Integration + Precision =

Quality measurements, Comfort, and Confidence

NTEGRA Prima couples exquisite scientific precision with unsurpassed flexibility to give you the ultimate power in scanning probe applications and measurements. Try NTEGRA Prima. Feel the quality of its superior engineering. See the exceptional imaging quality. Test drive the powerful but easy-to-use software and investigate its expandability. Enjoy the comfort and confidence of working with the highest quality scientific instrumentation.

One Core, unlimited functionality

NTEGRA Prima brings extraordinary freedom to your research. Now, one system can be used to investigate tiny, large, even massive samples. NT-MDT DualScan™ mode extends the conventional scanning range to 200 µm. The scanning head can also be used as a portable, stand-alone device, making it possible to measure samples of unlimited size.

NTEGRA Prima's standard configuration includes everything necessary for atomic resolution imaging in ambient and even in fluid environment. Start with a simple scanner and base then, as your needs grow, choose from dozens of techniques available in **NTEGRA** Prima to analyze your sample surface.

Not only does **NTEGRA** Prima provide all of the conventional techniques such as topography, phase, and magnetic force measurements, it extends to techniques that are unique to NT-MDT. For example, NT-MDT scanning capacitance microscopy (SCM) maps variations in electron carrier concentration across the sample surface with the unprecedented sensitivity (1 aF), setting the international standard for capacitance measurements.

Another advanced technique – piezoresponse force microscopy (PFM) for high spatial resolution imaging is based on the deformation of the sample surface due to the converse piezoelectric effect and the analysis of the resulting surface displacement.

Quality and Precision — accurate, reproducible measurements

When working at the atomic scale, precision positioning is critical. To guarantee that precision, the full **NTEGRA** line features specifically engineered, built-in, closed loop capacitive sensors. Even when scanning areas are as small as 50x50 nm, their exceptionally low noise levels (down to 0.1 nm typically) allows **NTEGRA** to image and modify the surface with the sensors engaged. The reliable scanner feedback assures high accuracy in the quantitative measurements of interaction forces between the probe and sample surface

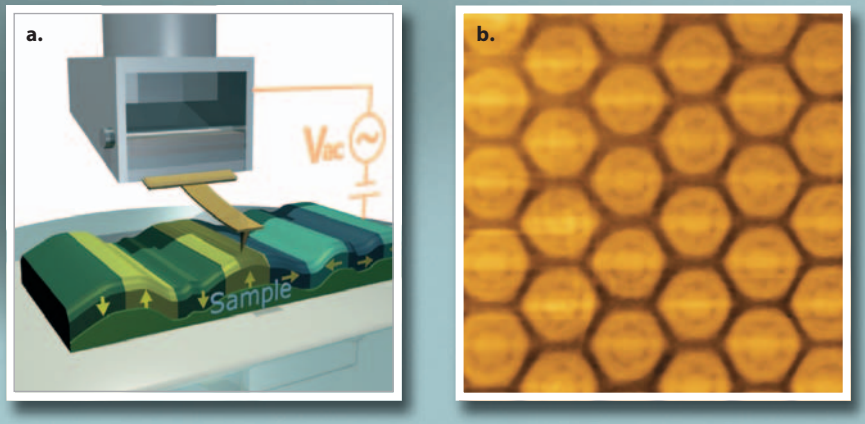
Focus on what's important

Using the integrated optical viewing system, find just the right area to measure. Zoom in to target your SPM tip on that exact area then control the scanning process in real time and compare optical image to the SPM information. Need still higher resolution? Drop the optical resolution on the **NTEGRA** Prima to 0.4 µm with the unique HRV (High Resolution Viewing) system. By combining the optical viewing system with either an STM or AFM head into one module, the HRV allows you to peer under the working probe. Interested in going to the next level? The same head provides laser input/output and focusing of the laser spot under the probe, expanding conventional scanning probe technology to include TERS[1] or apertureless SNOM[2] experiments on opaque samples.

One Core, Next-generation integration

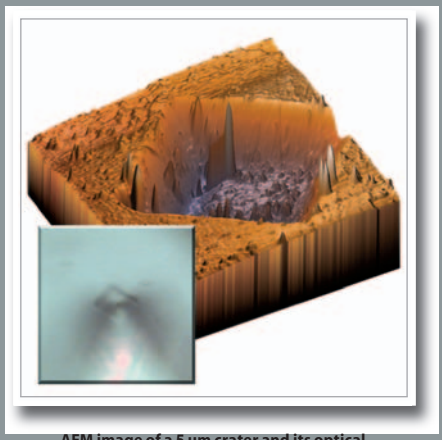
NTEGRA Prima is just the beginning. Designed with totally open architecture for hardware, software, and signal integration, this nanolaboratory forms the platform for interfacing with advanced spectroscopy, microtomy, high-throughput screening and thermal accessories to form the next generation of integrated analytical instrumentation. Whether your SPM needs are simple or bleeding edge, **NTEGRA** Prima can form the foundation for successful imaging and measurement in your lab.

[1] Tip Enhanced Raman Scattering
[2] Scanning Near-Field Optical Microscopy

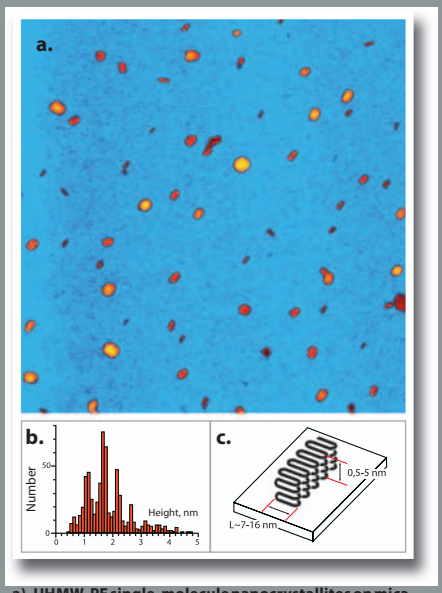


a) Piezoresponse force microscopy (PFM) b) Hexagonal domains in lithium niobate. PFM. Scan size 64x64 µm.
Image courtesy of T. Jungk, A. Hoffman, E. Soergel, University of Bonn

Silicon Test Echeloned Pattern STEPP. Monatomic step image with closed-loop on. Step height 0.31 nm. Scan size 7x7 µm



AFM image of a 5 µm crater and its optical image captured during the scanning process. The probe tip looks as a transparent "ghost" and does not obstruct optical imaging



a) UHMW-PE single-molecule nanocrystallites on mica. AFM Topography image. Scan size 800x800 nm
b) Typical histogram of the nanocrystallites height distribution for the population of 614 nanoparticles. The height is quantized with a step of approximately 0.5 nm (PE-chain diameter)
c) Simplified model of the nanocrystallite structure

Scanning probe microscopy

In air&liquid: AFM (contact + semi-contact + non-contact) / Lateral Force Microscopy / Phase Imaging/Force Modulation/Adhesion Force Imaging/ Lithography: AFM (Force)

In air only: STM/ Magnetic Force Microscopy/ Electrostatic Force Microscopy/ Scanning Capacitance Microscopy/ Kelvin Probe Microscopy/ Spreading Resistance Imaging/ Nanosclerometry/ Lithography: AFM (Current), PFM (optional)

Specification \ Scan type		Scanning by sample	Scanning by probe*
Sample size		Up to ∅40 mm, up to 15 mm in height	Up to ∅100 mm, up to 15 mm in height
Sample weight		Up to 100 g	Up to 300 g
XY sample positioning range, resolution		5x5 mm, 5 µm	
Positioning sensitivity		2 µm	
Scan range		⩾ 90x90x9 µm ⩾ 10x10x4 µm ⩾ 1x1x1 µm	⩾ 90x90x9 µm
		Up to 180x180x18 µm ** (DualScan™ mode)	
Non-linearity, XY (with closed-loop sensors)		⩽0.1%	⩽0.15%
Noise level, Z (RMS in bandwidth 1000 Hz)	With sensors	0.04 nm (typically), ⩽0.06 nm	0.06 nm (typically), ⩽0.07 nm
	Without sensors	0.03 nm	0.05 nm
Noise level, XY* ** (RMS in bandwidth 200 Hz)	With sensors	0.2 nm (typically), ⩽0.3 nm (XY 90 µm)	0.1 nm (typically), ⩽0.2 nm
	Without sensors	0.02 nm (XY 90 µm) 0.001 nm (XY 1 µm)	0.01 nm
Optical viewing system	Optical resolution	3 µm (1µm optional; 0.4 µm optional, NA 0.7) ****	3 µm
	Field of view	4.5–0.4 mm	2.0–0.4 mm
	Continuous zoom	available	available
Vibration isolation	Active	0.7–1000 Hz	
	Passive	above 1 kHz	

* Scanning head can be configured to serve as a stand-alone device for specimens of unlimited sizes.
** Optionally can be expanded to 200x200x20 µm.
*** Built-in capacitive sensors have extremely low noise and any area down to 50x50 nm can be scanned with closed-loop control.
**** High Resolution Viewing system (HRV head) is optional and provides additional functionality making it possible to generate and detect tip-localized aperture less near-field effects.

Papers:

- *Shahgaldian P., Sciotti M.A. Pieles U. Amino-Substituted Amphiphilic Calixarenes: self-Assembly and Interactions with DNA // Langmuir. 2008. N 24.*
- *Mahmood I. A., Moheimani S.O.R. Making a commercial atomic force microscope more accurate and faster using positive position feedback control // Review of scientific instruments. 2009. N 80.*
- *Hu Zhijun, Tian Mingwen, Nysten B., and Jonas A.M. Regular arrays of highly ordered ferroelectric polymer nanostructures for non-volatile low-voltage memories // Nature materials. 2009. Vol. 8.*