selectable objectives
Spectroscopy options	Micro-ChemID; KNOWITALL
featurefindIR	Included as standard with MOSAIC capability



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