Cypher ES Environmental AFM System

AFM Perfusion Cantilever Holder Kit. Optional cantilever holder kit for liquid or gas environments with two ports for liquid exchange with stainless steel clip. Kit includes tools and spares for using the liquid cantilever holder. Cantilevers are not included.

AFM Gas C-AFM (ORCA) Cantilever Holder Kit. Optional cantilever holder for conductive AFM application requirements. Cantilever holder with single 2nA/V (2e-9) gain.

AFM Dual-gain Gas C-AFM (ORCA) Cantilever Holder Kit. Optional dual-gain cantilever holder kit for conductive AFM application requirements. Dual-gain cantilever holder with (1uA/V, 1nA/V) gains.

Cypher AFM Specifications

Head/Optical Lever

- DC Detector Noise*: <5pm
- AC Detector Noise: <25fm/√Hz above 100kHz
- Photodiode Bandwidth: DC to 7MHz
- Light Source: User selectable/exchangeable. Options include superluminescent diodes and laser diodes. Wavelength is fixed at 850nm.
- Spot Size: User selectable/exchangeable. Focused spots range in size from 10x30µm down to 3x9µm.
- Controls: Focused spot positioning and photodiode centering controls are motorized and fully controllable from the software.

*Noise measurements are quoted as average deviation (Adev) in a 0.1Hz to 1kHz bandwidth unless otherwise noted.

Scanner

A variety of scanner modules are available depending on application. All scanner modules include XYZ actuation as well as a motorized cantilever engage stage. The standard scanner module specs are listed below:

- Scan Range: XY range is 30/40µm (closed/open loop). Z range is 5/6µm.
- XYZ Sensor Noise*: NPS™ Digital LVDT sensors. XY noise is <60pm. Z noise is <50pm. Closed loop scan performance achieves lattice resolution (<10nm scans) with feedback gains equivalent to large scan (>1µm) values.
- XYZ Open Loop Noise
- XY: <8pm Adev in a 1Hz to 10kHz BW
- Z: <4pm Adev in a 1Hz to 10kHz BW
- Vibration Immunity: <10pm coupling into deflection for 1mm/s^2 floor acceleration
- XY Sample Drift: <20/200nm/°C (with/without temperature control module)
- Out-of-Plane Motion: <3nm over closed loop scan range
- Sample Dimensions: 15/7mm (diameter/thickness)
- Sample Environment: Standard environments are ambient, droplet, or low evaporation/perfusion chamber.

*Noise measurements are quoted as average deviation (Adev) in a 0.1Hz to 1kHz bandwidth unless otherwise noted.

System

DC Height Noise*: <15pm (<5pm in quiet environments)
AC Height Noise*: <15pm

View Module

A variety of view modules providing top-down optical view of the sample/cantilever are possible depending on the application. The standard view module specifications are listed below:

- Configuration: Bright field/reflected light
- Illumination: LED based Köhler illumination with manual controls for the aperture and field diaphragms. Intensity is software controlled.
- Resolution: Diffraction limited performance (<1µm) with apochromatic correction. NA = 0.45
- Field of View: 690x920µm
- Camera: 3.1 megapixel CMOS camera with FireWire interface. Digital zoom/pan/capture; software controlled white balance, shutter speed, and binning.

Electronics

- ADCs
  - Two 16-bit, 80MHz
  - One 16-bit, 5MHz
  - Six 18-bit, 2MHz
  - Five 16-bit, 100kHz