परिशिष्ट 'क'

UNIVERSITY OF PUNE

DEPARTMENT OF CHEMISTRY

Ref. No. **Enquiry /Quot/Chem/Store/12-13/ 156 /15.02.20113**

Quotations are invited for the supply of following goods/carrying out the work, so as to reach this office on or before

To,
O./C.
For Web Publishing

DUE DATE

04.03.2013

Sr. No.	Description of Material/Item/Work	Approximate Quantity	Rate Per unit	Amount (Rs.)	Remarks
1	**Atomic Force Microscope (AFM)**	**1**			
	(Specifications enclosed)				

Note : 1) Quotation validity atleast 90 days from due date.
2) Payment after satisfactory delivery.
3) Please send your quotation along with authorized dealers/manufacturer certificate.

1. Octroi Exemption Certificate will be issue for the goods supplied from the places outside Pune Municipal Corporation Limits.
2. Excise duty/Exemption Certificate/Sale Tax form will be issued if applicable.
3. Please mention - STR No. _____ CST No. _____
4. Please give the quotation on letterhead as mentioned above without any changes and additions.

Note : For other terms and conditions see overleaf.

Signature : .....

Head,
Chemistry Department,
University of Pune, Pune-411007.

University of Poona * Pune-411007. * Deptt. of Chemistry

Head
Department of Chemistry
University of Pune
Pune - 411 007

Signature : .....
(Supplier)
(With Stamp)

[P.T.O.

TERMS AND CONDITIONS

1. Mention quotation No. on the envelope.
2. Quote rate per unit and date of validity. Date of Validity should be minimum of 45 days from the last date validity of submitting the quotation.
3. Submit sample/Catalogue of the material with quotation if necessary.
4. **Quotation must be sent alongwith the covering letter on your letterhead quoting your VAT Registration number and as per description given without making any changes/ addition.**
5. Conditional quotation will not be accepted.
6. Delivery within ..... days from the date of order at the Chemistry Department of the University of Pune.
7. Work to be completed within ..... days from the date of order of the University of Pune.
8. Quotation will be rejected in case of even a single correction or overwriting. Only clear and uncorrected quotation will be accepted.
9. Payment as per actual measurements wherever applicable.
10. Payment will be made by cross cheque only and after satisfactory delivery & installation.
11. Income tax will be deducted as per prevailing rule.
12. Water charges 2% will be recovered, if used.
13. In case of works and service contracts Security Deposit will have to be deposited by the contractor in following manner :
    (a) 2.5% before commencing the work.
    (b) 2.5% will be deduced from the R. A. Bill.
14. Electricity charges will be recovered as per rules if used
15. The University of Pune will issue Octori Exemption Certificate if applicable.
16. Excise duty exemption Certificate/Sales Tax form will be issued, if applicable.
17. Rates quoted should be Inclusive of all taxes with Tax details e.g. Excise duty, Custom duty, VAT, Packing forwarding etc., TOT@ % S.C. & ST @ % @ % @ %
18. The above terms and conditions are acceptable.

Signature of the Supplier/Contractor.

(With Stamp)

P.U.P.—1000–5–2012 (162) [PC-1]

University of Pune requests quotations for a Multiprobe-Atomic Force Microscope (AFM)

AFM Instrument is to be set up as a **Central Facility** for a wide range of experimental requirements. The instrument must have a robust design as it will be used daily by students of all levels of experience. A major fraction of the usage will be related to imaging and force measurements on nanoparticles, thin conducting and non-conducting films, polymers metal complexes, proteins and DNA.

The instrument should have capability or a provision to accommodate or adapt an inverted optical microscope from the leading brands, in future. Additionally, conducting AFM, magnetic, electrochemical modes and piezoresponse force (optional), must be included for hard materials research, where our particular emphasis will be on energy science and electrochemical applications. As this will be a shared facility instrument, an upgrade path for additional advanced modes is preferred. The AFM must meet all of the requirements listed below:

1. Operating Modes and Environmental Controls

Able to image the samples and perform measurements in air and in liquid using the same cantilever holder for simplicity. The cantilever holder must be compatible with most commercial cantilevers.

AFM Modes:

Scanning modes: Contact, AC (tapping), Multi-frequency (able to drive and detect the cantilever motion at more than one frequency simultaneously), frequency modulation (FM), force modulation, electric force microscopy (EFM), magnetic force (MFM), Kelvin Probe (SKPM), Conducting AFM (CAFM), Electrochemical AFM, Piezoresponse Force Microscopy (Optional),

Point measurement modes: Nanolithography and Nanomanipulation, Force vs. Displacement (single point and mapping), I-V measurements, and Switching Spectroscopy PFM.

Conductive AFM

- The conductive measurements while scanning as well as specified locations (I-V curves).
- The bandwidth of the transimpedance amplifier 17kHz.
- Wave forms for I/V spectroscopy : square, sine, triangle, pulse, or user defined.
- The current sensing range: 1pA to 20nA.

2. AFM Scanner and Optical Lever Detection Systems

Instrument Resolution

- The AFM instrument must have demonstrated atomic lattice resolution in AC mode and contact mode imaging.

Scanner

- A closed-loop scanning system ; Two types 90 μm ×90 μm×30μm and 5μm×5μm
- The XY scanner must be separate from the Z scanner to eliminate "bowing" artifacts.
- The instrument must preferably be a "sample scanning" system to facilitate "tip-enhanced" experiments.
- X and Y sensor noise< 500pm and Z sensor noise < 300pm

Optical Lever Arm: Light Source and Photodetector

- The cantilever holder and the optical lever assembly (laser, optics, and detector) must move together on a single rigid frame.

- Low coherence light source (preferably infra read SLD).
- Incident angle on the cantilever: 20-25 degrees
- The photodetector optical sensing bandwidth of at least DC to 2MHz.

Spare Cantilevers: A stock of AFM cantilevers (of all kinds, soft/hard, contact/tapping, magnetic/conducting coated tips, back side coated tips for fluid cell imaging, special tip-less cantilevers for polymer bead functionalization) for the typical two years should be included.

Spare substrates for the validations:
Highest grade HOPG substrates and AFM calibration gratings for atomic level calibration should be provided.

3. AFM Control System

Electronics

- Sensing bandwidth of at least 5 MHz.
- Thermal tunes of the cantilever up to 2 MHz.
- Digital Q-control in the range 2 kHz – 2 MHz.
- BNC access to all major input and output signals.
- User programmable control knob for the fine tune and adjust all scan parameters during any advanced operation.
- Minimum three lock-in-amplifiers to tap multiple signal analysis.

Software

- Windows based having compatibility with university network and other laboratory instrument software systems.
- Capable of driving the cantilever simultaneously at two or more arbitrarily chosen excitation frequencies in AC (dynamic) mode, while simultaneously collecting and displaying the amplitude and phase signals and images from each of these frequencies, along with the height or Z-sensor data.
- User-programmable in an open-source software programming language.
- Must include a macro building graphical interface for automation of complete multiple-step experiments and data processing sequences.
- One-click configuration tool that sets up the software for both standard modes as well as for user-defined operation modes.
- Includes 3D rendering technology for advanced image display both in real time as well as for off-line processing.
- Includes optical image navigation using any realtime optical input. Should have an image overlay function to combine (for example) AFM images with optical images for direct feature comparison.
- Allow image files to be exported in standard formats as JPEG, PNG, BMP and TIFF.
- Includes multiple built-in spring constant calibration methods, including the "thermal noise" and "Sader hydrodynamic" methods.
- Includes advanced force curve analysis modeling with at least Hertz, JKR, and DMT built-in functions. It must be possible to apply these to individual force curve data, multiple force curves, and complete force maps, with user control (or auto-fitting) of modeling parameters. Must include built-in nanolithography and nanomanipulation software.
- Must include drift compensation software Drift compensation should be possible during any advanced characterization mode (imaging, spectroscopy, etc), together with sample heating and cooling options.
- Must include free offline software for analysis of experimental data.
- Free software upgrades must be available for the life of the instrument.

Computer and peripherals: Latest configuration suitable for controlling the AFM system and performing data analysis simultaneously. Dual monitors at least 20" USB2, including color printer and suitable USB to give optimum power back to AFM computer and all other hardwares.

5. Instrument Environmental Isolation

- Thermally- and acoustically-isolating enclosure. 20dB of acoustic isolation.
- An air temperature control system in the acoustic hood to minimize thermal drift.
- Active vibration isolation table.
- Provision to carry out experiment in the inert as well as controlled atmosphere.

Optional Items:

(1) Low current STM attachment as an option with a box of 25 Pt/Ir STM tips (optional)

(2) Piezoresponse Force Microscopy (optional)

(3) AFM-mode to image live cell and tissues(optional): To image live cells and tissues for the simultaneous AFM and advanced optical measurements (i.e., Brightfield, epifluorescence and phase contrast illumination).

(4) Inverted Optical Microscope compatible with AFM with fluorescence attachment (optional) :

5. Guarantee, Warranty, Support and Service

- Preference will be given to the provision of maximum period of warranty on the eligible parts followed by subsidize AMC contract.
- Must include free AFM software upgrades for the life of the instrument.
- Must provide biannual training sessions for students during the warranty period.
- Appoint a permanent trained operator for the period of three years. The Salary and local expense of the operator will be borne by the company/vender.

Note: *The above mentioned specifications are guidelines which will be to the discretion of the technical advisory committee and the purchase committee.*