

attoAFM III / STM I

combined low temperature atomic force and scanning tunneling microscope

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Microscope Setup	
AFM/STM sensor unit	very compact, ultra stable AFM/STM head AFM tuning fork shear force detection (non-contact mode)
titanium housing diameter	47 mm (others on request)
Operation Modes	
feedback	PI feedback loop with additional PLL
imaging modes	non-contact mode, EI EFM, SGM,
feedback mode STM	constant current, constant height
spectroscopy mode STM	current-distance, current-voltage, point contact spectroscopy
Sample Positioning	
positioners and scanners	coarse positioners ANPxyz101 with piezo scanner ANSxyz100sr ³
coarse range	5 x 5 x 5 mm ³
step size	0.05 .. 3 µm @ 300 K, 10 .. 500 nm @ 4 K
fine scan range	40 x 40 µm ² @ 300 K, 9 x 9 µm ² @ 4 K
sample monitoring	sample / tip monitoring via CCD camera and mirror (optional)
Operating Conditions	
temperature range	mK .. 300 K (dependent on cryostat)
magnetic field range	0 .. 15 T+ (dependent on magnet)
operating pressure range	1E-6 mbar .. 1 bar (designed for exchange gas atmosphere)
Cooling Specifications	
bore size	designed for a 2" (50.8 mm) cryostat/magnet bore
cryostat	LTSYS-He4, LTSYS-He3,
STM tips	
probe design	e.g. Pt/Ir wire, Ø 0.4 mm; Tungsten wire
current detection	low noise amplifier with variable gain and bandwidth
gain range	1E3 .. 1E11 V/A
sample bias	bias voltage applied to sample; current taken from tip
bias voltage range	±10 V
Noise AFM	
shearforce detection noise density	< 1 pN/√Hz
measured z-noise density	< 16 pm/√Hz
z bit resolution full range mode	7.6 pm
z bit resolution small range mode	0.12 pm
Noise STM	
noise	150 pm RMS; typically 760 fA (@ 1E8 V/A)
current noise in spectroscopy mode	< 2 pA
current noise	< 15 pA RMS @ setpoint 500 pA
bias voltage bit resolution	305 µV
bias output noise	100 µVpp (10 Hz - 100 kHz) 20 µVpp (10 Hz - 1 kHz)
Scan Controller and Software	
ASC500 SPM controller	for detailed specifications please see attoCONTROL section

