

Inspire

- AFM-Based IR Nanocharacterization System

● Highest Resolution Nanochemical and Properties Mapping

Bruker's Inspire™ system acquires nanoscale infrared absorption and reflection maps at regular AFM imaging speeds, without the limitations of indirect mechanical approaches or added complexity for the user. The system instantly correlates atomic scale nanomechanics, with infrared sSNOM spatio-spectral imaging at 10-nanometer resolution, and unique nano-electrical measurements.

Simply put, Inspire redefines what's possible with atomic force microscopy.



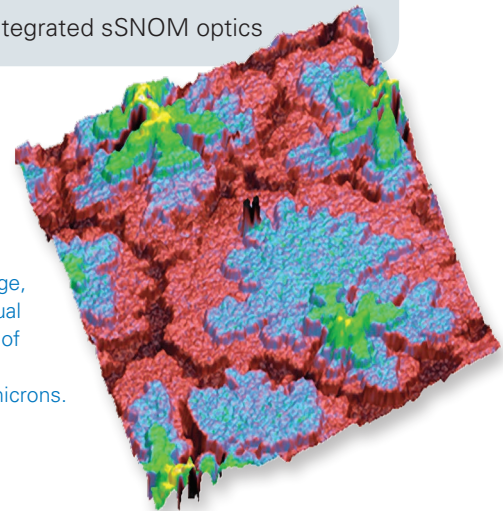
Inspire delivers, for the first time, highest-resolution nanoscale chemical and properties mapping combined with radical productivity advances and uncompromised AFM performance:

- Highest resolution characterization of nanochemistry, and plasmonics, enabled by a direct optical approach
- Unrivaled quantitative properties mapping produced by Bruker's PeakForce Tapping® technology
- Expansion of nanochemical imaging to previously inaccessible samples with new PeakForce IR™
- Fastest time to data through ScanAsyst® automatic image optimization and integrated sSNOM optics

Exceptional Imaging — Simplified

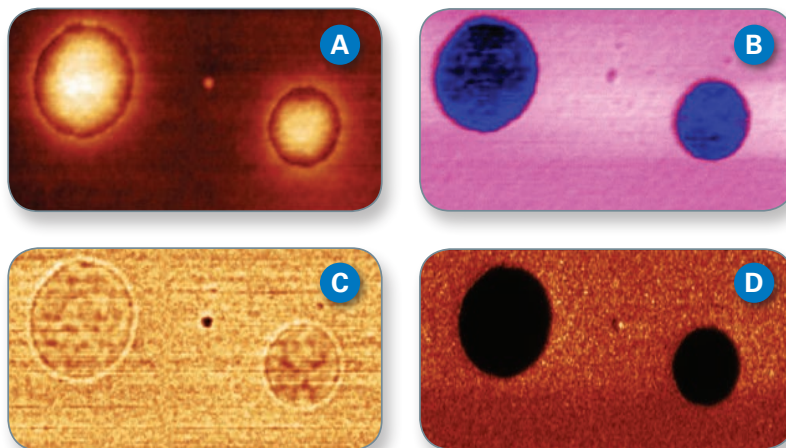
Inspire uses direct optical reflection and absorption mapping with sSNOM to deliver nanochemical information at the highest spatial resolution and sensitivity possible. With Inspire's integrated optics, experiments that previously took years of acquired expertise and weeks of setup time are quick and easily accomplished. PeakForce Tapping technology with ScanAsyst guarantees expert-level AFM image quality, so even novice users can set up and run experiments within minutes.

IR reflection image, resolving individual molecular layers of pentacene film. Image size 3.3 microns.



Powered by Exclusive PeakForce Tapping Technology

Bruker's exclusive PeakForce Tapping technology applies a precisely controlled force curve at every pixel, enabling the use of reduced imaging forces, protecting the probe and providing the highest resolution AFM images for both topography and nanoscale property mapping. Inspire takes full advantage of Bruker's exclusive PeakForce Tapping technology to deliver a new approach to infrared scattering scanning near-field optical microscopy (sSNOM) that extends its capability to nanoscale chemical mapping of a wide variety of samples. PeakForce IR is a new technique that interleaves sSNOM signal acquisition with PeakForce Tapping feedback, providing the full combined set of information at the same time.



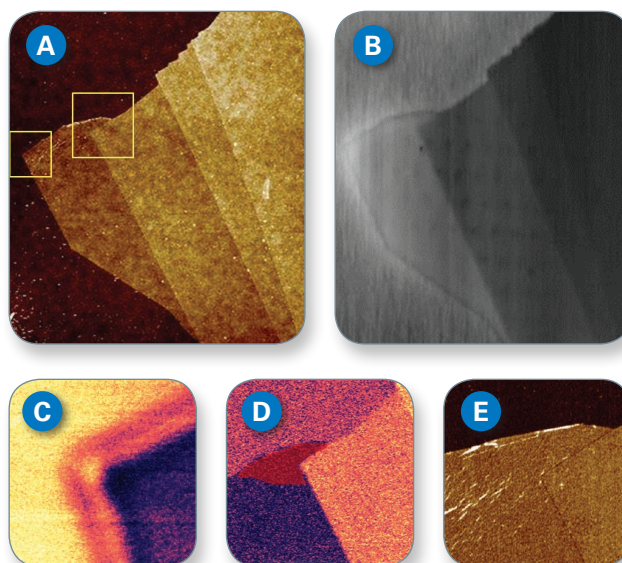
PeakForce IR images providing instantly correlated chemical and nanomechanical information of a Polystyrene/LDPE blend: (A) topography, (B) IR reflection at 1730cm⁻¹, (C) adhesion, and (D) modulus. Image size 5 microns.

Chemical Imaging for New Materials

PeakForce IR extends nanoscale mapping beyond the range of conventional AFM, sSNOM, or photothermal approaches. It does not require the sample to be microtomable or mounted onto a hydrophobic support, and it can address samples that are not Raman active. Inspire also can identify material types and detect film thickness variations with molecular monolayer sensitivity.

Expand IR nanocharacterization to:

- Powders and polymer brushes where neither contact nor Tapping Mode succeed
- Rubbery components, metals, semiconductors, ceramics, and other samples not conducive to photothermal approaches
- Graphene plasmonics, electronic structures, and chemical modifications to samples



Graphene (A) topography, (B) KPFM workfunction, and (C) plasmonics at edge of single layer. Defect rich area shows (D) lower IR conductivity and (E) nanomechanical variations.

Directly Correlated Information for New Discoveries

Inspire with PeakForce IR delivers scanning probe IR reflection and absorption imaging with all the advantages of scattering SNOM for chemical, materials, and plasmon imaging at the highest spatial resolution possible. It also provides the ability to instantly correlate PeakForce QNM quantitative nanomechanical modulus and adhesion mapping. Working in tandem with PeakForce IR, PeakForce KPFM opens the door to quantitative work function maps with millivolt sensitivity at the 10-nanometer resolution level, and PeakForce TUNA produces conductivity maps even on soft and fragile samples not amenable to contact mode.

A New Level of Productivity

PeakForce IR leverages Bruker's exclusive proprietary ScanAsyst to produce easier, faster, more consistent AFM imaging through its automatic image optimization. Together with the fast optical setup of the integrated optics with point-and-click optical alignment guided by an optical field map, set up time is reduced to minutes. The system's high performance AFM scanner enables high resolution infrared imaging with scan rates of up to 10 hertz. Inspire with PeakForce IR is the ideal choice for any scientist interested in the technique of scattering SNOM, nanoscale graphene research, or who requires the highest resolution chemical and property mapping possible.

Specifications

Optics	Integrated infrared scattering SNOM system: Includes all required optics, laser, and detector; High-quality broadband optical components; Lowest-noise, liquid N ₂ -cooled detector; Accurate interferometer control; Low-noise Quantum Cascade Laser source; Optimized near-field collection and excitation optics
AFM Head	Application module-ready AFM head (supports all optional modes)
Scanners	125µm x 125µm X-Y x 5µm Z range; Other scanner options available upon request
Controller	NanoScope® V Control Station with v9.0 NanoScope real-time control software; NanoScope v1.5 analysis software; Windows 7 Operating System
Modes	Scanning probe IR modes: IR sSNOM operated in TappingMode™ and PeakForce IR™ mode General imaging modes: ScanAsyst® Torsional Resonance Mode PeakForce Tapping® Scanning Tunneling Microscopy TappingMode Lateral Force Microscopy Contact Mode PhaselMaging™ Optional material characterization modes: PeakForce KPFM™ Nanoscale Thermal Analysis Conductive AFM Liquid Imaging PeakForce TUNA™ Electrochemical SPM PeakForce QNM® Nanoindentation PeakForce Capture™ Piezo Force Microscopy Force Volume Electric and Magnetic Force Microscopy

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Cover Image:

Top left: PeakForce IR images of PS/LDPE showing height, modulus, adhesion, deformation, reflection. Image size 1 micron.
 Bottom right: IR absorption image of PS-PMMA blend. Image size 5 microns.