

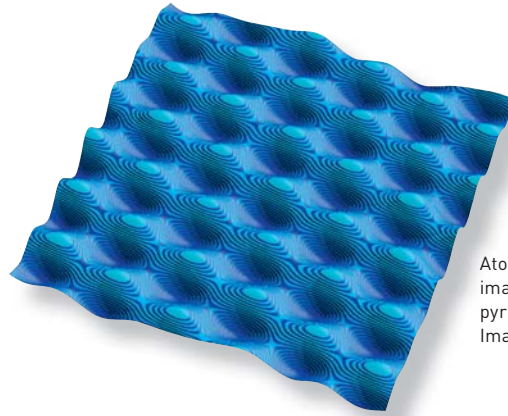
diInnova SPM

The Industry's Performance Leader

- High Resolution Closed-loop System
- Fast, Easy Tip & Sample Exchange
- Versatility and Value
- Powerful Research Flexibility



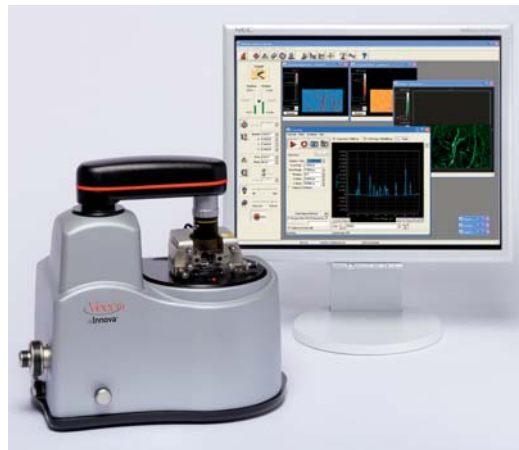
Solutions for a nanoscale world.™



Atomic resolution STM image of highly-oriented pyrolytic graphite (HOPG). Image size 1.3 nm.

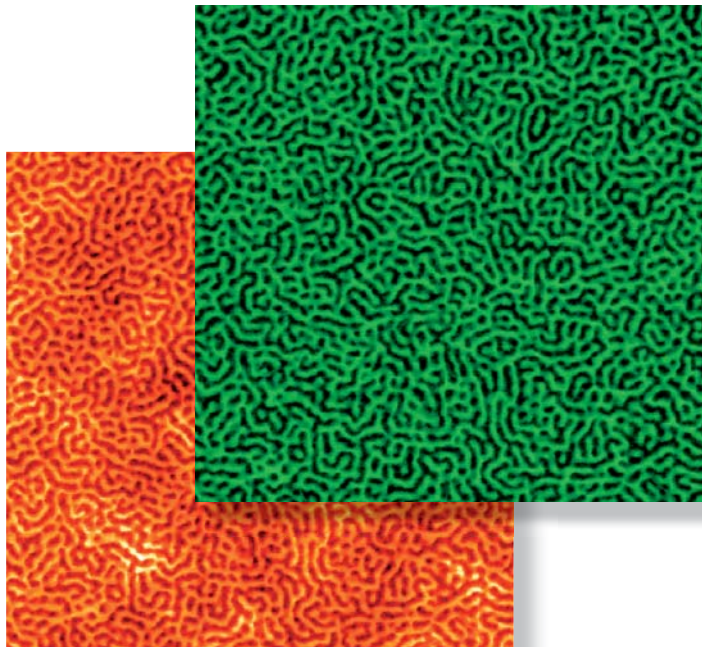
diInnova

Superior Research Performance and Versatility

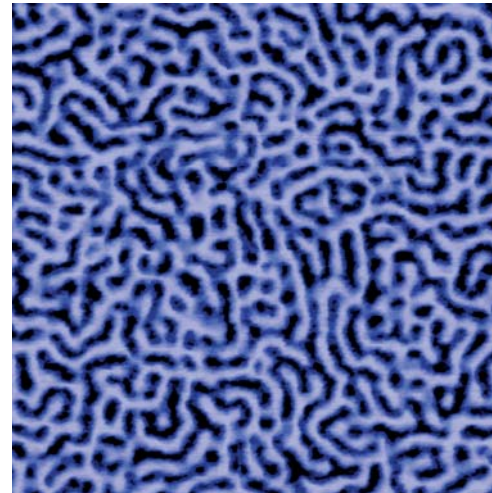


The Veeco Innova scanning probe microscope (SPM) delivers high resolution scanning, excellent value, and a wide range of functionality for physical, life, and materials sciences. Innova also offers application flexibility for demanding and varied scientific research at a moderate cost. It offers a unique state of the art closed-loop scan linearization system that ensures accurate measurements and noise levels approaching those of open loop operation. Innova delivers atomic resolution with great ease and scans up to 90 microns without the need to change scanner hardware. The integrated, high-resolution color optics and programmable, motorized Z-stage make finding features and changing tips or samples fast and easy.

- **Outstanding closed-loop scan control**
 - Accurate measurements in all dimensions
 - One step zoom to any object without distortion
 - Exceptional low noise performance
- **Highest resolution optics**
 - Ergonomically integrated top-down optics
 - Software controlled motorized zoom and light source
 - Accurate probe positioning
- **Fast and easy tip and sample exchange**
 - Programmable, motorized Z-stage with kinematically mounted head
 - Premounted cantilevers guarantee precise laser alignment
 - Exceptional physical and optical sample access
- **Powerful research flexibility**
 - Wide range of SPM modes
 - New, easily configurable software platform
 - An array of diagnostic tools



High-resolution topography (orange) and phase image (green) revealing the microphase separation in a poly(styrene-b-butadiene-b-styrene) (SBS) triblock copolymer. Raw data (unfiltered), 1k x 1k data points, 2 μ m image size, closed loop scan linearization active.



High resolution phase image revealing the microphase separation in a poly(styrene-b-butadiene-b-styrene) (SBS) triblock copolymer. Image size 750nm, closed loop scan linearization active.

SUPERIOR PERFORMANCE

All aspects of the Innova electromechanical design have been optimized, from the rigid microscope stage with a short mechanical loop and low thermal drift to the ultra-low noise electronics. The result is a unique combination of high resolution performance and closed-loop positioning.

Innova uses Veeco's proprietary ultra-low noise digital closed-loop scan linearization for accurate measurements in all dimensions, regardless of size, offset, speed, or rotation in air and liquid. Superior image quality is achieved from the full 90 micron scan range down to submicron images, with closed-loop noise levels approaching those of open-loop operation. In addition, closed-loop scan linearization can be activated and deactivated on-the-fly. This incredible flexibility allows zooming down to atomic resolution on any selected portion of a full size scan – without changing scanner hardware and without withdrawing the probe from the surface. Image rotation, location in the image window, and scan speed do not adversely affect the results.

HIGHEST RESOLUTION OPTICS

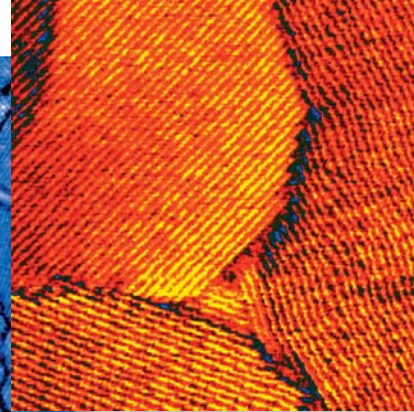
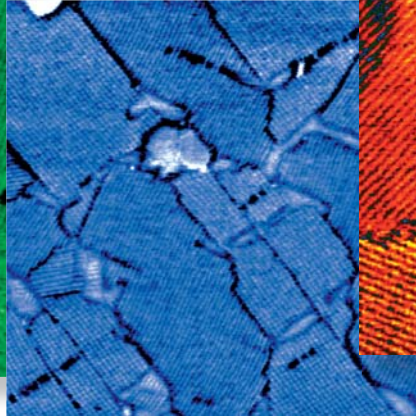
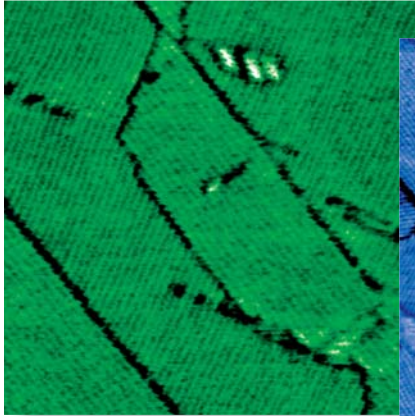
The patented top down optics of the Innova integrate seamlessly with all imaging modes, allowing for a direct view of the cantilever with better than 1 micron resolution, ensuring precise probe positioning on the sample. With the optics positioned entirely inside the protective instrument cover, probe and sample can be viewed at any time while insulating the instrument from the environment. The ergonomic integration of the optics with the microscope

also contributes to the ease and accuracy of tip exchange and laser alignment. The user can simply drop in a new tip and swing the optics back into place. The pre-aligned cantilever will always remain in focus.

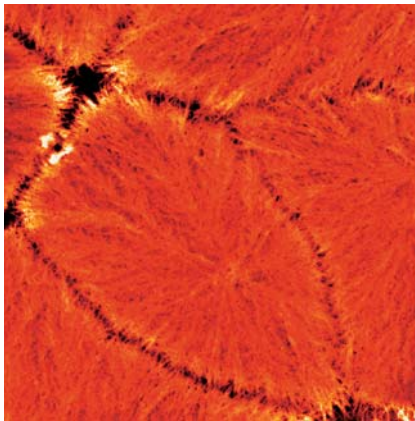
The motorized, software controlled, optical zoom provides a broad range of magnification with an unparalleled resolution. With infinity corrected optics and illumination, the smallest sample feature can be located accurately.

The Innova SPM provides excellent sample access, even when the microscope head is in place, without compromising the rigidity of the mechanical design. The physically open design provides flexibility for custom experiments, e.g., by allowing the easy insertion of electrodes for electrical and electrochemical sample characterization.

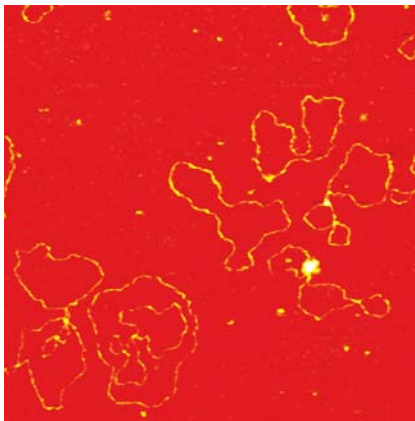




High-resolution phase image of $C_{60}H_{122}$ alkane on graphite. Image size 420 nm (green image), 700 nm (blue image), 380nm (red image). Closed-loop scan linearization active. Note the clear lamellar structure with its approximately 7.5nm periodicity proving outstanding force control and closed-loop performance.



Topography of syndiotactic polypropylene showing fibrillar fine structure within large spherulites. 35 μm image.



Plasmid DNA on mica, imaged in situ (aqueous buffer solution). Image size 1 μm . Closed-loop scan linearization active.

APPLICATIONS

No matter your application–Innova is ready

- Materials Science
- Nanolithography
- Life Sciences
- Polymer Chemistry
- Device Characterization

FULL RANGE OF SPM MODES AVAILABLE

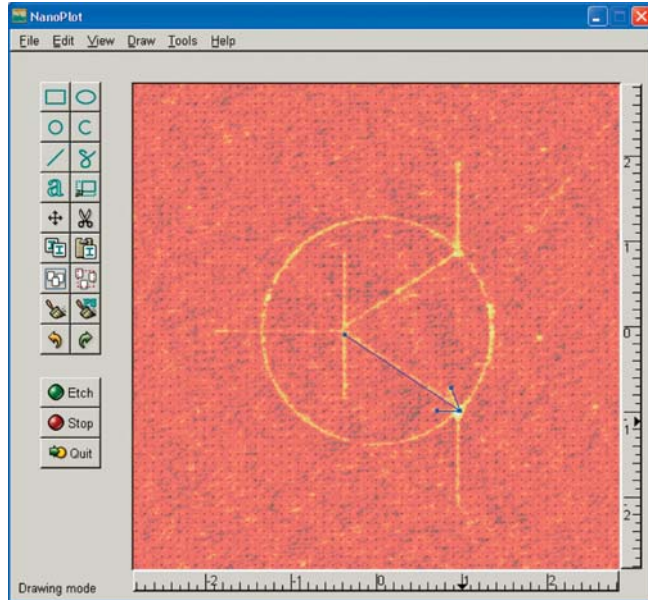
The Innova offers a full complement of SPM techniques, making it ideal for applications such as surface studies in materials science, polymer characterization, nanomanipulation and nanolithography. A host of standard and optional scan modes provides complete surface characterization of samples in both air and liquid.

- Contact Mode
- TappingMode™
- Lateral Force Microscopy (LFM)
- Scanning Tunneling Microscopy (STM)
- Magnetic Force Microscopy (MFM)
- PhaseImaging™
- Electrostatic Microscopy (EFM)
- Conductive Atomic Force Microscopy (CAFM)
- Scanning Thermal Microscopy (SThM)
- Force Distance Spectroscopy
- Current Voltage Spectroscopy
- Nanolithography
- And more

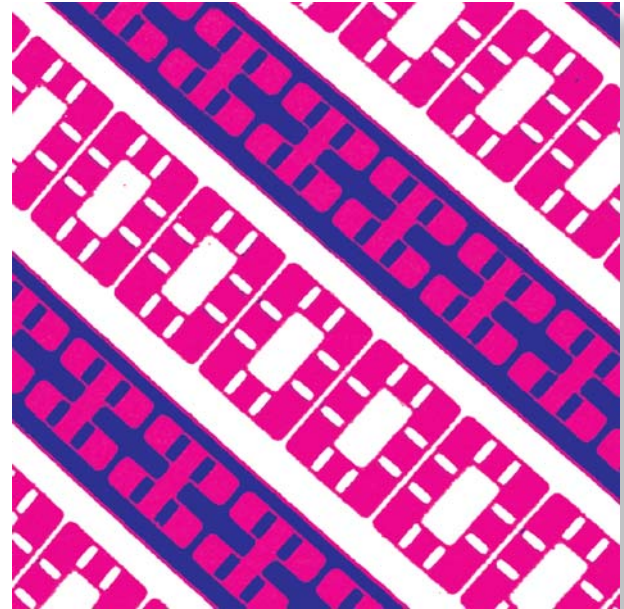
Cover image: MFM phase image showing the magnetic domain structure on a rough nickel alloy surface. Innova's intelligent LiftMode™ enables the efficient acquisition of magnetic field information without topographic artifacts independent of sample roughness. Image size 22 μm .

Cover image, top right: Innova Atomic Force Microscope.

Cover image, lower right: Topography of an oriented film of isotactic polypropylene, also known as the microporous membrane Celgard®. Oriented fibrillar regions are seen to be alternating with raised sections exhibiting a finer lamellar structure. Closed-loop scan linearization active. Image size 2.5 μm .



Nanolithography with the new NanoPlot package. Anodic oxidation on silicon.



Scanning Capacitance data of a Silicon DRAM cell. The 2-D dopant profile provided by dC/dV measurements allows the visualization of device defects and the extraction of critical parameters such as gate lengths. The powerful NanoDrive control electronics enable SCM on the Innova without the need for external lock-in amplifiers. Image size $45\ \mu\text{m}$.

INNOVA DESIGN FEATURES

The Innova head rests kinematically on three independently controlled motors that allow height, pitch and tilt adjustments relative to the sample. This allows much greater user convenience. User defined positions can move the head in sub-micron increments.

Innova has been specifically designed to provide quick and easy tip exchange and alignment. The system comes complete with a universal chip carrier that accepts almost any unmounted cantilever. For even faster and easier tip exchange, our series of precision premounted cantilevers ensure the laser is automatically and precisely focused on the same spot from one tip to the next.

Innova also incorporates numerous additional features that make it one of the most versatile research SPMs, including:

Advanced electronics

Modern state-of-the-art electronics provide exceptionally low noise and outstanding closed-loop performance. Innova features a 20 bit DAC architecture for superior piezo control and 8 fast ADCs providing generous data acquisition

bandwidth. Two integrated full lock-in amplifiers, enable advanced SPM modes such as scanning capacitance microscopy (SCM) without the need for external hardware or third-party software. Innova is ready for custom experiments with control electronics that provide built-in user access to I/O signals and software that enables flexible signal routing and processing.

Flexible and versatile acquisition software

The completely new SPMLab v7.0 software incorporates a host of features to ensure real world productivity. Direct and intuitive access to all important scan and feedback parameters is combined with extensive realtime signal diagnostics and processing options to accelerate the scan optimization process. Imaging capabilities are enhanced by advanced features like LiftMode™ and are complemented by several single point spectroscopy modes and an easy to use nanolithography package. Innova comes with an extensive analysis and processing package that integrates seamlessly into the realtime control. Data from partially acquired images can be fully analyzed at any time during the acquisition process without interrupting image acquisition.

PROBES FOR INNOVA IN AIR AND FLUIDS

Veeco Probes offers the world's largest selection of AFM probes and accessories. Below is a partial list available for the Innova. For a full list of probes and accessories, please visit www.veecoprobes.com or call 1-800-715-8440.

Application/Sample Type	Probe Model/Family		AFM Mode					
	Material	Unmounted	Tapping	Contact	Force Curves	EFM	MFM	Lithography
CAFM, EFM, MFM, SCM, Lithography (anodic oxidation)	Cobalt/Chrome coated	MESP				●	●	●
CAFM, Lithography (anodic oxidation) wear-resistant coating	Doped Diamond Coated	DDESP-FM				●		●
CAFM, EFM, SCM, Lithography (anodic oxidation)	Platinum/Iridium Coated	SCM-PIT				●		●
General purpose tapping applications	Silicon	TESP	●		●			
Tapping on some polymers and other materials with high adhesion	Silicon	LTESP	●		●			
Tapping, contact, force modulation on most polymers and soft materials	Silicon	FESP	●	●	●			
General purpose contact mode	Silicon Nitride	MLCT		●	●			
General purpose contact mode	Silicon Nitride	NP		●	●			
Liquid Imaging	Silicon Nitride	NP	●	●	●			
Liquid Imaging	Silicon Nitride	MLCT	●	●	●			

INNOVA SPECIFICATIONS

Closed-Loop Scanner: XY > 90 μm, Z > 7.5 μm

Open-Loop Scanner: XY > 5 μm, Z > 1.5 μm

Sample size: X-50 mm x 50 Y-mm x Z-18 mm

Motorized Z Axis Stage: Z Travel: 18mm

Optics:
 Camera: on-axis color CCD with motorized zoom
 Field of view: 1.24mm x 0.25mm (motorized zoom, with 10x objective)
 Resolution: <2μm with standard 10x objective (0.75μm with 50X)

Electronics: 20-bit DAC control, 100 kHz ±10v ADCs, digital feedback

System software: SPMLab™ v7.0 for data acquisition & analysis, Windows® XP

Note: Performance specifications are typical and subject to change without notice.



Nanolithography with the new Nanoplot package. Scratching on a polycarbonate substrate. Image size 10 μm.



Solutions for a nanoscale world.™

For more information visit www.veeco.com
 or call 800-873-9750
 B67, Rev A0

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WORLDWIDE CUSTOMER SUPPORT FROM THE INDUSTRY LEADER

Veeco Instruments Inc. provides solutions for nanoscale applications in the worldwide semiconductor, data storage, HB-LED/wireless and scientific research markets. Our Metrology products are used to measure at the nanoscale and our Process Equipment tools help create nanoscale devices. Veeco's manufacturing and engineering facilities are located in New York, New Jersey, California, Colorado, Arizona and Minnesota. Global sales and service offices are located throughout the United States, Europe, Japan and Asia.