

Super-flat AFM for SEM

Have you ever wanted to get fast 3D information in SEM? Kleindiek and Nanosurf have the plug-and-play retrofit solution for you.

The combination of Atomic Force Microscopy (AFM) and Scanning Electron Microscopes (SEM) opens exciting new possibilities. SEM's are widely used for analytics in the micrometer and nanometer range and AFM techniques are useful for investigating the surfaces and characteristics of different materials down to nanometer detail.

Kleindiek Nanotechnology has developed a slim, compact and flexible scanner that allows AFM to be performed in SEM. Combined with Nanosurf's SPM controller and easy-to-use control software, information on lateral dimensions and material from SEM inspection can be readily complemented by precise topographical and force information in-situ.

The unique and effortless availability of these two sets of data brings new value-added functionality to existing tools and reduces experiment cycle time, thereby increasing research throughput.

The AFM system is compact and slim enough to fit inside any SEM and is even compatible with your load-lock if your SEM is fitted with one.

The system also works stand-alone in air.



YOUR ADVANTAGES

3D information from simultaneous SEM and AFM pictures

Notably compact (height 10 mm)

Simple to operate

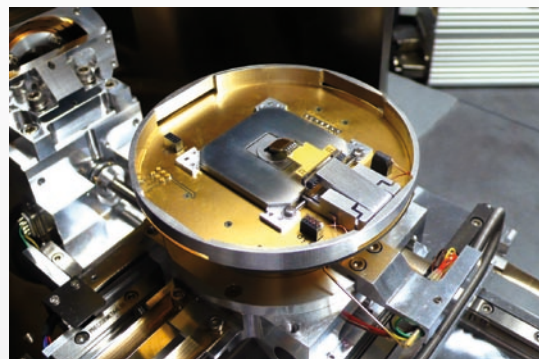
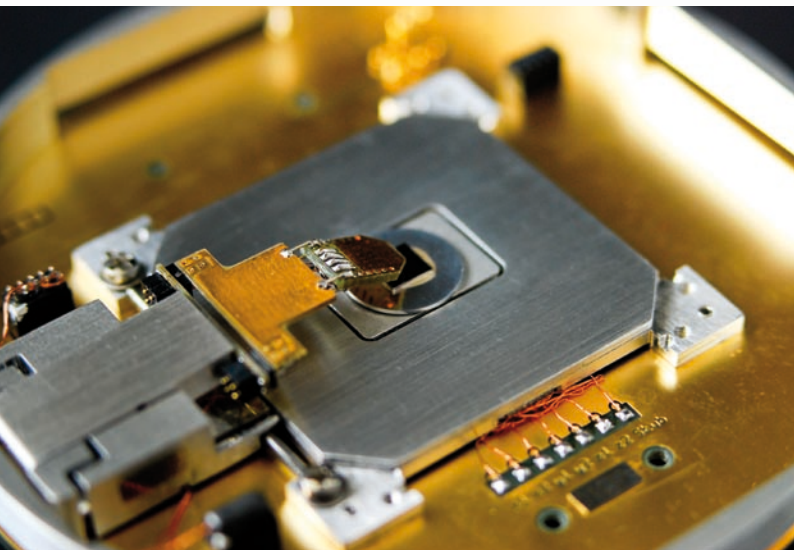
Load-lock compatible

Extremely stable operation

Easy sample and tip exchange without laser adjustment

Can be used in combination with micromanipulators and other in-situ and ex-vivo tools

Works in air and in SEM



Super-flat AFM for SEM

Coarse positioner

- The ultra-flat three-axis manipulator with unmatched stability and precision
- Operating range A 10 mm, B 80°, C 5 mm
- Piezo range A 1 µm, B 10 µm, C 1 µm
- Resolution A 0.25 nm, B 2.5 nm, C 0.25 nm
- Low drift 1 nm/min
- Reliable operation (one year endurance test)
- Fast pre-positioning by hand
- No backlash, creep or reversal play
- Fine and coarse displacement in one drive

A = left/right, B = up/down, C = in/out

AFM sensor

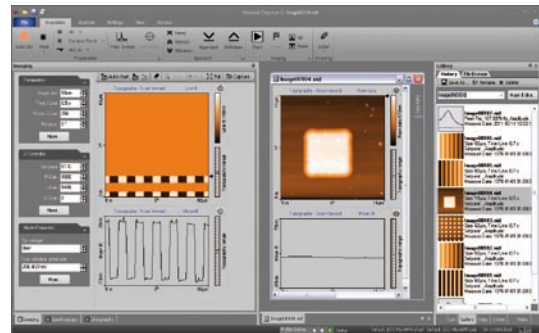
- Cantilever with integrated piezoresistive sensor
- Operates in contact mode with dynamic mode available in the near future
- Length 400 µm
- Width 50 µm
- Height 4 to 5 µm
- Tip radius < 20 nm
- Tip height > 5 µm
- Tip force constant 2–4 N/m
- Maximum tip force 80 µN
- Resistance 500 to 650 Ω
- Sensitivity 3.1×10^{-3} mV/nm @ $V_{\text{bridge}} = 2.5$ V

AFM scanning unit

- Ultra-flat scanner with scan ranges up to 15 µm in XY and 5 µm in Z

Shuttle platform

- SEM and FIB load-lock compatibility
- Quick and easy probe tip and sample exchange
- Total system height 9 mm
- Total system width 95 mm
- Maximum sample size 12 mm × 12 mm × 1 mm
- Weight 100 g



AFM software

- User-friendly control and imaging software
- Built-in post-processing and analysis capabilities
- Integrated lithography and scripting functions



SPM S200 controller

- 16-bit data acquisition with up to 16 lines/s
- Up to 2048 × 2048 scan area data point
- Up to 65536 spectroscopy data points
- Hardware sample tilt compensation
- 16-bit scanner drive signals
- One-wire connection to scanner
- USB 2.0 connection to computer
- Modular design allows future upgrades that enable extended AFM measurement modes
- Power supply 90–240 V AC @ 50/60 Hz (100 W)
- Size 470 × 120 × 80 mm
- Weight 2.4 kg



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