

Enabling Nanoscale Advances

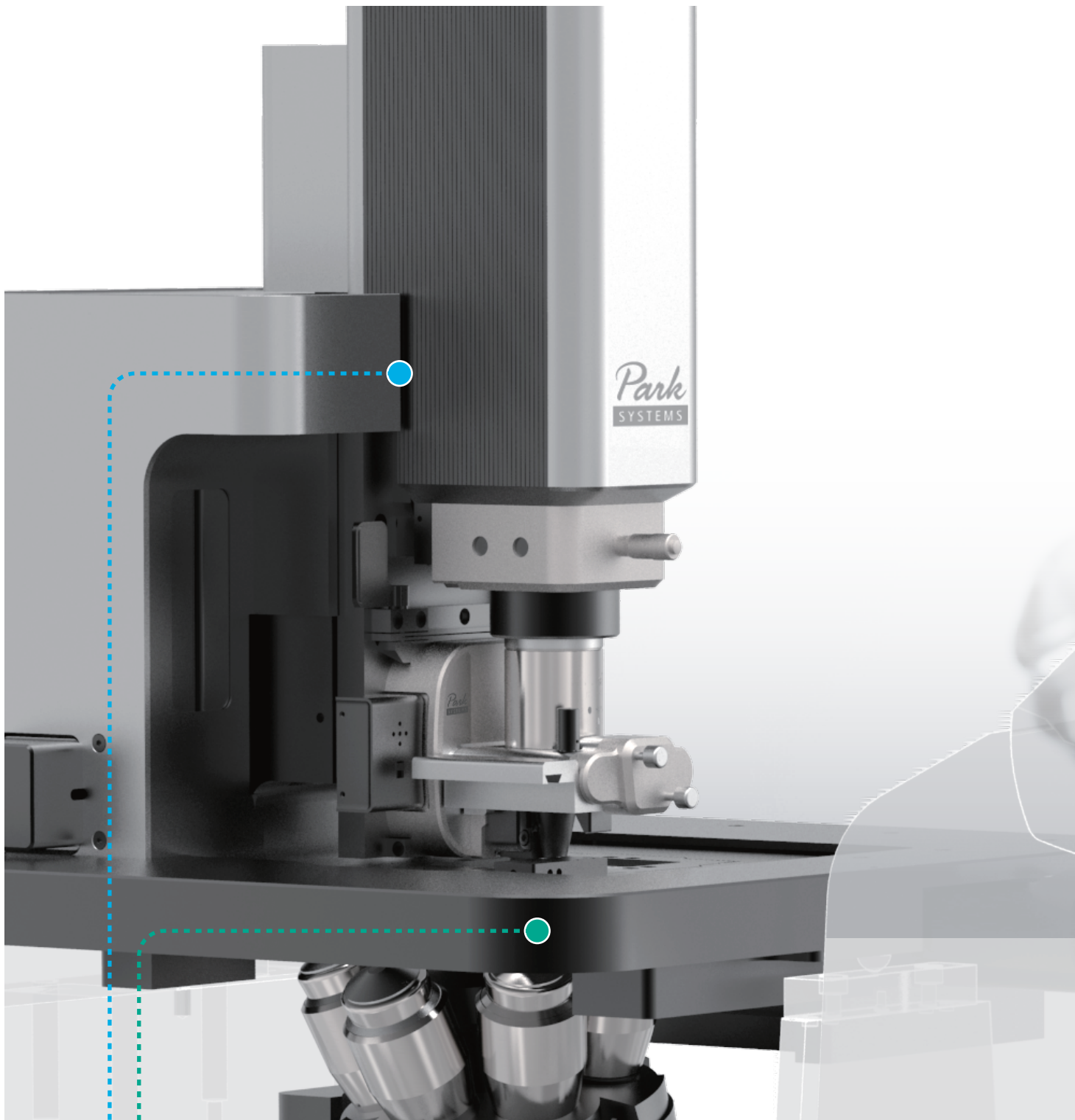


Park NX12

**The most versatile AFM platform
for your nanoscale microscopy needs**

- Atomic Force Microscopy (AFM) for nanometer resolution imaging with electrical, magnetic, thermal, and mechanical property measurement capabilities
- Pipette-based scanning system for high resolution Scanning Ion Conductance Microscopy (SICM)
- Inverted Optical Microscopy (IOM) for transparent material research and fluorescence microscopy integration





- Proven NX10 Performance
- Equipped with Inverted Optical Microscopy

Park NX12 couples the versatility and accuracy of Park AFM with a sample stage for inverted optical microscopy. This allows users to easily set up pipette-based techniques and work with samples that are transparent or opaque and soft or hard.

The perfect platform for fundamental electrochemistry

The study of the electrochemistry of batteries, fuel cells, sensors, and corrosion is a rapidly growing field, yet many AFMs do not directly address its unique needs. Park NX12 offers the functionality and flexibility chemistry researchers require by giving them one simple, easy-to-use platform with all the tools they need including:

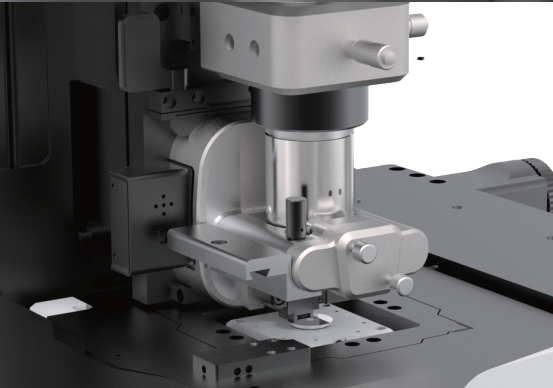
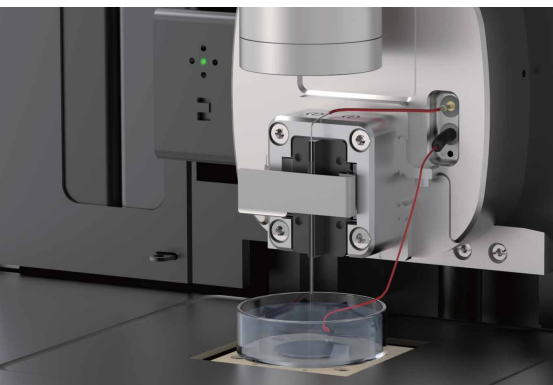
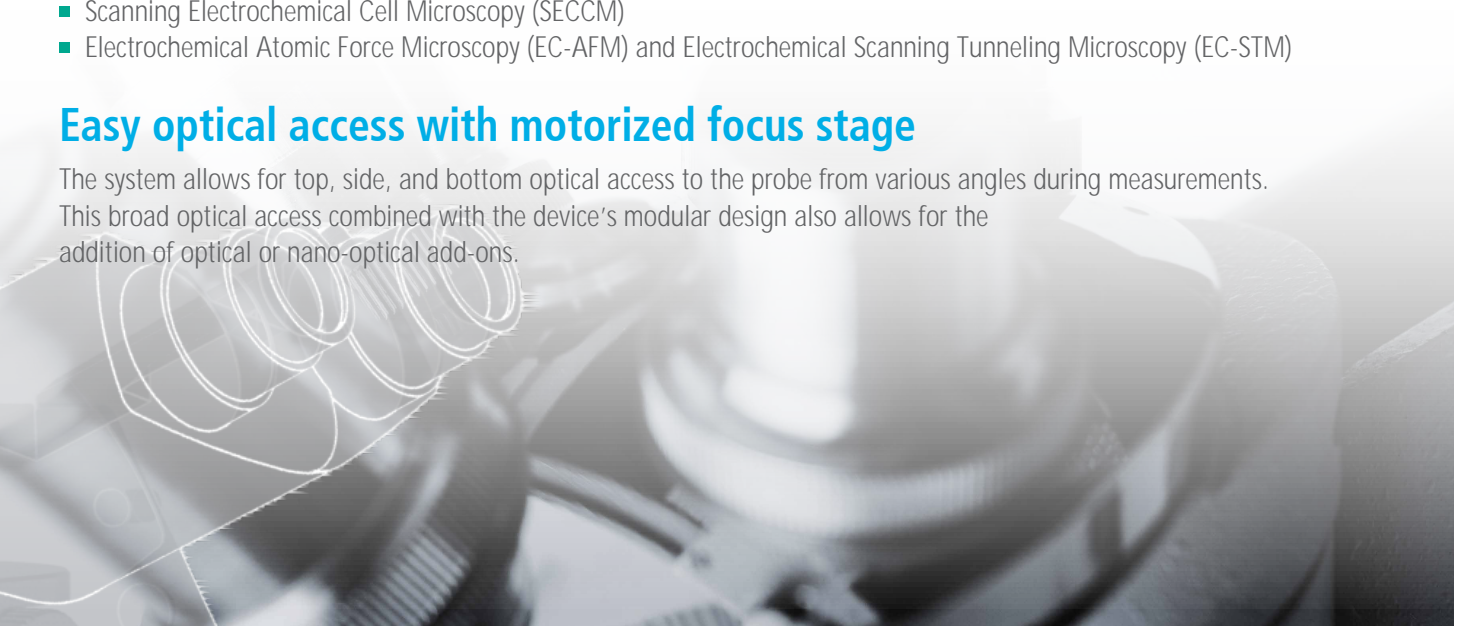
- Versatile and easy-to-use electrochemistry cells
- Environmental control options for inert gas and humidity
- Bi-potentiostat compatibility

Researchers can utilize the Park NX12 platform for various electrochemical applications:

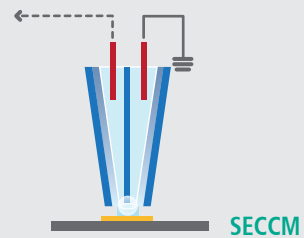
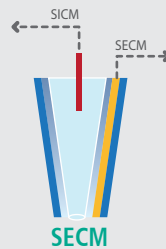
- Scanning Electrochemical Microscopy (SECM)
- Scanning Electrochemical Cell Microscopy (SECCM)
- Electrochemical Atomic Force Microscopy (EC-AFM) and Electrochemical Scanning Tunneling Microscopy (EC-STM)

Easy optical access with motorized focus stage

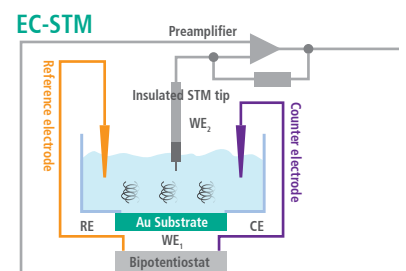
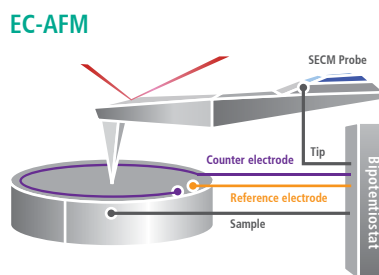
The system allows for top, side, and bottom optical access to the probe from various angles during measurements. This broad optical access combined with the device's modular design also allows for the addition of optical or nano-optical add-ons.

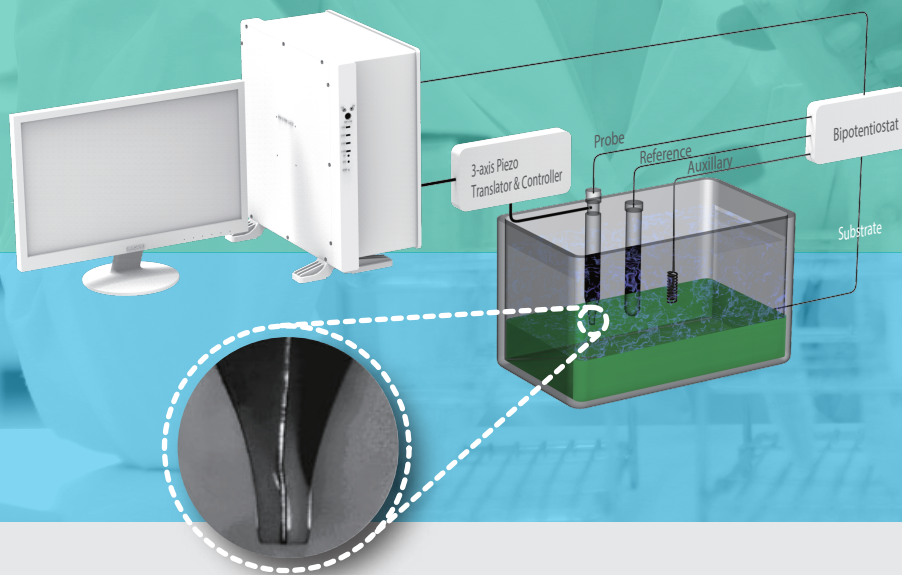


SICM-based electrochemistry applications



AFM-based electrochemistry applications





Built with multi-user facilities in mind

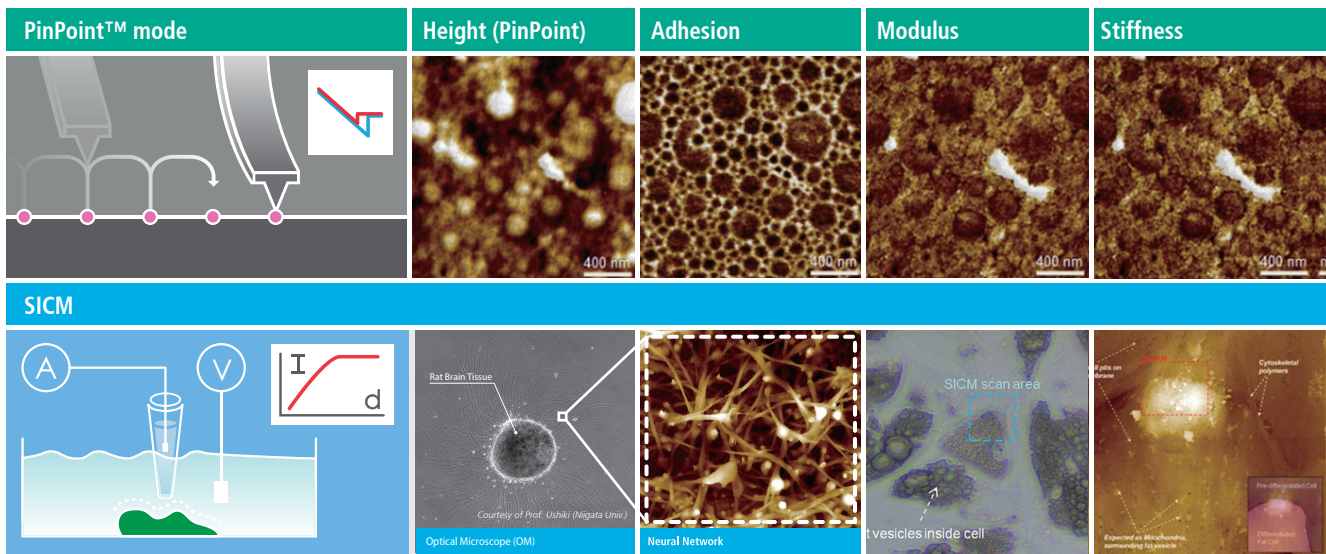
Park NX12 was built from the ground up to accommodate the needs of multi-user facilities. Other AFM solutions lack the required versatility to address the diverse needs of users in these facilities, making it difficult to justify the equipment cost. The Park NX12, however, is built to accommodate standard ambient AFM, in-liquid SPM, optical, and nano-optical imaging, making it one of the most flexible AFMs available.

A modular platform for shared user facilities

- The Park NX12 is an AFM platform specifically tailored to address the needs of analytical and electrochemistry researchers as well as others working in shared use facilities.
- It provides a versatile solution for SPM-based characterization of chemical and electrochemical properties and surface characterization in both air and liquid media for a broad range of opaque and transparent materials.
- The Park NX12 is easy to use for pipette-based SPM techniques with broad visual optical access to the scanning probe.
- The Park NX12's reasonable price and unparalleled accuracy makes it the ideal platform for multi-user facilities as well as early career researchers.

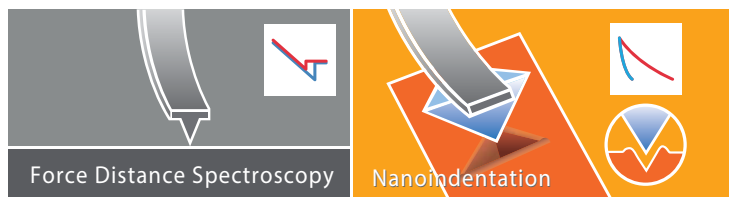
Multiple applications

The Park NX12 can serve a wide range of functions, including PinPoint™ in-liquid and nanomechanical mapping, inverted optical microscopy to locate transparent samples, SICM for imaging ultra-soft samples, and enhanced vision to improve optics for transparent samples.



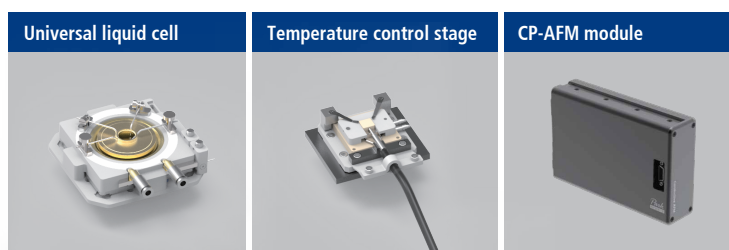
Comprehensive force spectroscopy solution

The Park NX12 provides a complete package for nanomechanical characterization in-liquid and in-air, making it ideal for a wide range of applications.



Modular

We make it easy to modify the Park NX12 to suit the unique needs of your lab by installing optional hardware and software add-ons even after installation.

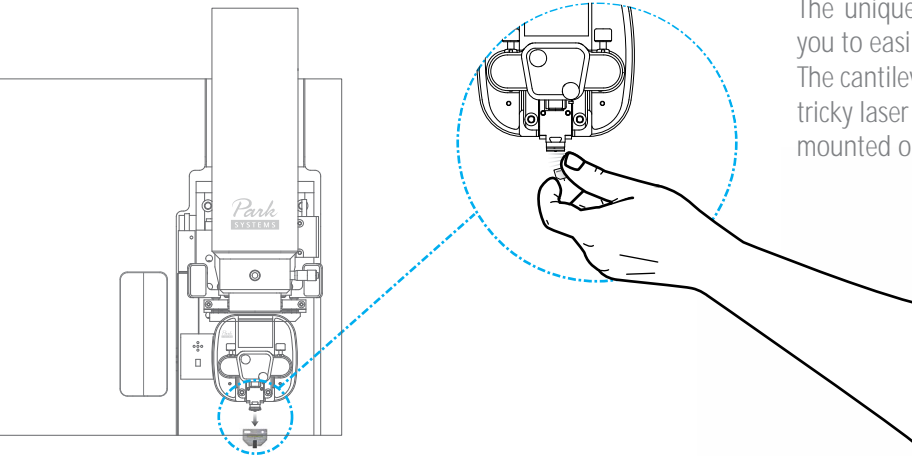


Park NX12

Why the world's most accurate small sample AFM is also the easiest to use

Easy tip and sample exchange

The unique head design allows easy side access allowing you to easily snap new tips and samples into place by hand. The cantilever is ready for scanning without the need for any tricky laser beam alignment by using pre-aligned cantilevers mounted on to the cantilever tip holder.



Lightning fast automatic tip approach

Our automatic tip-to-sample approach requires no user intervention. By monitoring the cantilever's response to the approaching surface, Park NX12 can initiate and complete an automatic fast tip-to-sample approach within 10 seconds of the cantilever's loading. Fast feedback by the high-speed Z-scanner and low-noise signal processing by the NX electronics controller enable quick engagement to the sample surface without any user intervention. It just works; minimal user involvement is required.

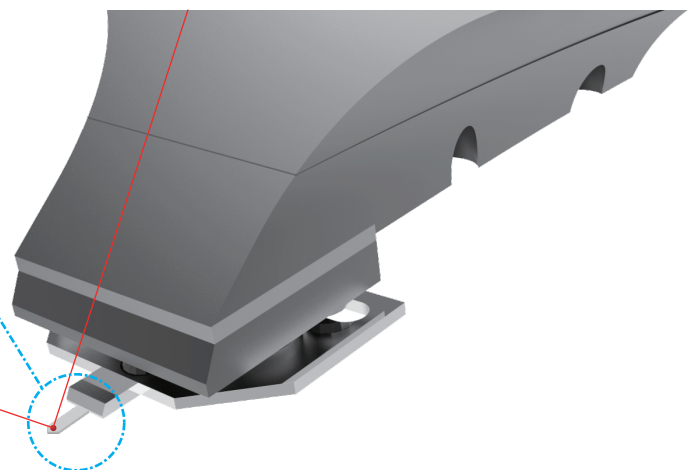
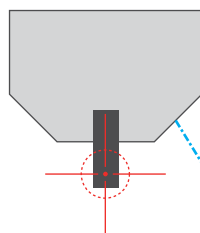
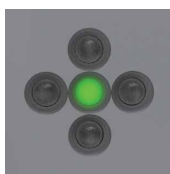


Easy, intuitive laser beam alignment

With our advanced pre-aligned cantilever holder, the **laser beam** is focused on the cantilever upon placement. Furthermore, the natural on-axis, top-down view—the only one in the industry—allows you to easily find the laser spot. Since the laser beam falls vertically onto the cantilever, you can intuitively move the laser spot along the X- and Y-axis by rotating two positioning knobs. As a result, you can easily find the laser and position it onto the position-sensitive photodiode using our operation software's beam alignment user interface. From there, all you will need is a minor adjustment to maximize the signal prior to starting data acquisition.



The laser beam is always focused on the probe tip upon cantilever replacement.



Park SmartScan™

Park AFM Operating Software



Pixel / Scan size
Quality / Speed

Quality Speed

Start with sample A

- 1 SETUP
- 2 POSITION
- 3 IMAGE
- 4 END

Start with new sample B

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.

Line	Min(nm)	RpV(nm)	Rq(nm)	Ra(nm)
Top layer	10.265	6.825	0.795	0.667
Bottom layer	8.661	2.837	0.152	0.115
Substrate	-0.235	1.291	0.057	0.044

Before EZ Flatten

After EZ Flatten

Excute

Park NX12

Adaptable to any project

The wide range of scanning modes and modular design of the NX series allows it to be easily tailored to the needs of any scanning probe microscopy project.

Standard Imaging

- True Non-Contact AFM
- Basic Contact AFM
- Lateral Force Microscopy (LFM)
- Phase Imaging
- Intermittent (tapping) AFM

Chemical Properties

- Scanning Electrochemical Cell Microscopy (SECCM)
- Scanning Electrochemical Microscopy (SECM)
- Electrochemical Microscopy (EC-AFM)
- Chemical Force Microscopy with Functionalized Tip

Mechanical Properties

- PinPoint Nanomechanical Mapping
- Force Modulation Microscopy (FMM)
- Nanoindentation
- Nanolithography
- Nanolithography with High Voltage
- Nanomanipulation

Electrical Properties

- Conductive AFM
- I-V Spectroscopy
- Kelvin Probe Force Microscopy (KPFM)
- KPFM with High Voltage
- Scanning Capacitance Microscopy (SCM)
- Scanning Spreading-Resistance Microscopy (SSRM)
- Scanning Tunneling Microscopy (STM)
- Photo Current Mapping (PCM)

Thermal Properties

- Scanning Thermal Microscopy (SThM)

Magnetic Properties

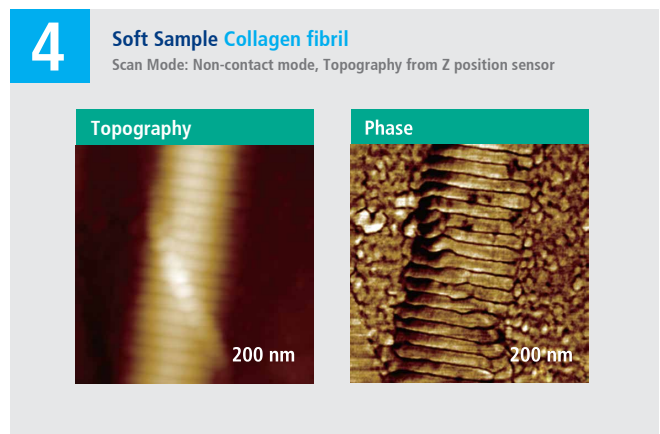
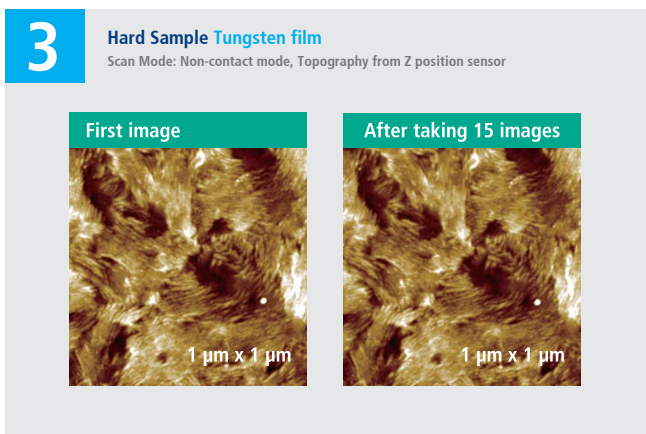
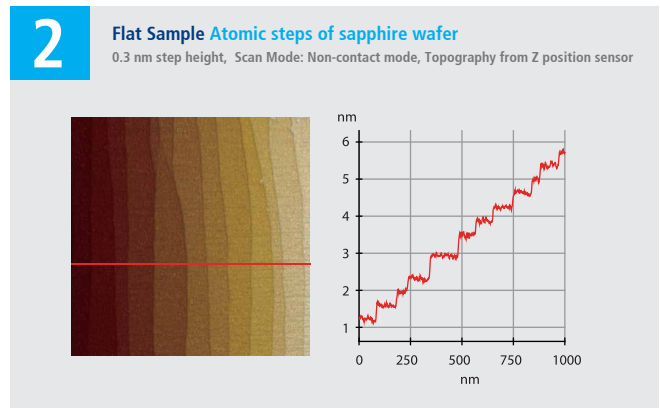
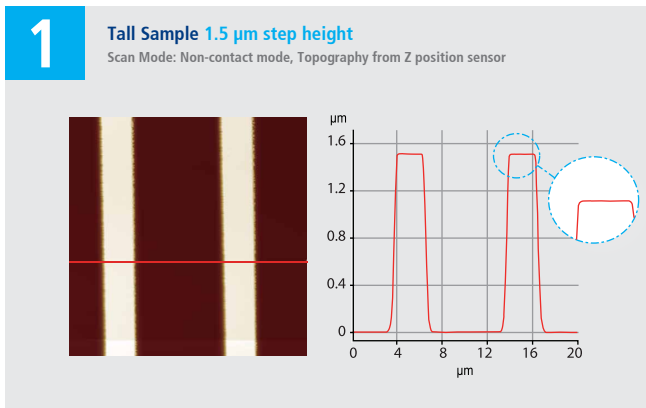
- Magnetic Force Microscopy (MFM)
- Tunable MFM

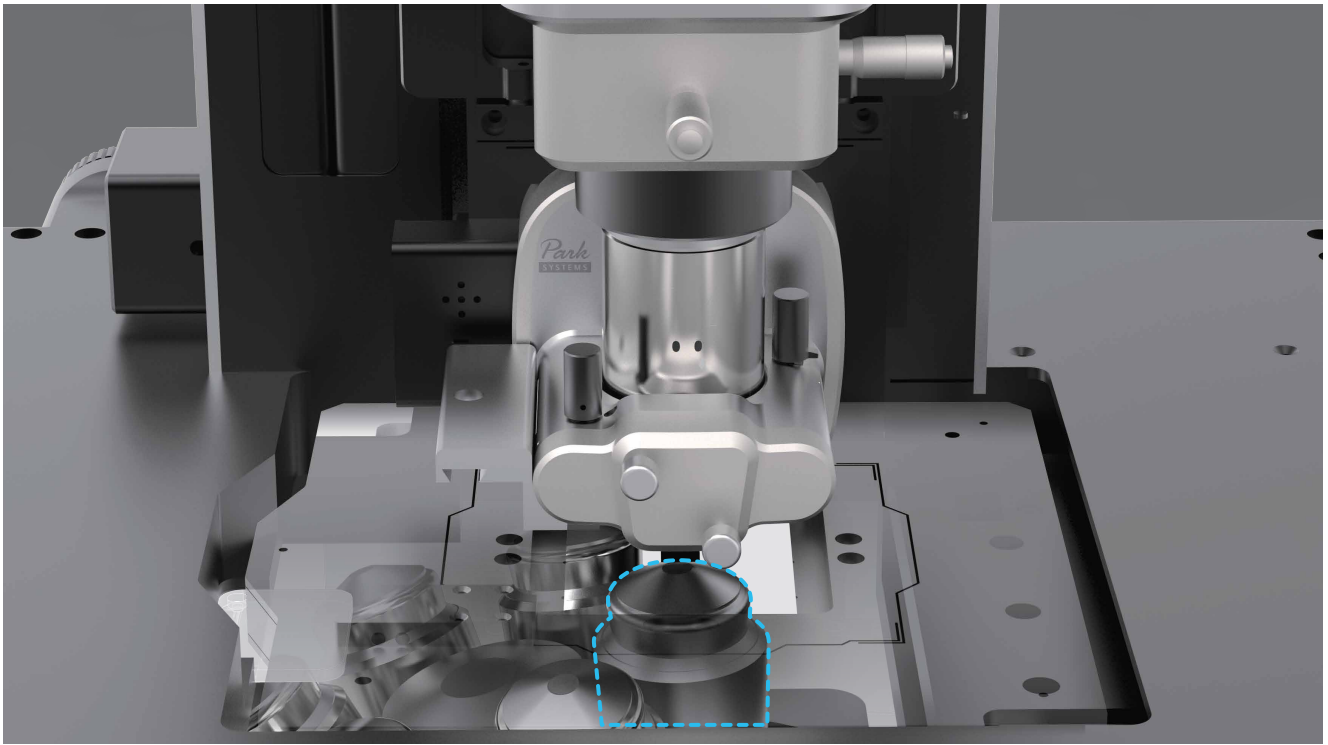
Dielectric/Piezoelectric Properties

- Electric Force Microscopy (EFM)
- Dynamic Contact EFM (DC-EFM)
- Piezoresponse Force Microscopy (PFM)
- PFM with High Voltage

Force Measurement

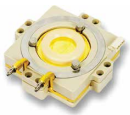
- Force Distance (F/d) Spectroscopy
- Force Volume Imaging
- Spring Constant Calibration by Thermal Method





Options

A wide range of environment control options including versatile electrochemistry cells, temperature stage, and glovebox with humidity control.



Electrochemistry cells

- Electrochemistry cell
- Electrochemistry toolkit for universal liquid cell



Z Scanner Heads

- 15 µm Z Scanner AFM head
- 30 µm Z Scanner AFM head
- 15 µm Z Scanner SICM module
- 30 µm Z Scanner SICM module



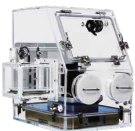
Electrochemistry options

- Potentiostat
- Bi-potentiostat



In-Liquid Imaging Options

- Liquid probe hand
- Open liquid cell
- Universal liquid cell



Environmental Control Options

- Glovebox
- Live cell chamber



Acoustic Enclosure

- Stand alone type AE 204
- Stand alone type AE 302



Temperature Controlled Stages

- Temperature controlled stage (-25 ~170 °C)
- 250 °C heating stage
- 600 °C heating stage



Clip-type Chip Carrier

- Can be used with unmounted cantilever
- Tip bias function available for conductive AFM and EFM
- Tip bias range: -10 V ~ 10 V



Magnetic Field Generator

- Applies external magnetic field parallel to sample surface
- Tunable magnetic field
- Range: ~ 300 gauss



Starter kits for advanced modes

- Easy to use for advanced modes
- Includes specialized probes and samples

Park NX12

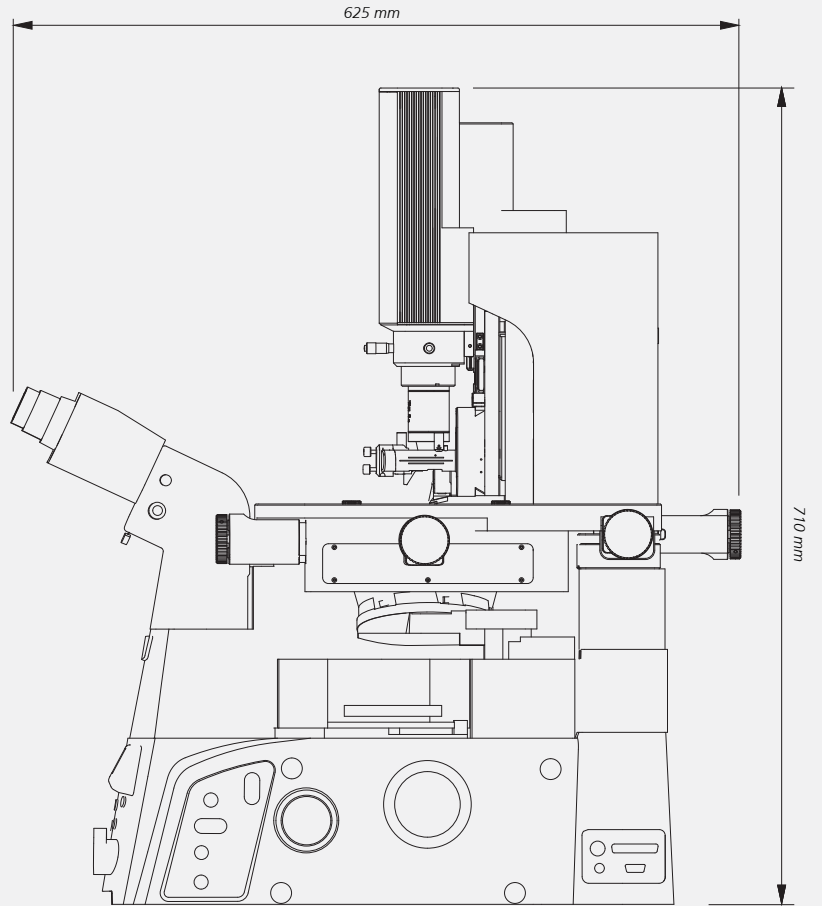
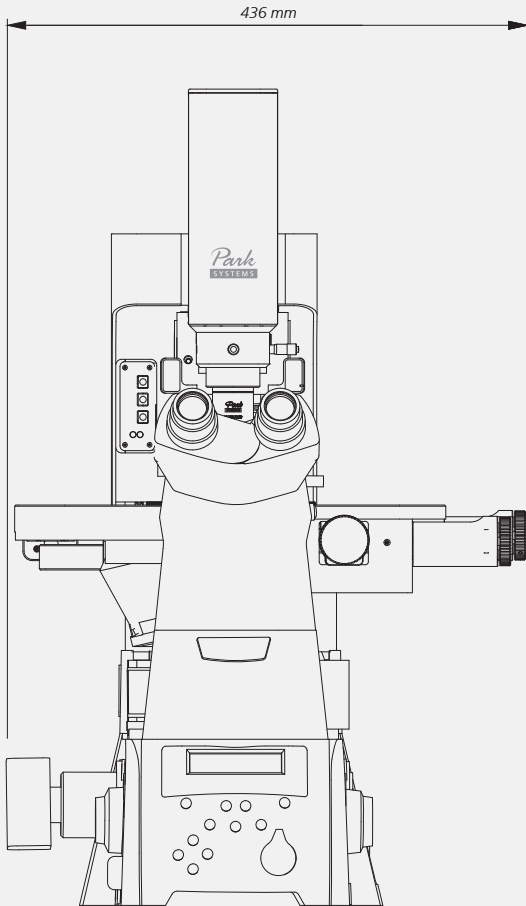
Specification

* optional

Scanner	Z scanner	XY 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 Scan range: 15 μm (optional 30 μm)	
		Flexure guided XY scanner with closed-loop control Scan range: 100 x 100 μm	
Stage	XY stage travel range	Z stage travel range	Focus stage travel range
	10 mm x 10 mm (Motorized)	25 mm (Motorized)	15 mm (Motorized)
Sample Mount	Sample size	Inverted Optical Microscopy	
	Open space up to 50 mm x 50 mm, thickness up to 20 mm (Sample size less than 40 mm x 40 mm recommended using SPM modes)	Fluorescence microscopy (optional) Confocal microscopy (optional)	
On-Axis Optics	Electronics		Integrated functions
	10x (0.21 NA) ultra-long working distance lens (1 μm resolution) Direct on-axis vision of sample surface and cantilever Field-of-view : 840 x 630 μm (with 10 \times objective lens) CCD : 5 M Pixel, 1.2 M Pixel (optional)		4 channels of flexible digital lock-in amplifier Spring constant calibration (Thermal method) Digital Q control
Options/Modes	Standard imaging	Chemical properties*	Dielectric/Piezoelectric properties
	<ul style="list-style-type: none"> • True Non-Contact • Contact • Tapping • PinPoint™ • Lateral Force Microscopy (LFM) • Phase Imaging • Scanning Ion Conductance Microscopy (SICM) 	<ul style="list-style-type: none"> • 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) 	<ul style="list-style-type: none"> • Electric Force Microscopy (EFM) • Piezoresponse Force Microscopy (PFM) • PFM with High Voltage* • Contact Resonance PFM (CR-PFM)*
	Force measurement	Magnetic properties	Thermal properties*
	<ul style="list-style-type: none"> • Force Distance (F/d) Spectroscopy • Force Volume Imaging 	<ul style="list-style-type: none"> • Magnetic Force Microscopy (MFM) • Tunable Magnetic Field MFM* 	<ul style="list-style-type: none"> • Scanning Thermal Microscopy (SThM)
	Electrical properties		Mechanical properties
	<ul style="list-style-type: none"> • Conductive AFM (C-AFM)* • IV Spectroscopy* • Kelvin Probe Force Microscopy (KPFM) • Sideband FM-KPFM • Scanning Capacitance Microscopy (SCM)* 	<ul style="list-style-type: none"> • Scanning Spreading-Resistance Microscopy (SSRM)* • Scanning Tunneling Microscopy (STM)* • Photo Current Mapping (PCM)* 	<ul style="list-style-type: none"> • Force Modulation Microscopy (FMM) • Nanoindentation • Nanolithography* • Nanolithography with High Voltage* • Nanomanipulation*
Software	Park SmartScan™	Accessories*	
	<ul style="list-style-type: none"> • AFM system control and data acquisition software • Auto mode for quick setup and easy imaging • Manual mode for advanced use and finer scan control 	<ul style="list-style-type: none"> • Liquid Probehead • Universal Liquid Cell with Temperature Control • Live Cell Chamber • Temperature Controlled Stage 1, 2 and 3 • Electrochemistry Cell • GloveBox • High-field Magnetic Field Generator • Tilting Sample Chuck • Snap-in Sample Chuck 	
	Park SmartAnalysis™		
	<ul style="list-style-type: none"> • AFM data analysis software • Stand-alone design—can install and analyze data away from AFM • Capable of producing 3D renders of acquired data 		

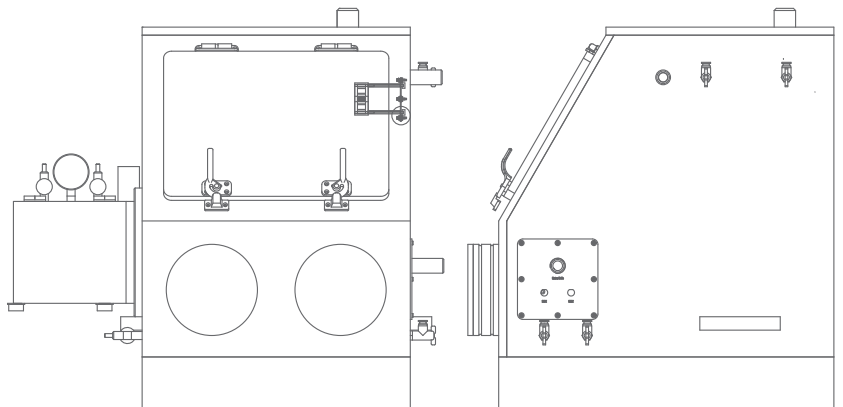
Dimensions in mm

Park NX12 with IOM



* GloveBox (Optional)

- Allows precise control over the humidity
- Makeup of specified gaseous environments
- Allowing you to insulate highly reactive materials





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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