KUSUMA SCHOOL OF BIOLOGICAL SCIENCES
INDIAN INSTITUTE OF TECHNOLOGY DELHI
HAUZ KHAS, NEW DELHI- 110016

Date: FEB 21, 2012

NOTICE INVITING QUOTATIONS

Please send your quotations for the purchase of **Scanning Probe Microscope (Atomic Force Microscope)** to the undersigned in a sealed envelope super scribed with "Quotation for Atomic Force Microscope" by **16th March 2012 by 3.30pm**. Quotations should have a compliance sheet for the items with proper technical information brochure from the company supporting the specifications.

A complete AFM Set (including applicability for biological samples) with all accessories should be quoted as per the following specifications which should allow all operations in liquids, air and gases in high resolution. The possible modes of operations should include Contact, Non-Contact, Intermittent contact, tapping mode etc.

The AFM should have the following features:

S. No.	Name of item with full specifications	qnty
1.	System should be of use to perform advanced tip-enhanced fluorescence work easily. It must have a sample scanning configuration for this purpose. In case of a tip scanning system, a separate sample scanning XY and Z scanner must be provided. This 'sample scanning' stage can be offered as an additional part or already integrated in the base configuration.	1
2.	The AFM should use with a large range and a small range scanner with following specifications i) Large range scanner: XY range : >90 μm x 90 μm (closed loop). Scanner with larger XY range is considered as an advantage. Z range : >10 μm, with vertical range of ~30 μm	

	should also be quoted. Z noise:<0.05nm and sensor non-linearity <0.05%. Imaging bandwidth>600Hz ii) Small range scanner XY range: 10 µm x10 µm (closed loop), Z range: 2.5 µm or less, Z noise:<0.03nm and sensor non-linearity <0.05%. XY nonlinearity: <1% iii) Standard scan modes in air and fluid should be available iv) All three axis should have closed feedback and independent nano-positioning sensors v) Overall drift of the system should be <0.02nm/min. vi) Scan heads must be calibrated with NIST standards. vii) The AFm must be capable of scanning atomic resolution images on atomic lattice structures such as Mica. The AFM should be capable fo scanning <300nm scans in closed loop operation and maintain positional accuracy of <0.05nm.	
3.	It should be possible to mount and operate this AFM on the inverted fluorescence microscope and capable of simultaneous AFM + Optical microscopy experiments. The AFM head must allow open physical access to sample from above while the AFM head is in place and in operation.	
4.	The AFM should be compatible to use with Zeiss, Nikon, Olympus and Leica inverted microscopes. A suitable inverted microscope and camera from Zeiss, Leica, Nikon or Olympus should be quoted in the offer. Adequate clearance for a full turret of six objectives should be given, including at least three with NA > 0.6.	
5.	The AFM must be compatible with a wide range of light microscope modes, including confocal laser scanning microscopy, phase contrast, DIC, TIRF, and FRET, FCS, FRAP, FLIM measurements. Topdown optical access of 0.7 NA or	

	greater, such that standard 0.50 NA or greater transmitted light condensers can be used on the light microscope while the AFM head is in place.	
6.	The AFM must include modules to perform Nanolithography and Nanomanipulation with positional accuracy of <0.15nm. i) The cantilever should be able to control lithography and manipulation applications. Capabilities should be preferably built in without the need for extra hardware or software. ii) Should be able to generate patterns with free hand curves and possibility of patterns import should be present iii) The cantilever amplitude, deflection and voltage must be controllable and modulated during lithography	
7.	The AFM should be able to perform modulus dissipation and adhesion map in real time of topographic imaging with scanning range and accuracy equivalent to the scanning capabilities for small scanner (refer point 2)	
8.	Software must include a built-in functionality for direct overlay of optical microscope data with AFM data. This overlay procedure must include an integrated procedure to provide registration between both image data sets.	
9.	A force curve based imaging mode should be available for challenging samples like soft samples (biomolecules), sticky samples (polymers or bacteria), loosely attached samples (Nanotubes or virus particles in fluid) etc. This mode should offer automatic control over the tip-sample interaction force at every pixel of the image without a need for set point or gain adjustment while scanning. Higher pixel density (i.,e. 512x512 or above) and higher speed are considered an advantage.	
10.	The AFM must include ability that provide automatic optimization of critical	

	imaging parameters including set point, gains, scan rates and Z limit in both air and liquid environment. During this operation, cantilever resonance is not required to be tuned but still preserving conventional imaging rates of < 10 minutes per image.	
11.	Should be designed for imaging biological specimens under aqueous buffer, on a glass cover-slip and also it should hold Petri dishes, glass slides etc. with a specimen stage of the following specifications: i) Motorized sample tyranslation stage with about 125nm travel in the X and Y directions. ii) Step resolution of ~2μm and at least 8 μm repeatability for any direction. iii) Z translation stage >25nm motorized and at least 5nm on servo control iv) The sample satge should be able to rotate about its centroid v) Sample holder of ~150mm diameter with compatibility to hold ~10mm thick samples.	
12.	The system should have a cantilever deflection detection system using laser. During alignment of Laser-on-cantilever, the laser spot must be visible on a screen. For easy laser-tip alignment, laser path from the Laser Source to Tip should be coaxial with the Optical Microscope path and also orthogonal to sample surface. Laser coming from an angle to the tip is not acceptable.	
13.	If cantilever tuning is necessary, it must be done fully automatic by just one mouse click. Tip engage process must be automatic as well.	
14.	For applications like single molecules and proteins Small volume fluid cell should be available (< 60 μl), with liquid inlet & outlet. For applications like live cell	

	imaging, a petri dish perfusion fluid cell should be available with temperature control and inlet & outlet.	
15.	Sample temperature control stage with a range from room temperature to 60 deg should be available for all sample holder types including cover slips, glass slides and petri dishes. It is accepted if additional stage is offered as an additional part in order to take care of all sample holder types.	
16.	The instrument should include a motorized XY stage with joy-stick control for ease of use.	
17.	The AFM should include signal access capability through a set of BNC connectors. It should also include data sampling up to 50MHz or higher, and have at least 3 built-in digital lock-in amplifiers. System should also include Q control and Thermal tuning up to 2MHz or higher.	
18.	The entire system should be quoted along with suitable controller.	
19.	Vibration isolation: i) A compatible active/passive vibration isolation system for atomic scale imaging ii) The system should include acoustic enclosure which should provide noise isolation better than 20dB iii) Tripod with elastic cord isolated platform	
20.	A minimum of 2 tip holders should be provided. At least one of the tip holder should include an electrical connection to the tip for EFM, KPFM, etc modes. EFM & KPFM should be included.	
21.	For both air and liquid operations, the offer should include a minimum of 500 AFM cantilevers for non-contact modes and 100 AFM cantilever for contact modes. System must accept any cantilevers commercially available from any	

	cantilever manufacturers.	
22.	Scanning module should be offered for heat induced DNA melting dynamic measurement application. This module must include ability that provides automatic optimization of critical imaging parameters including set point, gains, scan rates and Z limit. Should be capable of scanning <300nm closed loop operation and maintain positional accuracy of <0.15nm. It should provide ~5X improvement or more in high resolution scanning or ~20X improvement in normal resolution scans relative to conventional non-contact / intermittent contact / tapping mode.	
24.	Sample temperature controller: Sample heating from -25 °C to 250 °C with 0.1°C temperature stabilization should be available on this module. It should possible to independently control the temperature of the tip, by heating, hereby eliminating tip-sample temperature gradients. Should include peristaltic pump, reservoir, gas and fluid manifold, tubing and accessories specially configured to operate together. Should Include Thermal Applications Controller (TAC) heater/cooler controller with digital readout, -30 to 100-degree element, ambient to 250-degree element, cantilever holder with tip heating, stage base with purge ports, and other accessories.	
23.	Dual-piezo drive torsional mode should be offered to allow researches on loosely attached fabric in textile applications. This module must include ability to drive the cantilever in Torsional resonance and the torsional resonance amplitude used as the feedback signal. The Torsional resonance must be actuated by a dual-piezo design, with out-of-phase drive signals.	
24.	Software and computer: i. Fully functional software for data acquisition and data analysis for operating	

	system Windows XP or Vista ii. Thumbnail view should be available to allow searching, sorting and viewing AFM-specific data files to work with other software iii. Scientific publication-quality graphing and layout capabilities and movie making facilities should be available within the control and analysis software environment iv. Generation, display, and visualization of 3D images in real-time (during scan as well as off-line processing). v. Computer and printer: Windows XP or vista with dual flat panel Monitors (21 inch or larger), 320 GB HDD, CD/ DVD writer, USB ports (8), should be able to export files to the clipboard or save as JPEG, PNG, BMP, TIFF etc with a suitable Color Laser printer.	
25.	Power: 220-250 Vac 50 Hz.	
26.	UPS: Suitable 2 KvA Online UPS system (with minimum 30 minutes backup time) for uninterrupted data acquisition.	

Calibration samples for all the different operating modes as given above must be provided. A set of spring constant cantilevers fro force-distance microscopy and tip radius calibration gratings should also be provided. All the necessary installation and training must be provided by the vendor.

User List:- The vendor should also specify the user list for the said item in India as well as abroad

Warranty: (Required) On site comprehensive including part replacement for 1 year and additional AMC for two years should be included.

Terms and conditions covering submission of quotations

1. **DELIVERY:** The rate must be C.I.F. IIT Delhi (Air Freight),

Delhi Airport

2. **TERMS OF PAYMENT:** Letter of credit

3. **VALIDITY OF QUOTATIONS: three months or more**

4. **CORRESPONDENCE:** No correspondence regarding acceptance /rejection of quotation will be entertained.

5. **SUBMISSION OF QUOTATIONS:** Separate quotations should be submitted for technical bid and commercial bid in two separate and clearly marked envelopes.

6.**TECHNICAL SUPPORT:** Supplier must have a direct support office in Delhi, India. Registered address and contact details must be provided during the tender.

6. **DISCOUNTS/REBATES:** Special discounts/rebate wherever admissible keeping in the view that supplies are being made for an Educational institute may be indicated in the offer.

7**. DIRECTOR'S RIGHT:** Director, IIT Delhi reserves the right of acceptance or rejection of any or all quotations without assigning any reason.

Please specify terms and conditions. The quotations must have a validity of 3 months. Sealed quotations (separate technical and financial) should reach the following address on or before 16th of March 2012. Quotations received after the due date will not be accepted.

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