Setting the Standard for High-Performance SPMs

- Superior Resolution and Performance
- Fast, Consistent Expert-Quality Results
- Versatility for Widest Range of Applications
- Proven Productivity and Reliability
The MultiMode® is the world’s most field-proven scanning probe microscope (SPM), with thousands of systems installed worldwide. Its success is based on its superior resolution and performance, its unparalleled versatility, and its proven record of productivity and reliability. Now, the MultiMode 8, featuring Veeco’s proprietary ScanAsyst™ mode with automatic image optimization technology enables easier, faster, and more consistent results in materials, life sciences, and polymer research, regardless of user skill level.

It is no coincidence that many of the highest resolution SPM images published are taken using Veeco MultiMode SPMs

**HIGHEST PERFORMANCE AND RESOLUTION**
- A compact, rigid design ensures the lowest noise and highest resolution possible on even the most challenging samples
- The NanoScope® V controller offers unmatched bandwidth and processing power for the most demanding applications — today and tomorrow

**FASTER AND EASIER EXPERT-QUALITY RESULTS**
- ScanAsyst mode with automatic image optimization provides ease of use as well as faster, more consistent expert-quality results
- Direct force control protects delicate samples and tips from damage
- ScanAsyst eliminates the need for cantilever tuning, setpoint adjustment, and gain optimization

**VERSATILITY TO SATISFY MORE APPLICATIONS**
- Hardware and software enable easy imaging in air or fluid environments
- Full support available for sample heating and cooling and environmental control
- Offers all standard operating modes and many unique capabilities to characterize everything from mechanical to electrical properties at high resolution

**WORLD-RENOWNED PRODUCTIVITY AND RELIABILITY**
- It’s a simple fact that more high-impact SPM research has been published using MultiMode systems than any other SPM
- The reliability of the MultiMode is backed by a worldwide network of dedicated application and support engineers
ScanAsyst

Expert Quality Results, Faster and Easier than Ever Before

ScanAsyst is Veeco’s patent-pending, new revolutionary imaging mode with auto-optimization technology, which is standard on all new MultiMode 8 SPM systems. It automatically optimizes imaging parameters including setpoint, feedback gains, and scan rate to get the best possible image faster, easier, and more consistently than ever before.

ScanAsyst utilizes Veeco’s new Peak Force Tapping™ mode. This mode is enabled by patented technology that performs a very fast force curve at every pixel in the image. The peak force of each of these curves is then used as the imaging feedback signal. This allows direct control of imaging force, as compared to TappingMode™ where imaging force is a complex function of the setpoint and other variables. Thus, the MultiMode 8 operates at forces even lower than TappingMode, which helps protect delicate samples and tips.

Quantitative Mapping of Nanomechanical Properties

PeakForce™ QNM™ is a new patent-pending imaging mode that allows quantitative nanomechanical mapping of properties, including modulus and adhesion. It is an optional feature on the new MultiMode 8. Similar to Veeco’s HarmoniX® mode, PeakForce QNM derives these quantities from force curves taken during normal high-resolution imaging. Unlike HarmoniX, however, PeakForce QNM measures the force curves directly using Peak Force Tapping mode instead of reconstructing them from the higher torsional harmonics of a special probe. This allows PeakForce QNM to achieve more accurate quantitative results over a wider range of properties, approximately 1 MPa to 50 GPa for modulus and 10 pN to 10 μN for adhesion.

Cover images

Top: Self-assembled DNA web, imaged in fluid at a scan size of 800 nm. (Sample courtesy of Alexey Koyfman, University of California, Santa Barbara)

Middle: Nuclear pore complexes, imaged in fluid at a scan size of 1.4 μm. (Image courtesy of Victor Shahin, University of Muenster, Germany)

Bottom: Celgard membrane. Scan size 2 μm.
ULTIMATE PERFORMANCE BY DESIGN

The remarkable performance of the MultiMode 8 is the result of its superior combination of compact, rigid mechanical design and the industry’s most advanced and lowest noise SPM control electronics.

The performance of an SPM is strongly influenced by the length of the mechanical path between the sample and the SPM probe. Shorter paths offer greater immunity to acoustic and vibrational noise and are less susceptible to the effects of thermal drift. It is also critical that all functional components of the SPM are mounted securely and are rigid with respect to one another. These considerations, with generations of technological advances, are the basis for the MultiMode’s high-performance design.

The SPM control electronics are also a vital factor in system performance. The NanoScope V is Veeco’s fifth-generation SPM controller. It features an advanced digital architecture with high bandwidth, low-noise data acquisition and unmatched data processing capability. This allows Veeco to offer the most advanced and powerful new features in the industry, such as the revolutionary ScanAsyst and PeakForce QNM modes.
THE RIGHT ACCESSORIES FOR EVERY APPLICATION

The continued success of the MultiMode platform has been made possible by a long list of supporting accessories and modes that continues to grow every year. You may already be aware of the MultiMode platform’s reputation for ultra-high resolution imaging, but with the MultiMode 8, many additional features and capabilities are now possible. The MultiMode 8 offers a wide range of accessories and operating modes that allow it to be configured optimally for nearly every application.

MORE ACCESSORIES + MORE OPERATING MODES = UNMATCHED VERSATILITY

GENERAL IMAGING:
- ScanAsyst (NEW)
- Peak Force Tapping (NEW)
- TappingMode
- Contact Mode
- PhaseImaging™
- Torsional Resonance Mode (TRmode)
- Lateral Force Microscopy (LFM)
- Scanning Tunneling Microscopy (STM)

LIFE SCIENCE AND FLUID IMAGING APPLICATIONS:
- Liquid Resistant Scanners
- Small Volume Fluid Exchange
- Magnetically Actuated Tapping

MATERIAL PROPERTY CHARACTERIZATION:
- PeakForce QNM (NEW)
- HarmoniX Imaging
- Nanoscale Thermal Analysis
- Scanning Thermal Microscopy
- Nanoindentation
- Force Volume Imaging
- Force Modulation
- Piezoresponse Force Microscopy

ELECTROCHEMISTRY:
- Universal Bipotentiostat
- EC AFM
- SECPM
- EC STM

TEMPERATURE AND ENVIRONMENTAL CONTROL:
- Ambient to 60°C Heater
- -35 to 250°C Heater-Cooler
- Atmospheric Hoods

ELECTRICAL AND MAGNETIC PROPERTY CHARACTERIZATION:
- Surface Potential Mapping
- Electric Force Microscopy (EFM)
- Magnetic Force Microscopy (MFM)
- LiftMode™
- Conductive AFM (CAFM)
- Tunneling AFM (TUNA)
- Scanning Spreading Resistance Microscopy (SSRM)
- Scanning Capacitance Microscopy (SCM)

Materials Research: Polymer Phase Transitions
Syndiotactic polypropylene (sPP) and polyethylene oxide (PEO) blend imaged with ScanAsyst at a scan size of 2 μm. Beginning at room temperature (left), the blend was heated to 70°C, melting the PEO (middle). It was then rapidly cooled 43°C, leading to recrystallization of the PEO.

Electrochemistry Research: Energy Storage
Vanadium pentoxide thin film imaged using TappingMode at a scan size of 5 μm. The film was used as the positive electrode in a lithium micro-battery and examined in its original, pristine condition (left), after the first discharge (middle), and after the subsequent charge (right). Even this single charge/discharge cycle irreversibly changes the film structure. (Images courtesy of B. Fleutot, H. Martinez, B. Pecquenard, J.B. Ledeuil, A. Levasseur, and D. Gonbeau, University of PAU, France)
### MULTIMODE 8 SPECIFICATIONS

<table>
<thead>
<tr>
<th>SPM Controller</th>
<th>NanoScope V</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Heads</strong></td>
<td></td>
</tr>
<tr>
<td>(select one)</td>
<td></td>
</tr>
<tr>
<td>Standard</td>
<td>supports all modes except Application Modules;</td>
</tr>
<tr>
<td>Application module ready</td>
<td>supports optional CAFM, TUNA, SCM, and SSRM modules;</td>
</tr>
<tr>
<td>Non-magnetic, Application module ready</td>
<td>supports use in magnetic fields</td>
</tr>
<tr>
<td><strong>Scanners</strong></td>
<td></td>
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<tr>
<td>(select at least one)</td>
<td></td>
</tr>
<tr>
<td>AS-0.5 scanner</td>
<td>0.4μm x 0.4μm XY and 0.4μm Z range;</td>
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<tr>
<td>AS-12 scanner</td>
<td>10μm x 10μm XY and 2.5μm Z range (non-vertical engage);</td>
</tr>
<tr>
<td>AS-12LVR scanner</td>
<td>10μm x 10μm XY and 2.5μm Z range (vertical engage), features improved liquid resistance and 4-year warranty against liquid damage;</td>
</tr>
<tr>
<td>AS-130LVR scanner</td>
<td>125μm x 125μm XY and 5μm Z range (vertical engage), features improved liquid resistance and 4-year warranty against liquid damage;</td>
</tr>
<tr>
<td>AS-12M scanner</td>
<td>10μm x 10μm XY and 2.5μm Z range (non-vertical engage), features non-magnetic construction for use in magnetic fields;</td>
</tr>
<tr>
<td>AS-130M scanner</td>
<td>125μm x 125μm XY and 5μm Z range (non-vertical engage), features non-magnetic construction for use in magnetic fields;</td>
</tr>
<tr>
<td>PicoForce scanner</td>
<td>40μm x 40μm XY and 20μm Z range, features large, closed-loop Z range for force spectroscopy applications;</td>
</tr>
<tr>
<td>MMAFMXYZ</td>
<td>100μm x 10μm XY and 15μm Z range, closed-loop operation in XY and Z, not recommended for imaging in liquids</td>
</tr>
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</table>

**Standard Accessories**

- OMV, Optical microscope with 10X objective for viewing tip, sample, and laser;
- Probe holder for most imaging applications in air, includes tip bias connection;
- Probe holder for torsional resonance mode (TRmode);
- MFM starter kit with probes and training sample;
- Calibration grating for scanner calibration;
- Selection of common probe types

**Optional Accessories**

- Probe holder for most imaging applications in liquids;
- PeakForce QNM technology for quantitative mapping of material properties;
- Sample heater with ambient to 60°C range (compatible with all scanners above);
- Sample heater-cooler with -35 to 250°C range (includes integrated scanner with 125μm x 125μm XY and 5μm Z range);
- Environmental control hood for imaging in inert gases or under controlled humidity;
- STM head, standard and ultra-low current versions;
- Universal bipotentiostat for electrochemistry applications (ECAFM and ECSTM);
- Conductive AFM (CAFM) application module;
- Tunneling AFM (TUNA) application module;
- Scanning Capacitance Microscope (SCM) application module;
- Nanoindentation with diamond indenter probe;
- Force modulation probe holder for force modulation imaging in air;
- Signal Access Module for input/output access to analog control and data signals

**Vibration Isolation**

- VT-102, air table, 24in. square x 31in. tall (requires compressed air);
- VT-103, air table with acoustic hood, 36in. x 47in. x 62in. tall (requires compressed air);
- VT-50, passive isolation platform, 16.75in. square x 8.5in. tall (no air required);
- TRVI, tripod with elastic cord isolated platform;

**SYSTEM SPECIFICATIONS**

- Imaging Noise Level: <0.3Å RMS (Z noise using TappingMode in air at zero scan size)
- Maximum Sample Size: 15mm diameter x 5mm thick
- Regulatory Certification: CE compliant
- Laser Classification: Class 2M, 1mW maximum at 690nm (IEC and US CDRH)

Note: Configuration options and system specifications are subject to change without notice.