Enabling Nanoscale Advances

Park SYSTEMS

Park NX10

The most accurate and easiest to use Atomic Force Microscope

Park NX10

The premiere choice for nanotechnology research

Accurate XY Scan by Crosstalk Elimination

- Two independent, closed-loop XY and Z flexure scanners
- Flat and orthogonal XY scan with low residual bow
- Accurate height measurements without any need for software processing

Accurate AFM Topography with Low Noise Z Detector

- True sample topography without edge overshoot or piezo creep error
- Accurate surface height recording, even during high-speed scanning

Best Tip Life, Resolution and Sample Preservation by True Non-Contact™ Mode

- Fast Z-servo speed enabling True Non-Contact™ Mode
- Minimum tip wear for prolonged high-quality and high-resolution imaging

User Experience-Driven Software and Hardware Features

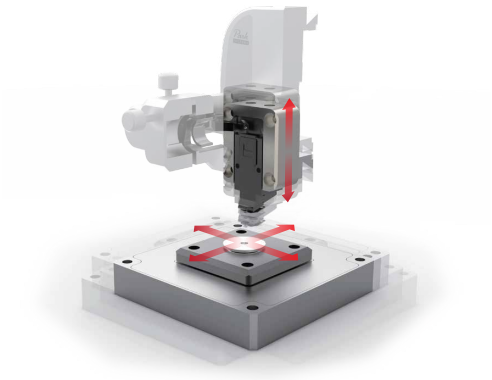
- Open side access for easy sample or tip exchange
- Easy, intuitive laser alignment with pre-aligned tip mount
- Park SmartScan™- AFM operating software for empowering both novices and power users towards versatile nanoscale research

Park NX10

AFM Technology

Flat Orthogonal XY Scanning without Scanner Bow

Park's Crosstalk Elimination scanner structure removes scanner bow, allowing flat orthogonal XY scanning regardless of scan location, scan rate, and scan size. It shows no background curvature even on flattest samples, such as an optical flat, and with various scan offsets. This provides you with a very accurate height measurement and precision nanometrology for the most challenging problems in research and engineering.



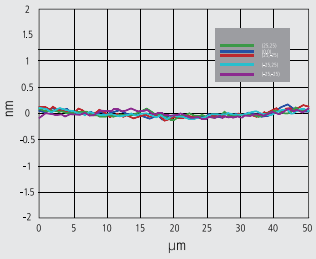
Decoupled XY and Z Scanners

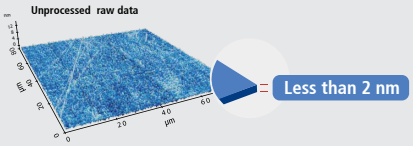
The fundamental difference between Park and its closest competitor is in the scanner architecture. Park's unique flexure based independent XY scanner and Z scanner design allows unmatched data accuracy in nano resolution further improved with NX AFM Head (Z scanner) powered by NX AFM electronic controller.

Accurate Surface Measurement

"Flat" sample surface as it is!

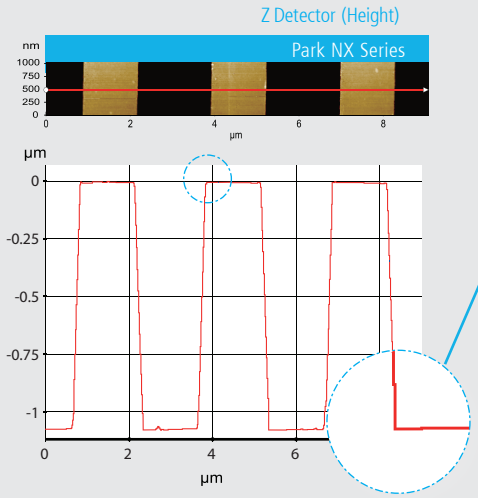
- Low residual bow
- No need for software processing
- Accurate results independent of scan location
- Less than 2 nm of out-of-plane motion with the NX electronic controller





Industry Leading Low Noise Z Detector

Park AFMs are equipped with the most effective low noise Z detectors in the field, with a noise of 0.02 nm over large bandwidth. This produces highly accurate sample topography and no edge overshoot. Just one of the many ways Park NX series saves you time and gives you better data.



No creep effect

Accurate Sample Topography Measured by Low Noise Z Detector

- Uses low noise Z detector signal for topography
- Has low Z detector noise of 0.02 nm over large bandwidth
- Has no edge overshoot at the leading and trailing edges
- Needs calibration done only once at the factory

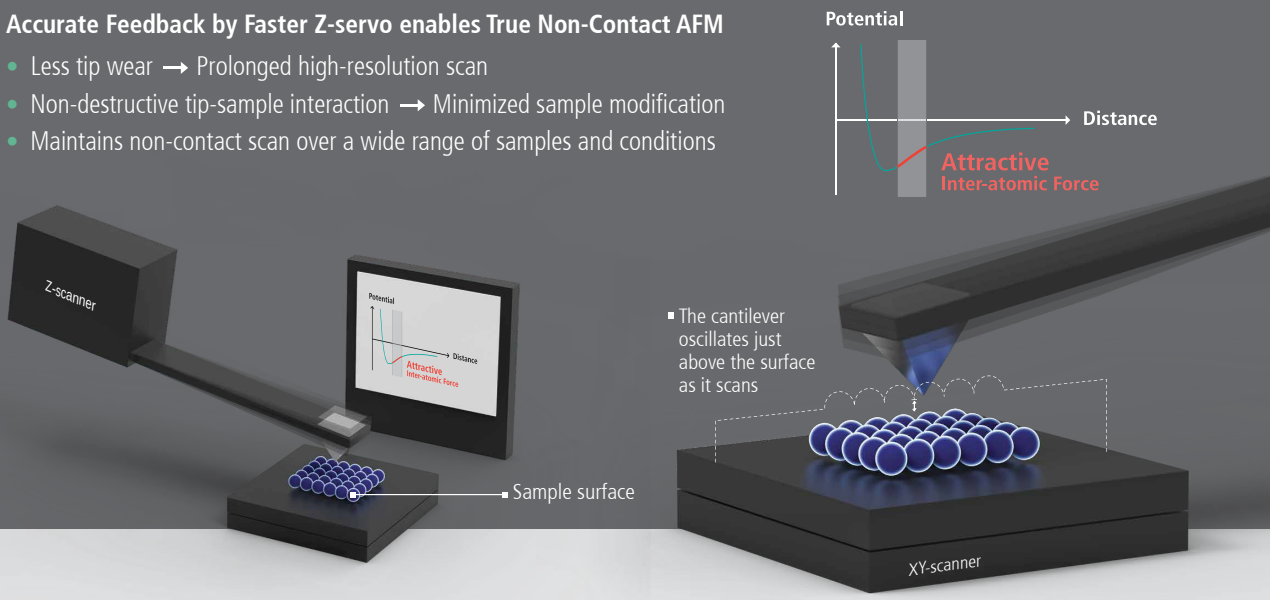
Sample: 1.2 µm Nominal Step Height
(9 µm x 1 µm, 2048 pixels x 128 lines)

True Non-Contact™ Mode

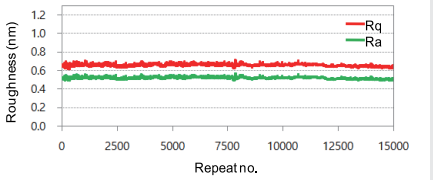
True Non-Contact™ Mode is a scan mode unique to Park AFM systems that produces high resolution and accurate data by preventing destructive tip-sample interaction during a scan.

Accurate Feedback by Faster Z-servo enables True Non-Contact AFM

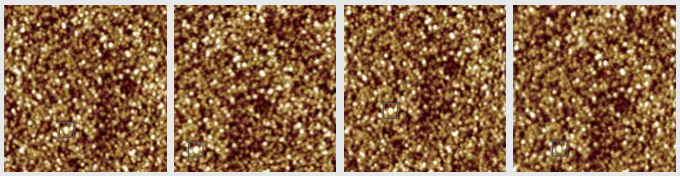
- Less tip wear → Prolonged high-resolution scan
- Non-destructive tip-sample interaction → Minimized sample modification
- Maintains non-contact scan over a wide range of samples and conditions



Unlike in contact mode, where the tip contacts the sample continuously during a scan, or in tapping mode, where the tip touches the sample periodically, a tip used in non-contact mode does not touch the sample. Because of this, use of non-contact mode has several key advantages. Scanning at the highest resolution throughout imaging is now possible as the tip's sharpness is maintained. Non-contact mode avoids damaging soft samples as the tip and sample surface avoid direct contact.



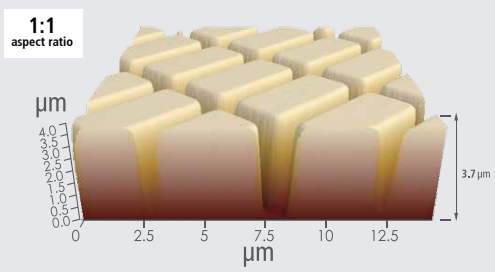
Repeat	1st	...	5000th	...	10000th	...	15000th	Total Avg.	1σ (%)
Rq(nm)	0.669		0.674		0.665		0.642	0.662	0.011 (1.720%)
Ra(nm)	0.527		0.535		0.525		0.508	0.524	0.010 (1.835%)



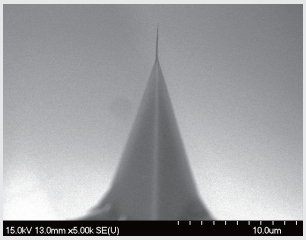
1st image | 5,000th | 10,000th | 15,000th

Furthermore, non-contact mode senses tip-sample interactions occurring all around the tip. Forces occurring laterally to tip approach to the sample are detected. Therefore, tips used in non-contact mode can avoid crashing into tall structures that may suddenly appear on a sample surface. Contact and tapping modes only detect the force coming from below the tip and are vulnerable to such crashes.

Deep trench image

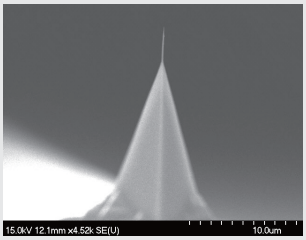


Before taking image



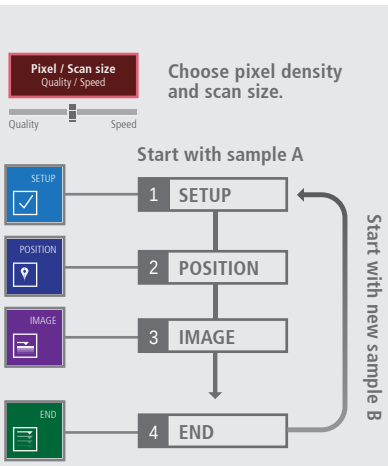
SEM (5.00 k)

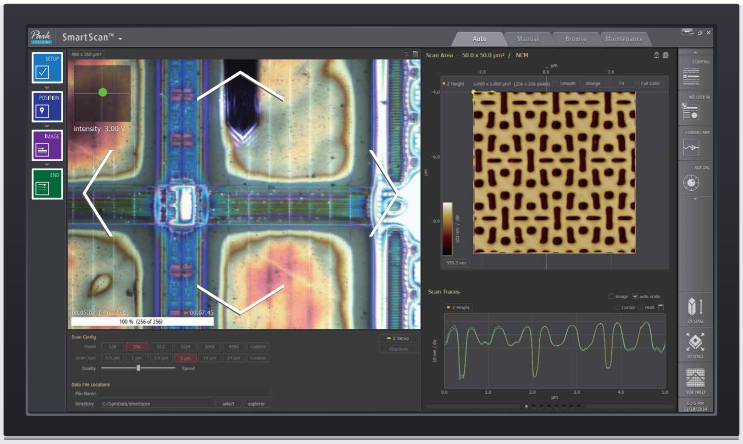
After taking 20 images

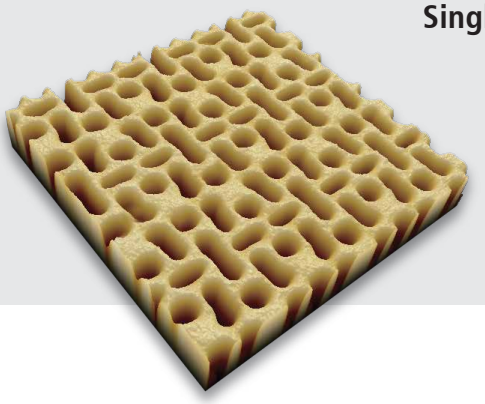


SEM (4.52 k)

Park SmartScan™
Park AFM Operating Software





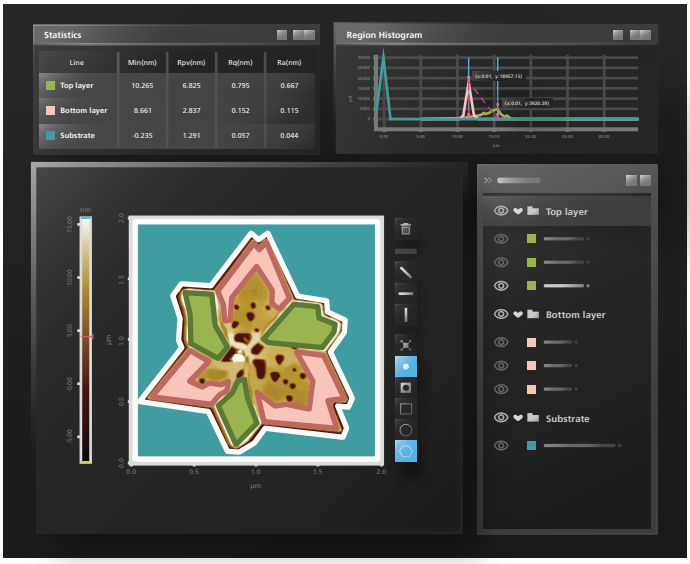


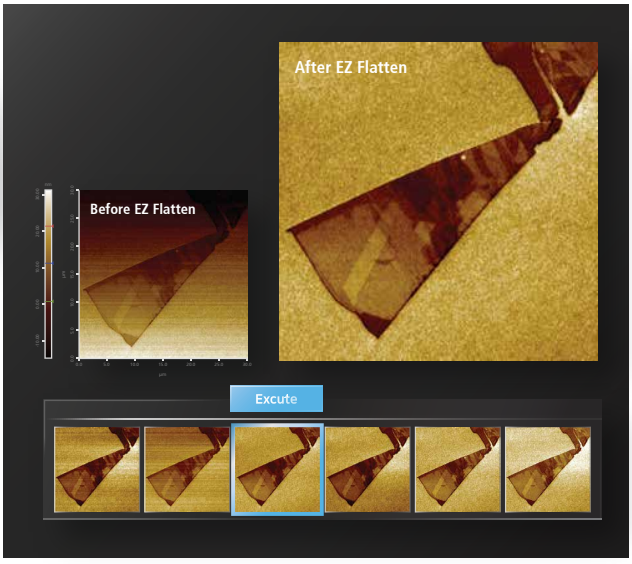
Single-click Imaging with SmartScan™ Auto Mode

All you need to specify for AFM imaging are quality-speed preference, pixel density and scan size. Outside of those factors, you can leave all sophisticated AFM parameters up to the Auto mode of SmartScan™. The system will start a measurement with optimized conditions for imaging automatically at the click of a button.

Park SmartAnalysis™
The Park AFM Image Analytics Software

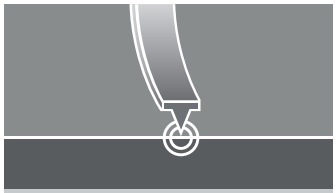
Park SmartAnalysis™ is an atomic force microscopy image processing and data analysis software for Park AFM.
It is the next generation image analytics software with powerful features and newly added automated functions.
Park SmartAnalysis enables users to swiftly prepare, analyze and publish their AFM acquired images and measurements.



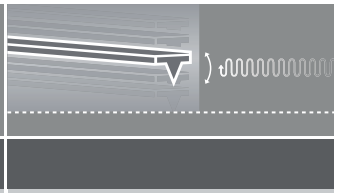


Park Atomic Force Microscopy Modes

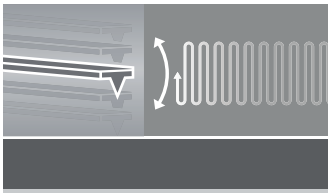
Get the data you need with Park's selection of scanning modes



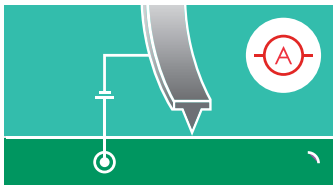
Contact



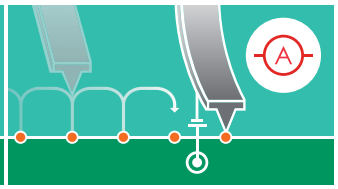
Non-Contact



Tapping



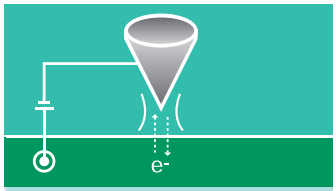
Conductive AFM



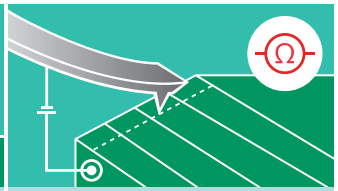
PinPoint Conductive AFM

IV Spectroscopy

Photocurrent Mapping

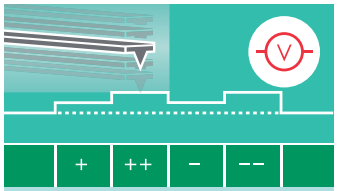


Scanning Tunneling Microscopy

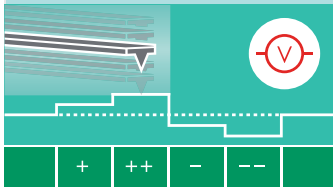


Scanning Spreading Resistance Microscopy

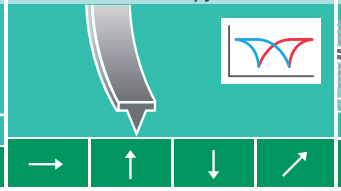
Scanning Capacitance Microscopy



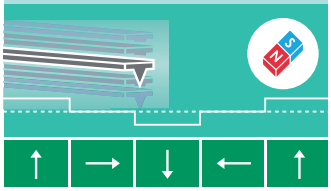
Electrostatic Force Microscopy



Kelvin Probe Force Microscopy



Piezoresponse Force Microscopy

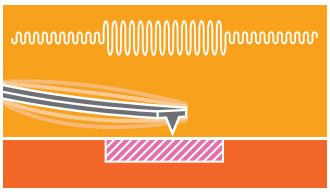


Magnetic Force Microscopy

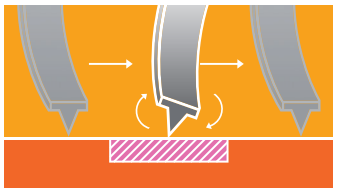
Tunable Magnetic Field MFM

Force Distance Spectroscopy

PinPoint Nanomechanical



Force Modulation Microscopy

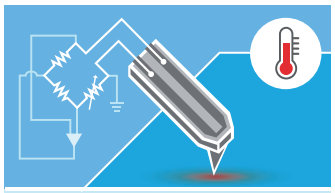


Lateral Force Microscopy

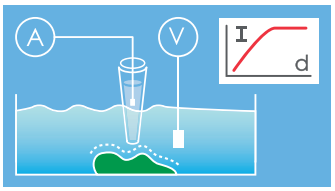
Nanoindentation

Nanolithography

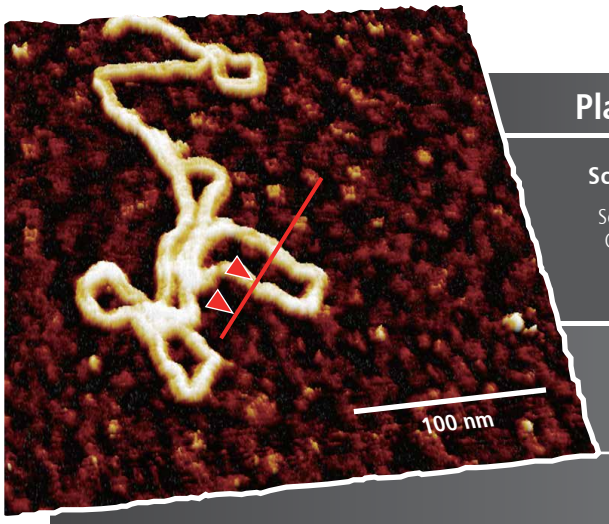
Nanomanipulation



Scanning Thermal Microscopy



Scanning Ion Conductance Microscopy

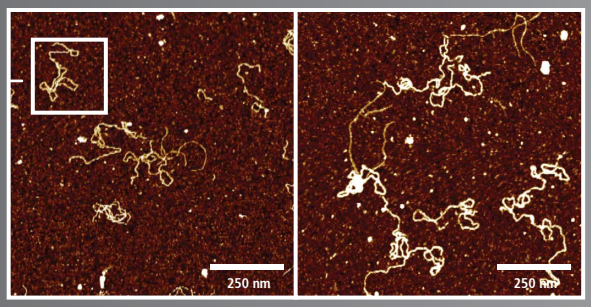


Plasmid DNA in Liquid

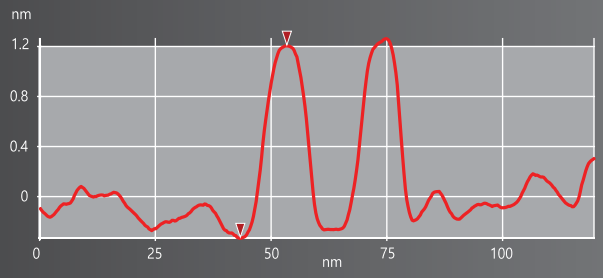
Scanning conditions

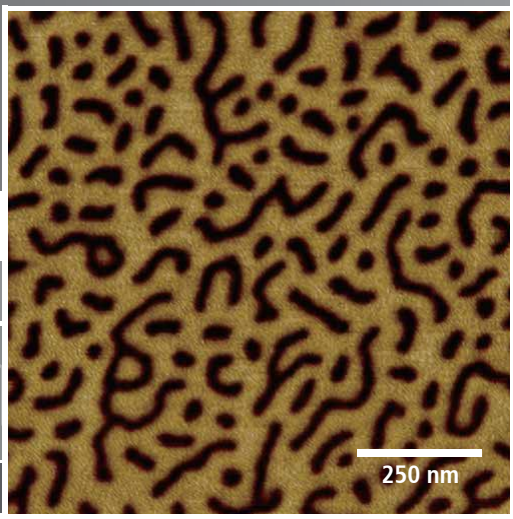
Scan Mode: Non-Contact
Cantilever: BL-AC40TS (k= 0.09 N/m, f= 110 kHz)
Option: liquid probehand and liquid cell

Position 2 Position 1



Line profile

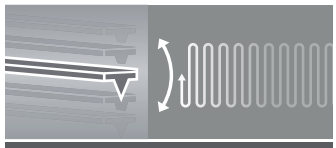




Polymer on Si

Scanning conditions

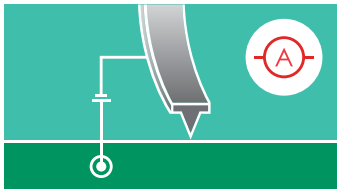
Scan Mode: Tapping
Cantilever: AC160TS (k= 26 N/m, f= 300 kHz)

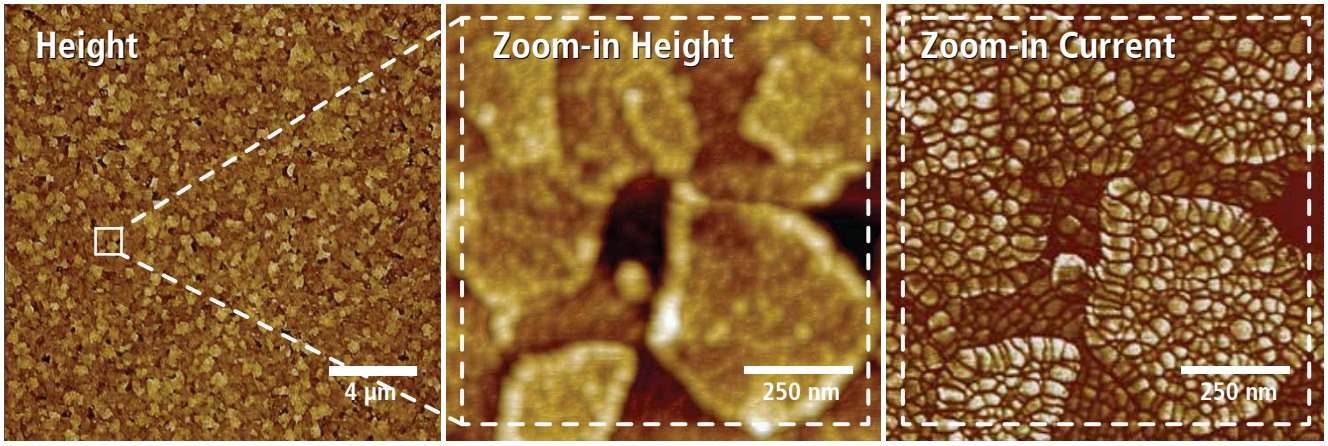


ITO Glass

Scanning conditions

Scan Mode: Conductive AFM
Cantilever: CDT-Contr (k= 0.5 N/m, f= 20 kHz)





* optional

Scanner

Z scanner

AFM Head
Flexure guided high-force scanner
Scan range: 15 µm (optional 30 µm)

SICM Head
Flexure-guided structure driven by multiply-stacked piezoelectric stacks
Z scan range: 15 µm (optional 30 µm)

XY scanner

Single module flexure XY-scanner with closed-loop control
Scan range: 50 µm × 50 µm
(optional 10 µm × 10 µm or 100 µm × 100 µm)

Stage

XY stage travel range: 20 mm x 20 mm (Motorized)
Z stage travel range: 25 mm (Motorized)
Focus stage travel range: 15 mm (Motorized)

Sample Mount

Sample size: Open space up to 100 mm x 100 mm, thickness up to 20 mm

On-Axis Optics

10x (0.21 N.A.) ultra-long working distance lens (1µm resolution)
Direct on-axis vision of sample surface and cantilever
Field-of-view : 480 × 360 µm (with 10× objective lens)
CCD : 1.2 M pixel, 5 M pixel (optional) (optional; Field-of-view: 840 µm x 630 µm)

Electronics

Integrated functions

4 channels of flexible digital lock-in amplifier
Spring constant calibration (Thermal method)
Digital Q control

Options/Modes

Standard imaging

- True Non-Contact
- Contact
- Tapping
- PinPoint™
- Lateral Force Microscopy (LFM)
- Phase Imaging
- Scanning Ion Conductance Microscopy (SICM)

Dielectric/Piezoelectric properties

- Electric Force Microscopy (EFM)
- Piezoresponse Force Microscopy (PFM)
- PFM with High Voltage*
- Contact Resonance PFM (CR-PFM)*

Electrical properties

- Conductive AFM (C-AFM)*
- IV Spectroscopy*
- Kelvin Probe Force Microscopy (KPFM)
- Sideband FM-KPFM
- Scanning Capacitance Microscopy (SCM)*
- Scanning Spreading-Resistance Microscopy (SSRM)*
- Scanning Tunneling Microscopy (STM)*
- Photo Current Mapping (PCM)*

Mechanical properties

- Force Modulation Microscopy (FMM)
- Nanoindentation
- Nanolithography*
- Nanolithography with High Voltage*
- Nanomanipulation*

Magnetic properties

- Magnetic Force Microscopy (MFM)
- Tunable Magnetic Field MFM*

Thermal properties*

- Scanning Thermal Microscopy (SThM)

Force measurement

- Force Distance (F/d) Spectroscopy
- Force Volume Imaging

Chemical properties*

- Chemical Force Microscopy with Functionalized Tip
- Electrochemical Microscopy (EC-AFM)
- Scanning Ion Conductance Microscopy (SICM)
- Scanning Electrochemical Cell Microscopy Single Barrel (SECCM Single Barrel)
- Scanning Ion Conductance Microscopy-Scanning Electrochemical Microscopy (SICM-SECM)
- Current-Distance (I/d) Spectroscopy (with SICM)

Software

Park SmartScan™

- AFM system control and data acquisition software
- Auto mode for quick setup and easy imaging
- Manual mode for advanced use and finer scan control

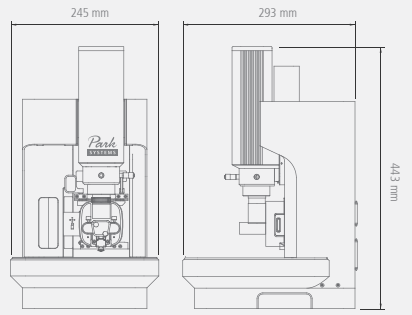
Park SmartAnalysis™

- AFM data analysis software
- Stand-alone design—can install and analyze data away from AFM
- Capable of producing 3D renders of acquired data

Accessories*

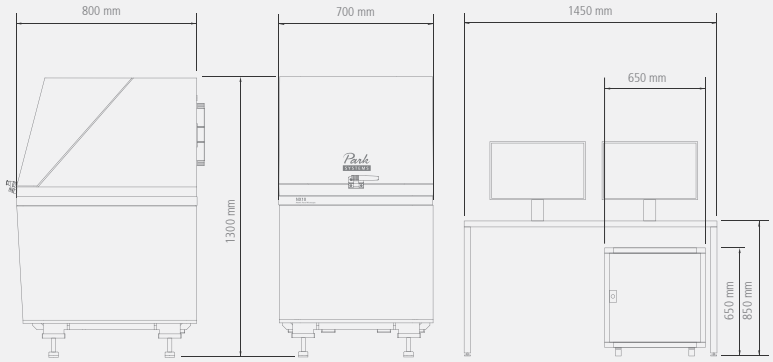
- Universal Liquid Cell with Temperature Control
- Temperature Controlled Stages
- Electrochemistry Cell
- Glove Box
- Magnetic Field Generator
- Tilting Sample Chuck

Park NX10



* Optional

Park NX10 Full System with Acoustic Enclosure



Committed to contributing to impactful science and technology

Park Systems Corporation is a leading manufacturer of nanoscale microscopy and metrology solutions that encompasses the atomic force microscopy, white light interferometry, infrared spectroscopy and ellipsometry systems. Its products are widely used for scientific research, nanoscale engineering, and semiconductor fabrication and quality assurance. Park Systems provides a full range of AFM products from desktop to fully automated systems with integrated robotic arms. Furthermore, its product line includes WLI AFM, Photo-induced Force Microscopy spectroscopy and ellipsometry systems for those in the chemistry, materials, physics, life sciences, and semiconductor industries. In 2022, Park Systems acquired and merged Accurion GmbH, a leader in high-end ellipsometry and active vibration isolation, to form Park Systems GmbH, Accurion Division.

Park Systems is a publicly traded corporation on the Korea Stock Exchange (KOSDAQ) with corporate headquarters in Suwon, Korea, and regional headquarters in Santa Clara, California, Mannheim, Germany, Paris, France, Beijing, China, Tokyo, Japan, Singapore, India, and Mexico. To learn more, please visit www.parksystems.com.

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