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**TENDER DOCUMENT FOR THE PURCHASE OF**  
**ATOMIC FORCE MICROSCOPE (AFM)**

TENDER No.- PHS/8259

Dated: 17<sup>th</sup> January, 2014

Last Date for Receipt of Tender: **Feb. 03, 2014, 3:00 PM**

DATE & TIME OF OPENING: **Feb. 06, 2014, 3:00 PM**

Tender Form Fee: Rs. 1,000/-

Earnest Money Deposit (EMD): Rs. 25,000/-

## **Tender Specifications for Atomic Force Microscope (AFM) System**

The Scanning Probe Microscope/AFM should be a stand-alone multifunctional system that has top view optical system for cantilever and sample alignment, control electronics and software, computer control workstation, active vibration isolation table, and all necessary accessories and spare parts. The instrument should be able to scan dimensions ranging from about 100 microns to a few nanometers with extreme linearity. Moreover, the image acquired should have a high resolution thus enabling one to get an unattended scan (over a large area) for samples kept under stable conditions.

**Please provide a compliance-statement with the technical bid.**

The specifications and configuration of AFM are as follows:

### **(1) GENERAL**

Essential measuring modes: In air

- Topography Imaging (Contact, Semicontact, Non-contact mode)
- Phase Imaging
- Force Imaging
- Lateral Force Microscopy (LFM)
- Force-Distance Spectroscopy
- Adhesion Force Microscopy
- Spreading Resistance Imaging (SRI)
- Force Lithography
- Current Lithography
- Nanomanipulations
- Magnetic-force microscopy (MFM)
- Electrostatic Force Microscopy (EFM)
- Kelvin Probe Microscopy (KPM)
- Scanning Capacitance Microscopy (SCM)
- Piezoresponse Force Microscopy (PFM)

Control software must have possibility to adjust system settings and parameters for these measuring modes by a single mouse click. Offered system must allow automated re-configuration for different measuring modes.

#### **Scanning Types:**

- High performance piezo-tube scanner 100x100x10  $\mu\text{m}$  or better with low noise closed loop sensors
- Decoupled or flexure scanners will not be acceptable.
- Scanning type: sample scanning in XYZ, while tip always remains at the same position in XYZ

**Noise level:**

Closed Loop noise XY: 0.2 nm RMS or better

Open Loop noise XY: 0.01nm RMS or better

Z noise floor: 0.03 nm RMS or better

- Performance proved design: atomic lattice resolution with the proper environmental and isolation
- One closed-loop scanner should perform all above mentioned measuring modes without any additional hardware or software.

**Measuring heads:**

AFM head for Si cantilever probes with easy and simple alignment facility. Same head and scanner must be capable for operation in air and liquid using exchangeable tip holder (offered optionally).

**SPM base and controller:**

- universal basement for replaceable measuring heads
- Sample XY coarse positioning: 5x5 mm
- Sample size: up to 25mm diameter, 10mm thick
- Compact ergonomic design, damage protected
- Approach system: by sample, motorized, 10 mm travel
- Embedded USB camera for sample observation with possibility of additional optical system.
- Remote control of the instrument through the Internet network
- Full digital controller with ease of use software package for data acquisition and image analysis compatible with MAC and Windows OS
- Image resolution: Up to 4000 pixels
- Simultaneous up to 8 signals under scanning and up to 3 signals under spectroscopy
- Low voltage regime included for imaging of areas < 1x1 um
- Digital controller with adjustable proportional–integral–derivative feedback which guaranties the high quality of imaging.
- Self diagnostic board for controller for easy troubleshooting on site

**Spare parts and accessories:**

- The offered system must include all necessary toolkits and accessories for AFM including screwdrivers, tweezers, sample plates etc
- The offered system must include a set of calibration gratings for scanner calibrations in X,Y and Z in the range of few Angstroms to few Microns.
- The set of supplied cantilevers must include at least the following probes:
- 10 chips - for contact AFM; 25 chips - for semicontact AFM; 5 chips - for SSRM; 5 chips - for SKM/SCM; 5 chips - for MFM.

Necessary spares and consumables [is to be provided by the vendor without cost during

first 2 years] required for smooth and efficient operation of SPM for 2 years.

**Data acquisition and image processing software:**

- Automatic cantilever spring constant calibration required
- Free life-time software update
- Software can be installed on unlimited number of PC's for offline work.
- The software must include Macro Language scripting possibilities for optimization of routine operations and user-defined experiments

**Image analysis software should include at least following features:**

- Cross section analysis
- Roughness measurement
- Grain size analysis
- Depth analysis
- Power spectral analysis
- Histogram analysis
- Fractal analysis
- Fourier analysis
- Image mixing
- Autocorrelation
- Enhanced image filtering tools
- Image modification and presentation software should include at least following features:
  - Force-distance curve analysis
  - 2D Fast Fourier analysis
  - Plane-fit
  - High pass and low pass filters
  - Zoom in/out
  - Optional grid on images and curves
  - Variable shading and display angle, tilt
  - Color bar completely user definable 2D and 3D height presentation
  - Menu for image series presentation

**Image and data export format at least:**

- Export to BMP, JPG, TIFF
- Export to ASCII format and MatLab
- Must include automated system configuration for operation in liquids to operate these modes by one mouse click
- Must include automated system configurations for advanced modes like SKM, MFM etc to operate these modes by one mouse click
- Software must be a sole package for all modes and attachments with no need for additional software programs.

- Software package must include both image acquisition and data processing software in one package with no need for different programs operation.
- Software must be free-for copy, eg can be installed on unlimited number of off-line PC.

**Optional (To be offered separately):**

**The offered system must be capable of performing imaging in liquid for the below mentioned modes.**

- Topography Imaging (Contact, Semicontact, Non-contact mode)
- Phase Imaging
- Force Imaging
- Lateral Force microscopy
- Force-Distance spectroscopy
- Adhesion Force microscopy
- Force lithography
- Nanomanipulations

**Scanning Tunneling Microscopy (STM)**

Scanning Tunneling Microscopy  
 Scanning Tunneling Spectroscopy  
 Tunnel spectroscopy (dI/dV measurements)  
 Work function measurements (Z modulation)

**Educational kit with piezo-probes:**

The module should include piezo-probes setup with use of tungsten wire, etching station with optics, toolkit for tip preparation. It should allow to sharp the used tip or creating the new one. Piezo-probes must work for topography imaging, phase imaging, spectroscopies, force lithography and scanning tunneling microscopy.

**Top view optical system:**

Resolution - 2.5  $\mu\text{m}$  or better: Offered system must have possibility of integration with additional top view optical system

**Heating Stage Option:**

The offered system must have a heating possibility with range RT to 150 deg C.

**Vibration Isolation Table:**

The supplier must offer branded vibration isolation table for minimization of external vibrations in order to achieve highest SPM performance. Active vibration isolation desktop system, active damping (1-200Hz), >200Hz - passive damping.

**It should be clear that all the required features must be clearly mentioned, so that at the time of making comparative statement – we must not end up in any trouble.**

SECTION – I

**PROCEDURE FOR SUBMISSION OF BIDS**

1. There will be **Two bid system** for this Tender: *Techno-Commercial bid* and *Financial bid*
2. The Techno-Commercial Bid of the Tender should be covered in one sealed cover superscribing the words “Techno-Commercial Bid”.

Likewise, the Financial Bid should also be covered in a **separate** sealed cover superscribing the words “Financial Bid”.

**The two documents viz., Techno-Commercial bid and Financial bid covers prepared as above should be enclosed in a single sealed cover marked as under:**

Tender for the supply of AFM

Due on Feb. 03, 2014; 3.00 PM (last date for submission).

Name & Address of the Tenderer.....

**Note: Price should not be indicated in the Techno-Commercial bid otherwise the Tender will be rejected**

3. Tenders received after the due date will not be accepted. If the last date for submission of Tender falls on any declared holiday in the University, the next working day will be considered as the last date for the same.
4. The bids prepared by the Tenderer and all correspondence and documents relating to the bids, shall be written in English language
5. The contract for the supply of the items is non-transferable.
6. Tender/Offer should be type written, other wise the same will be rejected
7. Each page of the tender document should be signed by the authorized signatory.
8. Each offer should be complete in all respects.
9. Telegraphic/electronic/conditional offers will not be accepted.

**SECTION – II**  
**TERMS AND CONDITIONS**

1. **Opening of bids:** Techno-Commercial bids will be opened by the Committee after the closing date and studied. The Tenderers will be invited for presentation and clarifications if needed. Financial bids of the Tenderers complying with the prescribed Techno-commercial specifications will be opened by the Committee. Tenderers or their authorized agents may be present if they so desire during opening of the Tenders. The Tendering company should depute the person who is qualified for technical knowledge and be present at the time of opening of the technical bid.
2. **Rejection of bids:** The Committee reserves the right to reject any or all offers without assigning any reason.
3. **EMD:** The Tender bid should accompany an EMD of Rs. 25,000. The EMD should be made by means of an A/c payee DD in favor of the Registrar, Panjab University, Chandigarh-160014 payable at Chandigarh. No interest is payable on EMD.
4. **Refund of EMD:** The EMD will be returned to unsuccessful Tenderer only after the Tenders are finalized. In case of successful Tenderer, it will be retained till the successful and complete installation of the equipment.
5. **CIF value and comparison of Financial bids:** CIF value upto Physics Department, Panjab University, Chandigarh (*shipment by air upto Delhi and insured up to the installation site*) should be quoted and will be considered for comparison of bids. Bids quoted in foreign currency will be converted into Indian Currency at the exchange rate applicable on the day of opening of the financial bids for comparison purposes.
6. **Warranty Period:** The warranty period should be *minimum 2 years (with spares)* from the date of installation with satisfactory performance as per specifications. *2 years free service* to be provided after the warranty period.
7. **PBG:** Tenderer selected for supply of equipment, will have to provide Performance Bank Guarantee (PBG) on any *scheduled bank situated in India, equivalent to 10 percent of the cost of the equipment* which should be valid until the expiry of the Warranty period. The PBG will be provided by the Company along with the letter of acceptance of the order by the Principals. LC will be opened in favour of the Principals only after obtaining the PBG.
8. **Terms of Payment:** LC will be opened for the 100% value of the equipment, 90% of the amount will be released after the shipment and remaining 10% after the installation of the equipment.
9. **Delivery period :** Delivery should be made within *120 days* of opening of the LC
10. **Delayed delivery:** If the delivery is not made within the due date for any reason, the Committee will have the right to impose penalty as under::

- i First extension for one month or part thereof @ 2%.
- ii Second extension for an additional month or part thereof @ 3%

11. **Non delivery beyond extended period:** If the Tenderer fails to execute the order within the second extension mentioned above or mutually agreed time frame, the order will be cancelled and EMD forfeited by the Dept. He will also be liable for all damages imposed by Physics Department for non supply of equipment including the liability to pay the difference between the price accepted by him and those ultimately paid by the Physics department for the equipment, such damages will be assessed by the Committee for the purchase of SPM.
12. Increased statutory levies and duties above the rate quoted in the offer will not be an excuse for the Tenderer to delay the supply beyond the date specified in the Tender.
13. **Validity of rates:** Rates quoted should be valid for at least *4 months* from the closing date of the tenders.
14. **Consistent pricing:** The rates quoted for the Equipments by the supplier shall in no case exceed the lowest price at which the supplier of this Equipment of identical description made to any other person/organization/Institution during the above said period and should attach an undertaking in this regard.
15. **Installation requirements:** The Supplier will clearly mention installation requirements on our part in the *Techno-Commercial bid*.
16. **Installation time:** The company must install the equipment *within a period of two months* of the date of delivery of the equipment at Physics Department, Panjab University, Chandigarh.
17. **Free Installation:** The equipment and software should be installed and tested to the specifications *free of cost*.
18. **Supporting Equipment:** The Tenderer will provide all requisite supporting equipments like isolation transformer, step down transformer, *if needed*. We need the complete installed system.
19. **Licenced Software and its upgradation:** *Two user licences* for analysis software should be provided. The certified/licensed software and programs should be the part of the supplies. There should be *free upgradation of software upto 5 years*
20. **Factory Acceptance Data:** Proposed acceptance criteria for the equipment should be provided by the supplier in order to compare the performance against the quoted specifications. *Manufacturer's test certificate along with test conditions and results* is to be supplied along with the equipment.
21. Tenderers are advised to study all technical aspects and terms & Conditions, of the Tender documents. Submission of Tender shall be deemed to have been done after careful study and examination of the Tender Document with understanding of its implications.

22. **Only Manufacturers or Authorized dealers to bid:** The offering firm should clearly mention whether they are the manufacturer or authorized agent/dealer of the manufacturer. In case of agent for overseas manufacturer, a letter of authorization from the manufacturer should be submitted along with the offer. The Tenderer can also enclose the rates on the letterhead of the manufacturer if he has been authorized to do so by the manufacturer.
23. **Descriptive literature:** A set of specifications, description and illustrated literature of the equipment and related peripherals *should accompany the Techno-Commercial bid.*
24. **User and Service Manuals:** A set of User's manuals and Service manuals of the main instrument, attachments and related equipment (water chiller etc.) should be supplied with the equipment
25. **Equipment must be new:** The Tenderer must ensure that the equipment being offered is a new one and not refurbished or repaired one.
26. **Defective Equipment:** If any of the equipment supplied by the Tenderer is found to be substandard, refurbished, unmerchantable or not in accordance with the description /specification or otherwise faulty, the committee will have the right to reject the equipment or its part. The prices of such equipment shall be refunded by the Tenderer with 18% interest if such payments for such equipment have already been made to him.
27. All damaged or unapproved goods shall be returned at suppliers cost and risk and the incidental expenses incurred thereon shall be recovered from the supplier. Defective part in equipment, if found before installation and/or during warranty period, shall be replaced within 45 days on receipt of the intimation from this office at the cost and risk of supplier including all other charges.
28. **Damage during transit:** In case of any mishappening/damage to equipment and supplies during the carriage of supplies from the origin of equipment to the installation site, the supplier has to replace it with new equipment/supplies immediately at his own risk. Supplier will settle his claim with the insurance company as per his convenience. The Physics Department, PU will not be liable to any type of losses in any form.
29. **Legal jurisdiction:** Any dispute in this regard of any term of the offer and on the supply of equipment is subject to *Chandigarh jurisdiction* only.
30. **Training** Two weeks training should be provided free of charge at the premises of Physics Department out of which one week should be on equipment usage & software and one week in maintenance and application including sample preparation.
31. **Availability of Spares:** The Tenderer must assure the availability of spares for servicing of equipment *for at least 10 years.* Supplier should give an undertaking that spares parts will be supplied within the specified periods as and when ordered.
32. **Infrastructure:** Physics Department will provide required air conditioned space, *single phase power supply* with required electricity outlets.
33. **Clearance:** The Principals will do all types of clearance work to deliver the equipment at the site of installation. Department will provide all types of documentary support including

Customs Duty Clearance. Principals will themselves have to procure any requisite permission from the Govt. of country of origin of equipment.

34. **Agency Commission:** Agency commission, if any, should be clearly mentioned by the Principals in the form of a certificate and will be paid in Indian Currency.
35. **Bank Charges:** Bank charges in India will be borne by the Panjab University and Bank charges abroad will be borne by the suppliers.
36. **Similar Models installed:** The Tenderer must mention in the *Techno-Commercial bid* the similar model of equipment installed in India *during the last three years* and the *addresses of contact persons at these places*.
37. **Application Specialist:** The Tenderer should mention in the *Techno-Commercial bid* the availability and *names of Application Specialist and Service Engineers* in the nearest regional office.
38. **Response Time:** The Tenderer should mention in the *Techno-Commercial bid* the response time for attending to a complaint about the equipment.
39. **Change of Indian Representatives:** The original manufacturer/Principals should give an undertaking that the aforementioned warranty and availability of spares clauses will be valid even in the case of change of their representatives in India.