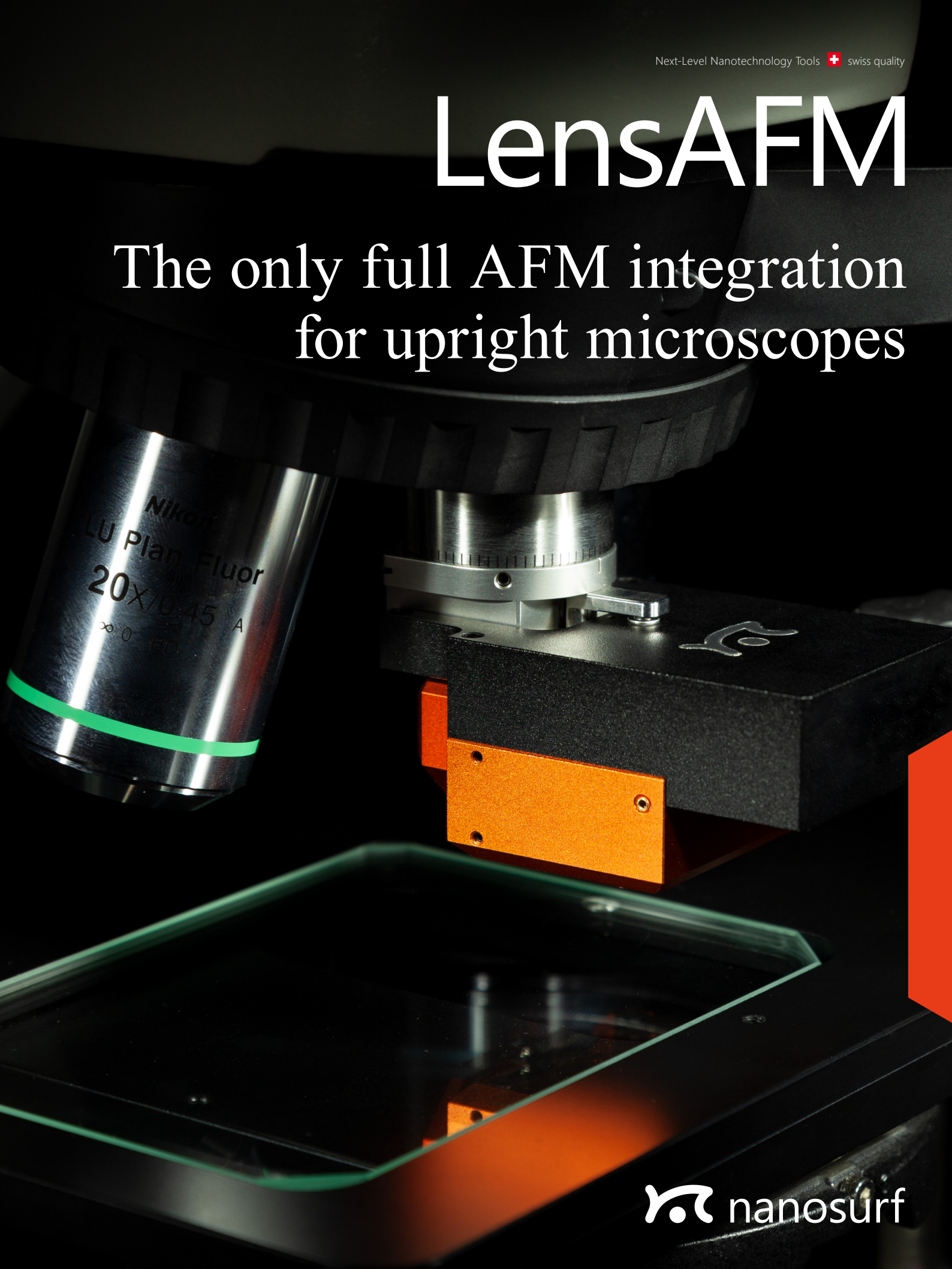
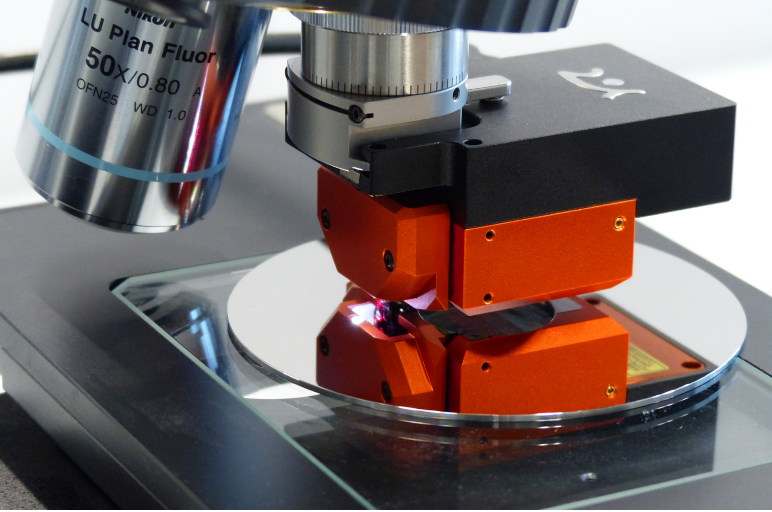


# LensAFM

The only full AFM integration  
for upright microscopes





## Extend the resolution of your optical microscope

The Nanosurf LensAFM is an atomic force microscope that continues where optical microscopes and profilometers reach their resolution limits. It is mounted like a normal objective lens, thus extending the resolution and measuring capabilities of these instruments.

The LensAFM not only provides 3D surface topography information, but can be used to analyze various physical properties of a measurement sample as well.

## Perform AFM measurements with the instrument you are used to

In an ever increasing number of situations, researchers want to combine optical and atomic force microscopy techniques. The ease of use, screening capability and (lack of) sample preparation requirements of optical microscopes is almost unparalleled. However, sometimes a 100x objective is not enough and you would like to have a closer look at some small features that go beyond the resolution of the instrument. In a regular laboratory setting you would require two dedicated instruments and it would be necessary to transfer the sample from one device to the other. With the LensAFM this is not the case. With its exceptionally small design and clever mounting mechanism all you need to do is rotate the turret on your optical microscope or profilometer and run the scan.

The LensAFM integrates perfectly into your workflow: upon mounting it on your optical microscope's turret — like a regular objective lens — you screen the sample with normal objectives to find areas of interest. Subsequently, the area of interest is readily found again using the integrated 8x optical lens, and you can then perform your AFM measurement to get higher resolution 3D information: work in the way you are used to, but with a huge boost in resolution and capabilities.

The LensAFM has a quick release mechanism to easily mount and unmount the LensAFM to and from the turret. The kinematic mounting guarantees that you will replace it with better than 10  $\mu\text{m}$  accuracy. Alignment grooves on the chip mount additionally ensure that the tip of the next cantilever is within 4  $\mu\text{m}$  of the same position allowing to find the same feature again, even after a cantilever exchange. And thanks to these alignment grooves, you don't even have to perform a laser alignment on the cantilever, saving additional time.

## Overcome the limitations of optical microscopy

Since the resolution of optical microscopy is limited by the wavelength of light, there is a barrier in the resolution you can achieve with your optical system. In an ever increasing number of applications, this calls for the combination of optical and atomic force microscopy. In addition, AFM overcomes problems characterizing transparent samples or samples otherwise difficult to assess optically. But not only the topography of a sample is of interest: AFM also allows knowledge of other material properties to be acquired, e.g. surface roughness, hardness variations, magnetism, or electrical conductance/resistance.

## Key Features

Mountable on virtually any optical microscope or 3D optical profilometer

Equipped with an objective lens for a clear view of sample and cantilever

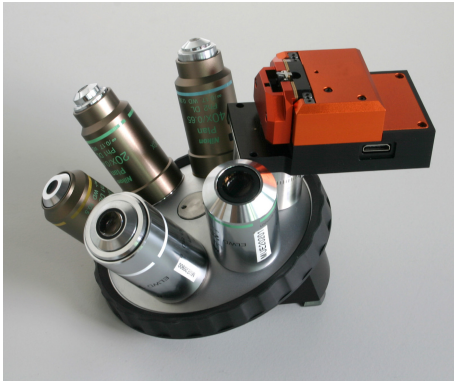
Simple sample positioning using the optical microscope position manipulators

Integrated motor for automated cantilever approach: Just bring your sample into optical focus and let the LensAFM do the rest

Large AFM Z-range allows measurement of high structures

Wide range of AFM modes available through the C3000 controller

Simply intuitive: Nanosurf's well-known "ease of use" will have you performing measurements in minutes!



## Easy mounting on virtually any upright optical microscope or 3D optical profilometer

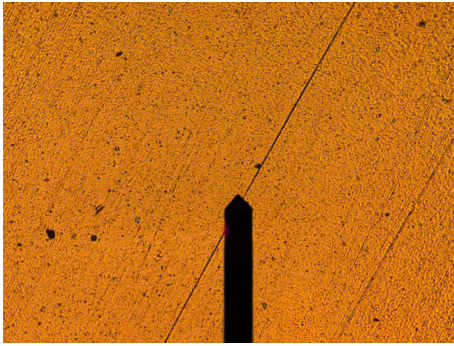
The LensAFM mounts just like a standard objective lens, and is compatible with all commonly used optical microscopes and 3D profilometers (Zeiss, Olympus, Leica, Nikon, Mitutoyo) via the wide variety of mounting adapters available.



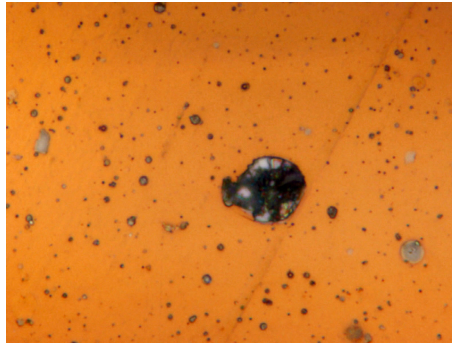
Adapters for mounting the LensAFM on the objective turret of a variety of microscopes are available

## Defect analysis with combined optical and AFM platform

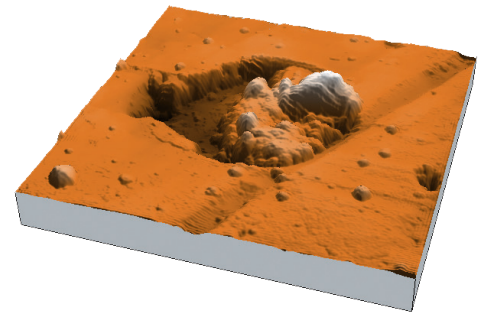
The combined LensAFM/optical platform provides a complementary imaging system that greatly extends the resolution and measuring capabilities of these individual instruments, as illustrated by the three images below.



Defects in a hard-coated metal surface as observed through the LensAFM's built-in 8× objective lens. The AFM cantilever is visible in the optical image and allows easy positioning of the sample before measurement.



Close-up of the area directly above the cantilever as observed through a 100× microscope objective lens (NA 0.9). A defect is observed, but its nature and exact structure remain unclear.



AFM topography of the same defect recorded by the LensAFM. 3D data of the area clearly identify the defect as a hole in the coating layer, partially filled with debris. Such data is used to improve the coating process and to measure the quality of the result. (image size: 20 μm x 20 μm x 1.5 μm)

### LensAFM scan head specifications

Scan head type	110-μm	70-μm
Maximum scan range (XY) <sup>(1,2)</sup>	110 μm	70 μm
Maximum Z-range <sup>(1)</sup>	22 μm	14 μm
XY-linearity mean error	< 0.6%	< 1.2 %
Z-measurement noise level (RMS, Static mode) <sup>(3)</sup>		typ. 350 pm (max. 500 pm)
Z-measurement noise level (RMS, Dynamic mode) <sup>(3)</sup>		typ. 90 pm (max. 150 pm)
Automatic sample approach	Built-in motorized parallel approach with 4.5 mm travel	
Sample observation <sup>(4)</sup>	Built-in 8× objective lens with 45 or 60 mm parfocal distance	
AFM measurement repositioning precision	±10 μm (including cantilever exchange, scan head remounting, and approach)	

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

(2) Maximum scan range at 45° rotation of the AFM scan direction

(3) Measured using the C3000 controller, with active vibration isolation on a stable desk, and in a low-noise laboratory environment (no air conditioning)

(4) Adapters with a correct parfocal distance are available for the different optical microscope types



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