



● **NEOS** High resolution surface inspection microscope

The NEOS is a high resolution surface inspection microscope that combines a research grade optical microscope and an interferometry based AFM.

The NEOS extends the capabilities of optical microscopes by generating real 3D data –with AFM level spatial resolution independent on the material. Due to this unique hybridization of optical microscopy and AFM the NEOS complements data achieved by conventional optical microscopy, confocal laser scanning microscopes or white light interferometric microscopy but also data from conventional AFMs and Electron Microscopes.

How does this work?

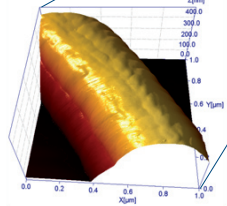
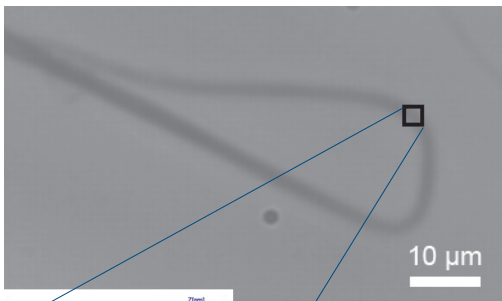
NANOS- the compact AFM scanning head - is mounted in the turret like an optical lens. By one turn of the turret the

system is ready for an AFM scan including all the benefits AFM offers for your application:

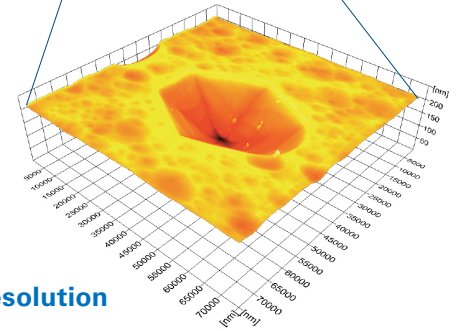
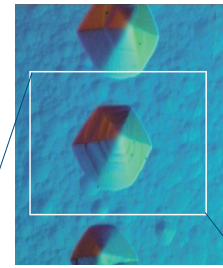
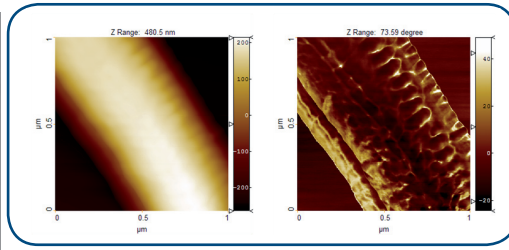
- lateral resolution up to 2 nm and
- vertical resolution up to 0.2 nm
- real 3D data
- additional sample info like magnetic or electric/electronic properties
- adjustable field of view from a maximum of 80 μm x 80 μm down to 100 nm x 100 nm or even smaller

Two additional key features will make the NEOS your favorite tool:

- Navigated AFM: Seamless integration of AFM and upright optical microscopy provides the ability to quickly and easily locate the feature of interest
- Productive AFM: Unique AFM design eliminates need for experienced AFM users and provides useable data within minutes



Top left:
Optical image of electro spun nano fiber - visible only with highest resolution optics
Left:
3D image of topography
Top right:
2D image of topography and corresponding phase contrast



Top:
Optical image with DIC contrast of an etched GaAs crystal (structures were only visible using DIC)
Bottom:
3D image of the etch pit, measured in intermittent contact mode

Measuring modes

Standard imaging modes
Non-Contact, Intermittent Contact, Phase Imaging, Contact, Friction & Lateral force Mode (FLM), Point Spectroscopy (force-distance), qualitative Elasticity Measurements, Magnetic Force Microscopy (MFM), Electrostatic Force Microscopy (EFM)

Optional modules
Surface Potential
Spreading Resistance

NEOS Benefits

- Resolution from the millimeter to the sub-nanometer level
- Easy AFM navigation by using optical microscopy techniques
- Ease of use: No laser beam alignment necessary due to interferometric deflection detection and special cantilever holders

Applications

i.e. Metallurgy, Coatings, Glass processing, Photo Voltaics, Printer toner, Fibers

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Specifications of NEOS - high resolution surface inspection microscope

Scan range: 80 µm x 80 µm x 6 µm
hardware linearized scan motion in X-Y-direction (optional in Z-direction)
Noise level: 0.2 nm rms in vertical direction (Z)
Lateral accuracy: typically within 1%, closed loop scanning
Scan speed: typ. 1 to 10 Hz
Detection principle: fiber optical interferometry, noise level < 0.01 nm rms
Tip change: adjustment free
Digital input resolution: 16 bit A/D
Digital output resolution: 16 bit D/A
Output voltage: ± 165 V, with 2 µV rms
Input channels: max. 8 simultaneous
External inputs: max. 3 with 16 bit resolution
Image size: freely selectable, from 128 to 1024 pixels,
Processing: internal 32 bit DSP, typ. 50 MHz
Computer interface: USB (standard universal serial bus)
OS: MS-Windows XP®
MS-Windows Vista®
Microscope: Nikon Eclipse with bright/dark field, differential interference contrast (DIC) optional
Objectives: Objectives: 10x, 50x, 100x CFI LU Plan Fluor, NA 0.9 for 100x
Positioning: manual translation stage 25 mm x 25 mm



Close up of the NEOS turret: AFM scanning head is ready to engage for the measurement