NaniteAFM

The smallest AFM for custom integration

nanosurf

The smallest AFM for custom integration

The surface morphology is an important property for many high-tech surfaces with features that can go down to a few nanometers and surface roughness below the nanometer. With AFM such features can be readily analyzed under ambient conditions. Most AFMs are limited in the type and size of samples they can handle. The NaniteAFM by Nanosurf is the market leading solution for AFM integration with least restriction to the sample dimensions.

Compact

Robust

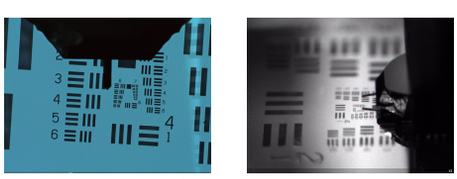
Easy to integrate

The NaniteAFM has a tip-scanner, two inspection video cameras and an on-board approach motor in an exceptionally small footprint. It contains everything needed to operate independently, paving the way for easy integration: All you need is 300 cm^3 in space and a stable docking site to mount the AFM.

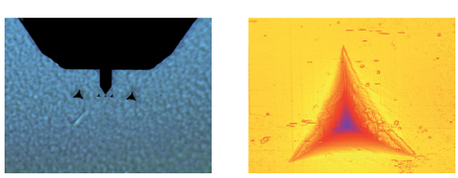
The NaniteAFM uses a dovetail mounting plate at the back to allow quick and reproducible mounting. The use of cantilevers with alignment grooves makes laser alignment unnecessary. For integration this guarantees a well-defined offset between the cantilever tip and other components of a setup, for example an indenter. This exceptional accuracy allows switching between the components without searching for the right area, thus reducing off-time and handling during experiments.

Top view camera for a perfect overview of your sample

The integrated topview camera with 2 µm lateral resolution gives a perfect overview of the surface to localize the areas of interest on the sample and position them under the cantilever. The convenient sideview camera shows the sample under the cantilever at an angle of 45 degrees. It guides the user during the initial fast approach to within a few tens of micrometers of the sample before the AFM takes over for the final automatic approach.



Topview/sideview camera images

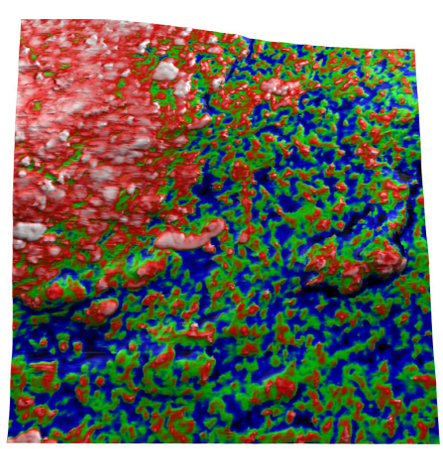


Optical and AFM image of indent

NaniteAFM integrated in the Accurion nanofilm_ep4 imaging ellipsometer

Quantitative surface analysis at the nanoscale

NaniteAFM is the optimal tool to enhance your imaging and analysis capabilities for quality control, providing nanoscale surface information. It has the advantage that it works equally well for opaque and transparent samples. Because of the latter, AFM has become a well established technique for surface analysis of glass. Some applications require glass surfaces exhibiting a roughness well below the nanometer, and nanometer-sized defects may affect the object's behavior. Despite their surface smoothness, glass objects can be large and heavy, and it is undesirable to cut out samples from a work piece for examination. Finally, glass surfaces are not necessarily plane-parallel, like in the case of lenses. The NaniteAFM is a flexible tool that can handle all requirements to obtain quantitative surface information of a glass work piece.



Overlay of phase on topography, uncovering variation in mechanical properties of rubber, with a higher phase in green-red on particles compared to the surrounding matrix in blue.

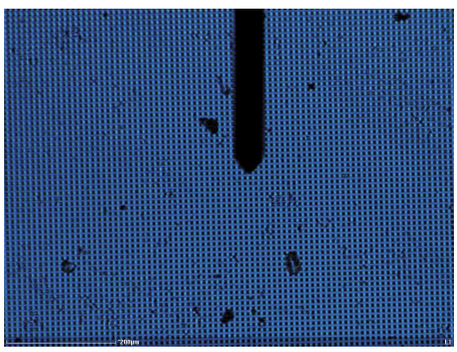
Compatible cantilevers

Cantilevers for the NaniteAFM scan head should have all of the following properties:

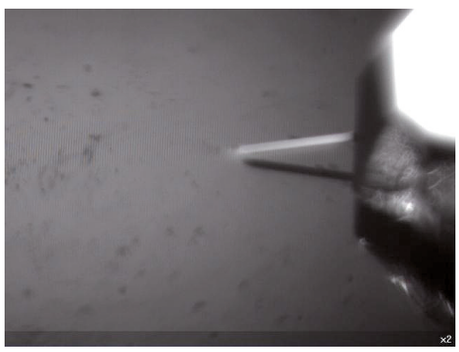
Grooves that are compatible with the alignment chip used by NanoSensors, NanoWorld, Applied Nanostructures, BudgetSensors, and VISTAprobes

A nominal length of 225 µm or more, and a width of 40 µm or more

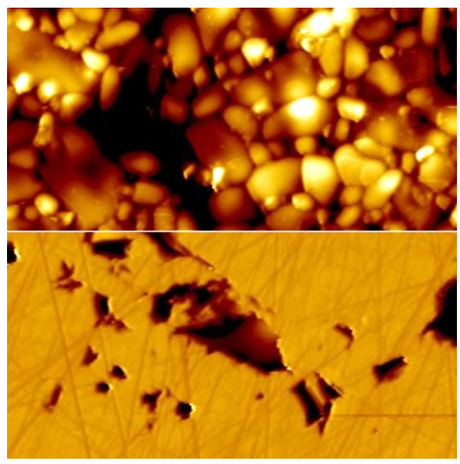
A coating on the backside of the cantilever to reflect (infra)red light



Top view image by the high resolution NaniteAFM video camera showing the AFM cantilever on a test grid. The individual structures of the grid are approximately 5 µm × 5 µm in size.



Simultaneous side view image of the same cantilever and sample. Availability of side view is ideal for a first coarse approach.



Unpolished (top) and polished (bottom) ceramic plate. The respective roughness values were determined to be 570 and 310 nm. Polishing scratches are visible in the bottom image. This quantitative and qualitative surface information can help optimize the polishing process and its QC. Image size: 90 µm × 90 µm.

NaniteAFM scan head specifications

Scan head type	110-µm	70-µm	25-µm
Maximum scan range (XY)[1,2]	110 µm	70 µm	25 µm
Maximum Z-range[1]	22 µm	14 µm	5 µm
XY-linearity mean error	< 0.6%	< 1.2 %	< 0.7%
Z-measurement noise level (RMS, static mode)[3]	typ. 350 pm (max. 500 pm)	typ. 350 pm (max. 500 pm)	typ. 80 pm (max. 150 pm)
Z-measurement noise level (RMS, dynamic mode)[3]	typ. 90 pm (max. 150 pm)	typ. 90 pm (max. 150 pm)	typ. 30 pm (max. 50 pm)
Mounting	Removable scan head (86 × 45 × 61 mm) with 3-point quick-lock mounting plate, mountable to Nanosurf or custom stages		
Alignment of cantilever	Automatic self-alignment for cantilevers with alignment grooves		
Automatic approach range	4.5 mm (1.5 mm below focal plane of internal optics)		
Sample observation	Dual USB video camera system (simultaneous top and side view): 5 MP, 1.4 mm x 1 mm, color top view and 5 MP, 3.1 mm x 3.5 mm, color side view of sample and cantilever		
Sample illumination	White LEDs (brightness 0–100%); Axial illumination for top view		
	Built-in 8× objective lens with 45 or 60 mm parfocal distance		

(1) Manufacturing tolerances are ±10% for the 110-µm scan head and ±15 % for the 70- and 25-µm scan heads

(2) Maximum scan range at 45° scan rotation

(3) Measured using the C3000 controller

nanosurf
info@nanosurf.com
www.nanosurf.com
Nanosurf and the Nanosurf Logo are trademarks of Nanosurf AG
Copyright © 2019 Nanosurf AG, Switzerland