

Department of Materials Science and Engineering

Indian Institute of Technology Kanpur

04th March 2013

Enquiry No: MSE/AG/2012-13/04032013/1

Revised Version by the Purchase Committee (on 07th March 2013)

Sealed quotations are invited for a **Scanning Probe Microscope** with following essential and optional features and should reach the undersigned latest by 18 March 2013.

Scanning Probe Microscope (SPM) with following features

(A) Essential Characteristics of SPM Modes

1. A contact, tapping and non contact mode scanning probe microscope
2. Feedback controlled contact mode with height, deflection, and lateral force signals.
3. Feedback controlled AC mode with height, amplitude/phase, I/Q, deflection, lateral signals and along with digital Q-control.
4. Force curve acquisition
5. Contact or AC mode mapping.
6. Frequency Modulation
7. Piezoresponse Force Microscopy (PFM): high sensitivity, high bias and crosstalk free measurements of piezo materials and thin films. High voltage operation of a PFM is essential, with bias minimum voltage required $\pm 100V$. Equipment must have the capability to measure piezoelectric constants such as d_{33} and domain imaging for switching kinetics.
8. Electric Force Microscopy (EFM)
9. Magnetic Force Microscopy (MFM)
10. Scanning Kelvin probe microscopy and Surface Potential
11. Complete set of softwares for operation in the above modes

(B) Optional SPM Modes/ Characteristics/Accessories

12. Scanning Tunneling Microscopy (STM) and/or Conductive AFM along with appropriate scan head(s) and tips having capability for measurements of low magnitudes of current.
13. Band Excitation
14. Temperature controlled stage with capability to go to temperatures between 200-300°C with upgradability to subzero temperatures, say down to -20 to -30°C.

(C) Other Essential features related to SPM hardware and software

- SPM controller must have at least 16 bit DSP and 16 bit DACs, for X, Y, and Z axis scan systems.
- Must have scanner(s) which operate in two area ranges: i.e. one in vicinity of 80 μm x 80 μm to 100 μm x 100 μm and 7 μm x 7 μm to 12 μm x 12 μm .
- Z-range must be in the vicinity of 8-10 μm or higher for large area scanner and between 1-2 μm or higher for small area scanner, if provided both.
- Minimum resolution of 0.5-1.0 nm in X and Y.
- Better than 0.05 nm resolution in Z in normal AFM mode and of pico-meter level in PFM mode.
- Sample of size approximately 20 mm x 20 mm x 5 mm should be accommodated in the sample stage.
- Equipment should have a closed and open loop imaging with switchability between the two.
- Noise must be low, especially in PFM and other quantitative measurements.

- High precision imaging and measurement capability.
- A low coherence laser source with a position sensitive detector optimized for the laser wavelength used for the detector of the cantilever position. Should be software controlled.
- It must have a CCD controlled optical microscope based viewing system with large working distance and a resolution in the range of 1-5 microns.
- The equipment must come with suitable electronic control, feedback and imaging capabilities as listed above, and particularly have high quality lock-in amplifiers with sufficient frequency bandwidth for good phase and amplitude imaging.
- Equipment must come with a suitable vibration isolation system and acoustic isolation box included.
- Sufficient number of standard calibration samples for X-Y-Z as well as image calibration.
- **Cantilever Tips:** The supplier **MUST** provide minimum 20 cantilevers for each of the basic modes and MFM and 50 for each of the specialized modes such as PFM / EFM from reputed manufacturers. In addition, the vendor should also provide costing and specifications of tips for various SPM modes as OPTIONAL items list.

(D) Essential software and computer related features:

- Dual monitor (23inch or higher) based system with all the necessary softwares for the capture, storage (in standard digital formats) and analysis of AFM images
- Computer processor should be core i7 (quad core) or better with minimum 1 TB HDD and should have a RAM of at least 8GB.
- Appropriate software for capturing images in all the above modes listed in (A and B).
- Post image analysis software **with additional** two free licenses for only post-imaging analysis software.

(E) Other Mandatory Requirements

- Warranty: min 3 years
- AMC for further two years
- Training and installation support by experienced personnel is mandatory and should be included in the cost.
- Must demonstrate user base. The quote should accompany contact details (email and phone no.) of reputed users in India and abroad.

Method of submitting the quotation

The prospective suppliers are required to send quotation in two parts in sealed envelopes, labeled as “**Technical Bid**” and “**Financial Bid**”. **The Technical Bid should contain detailed technical specification of the product being offered and should not mention any prices.** The Financial Bid should include the detailed price quotation clearly including the cost of the equipment, taxes, service charges if any, shipping and handling charges. Optional items should be listed clearly in the financial bid with their final cost. The two separate and sealed envelopes should be clearly marked appropriately as “**Technical Bid**” and “**Financial Bid**”. Both the sealed and labeled bids can be sent in a single envelope. **Technical bid must include appropriate quantitative and imaging data for all the modes.**

Terms and Conditions:

1. Maximum educational discount, if any should be offered.
2. Validity of quotation should be at least for 60 days
3. Prices should include the installation and training cost.
4. Warranty should be for at least three years after installation
5. Normal payment terms for the Institute will be applicable (90% on delivery of the items and the remaining 10% after satisfactory installation/ inspection). In case of import of items, payment will be made via letter of credit through bank.
6. Quotation should carry all the appropriate certifications like agency certificate, proprietary certificate if applicable etc.
7. Quote must give a warranty of minimum 3 years from the date of installation and AMC for further two years.
8. Delivery must be within 6 months from the data of purchase order.

Quotes should have the options for following delivery modes:

- Ex-works for pickup by our worldwide freight forwarder
- FOB in country of origin
- CIF, New Delhi
- For delivery to IIT Kanpur

Kindly send the Technical and Financial bids in sealed and labeled envelopes latest by 18th March 2013 by 5pm, to:

Prof. Ashish Garg
Department of Materials Science and Engineering
Indian Institute of Technology Kanpur
Kanpur – 208016
India.