Collect the light

NTEGRA Solaris

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Rayleigh said the diffraction limit for light was $\lambda/2$.

Expect more!

In a nanoscale world, the optical diffraction limit of $\lambda/2$ presents a serious barrier to scientific progress. Now, ride the evanescent wave over that barrier with **NTEGRA** Solaris. Even more exciting: control the powerful system that observes a nanoworld which, until very recently, was invisible. Using the near-field effect, this Scanning Near-field Optical Microscope (SNOM) opens new investigations of optical properties far beyond the diffraction limit.

Once you begin to feel the rhythm of subwave breakthroughs, you will certainly agree:
NTEGRA Solaris is not only a good instrument, it is the new wave of scientific progress!

Three microscopes in one!

NTEGRA Solaris combines three different microscopy techniques: light, scanning nearfield optical microscopy (SNOM), and atomic force microscopy (AFM). Integration at this advanced level creates enormous design challenges because the conventional light microscope which uses standard optics and mechanics cannot provide the accuracy, precision of movement, and stability required for scanning probe microscopy or the efficiency necessary to collect the weak SNOM signal. When they invented **NTEGRA** Solaris, NT-MDT engineers took a unique approach. They built a stable, rigid light microscope objective right into the base of the SPM. The result: high resolution imaging with none of the optical microscope instability. Coupling this exceptional stability with a delicately sensitive detection makes **NTEGRA** Solaris perfect for advanced measurements, even at molecular scale.

Sensitive detectors + stray light elimination yield "pure" signal

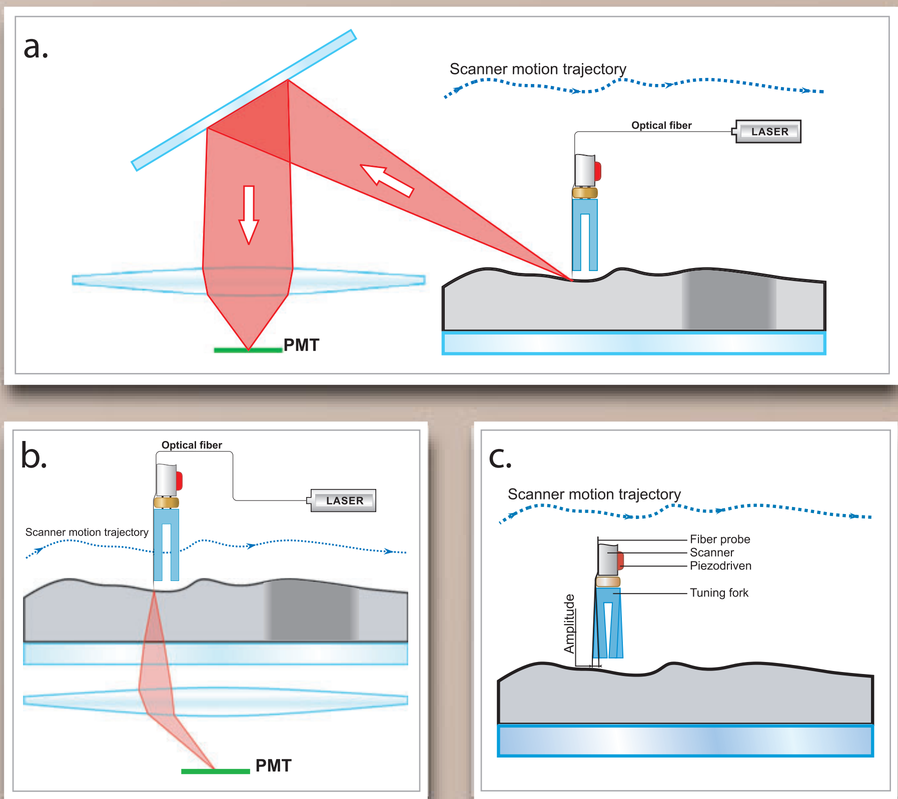
SNOM signals are much weaker than ambient light, demanding precise stray light control. Proprietary NT-MDT engineering and robust but elegant construction combine to guarantee that **NTEGRA** Solaris will provide you with superior protection from parasitic illumination. For the ultimate in sensitivity, Solaris incorporates the latest in PMT detectors. The proof is in the performance and validation tests confirm it: **NTEGRA** Solaris offers excellent high signal/noise ratio.

Reflected light + Transmitted light = Maximum characterization

Every nearfield quantum carries critical information and, with weak SNOM signals, every quantum is precious. It is also well known that the transmitted and reflected light present different views of the sample. **NTEGRA** Solaris delicately detects the light from both channels simultaneously, instantly providing correlative images and measurements.

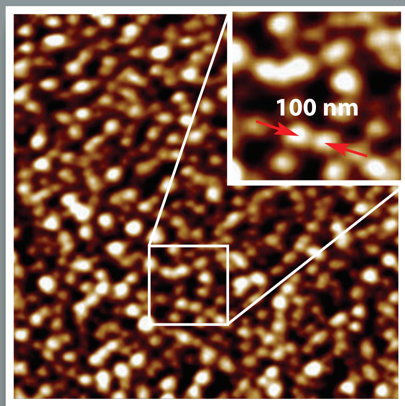
New engineering meets traditional quality

Successful nearfield microscopy rests on solving two problems: spatial resolution and detection efficiency. As a company, NT-MDT has grown from strong roots in physics and, as a result, our engineers and designers understand both these parameters and many others critical to SNOM. By consolidating all the traditional advantages of scanning probe microscopy with new directions in SNOM performance, they've built **NTEGRA** Solaris to take optical imaging and measurements on a whole a new level.

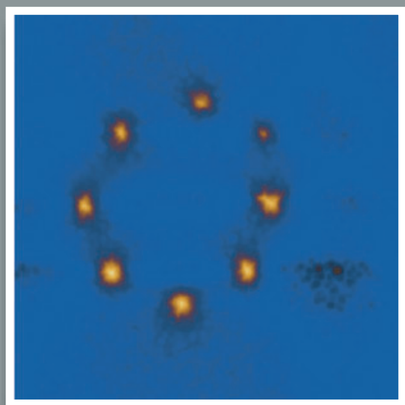


(a) SNOM Reflection mode principle, (b) SNOM Transmission mode principle and (c) Shear force microscopy principle.

Design solutions. Reflection unit.



SNOM image of polymer with globular structure.
The enlarged scan area shows spatial resolution.
Scan size: 3.5x3.5 µm.



SNOM lithography on positive photoresist
made with 488 nm Ar laser.
Scan size: 16x16 µm.

Scanning Near-Field Microscopy

Shear Force Microscopy / SNOM reflection, transmission, luminescence (optional)/ any AFM modes are available optionally

Specification

Laser module	Wavelength*	441, 488, 514, 532, 633 nm	
	Coupling unit	X-Y-Z positioner, positioning accuracy 1 µm	
		V-groove fiber holder	
		Coupling 40X objective	
Shear Force Imaging	Sample size	Up to ∅100 mm, up to 15 mm in height	
	XY sample positioning range	5x5 mm	
	Readable resolution	5 µm	
	Positioning sensitivity	2 µm	
	Closed-loop operation	Capacitive sensors for 3 axes	
		Scanning by sample	**Scanning by probe**
	Scan range	100x100x25 µm	100x100x7 µm
	Non-linearity, XY	0.03 % (typically)	<0.15 %
	Noise level, Z	<0.2 nm (typically)	0.04 nm (typically), ⩽0.06 nm
	Noise level, XY	<0.5 nm (typically)	0.2 nm (typically), ⩽0.3 nm
	Quartz tuning fork base frequency	190 kHz	
	Optical fiber diameter	90 µm (for 480-550 nm), 125 µm (for 600-680 nm)	
	Aperture diameter	<100 nm	
Channels for simultaneous registration		Reflection	
		Transmission/Fluorescence	
PMT detectors (for each channel)	Spectral response	185-850nm	
	Sensitivity at 420 nm	3x10^{10} V/W	
	Current-voltage conversion amplifier (built-in)	1x10^{6} V/A	
	Frequency band width	20kHz	
	High voltage power supply	built-in	
Vibration isolation	Dynamic	0.7-1000 Hz	
	Passive	above 1kHz	

* 488 nm laser is included as a default; other lasers can be supplied optionally.

Articles:

• V.N. Konopsky, K.E. Kouyanov, N.N. Novikova. Investigations of the interference of surface plasmons on rough silver surface by scanning plasmon near-field microscope. Ultramicroscopy, 2001, Vol.88, pp. 127-138.

• V. N. Konopsky, S. A. Saunin, V. A. Bykov and E. A. Vinogradov. Scanning plasmon near-field microscopy: signal-noise ratio of different registration schemes and prospects for single molecule detection. Phys. Chem. Chem. Phys. 4, 2733 (2002).