

Enabling Nanoscale Advances



# Park NX7

The affordable choice for the first step AFM research with the latest NX components





# Park NX7

The most affordable research grade AFM with flexible sample handling

Park NX7 has all the state-of-the-art technology you have come to expect from Park Systems, at a price your lab can afford. Designed with the same attention to detail as our more advanced models, NX7 allows you to do your research on time and within budget.

## 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

## The Most Extensible AFM Solution

- The most comprehensive range of SPM modes
- Advanced nanomechanical measurement modes are supported as default enabled by NX electronic controller
- The best option compatibility and upgradeability in the industry

## User Experience-Driven Software and Hardware Features

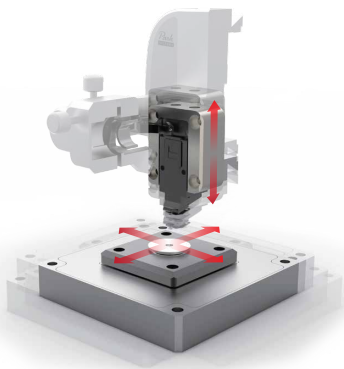
- Open side access for easy sample or tip exchange
- Easy, intuitive laser alignment with pre-aligned tip mount
- Park SmartScan™ - AFM operating software versatile enough to empower both novices and power users alike toward great nanoscale research

# Park NX7

## 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.



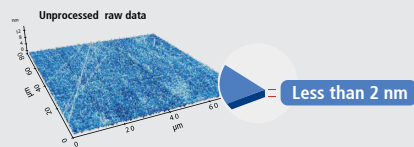
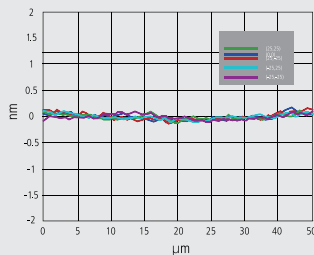
#### Decoupled XY and Z Scanners

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

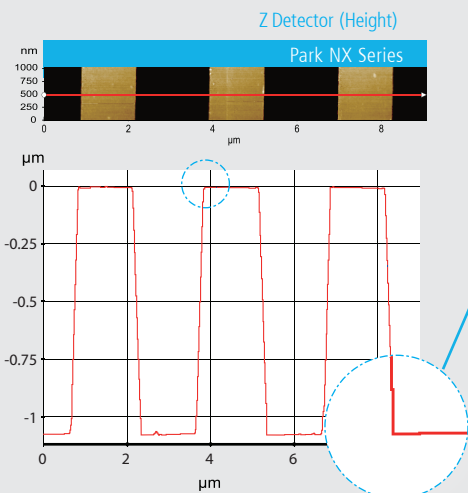
"Flat" sample surface as it is!

- 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

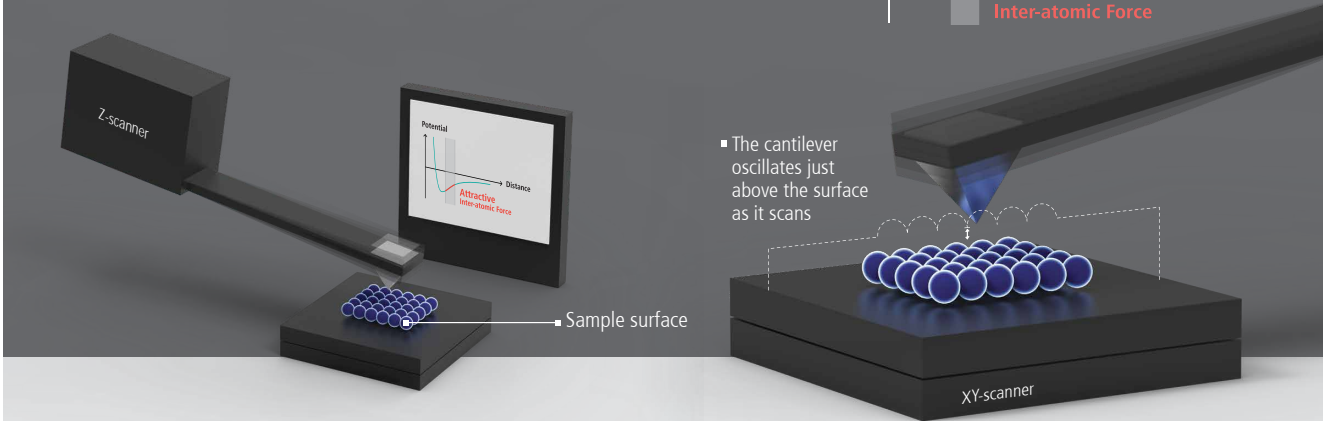
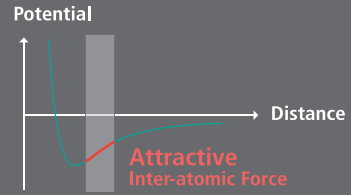
Sample: 1.2  $\mu\text{m}$  Nominal Step Height  
(9  $\mu\text{m}$  x 1  $\mu\text{m}$ , 2048 pixels x 128 lines)

# 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.

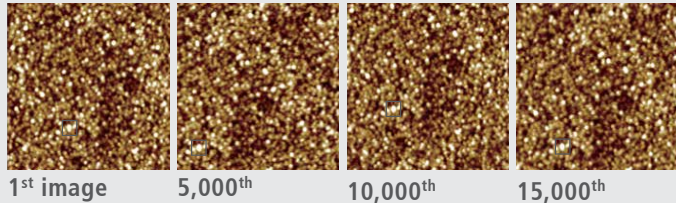
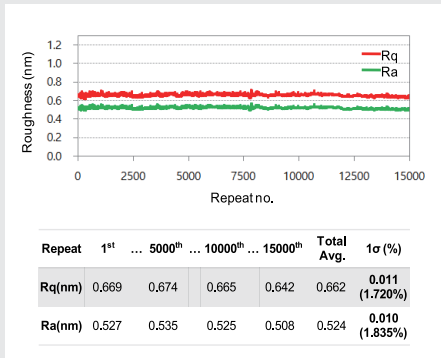
## Accurate Feedback by Faster Z-servo enables True Non-Contact AFM

- 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

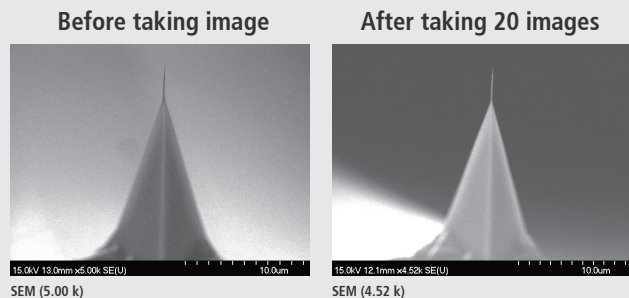
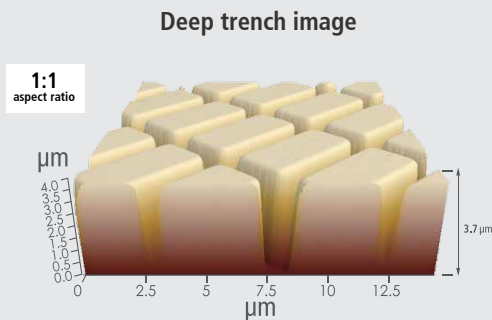


Unlike in contact mode, where the tip contacts the sample continuously during a scan, or in tapping mode, where the tip touches the sample periodically, a tip used in non-contact mode does not touch the sample.

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.



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.



# 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™

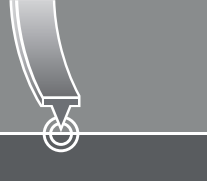
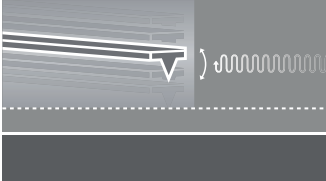
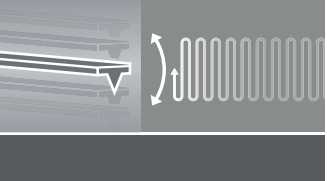

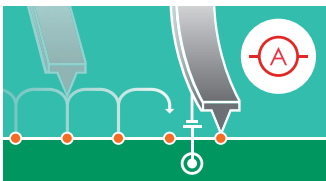


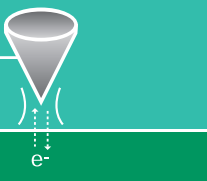
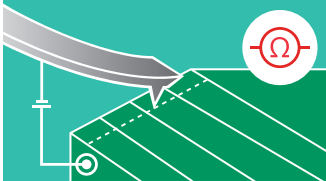


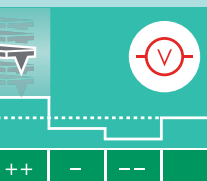
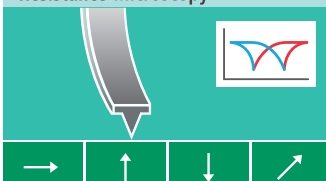
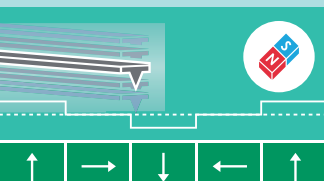
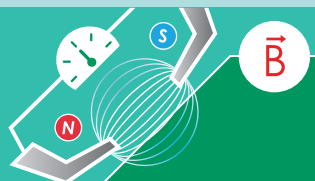


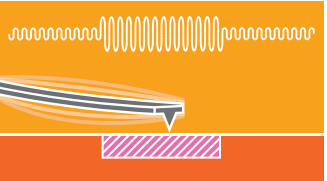
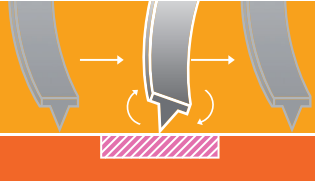



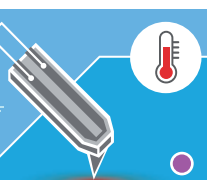
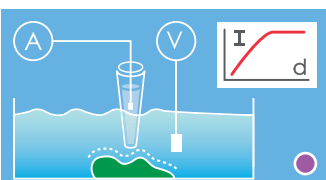
## The Park AFM Image Analytics Software

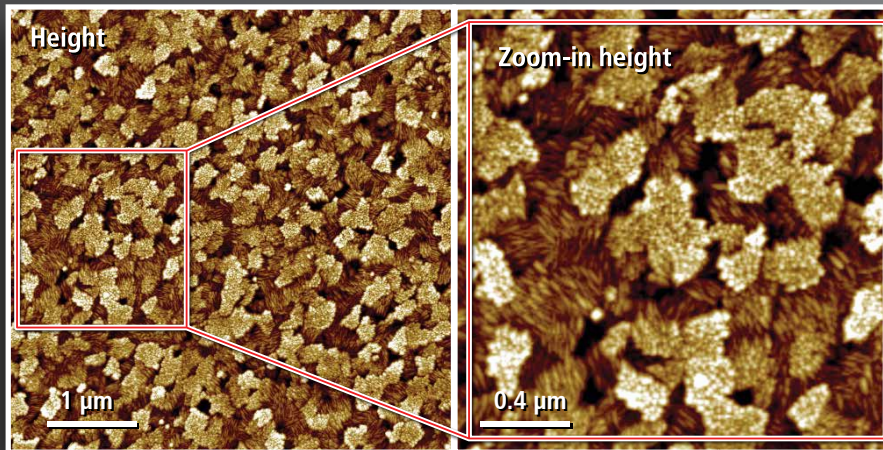
Park SmartAnalysis™ is an atomic force microscopy image processing and data analysis software for Park AFM. It is the next generation image analytics software with powerful features and newly added automated functions. Park SmartAnalysis enables users to swiftly prepare, analyze and publish their AFM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

Line	Min(nm)	Rpy(nm)	Rq(nm)	Ra(nm)
Top layer	10.265	6.825	0.795	0.667
Bottom layer	8.661	2.837	0.152	0.119
Substrate	-0.235	1.291	0.057	0.044

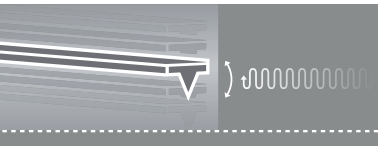
# Park Atomic Force Microscopy Modes

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		
			● NOT AVAILABLE FOR THIS PRODUCT



### ITO coated Quarts chip

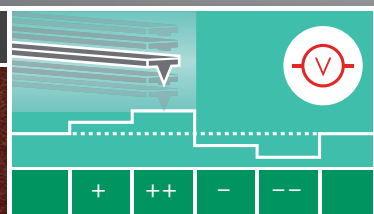
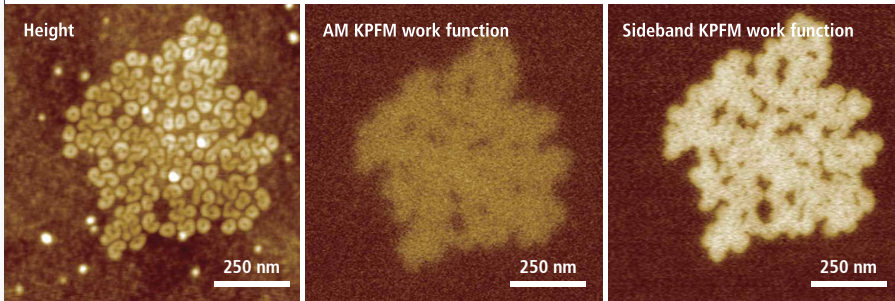


#### Scanning conditions

Scan Mode: Non-Contact  
 Scan Size: 5 μm x 5 μm, 2 μm x 2 μm  
 Cantilever: AC160TS (k= 26 N/m, f= 300 kHz)

Sample courtesy: Kee-Hyun Paik, Multerra Bio, Inc., US

### F<sub>14</sub>H<sub>20</sub> on Si; Work function



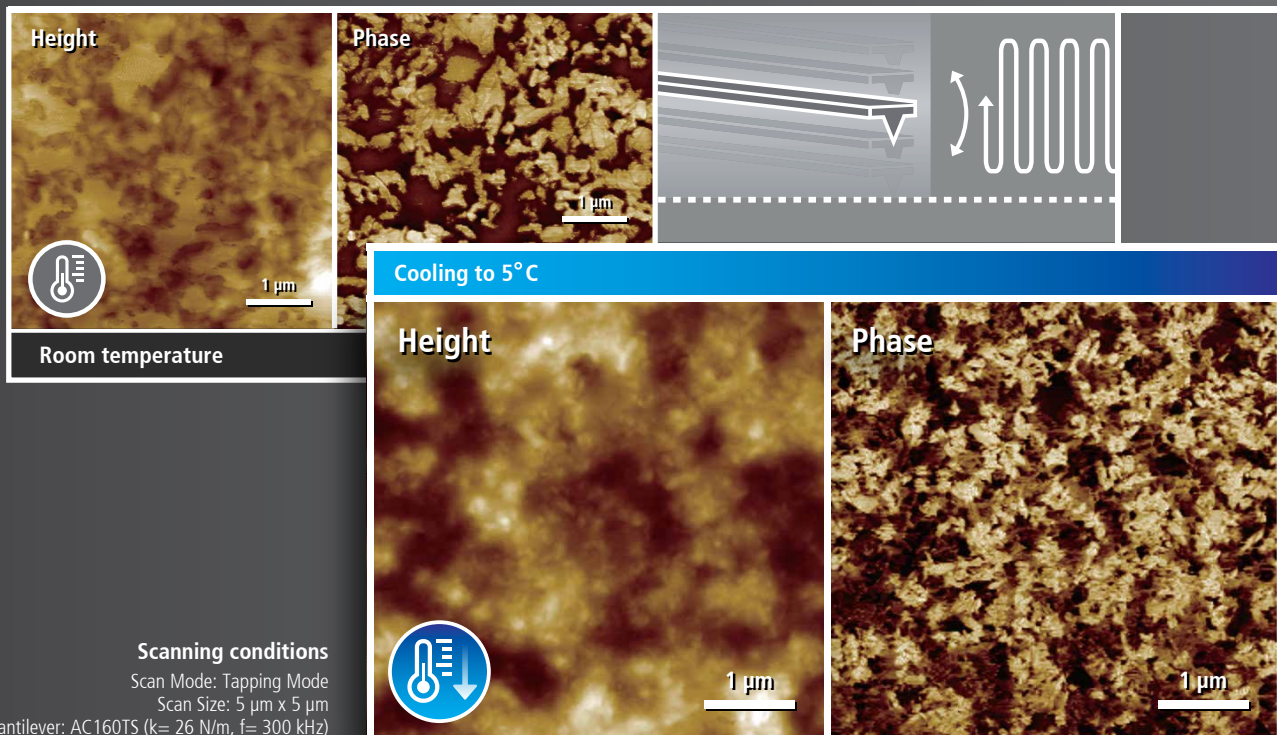
#### Scanning conditions

Scan Mode: KPFM  
 Scan Size: 1 μm x 1 μm  
 Cantilever: PPP-EFM (k= 2.8 N/m, f= 75 kHz)

The same image color scale was used for work function image comparison.  
 Sideband KPFM shows the better image quality and quantitative results compared to AM KPFM

### Margarines

### Phase change of Margarine surface by temperature control



Room temperature

Cooling to 5°C

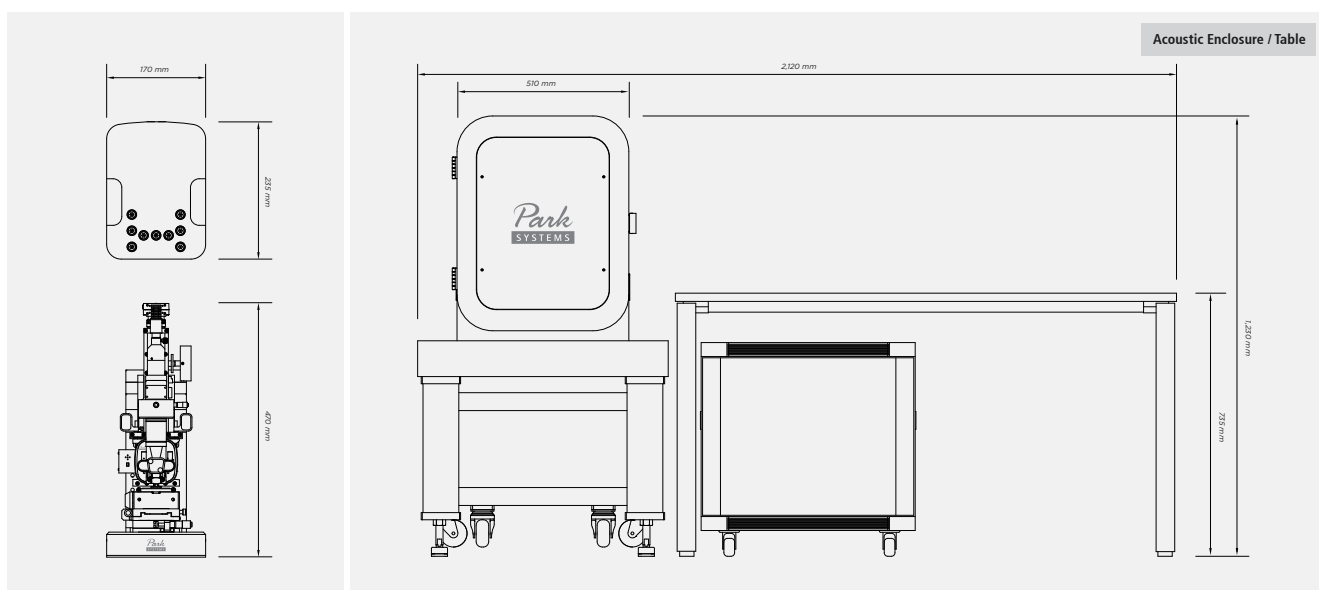


#### Scanning conditions

Scan Mode: Tapping Mode  
 Scan Size: 5 μm x 5 μm  
 Cantilever: AC160TS (k= 26 N/m, f= 300 kHz)

\* optional

Scanner	Z scanner	XY scanner	Stage	XY stage travel range	Z stage travel range	Focus stage travel range	
	Flexure guided high-force scanner Scan range: 15 µm (optional 30 µm)	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)		13 mm x 13 mm (Manual)	26 mm (Motorized)	30 mm (Manual)	
On-Axis Optics	Sample Mount	Sample size	Electronics	Integrated functions			
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)		Up to 50 mm x 50 mm, thickness up to 20 mm		4 channels of flexible digital lock-in amplifier Spring constant calibration (Thermal method) Digital Q control			
Options/Modes	Standard imaging	Magnetic properties	Electrical properties	Mechanical properties			
	<ul style="list-style-type: none"> <li>• True Non-Contact</li> <li>• Contact</li> <li>• Tapping</li> </ul>	<ul style="list-style-type: none"> <li>• PinPoint™</li> <li>• Lateral Force Microscopy (LFM)</li> <li>• Phase Imaging</li> </ul>	<ul style="list-style-type: none"> <li>• Magnetic Force Microscopy (MFM)</li> <li>• Tunable Magnetic Field MFM*</li> </ul>	<ul style="list-style-type: none"> <li>• Conductive AFM (C-AFM)*</li> <li>• IV Spectroscopy*</li> <li>• Kelvin Probe Force Microscopy (KPFM)</li> <li>• Sideband FM-KPFM</li> <li>• Scanning Capacitance Microscopy (SCM)*</li> <li>• Scanning Spreading-Resistance Microscopy (SSRM)*</li> <li>• Scanning Tunneling Microscopy (STM)*</li> <li>• Photo Current Mapping (PCM)*</li> </ul>	<ul style="list-style-type: none"> <li>• Force Modulation Microscopy (FMM)</li> <li>• Nanoindentation</li> <li>• Nanolithography*</li> <li>• Nanolithography with High Voltage*</li> <li>• Nanomanipulation*</li> </ul>		
	Dielectric/Piezoelectric properties	Chemical properties*	Force measurement				
	<ul style="list-style-type: none"> <li>• Electric Force Microscopy (EFM)</li> <li>• Piezoresponse Force Microscopy (PFM)</li> <li>• PFM with High Voltage*</li> </ul>	<ul style="list-style-type: none"> <li>• Chemical Force Microscopy with Functionalized Tip</li> <li>• Electrochemical Microscopy (EC-AFM)</li> </ul>	<ul style="list-style-type: none"> <li>• Force Distance (F/d) Spectroscopy</li> <li>• Force Volume Imaging</li> </ul>				
Software	Park SmartScan™	Park SmartAnalysis™	Accessories*				
	<ul style="list-style-type: none"> <li>• AFM system control and data acquisition software</li> <li>• Auto mode for quick setup and easy imaging</li> <li>• Manual mode for advanced use and finer scan control</li> </ul>	<ul style="list-style-type: none"> <li>• AFM data analysis software</li> <li>• Stand-alone design—can install and analyze data away from AFM</li> <li>• Capable of producing 3D renders of acquired data</li> </ul>	<ul style="list-style-type: none"> <li>• Liquid Probehead</li> <li>• Universal Liquid Cell with Temperature Control</li> <li>• Temperature Controlled Stage 1, 2 and 3</li> </ul>	<ul style="list-style-type: none"> <li>• Electrochemistry Cell</li> <li>• High-field Magnetic Field Generator</li> <li>• Tilting Sample Chuck</li> </ul>			



## 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](http://www.parksystems.com).

### Park Systems Americas

+1-408-986-1110 (USA)  
+52-55-7100-2354 (Mexico)

### Park Systems Europe

+49 (0)-621-490896-50 (Germany)  
+33 (0)-6-07-10-87-36 (France)  
+44 (0)-115-784-0046 (UK&Ireland)

### Park Systems GmbH - Accurion

+49-551-999600 (Germany)

### Park Systems Japan

+81-3-3219-1001 (Japan)

### Park Systems Greater China

+86-10-6254-4360 (China)  
+886-3-5601189 (Taiwan)

### Park Systems SE Asia

+65-6634-7470 (Singapore)

### Park Systems Korea

+82-31-546-6800 (Republic of Korea)

### Park Systems India

+91-96869 51464 (India)

### Park Systems Corporate Headquarters

To learn more about Park Systems, please visit [www.parksystems.com](http://www.parksystems.com) or e-mail [inquiry@parksystems.com](mailto:inquiry@parksystems.com)

KANC 15F, Gwanggyo-ro 109, Suwon 16229, Korea Tel.+82-31-546-6800

©2023 Park Systems Corp. All rights reserved. All products and features are subject to change.

All brand names and logos are trademarks of their respective companies.

No part of this publication may be reproduced or distributed without the express written permission of Park Systems Corp.

