### Park NX20

The leading nanometrology tool for failure analysis and large sample research

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**DUAL-AXIS FEEDBACK**

- Flexure-guided high-force scanner
- Scan range: 100 μm × 100 μm (optional 50 μm × 50 μm)
- Dual-servo closed-loop feedback control
- 100 x ultra-long working distance
- 200 x high-resolution long-working distance
- AFM Head
- SICM Head
- Fast Scan™ (optional 30 μm)
- Direct on-axis vision of sample surface and cantilever
- Vacuum grooves to hold wafer samples
- Up to 16 small samples (10 mm x 10 mm, 20 mm thickness) (Optional Multi Sample Chuck)
- Universal Liquid Cell with Temperature Control
- Temperature Controlled Stages
- Electrochemistry Cell
- Glove Box
- Magnetic Field Generator
- Multi Sample Chuck
- Tilting Sample Chuck
- Snap-in Sample Chuck
- AFM Data Analysis Software
- KPFM with SICM
- Scanning Capacitance Microscopy (SCM)
- Scanning Spreading-Resistance Microscopy (SSRM)
- Scanning Tunneling Microscopy (STM)
- Photo Current Mapping (PCM)
- Current-Distance (I/d) Spectroscopy (with SICM)
- Electrostatic Force Microscopy (EFM)
- Scanning Thermal Microscopy (SThM)

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**AFM SYSTEM CONTROL AND DATA ACQUISITION SOFTWARE**

- ATOMIC FORCE MICROSCOPE

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**ACCESSORIES**

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**COMMITTED TO CONTRIBUTE TO IMPACTFUL SCIENCE AND TECHNOLOGICAL DEVELOPMENT**

More than 25 years ago, the foundations of Park Systems were laid at Stanford University, where Park Systems’ founder, Dr. Sang-il Park, worked in Prof. Calvin Quate’s group, the group that invented the world’s first AFM. After years of development, Dr. Park introduced the first commercial AFM to the world, thus starting the successful path of Park Systems. With good foresight, a superior product and keen business acumen, Park has positioned themselves as the dominant industry leader in AFM Nanoscale Metrology and in 2020, Park Systems will roll out their most exciting line of AFM products in their history.

Park Systems continuously strives to live up to the innovative spirit of its origin. Throughout its long journey, the company has been committed to provide advanced, accurate, and reliable AFM instrumentation, with revolutionary features such as True Non-Contact™ mode and PinPoint™ Nanomechanical AFM. Cutting-edge AFM automation features, like SmartScan™, make Park Systems AFMs not only extremely easy to use, but they also enable users to obtain outstanding results faster, more efficiently, and more accurately.
Park NX20
The premiere choice for failure analysis

Accurate AFM Solutions for FA and Research Laboratories
- Surface roughness measurements for media and substrates
- Defect review imaging and analysis
- High resolution electrical scan mode
- Sidewall measurements for 3D structure study*

Accurate and Reproducible Measurements for Better Productivity
- Non-contact mode to preserve tip sharpness for surface roughness accuracy
- Fastest defect imaging in non-contact mode
- Decoupled XY scanning system for 3D structure measurements
- Minimized system drift and hysteresis using thermally matched components

Accurate AFM Topography with Low Noise Z Detector
- Sample topography measured by industry leading low noise Z detector
- True sample topography without edge overshoot or piezo creep error
- Accurate surface height recording, even during high-speed scanning
- Industry leading forward and backward scan gap of less than 0.15%

Cost Savings with True Non-Contact™ Mode
- 10 times or longer tip life during general purpose and defect imaging
- Less tip wear from prolonged high-quality scans
- Minimized sample damage or modification
* tilting sample chuck

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 in the industry.

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 NX20 saves you time and gives you better data.

Tilting Sample Chuck for Sidewall Imaging lets you see more
The NX20’s innovative architecture lets you detect the sidewall and surface of the sample, and measure their angle. This gives the unit the versatility you need to do more innovative research and gain deeper insights.
- Tilting angle: 10°, 15°, and 20°
- Sample size: Up to 20 mm x 20 mm
- Sample thickness: Up to 2 mm

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.

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.

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An AFM operation software for everyone, from amateurs to experts

Whether your AFM needs are focused on academic research, industrial metrology or failure analysis, SmartScan’s Auto mode offers a streamlined system to generate publishable, high-quality AFM data. Moreover, SmartScan™ promises productive sessions with an AFM even for beginners to obtain quality data as good as an expert’s, in much shorter time.

FastApproach™
Click the Position button, and the Z scanner approaches the sample automatically and at a much higher speed than the typical manual approach. Park’s FastApproach™ safely takes the cantilever down to the sample surface at full speed without the user’s intervention and engages in just 10 seconds after loading the cantilever.

Easy to find an area of interest
After tip-to-sample engagement, the optical camera will automatically focus on the sample to find your area of interest (AOI). The UX of SmartScan™ easily enables intuitive navigation of the sample by controlling the motorized stages in the integrated optical window. You can move the AOI of the sample directly by clicking the desired position in the optical window.

Speeds up imaging with AdaptiveScan™
Park’s innovative AdaptiveScan™ controls the scan speed automatically based on the peaks and valleys of the sample surface. AdaptiveScan™ adjusts the optimum scan speed dynamically to acquire a quality image of an unknown morphology at a higher speed. This effectively shortens the imaging time while retaining top image quality comparable to that obtained by a well-trained expert manually. When moving to neighboring locations or zooming in to a target, AdaptiveScan™ automatically applies a new optimal condition.
Park Atomic Force Microscopy Modes
Get the data you need with Park’s selection of scanning modes

**Scanning conditions**
- **(100) Si Epi Wafer**
  - Scan Mode: Non-Contact
  - Cantilever: PPP-NCHR
  - (k=42N/m, f=330kHz)

**Patterned Sapphire Substrate (PSS)**
- **Scan Mode:** Non-Contact
  - Cantilever: AR5T-NCHR
  - (k=42N/m, f=330kHz)

**Stainless Steel (Ferrite, Austenite)**
- **Zoom in 3D**
  - X:Y:Z scale = 1:1:1

**MFM Phase**
- **Height**
  - Kelvin Probe Force Microscopy
  - TOPOGRAPHY IMAGING
  - Piezoresponse Force Microscopy

**Conductive AFM PinPoint Conductive AFM**
- **Scanning Tunneling Microscopy**
  - Scanning Capacitance Microscopy
  - Electrostatic Force Microscopy
  - MFM Phase

**Height**
- **Line Profile 1**
  - **Line Profile 2**

**Nanoindentation**
- **Nanolithography**
- **Nanomanipulation**

**Force Distance Spectroscopy**
- **PuPoint Nanomechanical**
  - **Force Modulation Microscopy**
  - **Lateral Force Microscopy**

**Piezoresponse Force Microscopy**
- **Conductive AFM**
  - **PinPoint Conductive AFM**

**Zoom in 3D**
- **X:Y:Z scale = 1:1:1**

**Scanning conditions**
- **Scan Mode:** MFM
  - Cantilever: PPP-MFMR
  - (k=2.8N/m, f=75kHz)