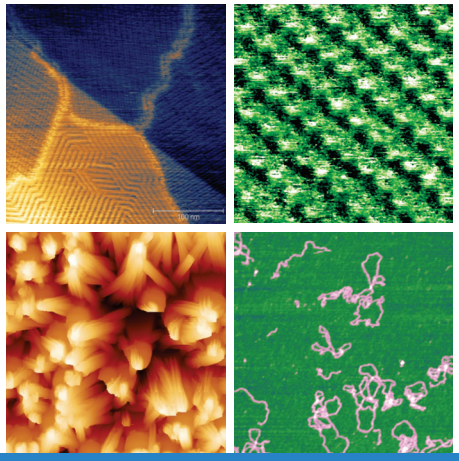
HORIBA Scientific

SmartSPM™

Scanning Probe Microscope

The World's Fastest and Most Advanced Scanning Probe Microscope

- Automation of operation & ease of use
- High resolution, stability and accuracy
- Fast scanning
- All SPM modes included plus Nanolithography and Dynamic AFM with no extra units and costs
- Flexibility to upgrade to NanoRaman™



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True molecular resolution in ambient conditions:

1. *Melissic acid self-assembled on HOPG*
   325 nm topography

2. *Cholesteryl octadecanoate on HOPG*
   16 nm topography

Difficult samples, up to Z range 15 µm:

3. *Zinc oxide nanorods*
   4x4 µm topography, Z range 3.6 µm

Imaging in liquid:

4. *1.4 µm topography image of plasmid DNA.*
   Semicontact mode in buffer solution.

SPM Measuring Modes

• Contact AFM in air/(liquid optional)	• Conductive AFM (optional)	• Nanolithography
• Semicontact AFM in air/(liquid optional)	• Magnetic Force Microscopy (MFM)	• Nanomanipulation
• Non contact AFM	• Kelvin Probe (Surface Potential Microscopy, SKM, KPFM)	• STM (optional)
• Phase Imaging	• Capacitance and Electric Force Microscopy (EFM)	• Photocurrent Mapping (optional)
• Lateral Force Microscopy (LFM)	• Force Curve Measurements	• Volt-Ampere Characteristic Measurements (optional)
• Force Modulation	• Piezo Response Force Microscopy (PFM)	

SmartSPM Scanner and Base

Sample scanning range	100 µm x 100 µm x 15 µm (±10 %)
Scanning type by sample	XY non-linearity 0.05 %; Z non-linearity 0.05 %
Noise	• 0.1 nm RMS in XY dimension in 200 Hz bandwidth with capacitance sensors on • 0.02 nm RMS in XY dimension in 100 Hz bandwidth with capacitance sensors off • < 0.04 nm RMS Z capacitance sensor in 1000 Hz bandwidth
Resonance frequency	• XY 7 kHz (unloaded) • Z 15 kHz (unloaded)
X, Y, Z movement	• Digital closed loop control for X, Y, Z axes • Active elimination of XY phase lag, overshooting and ringing results in fast scanning without any dynamic image distortion • Motorized Z approach range 18 mm
Sample size	Maximum 40 x 50 mm, 15 mm thickness
Sample positioning	Motorized sample positioning range 5 x 5 mm
Positioning resolution	1 µm

AFM Head HE001

Laser wavelength	• 1300 nm • No registration laser influence on biological sample • No registration laser influence on photovoltaic measurements
Registration system noise	< 0.03 nm RMS
Fully motorized	4 stepper motors for cantilever and photodiode automated alignment
Access	Free access to the probe for additional external manipulators and probes

Compatibility with Optical Systems

Spectroscopy compatibility (AFM head HE002)	• No interference with optical imaging due to infrared laser • Upgradeability to NanoRaman™ for spectroscopic and TERS operation • Registration system noise < 0.1 nm RMS
Closed loop piezo objective scanner for ultra stable long term spectroscopic laser alignment	• Range 20 µm x 20 µm x 15 µm • Resolution: 1 nm
Capability to use simultaneously top and side planapochromat objectives	• Up to 100x, NA = 0.7 from top or side • Up to 20x and 100x simultaneously

Conductive AFM Unit (optional)

Current range	• 100 fA ÷ 10 µA • 3 current ranges (1 nA, 100 nA and 10 µA) switchable from the software

Optical Microscope (optional)

Numerical aperture	up to 0.1
Magnification	from 85x to 1050x (on 19" monitor with 1/3" CCD)
Horizontal field of view	from 4.5 to 0.37 mm
Manual detent zoom	• 12.5x (motorized zoom optional) • Stand and coarse/fine focusing unit • Capability to use planapochromat objectives 10x, NA=0.28 and 20x, NA=0.42 and 100x, NA=0.7 • Depends on AFM head

Liquid Cell (optional)

Sample size	2 mm thickness, 25 mm diameter
Sample positioning range	5 x 5 mm
Positioning resolution	1 µm
Cell size	40 x 40 x 12 mm
Volume of liquid	• 3 ml • Capability of liquid exchange • Autoclave and ultrasonic cleaning of cell parts
Heating	up to 60°C
Cooling	Down to 5°C below room temperature

Additional Options

Heating stages (up to 300 °C) • External magnet (up to 4 kGauss) • Nanoindenter unit • Humidity control system • Acoustic enclosure • Vibroisolation

Manufactured by

AIST-NT
Advanced Integrated Scanning Tools for Nano Technology

HORIBA Scientific

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