



INSTITUTE OF PHYSICS

SAINIK SCHOOL, BHUBANESWAR

(An autonomous Research Institute of Dept. of Atomic Energy, Govt. of India)

GLOBAL TENDER NOTICE NO. - 01/2008-09

Last date for submission of tender: 30th June, 2008 up to 15.00 Hrs.

The Institute intends to procure the following items:

Large Area, High Precision Atomic Force Microscope and Accessories: 01 Set (against Two Bid format (Technical & Financial separately))

For detail specifications, terms & conditions please visit our website, <http://www.iopb.res.in>.

For both the above items, sealed quotations in **two parts**, superscribed with tender name & number as mentioned above are invited from leading manufacturers and / or their accredited Associates as per following mode:

**Part-I will consist of the Technical bid
and
Part- II will consist of the Financial bid.**

It may be noted that the two bids should be separately sealed in two envelopes, marked with "Technical Bid" and "Financial Bid", which should be further sealed in an envelope superscribing the name of the equipment and the tender number.

Offer for the above tender will be received by the undersigned till 03:00 PM on 30th June, 2008. The Technical bid (Part- I) will be opened at 3:30 PM on 30th June 2008. The Financial bid (Part-II) of only the technically qualified bidders will be opened on a later date with prior intimation.

The technical bid should also contain an item-wise compliance statement against the detailed specifications. Queries related to the technical specifications may be addressed to:

Dr. T. Som, E-mail: tsom@iopb.res.in

The Institute reserves the right to accept / reject any or all offers in full / part without assigning any reasons thereof and the decision of the Director of the Institute shall be final and binding.

Part- I: Technical Specifications

Large Area, High Precision Atomic Force Microscope and Accessories – 01 Set

Operational Modes

- Imaging modes: Contact; Constant force, Constant height; Lateral Force; Non-contact; AC (intermittent contact); Phase; Dual AC; Magnetic (MFM); Electric Force (EFM); Surface potential (Scanning Kelvin Probe Microscopy); Piezo Force Microscopy (PFM); and Conductive AFM imaging
- Non-imaging modes: Force; Force/Distance spectroscopy; Force Volume Mapping; Nanolithography and Nanomanipulation; and Current/Voltage (I/V) spectroscopy

Scanning system – Closed loop operation with position sensors in 3 axes

Standard scan modes in air and fluid should be available

- XY scanner should be separate from Z scanner.
- Each axis of motion should be independent.
- Integrated position sensors in all three axes should provide seamless closed loop operation so that position errors in the scanning system are eliminated/corrected and thermal drift effects get substantially reduced.
 - Z position sensor should be calibrated with a NIST traceable interferometer.
 - XY position sensors should be calibrated with VLSI standard.
- Large vertical scan range (>15 μ m) should be quoted, while option should be quoted for extension up to 40 μ m.
- X&Y: Up to 90-100 μ m travel. Closed loop position control with sensor noise <0.6 nm absolute deviation (Adev) in a 0.1 Hz-1 kHz bandwidth (BW) and sensor nonlinearity <0.5% at full scan.
- Z: 15 μ m or more with closed loop sensed control. Sensor noise <0.3 nm in a 1 kHz BW and sensor nonlinearity less than 0.2% (Adev/Full travel). Z height noise should be <0.06nm at full scan.
- Should be possible to accommodate sample sizes of 75 × 75 mm (dia) or bigger and >20 mm thick (with leg extenders)

Scan Head/Optical Lever Detection

- Infrared superluminescent diode (SLD: 860 nm).
- Low coherence light source should be offered to reduce optical interference.
- The SLD should be incident on the cantilever at a low angle to the sample normal. The inverted SLD to be provided.
- Optical lever noise should be very low <0.03 nm Adev in a 0.1 Hz-1 kHz BW (10 second measurement).
- SLD focus spot should be mentioned and optimized for small cantilevers.
- Should be able to use all commercial AFM cantilevers.

Specimen Stage

- Micrometer controlled sample translation stage with 10 mm (diameter) range in the X and Y directions.
- Motorized sample translation stage should be quoted as an optional item with a range of 7-10 mm in X and Y directions, which should be controlled through the AFM software interface

Controller

- Total digital operation (with data points of 5K×5K and more and freely selectable).
- Should not have any external wiring or complicated cabling.
- Fast, real-time processing of signals.
- 5 MHz, 16 bit digitization rate of the deflection signal.
- Digital control allowing the cantilever quality factor to be changed.

- Access to all major signals on BNC connectors on the controller front panel.
- Auto configuration of external hardware is needed. Device parameters should be stored in non-volatile RAM on the device itself and read into the software when the device is plugged in.
- Images may be collected at up to 25 Mega pixel resolution on all available channels simultaneously (larger data sets obtainable with additional installed computer memory).
- Software controlled relay for turning laser SLD on and off quickly (a few milliseconds) for measurements on light sensitive photovoltaic materials.
- GPIB (IEEE 488) based controller support.
- Fast, single cable USB connection to control the computer should be available. Typical data size should be clearly defined.

Any further detail on the controller will be appreciated.

Open Source Software

- Windows XP based software (open source code)
- Thumbnail view should be available to allow searching, sorting and viewing AFM-specific data files to work with other softwares
- Scientific publication-quality graphing and layout capabilities and movie making facilities should be available within the control and analysis software environment.

Image Rendering from within Software Environment

- Generation, display, and visualization of 3D images in real-time (during scan as well as off-line processing).
- Should include Windows XP P4 (Centrino Duo) Workstation with Dual Flat Panel Monitors, 160 GB HDD, CD, DVD writer, USB ports
- Multiple images and channels of a single scan such as phase, amplitude, topography, MFM, conductivity should be available viewed simultaneously, or overlaid on a primary channel for signal correlation.
- Independent scaling of each axis should allow adjustment of aspect ratios to best represent the data.
- One should be able to export files to the clipboard or save as JPEG, PNG, BMP, TIFF, or other files.

Multiple Spring Constant Calibration Methods

- Non-destructive determination of cantilever spring constant using thermal noise and hydrodynamic methods should be possible.
- Integrated mechanical micro-manipulation system should be available for force measurements and spring constant calibration method.

Magnetically Actuated Cantilever Drive (optional)

- No magnetic material (rare earth or transition metal ions) should be used on the cantilevers.
- Should have ability to switch between acoustic and magnetic drive in the software.

Variable Magnetic Field Module (optional)

- To apply an in-plane field to the sample exceeding $\pm 2,000$ Oe with <1 Oe resolution. Rare earth magnet to be used to eliminate heating and drift caused by electromagnets.
- Calibrated field measurement device with digital read-out should be an integral part.

Nanolithography and Manipulation

- 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 or compiling.
- Users should be able to generate patterns with freehand curves, straight lines and points. Patterns should also possible to be imported
- Cantilever amplitude, deflection, and voltage should be controllable and modulated during

lithography and should be simultaneous.

→ Better than 5 milliseconds latency between points as they are downloaded to the controller.

Nanoindentation

- Should be possible to drive the indenting tip perpendicular to the surface and then measure displacement and force with optimized AFM sensors.
- There should not be any drift problem.
- Standard nanoindenter tips should be used and tip characterization facility should be there.

Standalone Microscope Model

Top view optics base should be offered to view the cantilever and the sample through at least a 10X objective. The base should contain port for inserting fiber guide illumination and built-in cameras with different magnifications. Type of camera and field of view should be clearly mentioned.

Real time Interaction between the User and the Sample (optional)

The device (including proper software) should allow real time interaction between the user and the sample surface through six degrees of freedom sensor and three degrees of freedom force feedback. The user should be able to directly control the tip sample position in three dimensions and feel the surface as the AFM cantilever moves over it.

Closed Fluid Cell (optional)

→ Maximum sample size should be clearly defined.

→ Disposable/easily cleanable small volume fluid/gas cell (Optional).

→ Fluid and gas exchange should be possible while on an inverted microscopes.

→ Completely closed, sealed environment with multiple ports for fluid/gas exchange.

Miscellaneous

- Apart from the above items, sample heating stage, acoustic vibration isolation module (level of acoustic noise should be clearly mentioned), and all other necessary and relevant attachments/items should be quoted as optional items.
- Number of tips/cantilevers that will be offered as an integral part should be mentioned clearly. Spare tips/cantilevers (along with tip constituent material) should be quoted as an optional item.
- Power line compatibility with 220 VAC, 50 Hz input supply should be clearly mentioned.

Part-II : Commercial Terms & Conditions

- 1. Price:** The price required to be quoted on Ex-works (inclusive of necessary export packing cost). This does not include the applicable duties & taxes. The price quoted in the tender required to be quoted in ink, both in figures & words. In case of any discrepancy, the rate quoted in figures will be accepted.
- 2. Price Validity:** - The price validity of the system should not be less than six months from the date of opening of the tender.
- 3. Specification and quantity:** - The specification as well as the configuration and quantity of the equipment are required to be strictly as per the requirement of the indenter.

4. **Payment:** - The payment will be made against letter of credit (L/C). 90% of the L/C value will be released against successful delivery of the consignment at IOP site and balance 10% will be released after successful installation, commissioning of the system against submission of performance bank guarantee of equivalent amount valid for the entire warranty period. The bank guarantee required to be issued by a nationalized bank.
5. **Delivery:** - The delivery of the system is required to be made within **24 weeks** from the date of establishment of L/C.
6. **Bank charges:** - The bank charges inside India to the applicant account and outside India to the beneficiary account.
7. **Warranty:** - The system required to be warranted against manufacturing and functional defects for **3 years** from the date of completion of installation, commissioning.
8. **Liquidated damage:** -The liquidated damage is to be collected @ 0.5% of the total value per delayed week or part thereof or 5% (aggregate) of the total order value if such case arises.
9. **Training:** - The free training for one week for one/two scientists of the Institute is to be imparted at principal's factory within the warranty period. The to and fro airfare as well as the lodging, boarding and the local transport etc. are to the supplier account.
10. **Installation and testing:** - Installation and testing of the system at our site with your instruments, accessories, tools & tackles; deploying appropriate manpower as required, at your cost.
11. **Supply of spares:** Supply of spares should be ensured for at least for 3 years from the date of supply.
12. **Experience:** Details of the client list for supplying similar type of instruments have to be submitted.
13. **Agent:** An Indian agent, if any, who will participate in this Tender on behalf of one manufacturer, will not be eligible to present another manufacturer.

DIRECTOR