



Central Purchase unit
National Institute of Technology Srinagar (J&K) -190006

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No. NITS/CPU/ 2018/ CRFC/ 3760-65 Dated.:- 28 .02.2018

“Tender Notice for Invitation of bids for the supply of Scanning Probe Microscopy with accessories for Central Research facility Centre, with A Pre-Bid Conference”

-0-0-0-

1. Sealed Bids are invited for the lab equipment having detailed Specifications as given in Annexure -A. in two bid format on the terms & conditions given from para-2.
2. **Envelope- A (Techno-commercial Bid) Containing the following documents:-**
 - (a) Original equipment manufacturer proof.
 - (b) Proof of being Distributor/Marketing agent/ Authorized dealer in the shape of copy of agreement and registration under law in force.
 - (c) PAN card of the firm.
 - (d) Tax registration
 - (e) Proof of annual turnover of the firm for last three years which shall not be less than Rs.5.00 Crores to be proved by way of copy of audited accounts and income tax returns of 3 years.
 - (f) Proof of availability of after sale support/service.
 - (g) Bid security for Rs.4.00 lac in the form of CDR/TDR in favour of Officer In-charge, Central Purchase Unit NIT Srinagar (J&K) and tender document fee Rs.1,000/- in the form of DD, in favour of Director, NIT Srinagar. Tender without CDR/document fee shall be rejected.
 - (h) Proof of legal status.
3. **Envelope-B (Price Bid), Containing the following:-**
 - (a) Bid prices must be quoted both in words & figures. The rates quoted should be covered with transparent tape.
 - (b) The rate quoted should be FOR NIT Srinagar (J&K).
 - (c) Bid price should be without over writing. However minor over writing should be clearly signed by the bidder. In case of any discrepancy between price quoted in figures and words, the price quoted in words will prevail. Bid price should be firm for the bid validity period.
 - (d) **All duties, taxes and levies (GST or other charges) payable, must be quoted separately.**
 - (e) **As per SRO 129 of Government of Jammu & Kashmir, the institute is Exempted from state entry tax. The Institute will provide Entry tax exemption certificate to successful bidder with supply order. The Institute is also exempted from Custom/Excise duty.**
 - (f) The bidder shall fill in Bid form in the format given in Annexure-B, Technical specification Schedule as per Annexure-C and Price bid schedule in the format enclosed in Annexure-D
4. **Validity of Bids**

Bids shall remain valid at least for 120 days from the date of opening of the bids.
5. **Evaluation of Bids.**
 - (a) The purchaser shall evaluate and compare the bids which are found Responsive. i.e
 - (i) Properly signed.
 - (ii) Conform to terms and conditions and technical specifications.
 - (iii) Accompanied with Bid security and all other documents.
 - (b) Bids shall be evaluated separately for each item.

6. Award of contract

- (a) Contract shall be awarded to the bidder whose bid is commercially, technically responsive and offered at lowest evaluated price.
- (b) Successful bidder shall be notified about the award of the contract through a supply order where in terms and conditions of supply shall be incorporated.

7. Payment.

Payment to foreign manufacturer can be made through LC as per approved terms and conditions of the supply order. However, 90% of LC will be released only after receiving the equipment in good condition at NIT, Sgr. and as per prescribed specifications along with all the necessary documents. Indian agent has to take full responsibility of its installation, commissioning and trainings. 10% of payment will be released after successful installation, commissioning and trainings. For indigenous equipment 90% payment shall be made against delivery of equipment at NIT Srinagar in good condition and found as per prescribed specifications and 10% after successful installation/ commissioning and trainings of the equipment.

8. Warranty and after sale service:

- (a) All items shall carry comprehensive standard warranty of two years from the date of commissioning and service support after expiry of warranty.

9. Performance security.

- (a) Performance security shall be retained for the amount as mentioned in the award of contract letter/supply order. However it shall not exceed 10% of the contract value.

10. Settlement of disputes.

Settlement of disputes if any shall be subject to the jurisdiction of Srinagar Courts only.

11. Liquidated Damages.

If the bidder after accepting the purchase order of goods/equipments or services, fails to deliver any or all of the goods/equipments or to perform the services within the specified period, a penalty of 0.50% (half percent) of the price value of the item per week or part thereof shall be imposed. The maximum penalty shall be limited to 10% of the cost. Once maximum is reached NIT Srinagar shall proceed on its own to consider the termination of the supply order, on the risk & responsibility of the defaulting bidder

12. Submission of Bids.

- (a) ***The last date for submission of bids is 28.03.2018 upto 16.00 hours.***

However before closing of Bid, a Pre Bid Conference will be held on 7th March 2018 at Our Institute At 10.00 A.M in the office of the undersigned.

Interested bidders should register themselves for this with Prof. M.F Wani, Chairman CRFC whose email and phone is given on the website.

- (b) Bids should be properly sealed.
- (c) The two envelopes A & B should be separately sealed and superscripted as Techno-Commercial Bid & Price Bid, due date of submission, Name of equipment. These two sealed envelopes should be sealed in a bigger Envelope with the address of the Tender receiving Officer & Tender No.
- (d) Bids should be addressed to Officer In-charge, Central Purchase Unit NIT Srinagar (J&K)-190006.
- (e) Bids not from Srinagar shall be dispatched sufficiently well in advance so as to reach the destination as per scheduled time & date. NIT Srinagar shall not be responsible for any delay by posts Deptt. or Courier agency.

13. Bid opening

- (a) The Technical Bid (Envelope- A) will be opened first and Price Bid (Envelope-B) of the qualified bidders will be opened subsequently. Interested bidders can attend the Bid opening.

- 14. Custom clearance will be responsibility of the supplier, however, Institute. will pay custom on Line through on line portal (Indian Customs EDI Gateway)**
- 15. Not withstanding above, the purchaser reserves the right to reject any or all the bids received in response to this N.I.T. or withdraw it without assigning any reasons thereof.**

Officer In-charge
Central Purchase unit, NIT Srinagar

N.B.

1. Before preparing your valuable bid kindly go through the document fully and take care of all the requirements.
2. Bidders from outside Srinagar may please send their Bids well in advance so that these are received in time.

Annexure-A
Details of Equipment:-

S.No	Description of items	Specifications	Qty	Delivery Period
1	Scanning Probe Microscopy with accessories	<p>Equipment Specifications:</p> <p>Detector: Position sensitive photodetector</p> <p>Capabilities: Intermittent contact (tapping) AFM</p> <ul style="list-style-type: none"> . Phase imaging in intermittent contact mode . Contact AFM . Magnetic Force Microscopy . Electric Force Microscopy, requires either static charge or means of electrical condition for active devices <p>Cantilever Beam/Tip: .Standard commercially available tips are utilized</p> <ul style="list-style-type: none"> . MFM requires magnetic tips <p>XY Resolution: . Image resolution is 512x512 or more</p> <ul style="list-style-type: none"> . Actual resolution is tip dependent <p>Scan Size: . Z: Max. Z-range is 5 micrometer</p> <ul style="list-style-type: none"> . XY: Up to 100 micrometers square . Smallest size (XY) is 0, which is used for diagnostics . Smallest particle size is dependent upon the tip sharpness and sample feature size. <p>Z Resolution . Z Digital resolution is scalable in the sub-Angstrom scale</p> <ul style="list-style-type: none"> . Typical resolution settings: . Full range: 0.075nm, . 1um range: .015nm <p>Specimen Stage: X= 150MM,Y=100MM, Z= 15MM, Rotation= 360</p> <p>Scan Size, Multimode . Several Scanners available</p> <ul style="list-style-type: none"> . J Scanner: XY=95um, Z= 3um . E Scanner: XY= 9um, Z= 4um . Smallest size (XY) is 0, which is used for diagnostics . Smallest particle size is dependent upon the tip sharpness and sample feature size. <p>Z Resolution, Multimode: . Z digital resolution is scalable in the sub-Angstrom scale</p> <ul style="list-style-type: none"> . Typical resolution settings: . Full range: 0.050nm, . 1um range: 0.015 <p>Specimen Stage, X= 15mm, . Y= 15mm, Z= 5mm.</p>	1No	60 days After date of issue of supply order.

Specimen Considerations:. Accepts most samples: Conductors, Semiconductors, and Insulators Can be observed.

- . Including, but not limited to metals, semiconductors devices, Ceramics, biological, polymer, textile, pharmaceuticals, even food etc
- . Specimens can be upto 150mm in diameter and upto 15mm thick
- . Sample stage must be rotated in order to observe all the way across
- . All specimen, conductors, semi conductors and insulators (metals,ceramics,biological,polymers,textiles,pharmasuticals,food etc

A high-resolution imaging system of a Scanning Probe Microscope (SPM) capable of Nanolithography, Nano-manipulation, and Multiple Mode Imaging Techniques (AFM in air and liquid & STM.), the following minimum instrument specifications are required. The instrument should be upgradeable and all possibilities of upgradations.

1. MEASURING MODES:

Following measuring modes should be provided by offered specification of device:

A. Modes to operate in air:

- a. Contact mode
- b. Noncontact and semi-contact mode
- c. Lateral Force Microscopy
- d. Phase Imaging
- e. Force Modulation Microscopy (Viscoelasticity)
- f. Adhesion Force Microscopy
- g. AFM Lithography Voltage and Force
- h. Nanomanipulation
- i. Magnetic force microscopy
- j. Electrostatic force microscopy
- k. Kelvin Probe Microscopy
- l. Piezo Response Force Microscopy, including imaging of amplitude and phase signals of vertical and lateral piezoelectric domains. Must offer comprehensive measurements of hysteresis loops and PFM spectroscopy.
- m. Spreading Resistance Imaging (30pa-50nA)
- n. AFM/STM spectroscopies (F-D, I-V etc.)
- o. Force-Distance curves capabilities
- p. Scanning Tunneling Microscopy (30pa-50nA)
- q. Scanning Capacitance Microscopy

B. Modes to operate in liquid:

- r. Contact mode

- s. Non-contact and semi-contact mode
- t. Lateral Force Microscopy
- u. Phase Imaging
- v. Force Modulation Microscopy (Viscoelasticity)
- w. Adhesion Force Microscopy
- x. AFM Lithograph Force

All modes should be able to run with one piezo tube closed-loop scanner and software, no separate modules required.

- 1.1. Must be able to perform vertical engage, where the scanner moves in such a way to eliminate lateral translation of the tip during engage.
- 1.2. Must be a modular design construction to enable future up gradation with different heads and accessories for multiuser facility.
- 1.3. Sample size must be up to 40 mm diameter and up to 15 mm height or more.
- 1.4. Must include integrated top view optics and optical microscope with real-time color video display / image capture and cross hair (inside the AFM software).
- 1.5. Must include temperature and humidity sensors to monitor control of atmosphere during the measurements
- 1.6. Compatible for operations in low vacuum (10⁻⁴ Torr) is an additional advantage.
- 1.7. Must be a sample scanner system while tip maintaining its XYZ position relative to laser and photodiode fixed. Possibility to use additional measuring head for the tip scanning with fixed XYZ position of sample is considered as an advantage.
Please quote optionally for appropriate measuring head if available.
- 1.8. Scanners should be of piezo tube construction for highest resolution in compared to Decoupled or Flexure stage based system which has more noise and poor resolution due to their large mechanical loop.

1.9. Open liquid cell and special probe holder with glass prism for operation in liquid should be included.

1.10. One measuring head should be used for air and liquid operation

2. TWO PIEZO TUBE SCANNERS ARE NEEDED (BOTH SHOULD OPERATE IN AIR AND LIQUID):

2.1. Small scanner for high resolution and STM:

Scanning Range: X YZ: 1 x1 x 1 um

Non-Linearity XY,; 0.1%

Drive resolution: 0.0011 nm

Z RMS noise in 1000 Hz bandwidth <0.03 nm

XY RMS noise in 200 Hz bandwidth 0.005nm

2.2. Large area scanner with closed-loop capacitance sensors:

(5)

Scanning range: $\geq 90 \times 90 \times 9$ um (+/-10%)

XY RMS noise (with capacitance sensors) : 0.2 nm

XY RMS noise (without capacitance sensors) :0.02 nm

Z RMS noise in 1000 Hz bandwidth (with capacitance sensors) :0.04 nm

Z RMS noise in 1000 Hz bandwidth (without capacitance sensors) :0.03 nm

Drive resolution: 0.006 nm

3. OPTICAL VIDEO SYSTEM

3.1. Top view optical system with possibility to observe cantilever and sample in air and liquid. Side view possibility to control tip to sample approach process is desirable. Optical system should be internationally recognized make.

3.2. Resolution 3um or better.

3.3. Maximum field of view 4.5x4.5 mm or better.

3.4. Magnification on LCD screen 5000x or better.

3.5. Color CDD camera and LCD display 20" monitor

4. VIBRATION AND ACOUSTIC ISOLATION:

4.1. Acoustic enclosure for protection of the sample/tip from acoustic noises, air flows and external noises. Should also enable inert gas operation. The size of the enclosure must allow comfortable operation of the AFM system with optical microscope and all required accessories.

4.2. Active Vibration Isolation Table for the AFM system: Active damping (0.6 to 200 Hz) and passive > 200Hz. Table size must be compatible with the acoustic enclosure. Table must comfortably keep the AFM system and all its accessories while operating.

4.3. CONTROLLER:

4.4. PCI ultra fast interface

a. Three 24 bit DACs for each channel (X, Y, Z).

A single large area scanner (90 microns) must be able to provide small scan (<50x50nm) without artifacts caused by quantization or aliasing.

3 ADC: 16-bit with preamplifiers for each axis X, Y, Z for independent control of bias, scale and offset.

16-bit DAC for Bias Voltage control

12-bit DAC for user output

5 external inputs for user flexibility

5 MHz Lock-In amplifier

b. Lock-in phase detector having at least four 16-bit analog-to-digital (A/D) converters with software controlled variable gain inputs to digitize the outputs of the lock-ins.

c. Controller must provide dual lock-ins, 360 degree quantitative cantilever phase detection, 0 Hz to 5 MHz.

d. Supports signal access module (break-out box) for user defined experiments and access to all signals

e. Automatic system hardware identification and control of external devices

f. Must include self-diagnostic board for automatic testing of the system

- g.** Controller must provide complex feed-forward and feedback algorithms to optimize control of tip-sample forces.
- h.** Determination of resonance frequency, easy setting of resonance amplitude and phase by software

5. SOFTWARE:

- 5.1.** Automatic cantilever spring constant calibration required.
- 5.2.** Graphical User Interface within software for customized force Measurements: enables design of complex force experiments, implementation of Macro routines etc. Scripting support of user-defined force curve paths. Users have immediate access to all other microscope functions because the interface is self contain within the software and is not an external package. Powerful off-line export and processing tools.
- 5.3.** Free life-time software update.
- 5.4.** The software must include macro language scripting possibilities for optimization of routine operations and user-defined experiments.
- 5.5.** Must include automated system configuration for operation in liquids to operate these modes.
- 5.6.** Must include automated system configurations for advanced modes like SKM, MFM etc.
- 5.7.** Software must be a sole package for all modes and attachments with no need for additional software programs.
- 5.8.** Software package must include both image acquisition and data processing software in one package.
- 5.9.** Software must be free-for copy, e.g. can be installed on unlimited number of off-line PCs.

Image analysis Windows-based (preferred) software should include at least following features:

- 1.** Cross section analysis
- 2.** Roughness measurement
 - a.** Grain size analysis
 - b.** Depth analysis
 - c.** Power spectral analysis
 - d.** Histogram analysis

- e. Fractal analysis
- f. Fourier analysis
- g. Image mixing
- h. Autocorrelation
- i. Enhanced image filtering tools

5.10. Image modification and presentation software should include at least following features:

1. Force-distance curve analysis
 - a. 2D Fast Fourier analysis
 - b. Plane-fit
 - c. High pass and low pass filters
 - d. Zoom in/out
2. Optional grid on images and curves
 - a. Variable shading and display angle, tilt
 - b. Color bar completely user definable 2D and 3D height presentation
 - c. Menu for image series presentation

5.11. Image and data export format at least:

1. Export to BMP, JPG, TIFF
2. Export to ASCII format and MatLab
6. **SPARE PARTS AND ACCESSORIES:**
 - 6.1. The offered system must include all necessary toolkits and accessories for AFM and STM including screwdrivers, tweezers, sample plates etc.
 - 6.2. 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.
 - 6.3. The set of supplied cantilevers must include at least the following probes:
 - a. 10 chips - for contact AFM;
 - b. 25 chips - for intermittent contact AFM;
 - c. 5 chips - for SSRM;
 - d. 5 chips - for SKM/SCM;
 - e. 5 chips - for MFM

Heating: RT to 150 degree

A. Vacuum Attachment:

In order to remove water layer from the surface, increase sensitivity measurements and enable controlled homogeneous environment around the sample during SPM measurements the system must be equipped with compatible vacuum pumping/gas injection system:

1. SPM base system must be hermetic and allow for connection to external vacuum pumping station and gas injection.
2. SPM base system must have inbuilt industry standard flanges for connection to external vacuum pumping station.
3. While operating SPM system in low vacuum/gaseous atmosphere there must be optical access to the tip and sample.
4. XY motorized sample positioning must be possible while operating SPM system in low vacuum/gaseous atmosphere.
5. Vacuum pumping station must include appropriate pumps, vacuum gauge, shutters, flanges, gas injection system and all necessary accessories.
6. Vacuum pumping station must allow for down to 5×10^{-4} Torr operation.
7. This station must not limit functionality of the SPM system, e.g. allow for sample and probe scanners operation, simultaneous use of heating stages and other SPM accessories.
8. Closed loop scanning is essential for SPM system operation in low vacuum also.

B. External Magnetic Field :

1. Must include Scanning Measuring Head made of Non-Magnetic materials for operations in external magnetic field
2. Must include External Magnetic field Generators integrated into the SPM system:
 - a. In-plane Variable Magnetic Field: ± 0.35 T. This generator must include exchangeable magnetic poles of different geometry.
 - b. Out-of-plane Variable Magnetic Field: ± 0.05 T. It must be possible to use this generator in low vacuum also.
 - c. These generators must be controlled through the same software.
 - d. During the measurements in external magnetic field the system must operate as a Probe Scanning System with no any motion of the sample for proper data acquisition.

Note:- Equipment should be supplied with warranty and AMC executed

		Final specifications shall be determined in the pre-bid conference for all equipment.		
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(Tender opening format)

(To be filled-in by the Bidder)

Name of the firm:- _____

Tender for supply of _____

NIT No. &Date:- _____

Technical specification/ literature attached:- Yes/No

Valid tax clearance certificate attached:- Yes/ No

Registration/ Authorization Dealership/
manufacturer certificate attached:- Yes/ No

Revenue stamp affixed. Yes/ No

Rates covered with transparent tape:- Yes/ No

Bid document fee deposited:- Yes/ No

Call Deposit Receipt enclosed:- Yes/ No.

Bid price in Indian Rupees:- Yes/ No

FOR Srinagar:- Yes/No

Bid without correction/overwriting:- Yes/ No

Seal & Signature of the Supplier.

Annexure-B

BID FORM

From M/S.....

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To,

Officer In-charge,
Central Purchase unit, NIT Srinagar.

Ref: NIT No.: NITS/CPU/ /2017-18 Dated:.....goods/Equipment for
.....Department

Sir,

With reference to above invitation for bids we would like to say that we have gone through your bid document thoroughly and hence offer our competitive Technical/Price Bid in sealed envelope for the supply of various goods/equipment listed in your document.

The following documents constitute our Bid.

- (a) Bid form
- (b) Price Bid schedule in the requisite format
- (c) Authorization dealer ship certificate from the manufacturer
- (d) Valid sales tax certificate
- (e) Technical literature for the goods/equipment
- (f) Names of organization where this equipment has been supplied. (Applicable for equipment whose unit price exceeds Rs.2.00 lacks
- (g) Bid security as mentioned in the schedule of requirements in the form of CDR drawn in favour of the Officer In-charge Central Purchase Unit NIT Srinagar.
- (h) Telephone No.....

Kindly feel free for any enquiries and clarifications.

Yours Sincerely

(.....)

From M/S.....

.....

Place.....

Date.....

Annexure-C

Technical specification.

Name of Equipment /Goods :

Make /Model/ Country of origin:

S. No.	Technical Specifications (as per. NIT Advertised)	Technical Specifications of the Make /Model	Complies	Higher/Better (with detail quantification)	
				Higher/Better	Quantification
1			Yes	----	
2				Higher	
3					

