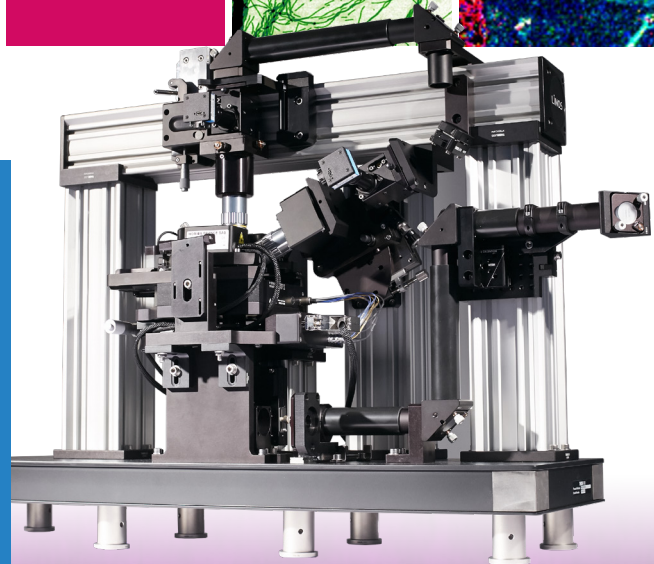
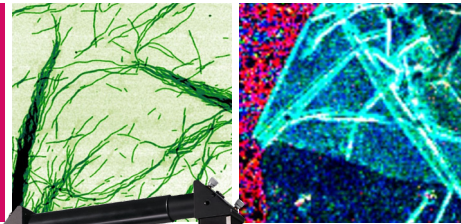


## TRIOS

Versatile AFM Optical Coupling



Tool Box

Customisable by each researcher



Automation

Automated operation



SPM Modes

All SPM modes included



Upgradability

Multiple optical accesses

The most versatile AFM optical coupling platform providing 3 ports for spectroscopy measurements with top-down, side (oblique) and inverted access.

Scanning Probe Microscope Series

TRIOS Measuring Modes	
<b>Basic modes:</b>	<ul style="list-style-type: none"> <li>• Contact AFM</li> <li>• Semicontact AFM</li> <li>• True Non-contact AFM</li> <li>• Top Mode™</li> <li>• Phase Imaging</li> <li>• Dissipation Force Microscopy</li> <li>• Contact AFM in liquid (optional)</li> <li>• Semicontact AFM in liquid (optional)</li> </ul>
<b>Electrical modes:</b>	<ul style="list-style-type: none"> <li>• Single / Double pass Kelvin Probe Force Microscopy (KPFM) AM and FM</li> <li>• Capacitance Microscopy (SCM)</li> <li>• Single / Double pass Electric Force Microscopy (EFM)</li> <li>• Piezo Response Force Microscopy (PFM)</li> <li>• PFM with High Voltage (optional)</li> <li>• PFM-Top mode™</li> <li>• Conductive AFM (optional)</li> <li>• Conductive AFM High Voltage (optional)</li> <li>• I-Top mode™ (optional)</li> <li>• I-V Spectroscopy (optional)</li> <li>• Photocurrent Mapping (optional)</li> <li>• Volt-ampere characteristic measurements (optional)</li> </ul>
<b>Nanomechanical modes:</b>	<ul style="list-style-type: none"> <li>• Lateral Force Microscopy (LFM)</li> <li>• Force Modulation Microscopy (FMM)</li> <li>• Force Curve Measurement (Force Distance (F-D) Spectroscopy and Mapping)</li> <li>• Nanolithography</li> <li>• Nanomanipulation</li> </ul>
<b>Nanospectroscopy:</b>	<p>Compatible with HORIBA spectrometers (XploRA, LabRAM HR, LabRAM Soleil) (optional)</p> <ul style="list-style-type: none"> <li>• Confocal Raman, Photoluminescence imaging and spectroscopy (optional)</li> <li>• Tip-Enhanced Raman and Photoluminescence (TERS/TEPL) (optional)</li> <li>• Near-field Scanning Optical Microscopy (NSOM/SNOM), with fiber-based and cantilever-based SNOM probes (optional)</li> </ul>
<b>Special modes:</b>	<ul style="list-style-type: none"> <li>• Single / Double pass Magnetic Force Microscopy (MFM)</li> <li>• Tunable Magnetic Field (optional)</li> <li>• Shear-force Microscopy with tuning fork (ShFM)</li> <li>• Normal-force Microscopy with tuning fork (optional)</li> </ul>
<b>Other:</b>	<ul style="list-style-type: none"> <li>• Scanning Tunneling Microscopy (STM) (optional)</li> <li>• Scanning Tunneling Spectroscopy (optional)</li> </ul>

TRIOS Optical Access and Microscope	
<b>Simultaneous optical access:</b>	<ul style="list-style-type: none"> <li>• From the bottom with up to 1.49 NA oil immersion objective</li> <li>• From the top with up to 100x 0.7 NA objective</li> <li>• From the side (optional) with up to 100x 0.7 NA objective</li> <li>• Near UV, Visible, Near IR objectives available</li> <li>• All reflective objectives available</li> </ul>
<b>Mirrors:</b>	<ul style="list-style-type: none"> <li>• 450-2000 nm, reflectance (%): ≥97.5 avg., protected Silver coating</li> <li>• Easy to change to dielectric mirrors due to magnetized mirror mounts</li> <li>• Parabolic mirror of bottom channel easily interchangeable</li> </ul>
<b>Objective Scanner:</b>	<ul style="list-style-type: none"> <li>• Closed loop piezo Objective Scanner for ultra-stable long term spectroscopic laser alignment</li> <li>• Range: 30 x 30 x 10 μm<sup>3</sup></li> <li>• Resolution: 1 nm</li> </ul>

TRIOS Scanner	
<b>Sample scanning range:</b>	100 x 100 x 15 μm <sup>3</sup> (+/-10%)
<b>Optional scanning range:</b>	200 x 200 x 20 μm <sup>3</sup> (+/-10%)
<b>Non-linearity:</b>	XY < 0.05%, Z < 0.05%
<b>Noise:</b>	<ul style="list-style-type: none"> <li>• &lt; 0.1 nm RMS in XY dimension in 100 Hz bandwidth with capacitance sensors on</li> <li>• &lt; 0.02 nm RMS in XY dimension in 100 Hz bandwidth with capacitance sensors off</li> <li>• &lt; 0.1 nm RMS in Z dimension in 1000 Hz bandwidth with capacitance sensor on</li> </ul>
<b>X, Y, Z movement:</b>	<ul style="list-style-type: none"> <li>• XY resonance frequency 7 kHz (unloaded)</li> <li>• Z resonance frequency 15 kHz (unloaded)</li> <li>• Digital closed loop control for X, Y, Z axes</li> </ul>

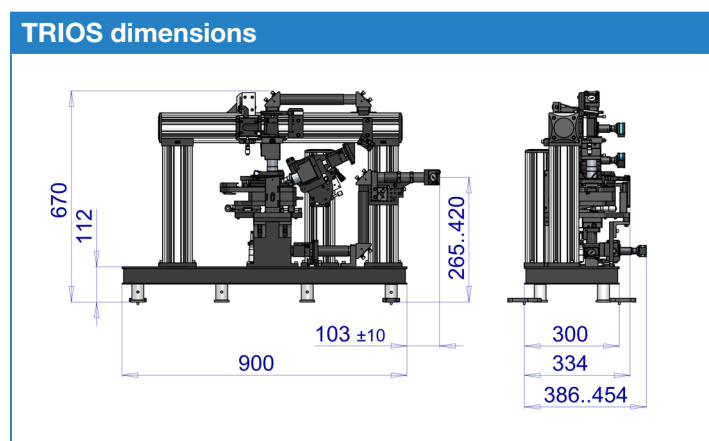
TRIOS Base	
<b>Sample size:</b>	<ul style="list-style-type: none"> <li>Maximum 50.8 x 50.8 mm<sup>2</sup></li> <li>Maximum 5 mm thick</li> <li>Standard up to 50.8 x 50.8 mm<sup>2</sup>, up to 100 x 100 mm<sup>2</sup> with special holder</li> </ul>
<b>Manual sample positioning range:</b>	25 x 25 mm <sup>2</sup>
<b>Optional motorized sample positioning range:</b>	22 x 22 mm <sup>2</sup>
<b>Motorized SPM measuring head positioning:</b>	1.6 x 1.6 mm <sup>2</sup>
<b>Motorized approach:</b>	1.3 mm

TRIOS AFM Head	
<b>Laser wavelength:</b>	1300 nm No influence of registration laser on photovoltaic measurements or on biological samples
<b>Fully motorized:</b>	4 stepper motors for automatic cantilever and photodiode alignment
<b>Access:</b>	Free access to the probe for additional external manipulators and probes

TRIOS Options	
Conductive Unit (Current range 100 fA - 10 µA / 3 current ranges (1 nA, 100 nA and 10 µA) software switchable)	
Liquid Cell (Petri dish 35 mm diameter, Liquid exchange capability)	
Temperature control for liquid cell (heating up to 60°C)	
Heating module (heating up to 300°C / Temperature stability 0.1°C)	
Heating module (heating up to 150°C / Temperature stability 0.01°C)	
Combined Shear-force and Normal-force tuning fork holder	
STM holder	
Signal Access Module	

TRIOS Software	
Omega:	<ul style="list-style-type: none"> <li>Automatic alignment of registration system</li> <li>Automatic configuration preset parameters for standard measuring techniques</li> <li>Automatic cantilever resonance frequency adjustment</li> <li>Macro language Lua for programming user functions, scripts and widgets</li> <li>Capability to reprogram DSP macro language of the controller in real time without reloading control software</li> <li>Spring constant calibration (Thermal method)</li> </ul>
IAPro:	<ul style="list-style-type: none"> <li>Process images in coordinate space including making cross-sections, fitting and subtracting of polynomial (up to 12 degrees) surface</li> <li>FFT processing with the capability to treat images in frequency space including filtering and analysis</li> </ul>
Processing:	<ul style="list-style-type: none"> <li>Up to 5000 x 5000 pixel images.</li> </ul>

TRIOS Controller electronics	
Modular, fully digital, expandable controller	
High speed DSP 300 MHz	
ADC: 20 channels	
High speed 500 kHz 18-bit ADCs for scanner position sensor	
5 MHz frequency range registration system	
2 lock-in amplifiers with 5 MHz frequency range	
6 digital 32-bit generators with 5 MHz frequency range, 0.018 Hz resolution	
7 stepper motors control	
Digital outputs for integration with external equipment	
Analog input/outputs for integration with external equipment	



λ = 325-1064nm P ≤ 500mW  
 VISIBLE AND/OR INVISIBLE LASER RADIATION  
 AVOID EXPOSURE TO BEAM  
 CLASS 3B LASER PRODUCT



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