NANOSCALE RESEARCH FACILITY (NRF)
INDIAN INSTITUTE OF TECHNOLOGY DELHI
HAUZ KHAS, NEW DELHI- 110016

Date: August 29, 2012

NOTICE INVITING QUOTATIONS

Ref: No. NRF/AFM/2012 **Due date: Sep. 28, 2012**

Please send your quotations to the undersigned in a sealed cover super scribed with our Ref no. & due date for the following items (Scanning Probe Microscopy with multiple options).

S.No.	Name of item with full technical specifications	quantity
1	Scanning Probe Microscopy system **A.** Operating modes: i. Tip/sample scanning configuration ii. Contact, Non-contact, AC (intermittent contact), Constant force, Constant height, phase, amplitude and force modulation imaging, Lateral Force mode iii. Scanning magnetic force microscopy(MFM), Electric Force microscopy (EFM), Surface potential (Scanning Kelvin Probe Microscopy), Scanning Capacitance Microscopy, Piezo Force Microscopy (PFM), Conducting AFM imaging, Scanning Thermal Microscopy (SThM), Scanning Tunnelling Microscopy (STM), Liquid cell imaging **(**disposable/easily cleanable small volume fluid/gas cell, a sealed environmental chamber with multiple ports for fluid/gas exchange), and other standard imaging modes. **B.** Other non-imaging modes: i) Nanoindentation and nanomechanical measurements (Cantilever based nanoindentation and full-fledged nanoindentation capabilities using standard indenters like Berkovitch tips should be quoted.) ii) Nanolithography and nanomanipulation (Cantilever should able to control lithography and nanomanipulation applications. Capabilities should be preferably built-in without the need for extra hardware or software. The system should able to generate patterns with freehand curves and possibility of patterns import should be present. The cantilever amplitude, deflection, and voltage must be controllable and modulated during lithography.)	01

C. Specimen Stage:

i. Motorized sample translation stage with about 125 mm travel in the X and Y directions.

ii. Step resolution ~2μm and at least 8μm repeatability for any directions.

iii. Z translation stage: > 25 mm motorized and at least 5 mm on servo control.

iv. The sample stage should able to rotate about its centroid.

v. Sample holders with vacuum chuck to hold ≥ 4 inch semiconductor wafers. Magnetic holders for smaller samples up to ~15 mm. Sample holder should be compatible with ~10 mm thick samples.

vi. Compatible with sample weight: up to 500 gm.

D. Scanners:

For two scanner configuration:

i. XY scan range: 90 μm×90 μm (closed loop)

ii. Z range: 10 μm, Z noise: < 0.05 nm and sensor non-linearity < 0.05%

iii. Imaging bandwidth >600 Hz

i. Small range XY scanner: 10 μm×10 μm (closed loop)

ii. Z range: 2 μm, Z noise: < 0.03 nm and sensor non-linearity < 0.05%, XY non-linearity <1%

In case of single scanner, the scanner must be compatible with all the scanner specifications as mentioned above.

iv. Standard scan modes in air and fluid should be available.

v. All three axes should have closed feedback and independent nano positioning sensors.

vi. Overall drift of the system should be < 0.2 nm/min.

vii. Scan heads must be calibrated with NIST standard.

viii. **The AFM must be capable of scanning atomic resolution images Mica.** The AFM should be capable of scanning <300 nm scans in closed loop operation and maintain positional accuracy of <0.15 nm.

E. Microscope optics:

i. Sample illumination: Integrated color camera (minimum 5 MP) with software controlled power adjustable white LED light source.
ii. Motorized zoom and focus
iii. Variable field of view with range better than 1 mm to 200 μm.
iv. Optical resolution: better than 2μm.
v. Camera software should be integrated with the AFM software.

F. Electronics and controller:

i. High performance DSP based electronics
ii. Data acquisition sampling rate ~50 MHz.
iii. All the ADC and DAC must be ≥ 16 bits
iv. Digital Q control of the cantilevers, simultaneous collection of up to 8 data channels should be possible, should provide thermal tuning of cantilevers up to 2MHz in air or fluid to determine spring constant (to be demonstrated).
v. Should provide 3 user accessible lock-in amplifiers and should be capable of applying up to10V bias to the AFM tip or sample.
vi. It must provide real time adjustment to all scanning parameters – scan rate, scan size, scan offset, and gain.
vii. Should support use of micro-actuated cantilevers for fast scanning (up to 10Hz).
viii. Fast, single cable USB based computer-to-controller communication should be available, electrical noise: < 1 pA, Bandwidth: at least 500 kHz.
ix. Access to all major signals on BNC connectors through either controller front panel or by a break-out box.
x. Image resolution must be greater than 5k $\times$ 5k.

G. Software and computer:

i. Fully functional software for data acquisition and data analysis using a Windows based operating system.
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 graphics 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:** Windows based operating system with dual

	flat panel Monitors (24 inch or larger), 500 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. **H.** Vibration isolation: i. A compatible active/passive vibration isolation system for atomic scale imaging. ii. The system should include an acoustic enclosure which should provide acoustic noise isolation better than 20 dB. **I.** Sample heating/cooling option: The sample heating/cooling option (-25 ^{o}C to 250 ^{o}C) with 0.1 ^{o}C temperature stabilization. **J.** Power: 220-250 Vac 50 Hz	

Calibration samples for all the different operating modes mentioned above must be provided. A set of spring constant calibrated cantilevers for force-distance microscopy and tip radius calibration gratings should also be provided. **The atomic scale imaging of mica in ambient condition should be demonstrable.** A compliance chart is required for all the technical specifications mentioned above. All the necessary installation and training must be provided by the vendor.

Users list: Vendors 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 2 years. Additional warranty per annum may be quoted. This should be clearly shown in the technical as well as financial bid.

Terms and conditions covering submission of quotations

1. **DELIVERY:** All prices quoted for FOB

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. **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) may be send to the following address.

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