Park NX1

The Highest Resolution AFM

Park SYSTEMS

Park NX1 is a compact AFM designed for high-resolution imaging with stable operation. The system combines a mechanically rigid structure with a thermally stable body to support atomic-scale imaging in ambient conditions while maintaining the ease of use typical of Park Systems instruments.

A minimal mechanical loop between the probe and the sample improves mechanical stability. The AFM core body is made of Kovar to reduce thermal drift. The system includes a XYZ tube scanner for imaging and a tungsten carbide stick–slip stage with kinematic contacts for Z approach.

The sample can be positioned using stick–slip XY motion. An on-axis optical microscope allows observation of both the probe and the sample during operation. The system supports standard AFM probes as well as optional qPlus (quartz tuning fork) sensors.

NX1 - Key Features

Optimized AFM Architecture

- Rigid and Compact Design
- XYZ Tube Scanner with Stick–Slip Positioning
- AFM Core Body Made of Kovar

Exceptional Stability

- High-Resolution Imaging
- Low Noise Floor
- Minimal Thermal Drift

User Convenience and Versatility

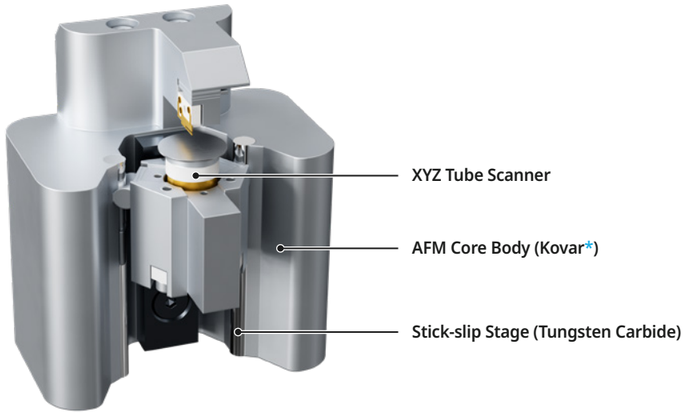
- Easy Probe Exchange and Laser Beam Alignment
- On-Axis High-Power Optical Microscope
- Various AFM Modes and qPlus Sensor Option

Park NX1

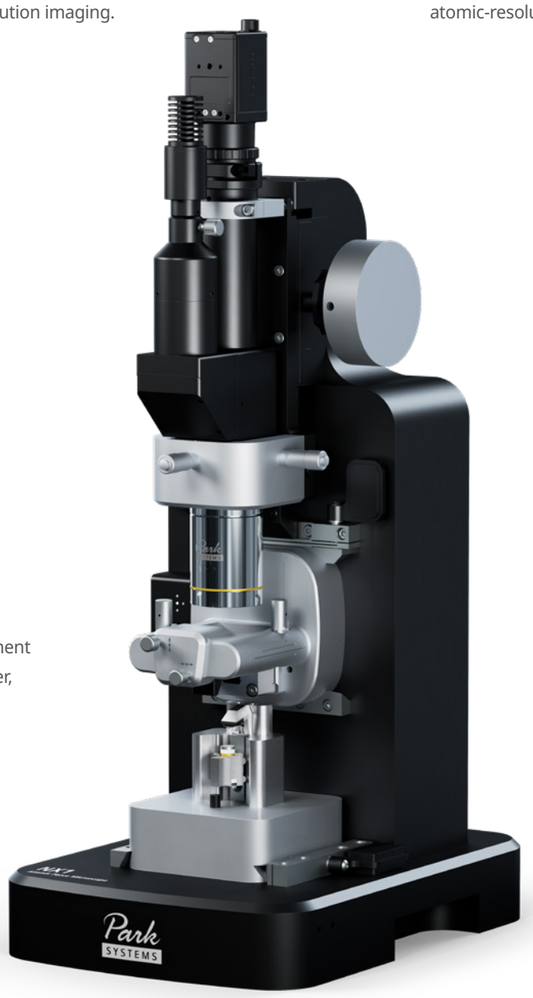
Precision AFM for Atomic Lattice Imaging

Optimized AFM Architecture

The NX1 features a compact, mechanically rigid architecture that minimizes the probe-to-sample mechanical loop, enabling low noise and high stability. A precision XYZ tube scanner combined with a tungsten carbide stick–slip stage and kinematic contacts enables stable positioning, while low thermal expansion materials reduce drift for consistent atomic-resolution imaging.

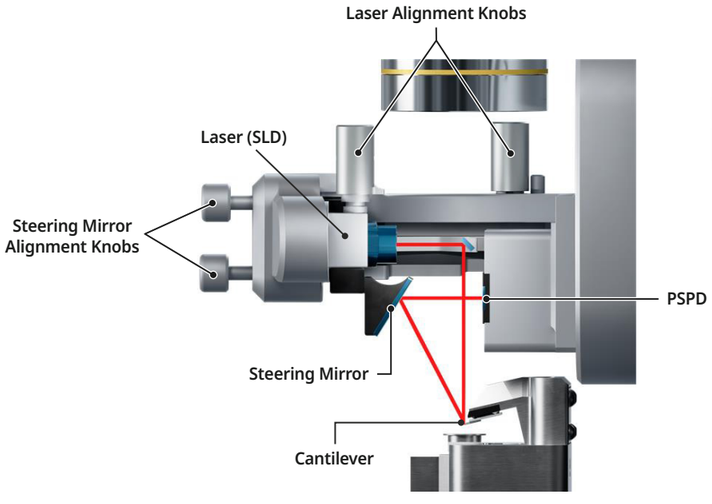


* Kovar: a nickel–cobalt ferrous alloy with thermal expansion coefficient 6 × 10^{-6} K^{-1}



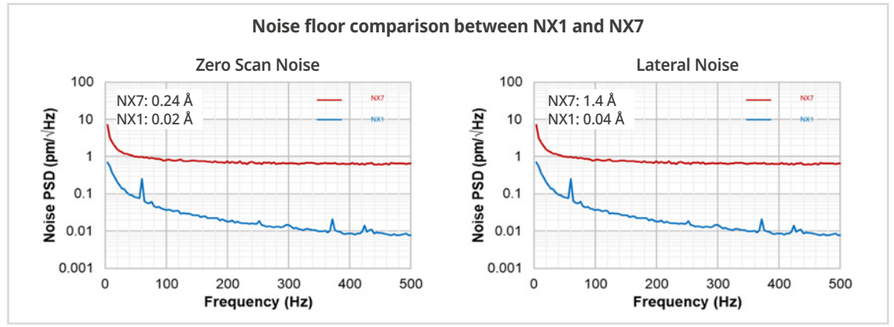
Intuitive Laser Beam Alignment

The NX1 uses a beam-bounce detection system with a separated detection module to preserve measurement stability. The intuitive alignment design simplifies setup and enables fast laser positioning on the cantilever, supporting stable signal detection.



Low Noise Performance

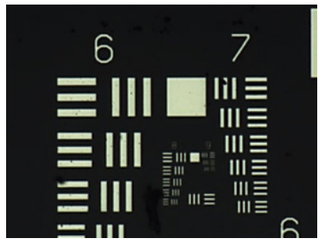
The NX1 achieves a noise floor about an order of magnitude lower than typical AFM systems, enabled by its optimized architecture. This low noise level provides a stable measurement environment, supporting consistent signal detection and atomic-resolution imaging.

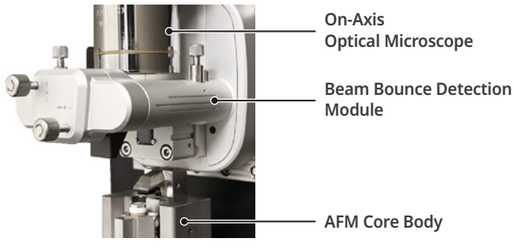


On-Axis Optical Microscope

The NX1 features a high-resolution on-axis optical microscope that provides a direct view of both the probe and sample, enabling accurate tip positioning and efficient sample navigation. Integrated illumination provides clear visibility across sample types, simplifying setup and improving measurement accuracy supporting reliable measurements.

Vision from NX1 Optics



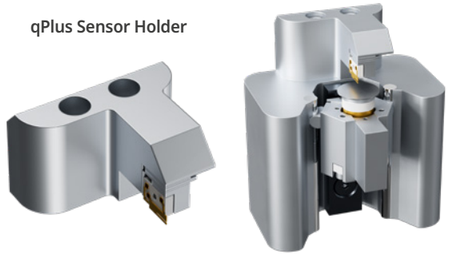


qPlus Sensor Option

The NX1 supports an optional qPlus sensor based on a quartz tuning fork for advanced atomic-scale measurements. Its high stiffness enables stable operation at picometer-scale amplitudes, minimizing jump-to-contact.

Standard AFM Probe Holder

qPlus Sensor Holder

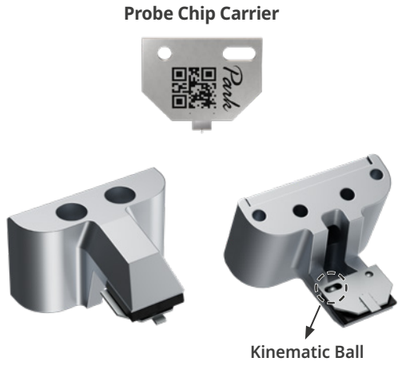


Park NX1

Engineered for Stable and Efficient AFM Measurements

Easy Probe Exchange

AFM probe exchange can be time-consuming and prone to tip damage. NX1 simplifies this process with a pre-aligned probe chip carrier and kinematic mounting, ensuring consistent tip positioning while reducing setup time and handling errors. Each carrier includes a QR code for quick access to probe specifications and identification.

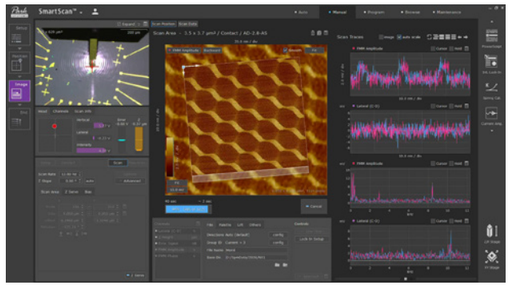


NX1 Controller

The NX1 controller enables fast and stable system control through high-speed communication with the PC. With an integrated 8-channel lock-in amplifier and up to 5 MHz bandwidth for tip bias modulation, it supports simultaneous multi-signal acquisition and advanced electrical measurements within a single scan.

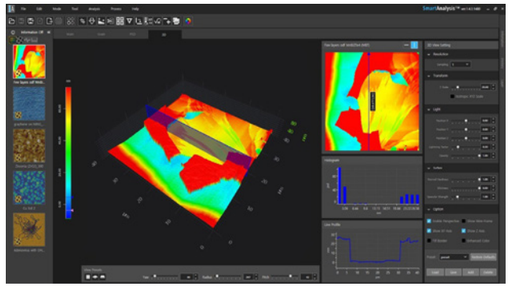
Park SmartScan™

SmartScan streamlines AFM operation with an intuitive interface and automated workflows, enabling faster setup and high-quality imaging with minimal user effort.



Park SmartAnalysis™

SmartAnalysis delivers fast and comprehensive data processing, enabling efficient interpretation and clear visualization of results. Its advanced tools support in-depth analysis within a smooth and user-friendly workflow.



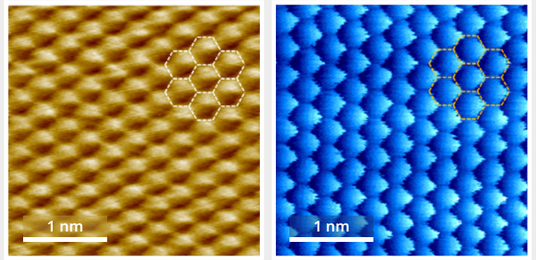
Park NX1

Designed for Your Applications

The NX1 offers high-resolution imaging for a wide range for a wide range of advanced research applications.

2D Materials

Height Lateral



MoS_2 Single Crystal

MoS_2 single crystal, a layered two-dimensional material with a hexagonal lattice structure, is measured at a 3 nm scan size, and the atomic lattice is observed in both height and lateral signals under low-noise conditions.

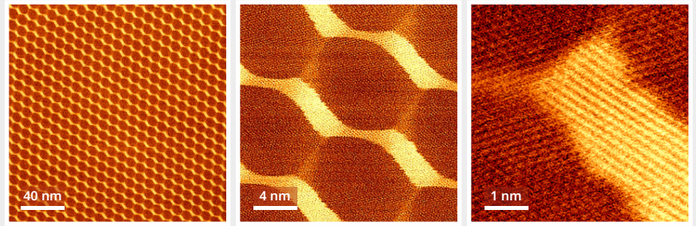
The measured lattice spacing (3.164 Å) agrees with the reference MoS_2 lattice constant (~3.16 Å), confirming consistent atomic-scale measurement.

Twisted Bilayer Graphene

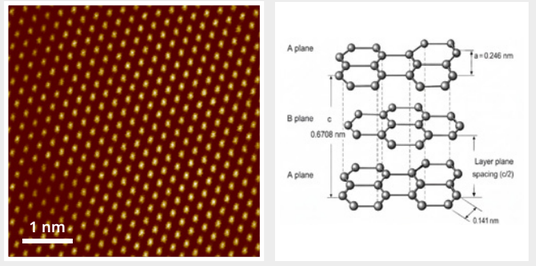
Twisted bilayer graphene forms a moiré superlattice due to the rotational misalignment between two graphene layers, resulting in characteristic periodic patterns.

As the scan size decreases from 200 nm to 5 nm, moiré patterns appear at larger scales and the atomic lattice is resolved at smaller scales.

200 nm scan 20 nm scan 5 nm scan



FMM Amplitude Lattice Constant ~2.46 Å



HOPG

A HOPG (Highly Oriented Pyrolytic Graphite) is a layered material with a well-defined hexagonal lattice structure, commonly used as a reference sample for atomic-scale imaging.

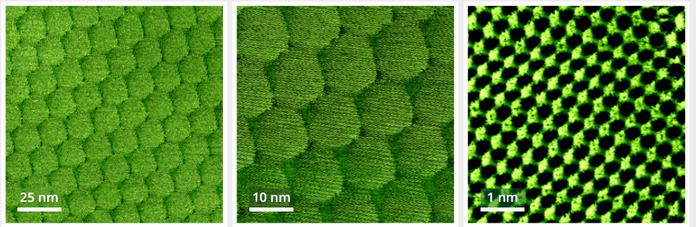
Atomic lattice is measured by FMM at a 5 nm scan size, and the measured lattice spacing agrees with the reference value of graphite (~2.46 Å).

WSe_2 on Graphene

WSe_2 on graphene forms a moiré superlattice due to lattice mismatch between the two materials, resulting in characteristic periodic patterns.

From 100 nm to 5 nm, the moiré pattern is observed at larger scales, while the atomic lattice is resolved at smaller scales as the scan size decreases.

100 nm scan 50 nm scan 5 nm scan



Park NX1

Technical Specifications

AFM Modes

- Topographic Imaging
  - Contact Mode
    - Constant Height Mode
    - Constant Force Mode
  - True Non-Contact™ Mode
  - Tapping Mode
  - PinPoint™ Mode
- Mechanical Properties
  - PinPoint™ Nanomechanical Mode
  - Force-Distance (F-D) Spectroscopy
  - Force Modulation Microscopy (FMM)
  - Torsional Force Microscopy (TFM) *
- Electrical Properties
  - Conductive AFM (C-AFM) *
    - Current-Voltage (I-V) Spectroscopy
  - Piezoresponse Force Microscopy (PFM)
    - Piezoresponse Spectroscopy
    - Off-resonance PFM
  - PinPoint™ Nanoelectrical Modes *
  - Electrostatic Force Microscopy (EFM)
  - Kelvin Probe Force Microscopy (KPFM)
    - Sideband KPFM
    - Amplitude Modulation KPFM (AM-KPFM)
- Magnetic Properties
  - Magnetic Force Microscopy (MFM)
    - Frequency Modulation MFM (FM-MFM)
    - Amplitude Modulation MFM (AM-MFM)

XYZ Scanner

- XY scan range: 3 μm × 3 μm
- Z scan range: 1 μm
- Open-loop feedback control

Stage

- XY: 0.5 mm × 0.5 mm
- Z: 15 mm

On-axis Optics Microscope

- Direct on-axis vision of sample surface and cantilever
- Field of view: 480 μm × 360 μm (w/ 10× objective lens)
- CCD: 1.2 M Pixel / 5 M Pixel (optional)

Sample Mount

- Size: Ø 16 mm
- Weight: 2 g – 8 g

System Dimension and Weight

- AE (Outer): 700 mm × 800 mm × 1,248 mm
- Desk: 1,410 mm × 810 mm × 740 mm
- Total weight: 250 kg (AFM Body + AE + AVI)
- Desk: 1,410 mm × 810 mm × 740 mm

Required Environment

- Required acoustic noise level: Below 65 dB
- Required floor vibration level: VC-D (6.25 μm/sec)
- Power: 1 kW (Maximum)

** Requires additional options*
*** Consult with Park Systems*

Park SYSTEMS
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