

Multipurpose Scanners for Agilent AFM/SPM

Data Sheet

Features and Benefits

- Choice of two scan ranges offers either scanning of areas up to 90 μm x 90 μm open loop and closed-loop or atomic resolution up to 9 μm x 9 μm
- Innovative nose cones enable imaging modes to be changed quickly and easily
- Scanner design facilitates imaging in ambient, controlled gas, or a fluid environment
- Top-down configuration protects electronics and piezo elements from damage caused by harsh imaging environments
- Open-top optical and video access allow high-resolution video microscopy straight down the optical axis of the scanner
- Multiple AFM imaging modes with one scanner increase application versatility
- STM imaging mode option provides superb sensitivity and resolution
- Built-in viewing screen for laser spot enables easy laser alignment in air or fluid
- Compact design with integrated photodetector permits accurate X-Y position adjustment
- Full compatibility with Agilent Technologies' modular AFM/SPM microscopes offers simple upgrade path for extended capabilities



Overview

Agilent's multipurpose scanners deliver unsurpassed performance, versatility, and ease of use for atomic force microscopy (AFM). They are ideal for imaging in fluids or air and under controlled temperature and environmental conditions.

These unique top-down scanners offer many key performance benefits. To deliver high-resolution imaging results, a patented pendulum scanner design is utilized that eliminates artifacts in the image by keeping the relative position of the laser spot fixed in relation to the cantilever throughout the scan cycle. The top-down configuration provides complete isolation of the scanning elements and electronics from the imaging environment, thus allowing total environmental control, fluid-friendly operation, and superior thermal stability. As a result, samples can be imaged at temperatures up to 250° C over time periods as long as 10 hours.

Scanner Versatility

Agilent's nose cone cantilever modules are optimized for different imaging modes. A universal nose cone socket on the multipurpose scanner enables the nose cones to be changed quickly and easily, putting a wide variety of operating modes at the researcher's fingertips.

To provide optimized scanning for a diverse set of applications, Agilent's multipurpose scanners are available in two scan ranges. Agilent's large scanner can scan areas up to 90 μm x 90 μm and its small scanner offers atomic resolution up to 9 μm x 9 μm .

A low coherent light source (LCL) for the multipurpose scanners expands the capability of AFM by affording researchers the ability to obtain superior force measurements with pico-Newton sensitivity. The LCL option delivers better performance because the low coherent light source effectively eliminates laser interference, thereby resulting in far more sensitive force detection. Additional light source options are available upon request.

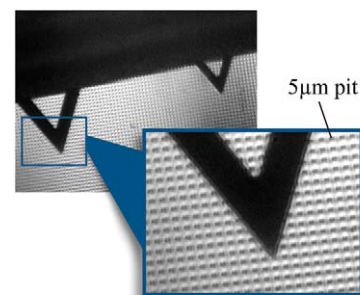


Figure 1. Open-top design allows high resolution video microscopy straight down the optical axis.



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Nose Cones

A variety of interchangeable nose cones are available for use with these multipurpose scanners (Figure 2). The standard nose cone performs contact mode AFM, LFM, and Agilent's patented MAC Mode. Nose cones for Top MAC Mode, acoustic AC mode (AAC), current sensing mode (CSAFM), scanning tunneling microscopy (STM), and dynamic lateral force modulation (DLFM) are also available. All standard AFM cantilevers can be used on any of the AFM nose cones. Customized nose cones are available upon request.

Additionally, polymer and stainless steel housing options are available. The nose cones are uniquely designed for imaging in fluids as well as to resist damage caused by exposure to harsh environments.

Specifications

Large AFM Scanner

Scan size	90 μm x 90 μm x 7 μm
Noise level	< 5 \AA RMS < 0.5 \AA RMS

Small AFM Scanner

Scan size	9 μm x 9 μm x 2 μm
Noise level	< 1 \AA RMS < 0.2 \AA RMS

STM and CSAFM Nose Cones

Sensitivity	10 nA/V; 1 nA/V; 0.1 nA/V
Noise (RMS)	20 pA; 2 pA; 0.2 pA

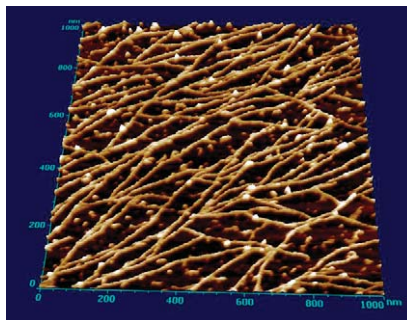


Figure 2. 5500 AFM image in MAC Mode of poly-peptide on mica in DI water.

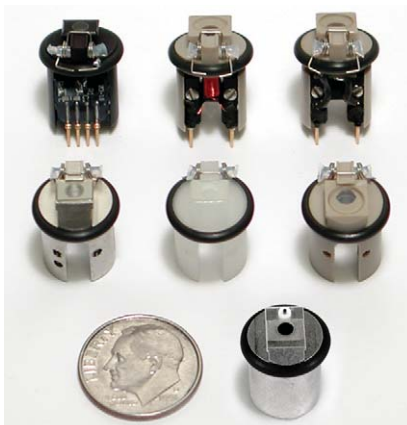


Figure 3. Interchangeable nose cones that enable various imaging modes.

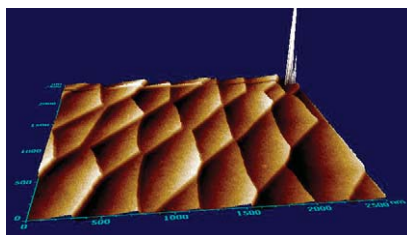


Figure 4. Silicon Steps imaged in ethanol with the 5500 AFM in contact mode.

AFM Instrumentation from Agilent Technologies

Agilent Technologies offers high-precision, modular AFM solutions for research, industry, and education. Exceptional worldwide support is provided by experienced application scientists and technical service personnel. Agilent's leading-edge R&D laboratories are dedicated to the timely introduction and optimization of innovative and easy-to-use AFM technologies.

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