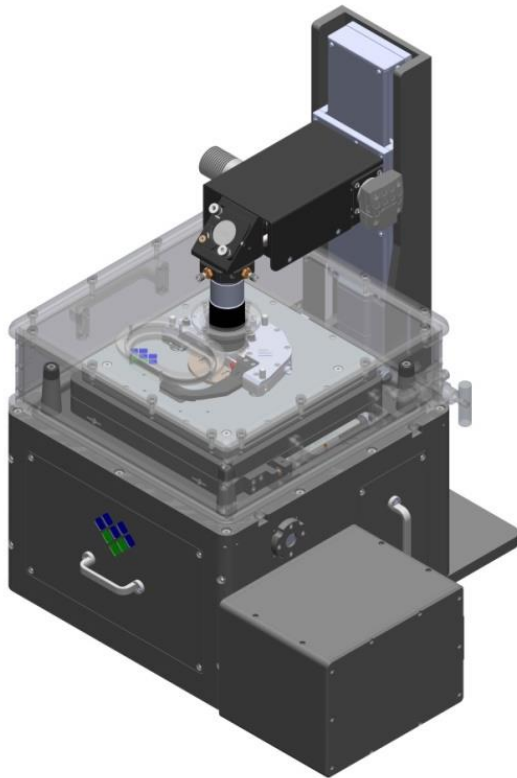
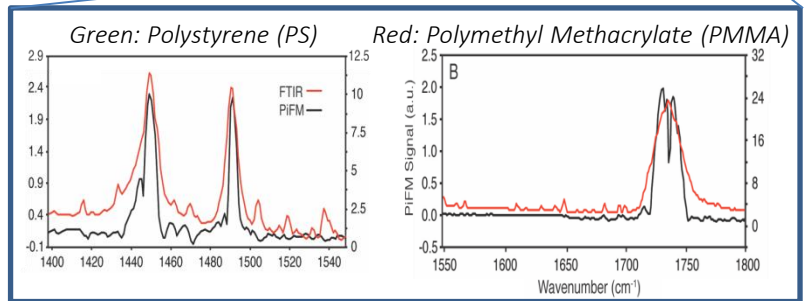
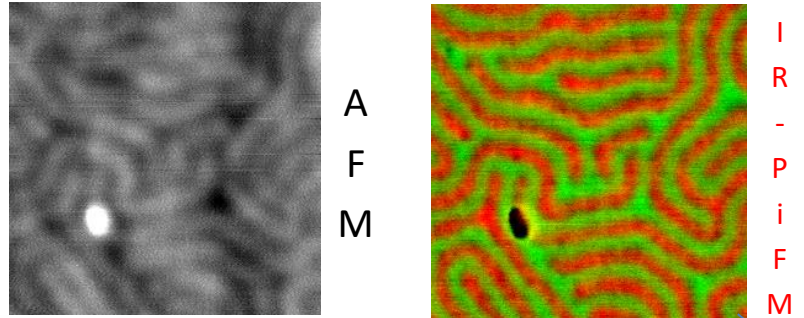


Simultaneous Nano IR Imaging/Spectroscopy and AFM Photo Induced Force Microscopy



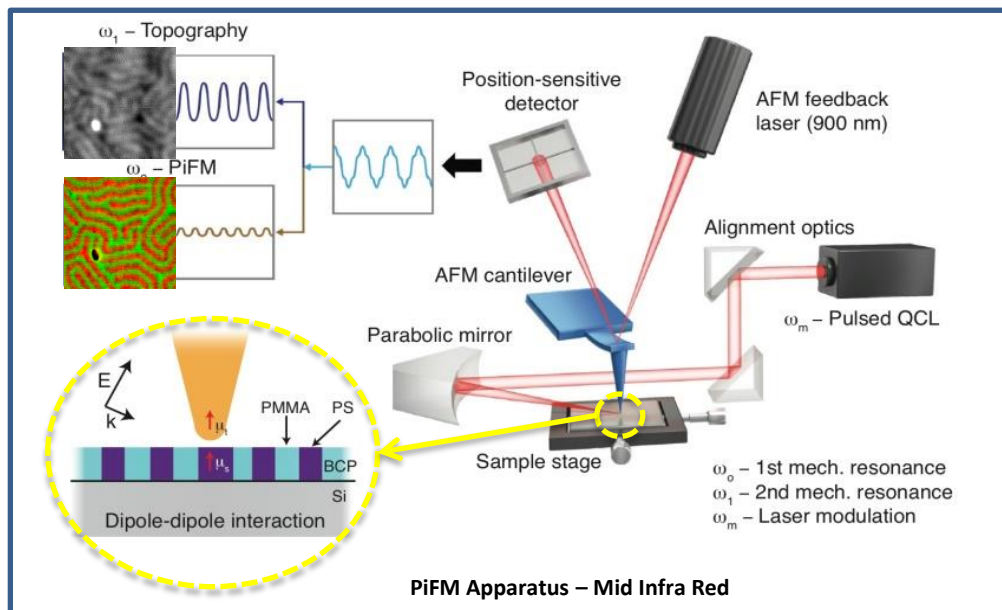
5 μm x 5 μm PiFM of PS-b-PMMA Block Copolymer.



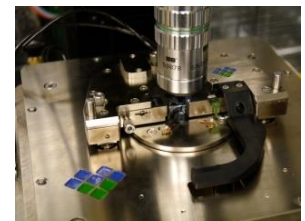
Nanometer-scale infrared spectroscopic mapping is achievable quickly and routinely on a wide variety of samples. Vista-IR uses an oscillating AFM cantilever to very sensitively detect polarization-induced forces between tip and sample resulting from wavelength-dependent IR absorption.

A Mid IR range (800-1800 cm^{-1} or 5-13 μm) Quantum cascade laser (QCL) is employed for spectroscopic imaging. Nm-scale resolution is achieved with excellent SNR and speed via *mechanical* detection (no need to collect scattered photons or respond to temperature changes).

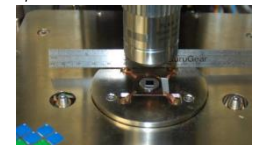
Spatial resolution does not vary with sample thermal properties or thickness.



AFM head and top objective



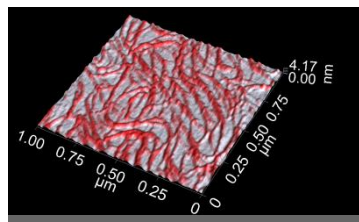
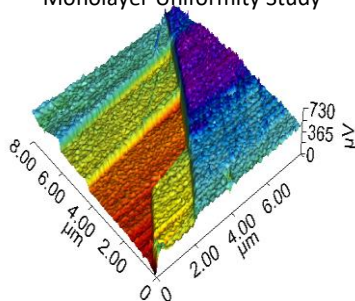
Ideal sample is $\sim 25\text{mm} \times 25\text{mm}$ and $< 3\text{mm}$ tall. Maximum height: 5mm. For thin film sample, we can provide a clean substrate.





2 μ m x 2 μ m
Monolayer Hydrocarbon

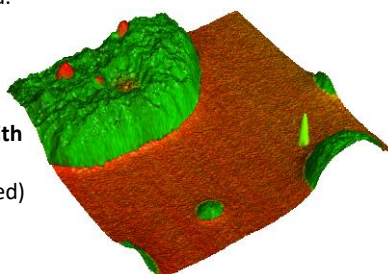
5 μ m x 5 μ m Graphene
Monolayer Uniformity Study



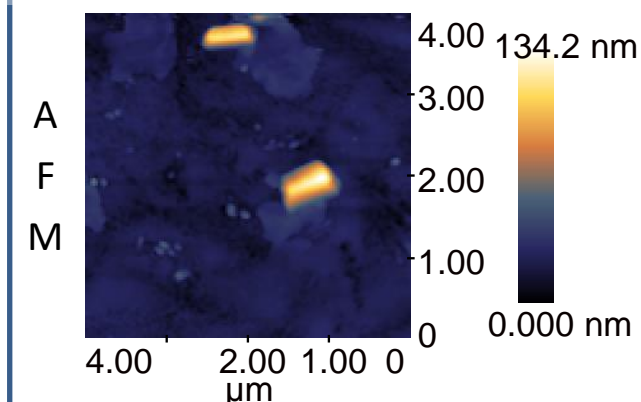
1 μ m x 1 μ m Collagen on mica.
1666 cm⁻¹, Amide 1 peak

**3D topography overlaid with
chemical information**

3 μ m x 3 μ m Polystyrene (Red)
and Polyethylene (Green)

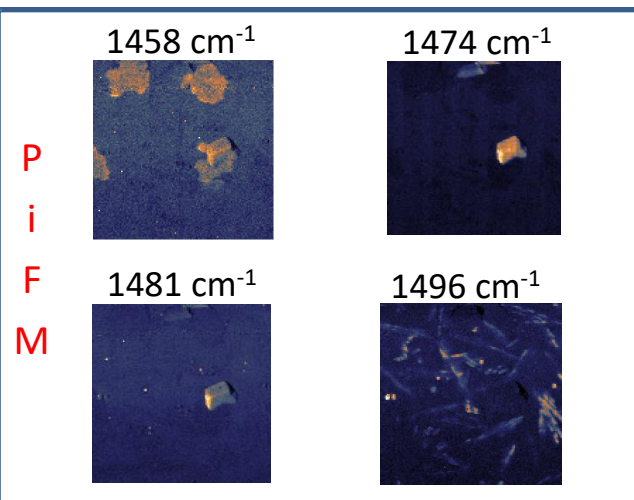


hyPIR image of 2D Perovskite: AFM and PiFM images at different
wavenumbers showing different chemical compositions



PiFM Features

- Works with both Transparent and Opaque substrates
- Non-contact and Tapping Method
- Standard off-the-shelf cantilever
- Works in visible and mid-IR spectrum
- Simplified optical setup with no far-field background signal
- Tip-to-tip reproducibility
- Spatial resolution < 10 nm
- Other standard scanning probe techniques are provided: Conductive AFM, Electric Force Microscopy, Kelvin Probe Force Microscopy
- Options are available to combine far-field (Raman, Photoluminescence) and near-field photon collection techniques (TERS, sSNOM)



Performance Configuration

- Acquisition Time:** ~ 1 min/survey mode
64x64 pixel at 1 Hz scan speed
~ 4 min/site – normal resolution
256x256 pixel at 1 Hz scan speed
- hyPIR*:** < 1 hour for 128x128 pixel image
*Hyperspectral IR PiFM spectrum at each pixel
- Sensitivity:** < monolayer
- AFM Tip:** Commercially available Gold-coated self-aligning tip

System Features

- Max sample size:** 1" x 3" or 25mm x 75 mm
- IR Source:** Quantum Cascade Laser 800-1,800 cm⁻¹

Applications

Academic and R&D
Data Storage
Polymer

Semiconductor, Solar
Biotechnology
1D and 2D Materials

Technical Specifications

Dimensions (inches)

System w/ Acoustic Enclosure
30 x 32 x 32
Control Unit: 22 x 18 x 24
Monitor: 26"
Total Weight: 400lbs/181 kg

Operating Specifications

Op. Temp.: 18-30° C
Vacuum: 10⁻² Torr
Dry Air or N2 Purge: 18 Cfm
Voltage: 120 - 230 VAC
Current: 4A