

ASSOCIATION FOR THE CULTIVATION OF SCIENCE
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Ref. No.- IACS/CSS/PK/20-21/42-2

DATE : 15.03.2021

CORRIGENDUM NOTICE No.- II

NIT No. : IACS/CSS/PK/20-21/42

DATE: 03.03.2021

Based on the online pre-bid meeting, following amendments in the specifications must be taken care for the tender submission:

Tender Specification	Amended Specification
1. Modes of operation The Atomic Force Microscope (AFM) is a complete system capable of imaging and measuring of atomic resolution for nanomaterial samples in Rubbers and Polymers	1. Modes of operation The Atomic Force Microscope (AFM) is a complete system capable of imaging and measuring in high resolution for nanomaterial samples in Rubbers and Polymers
Large scanner: Z scanner range: 5 mm or above	Large scanner: Z scanner range: 5mm or above
The quoted model should have future up-gradation possibilities without changing the scanner head. Other modes like Conductive AFM (CP-AFM), Scanning Tunneling Microscopy (STM/STS) should be quoted as an optional items.	The quoted model should have future up-gradation possibilities without changing the scanner head. Other modes like Conductive AFM (CP-AFM), Scanning Tunneling Microscopy (STM/STS) should be quoted as an optional items. <u>The vendors must state/certify that the AFM system provided will be compatible with this attachment without any controller/ electronics upgradation.</u> These modes will be purchased only if the price falls within the budget available.
2. Scanner Z scanner range: 5 mm or above, Topography noise ≤ 0.06nm	2. Scanner The Z scan range should be at least 10 μm or better, and optional up to 25 μm. The Z scanner must have topography noise of less than 0.06 nm or better (bandwidth: 1 kHz)
Prefer to have a one-year warranty for the scanner.	NIL
The XY scanner must be separate from the Z scanner to eliminate the “bowing” art effect	The system should have decoupled/piezo XY & Z scanner to have flat, highly orthogonal XY scan to eliminate out-of-plane motion in the entire scanning area
3. Controller 24-bit Scan control and inputs or better	3. Controller The controller system should use at least 20 or more bits DAC/ADC converters to generate XY and Z scan signals.
4. Tip-sample viewing SPM scanning cantilever/probe optical surface should be viewable on-axis in real-time optics with 5 Megapixel High-Resolution CCD Camera and video access	4. Tip-sample viewing The optic & camera system should have resolution of 2 μm or better and quote suitable camera. 5 Megapixel or higher High-Resolution CCD Camera can be quote optionally.
5. Sample Size 10 mm dia or more and thickness of 5mm or more	5. Sample Size Accommodate large samples at least 70 x 70 x 10 mm (xyz) or better, must come with autotomized fine approach of z-stages (No third party motorized stage should be provided).
Mandatory requirement: Minimum 10 appreciation letters from any organization.	Please consider changing this sentence to Minimum 7 or more appreciation letters from any organization.

REVISED TECHNICAL SPECIFICATION OF ATOMIC FORCE MICROSCOPE (AFM)

Date: 15.03.2021

1. Modes of Operation:

- 1.1. The Atomic Force Microscope (AFM) is a complete system capable of imaging and measuring of **high** resolution for nanomaterial samples in Rubbers and Polymers.
 - 1.2. The system provided should be a complete system inclusive of all necessary computers, software, hardware, and accessories for all the specified imaging modes and optional modes.
 - 1.3. The main unit with standard microscopy imaging modes operated on Contact,
 - 1.4. Tapping mode/Intermittent contact/Dynamic Force, Phase Imaging, Lateral Force Microscopy (LFM), EFM, MFM, and Force Modulation.
 - 1.5. Advanced Mode for Mechanical properties such as Adhesion, Young's Modulus, and Elasticity.
 - 1.6. Provision for imaging delicate soft samples under air and liquid environments without any loss in resolution and clarity.
 - 1.7. The system must include a general-purpose imaging mode with all of the following features:
 - 1.7.1. Automatic optimization of critical imaging parameters including set-point, gains, scan rate, and Z limit;
 - 1.7.2. Mode must operate in both air and liquids;
 - 1.7.3. The cantilever resonance be "tuned"; automatically
 - 1.7.4. Has conventional imaging rates;
 - 1.7.5. Directly controls the tip-sample imaging force down to at least 100 pN or better;
 - 1.7.6. Mode automatically compensates for a drift of the deflection signal
 - 1.8. Any other modes, which come as default modes with the quoted system should also be clearly mentioned.
 - 1.9 The quoted model should have future up-gradation possibilities without changing the scanner head.
 - 1.10 Other modes like Conductive AFM (CP-AFM), Scanning Tunneling Microscopy (STM/STS) should be quoted as an optional items.
 - 1.11 The vendors must state/certify that the AFM system provided will be compatible with this attachment without any controller/ electronics upgradation.
- These modes will be purchased only if the price falls within the budget available.

2. Scanner:

- 2.1 The quoted system should be compatible with using one or more Scanners to cover from a large area to the smallest possible areas with the best possible resolution.
- 2.2 It should have already been supplied/installed in India at least five quoted AFM model systems. Tailor-made scanners are not accepted.

Large Scanner

- 2.3 XY scan range of 50µm x50 µm or above.

2.4 Z scanner range: The motorized Z scan range should be at least 10 μm or better, and optional up to 25 μm . The Z scanner must have topography noise of less than 0.06nm or better (bandwidth: 1 kHz)

2.5 Should mandatorily demonstrate the scan range and noise number during the installation at the site.

2.6 The system should have decoupled/peizo XY & Z scanner to have flat, highly orthogonal XY scan to eliminate out-of-plane motion in the entire scanning area.

2.7 The scanners should have closed-loop feedback system in all X, Y, and Z.

2.8 The quoted scanner must support all imaging modes as required.

3. Controller:

3.1. The system must provide the capability to calibrate the cantilever spring constant by thermal tuning of the cantilever.

3.2. The system must support High pixel density images up to 4k x 4k data points or above

3.3. The controller system should use at least 20 or more bits DAC/ADC converters to generate XY and Z scan signals.

3.4. The system must allow for up to 8 simultaneous channels (or better) in real-time scanning

3.5. The lock-ins, if any, must be software controlled, including control of the lock-in bandwidth, routing of an input signal, routing of output signals.

3.6. The controller must provide three independent digitals to analog converters (DACs) per axis (X, Y & Z)

3.7. The controller must include active digital control of the cantilever quality factor Q (Q Control).

4. Light Source/Detector:

4.1. Appropriate laser light source.

4.2. Four Quadrant (or better) position-sensitive photodetector

5. Tip-sample viewing:

SPM scanning cantilever/probe optical surface should be viewable on-axis in real-time optics with 5 Megapixel High-Resolution CCD Camera and video access

6. Sample Holder:

6.1. Appropriate sample holder/s: should be compatible with all operating modes.

6.2. The mounting of the samples and cantilever/probe should be user-friendly.

7. Sample Size:

7.1. Accommodate large samples at least 70 x 70 x 10 mm (xyz) or better,

7.2. Must come with autotomized fine approach of z-stages (No third party motorized stage should be provided).

8. Power Supply:

8.1. The instrument and computer should be compatible with the power supply specification in India; 220V, 50/60 Hz, (Operating range 210-240V)

8.2. Suitable online UPS with one-hour backup for the operation of the system and computers must be provided.

9. Probes/Cantilevers:

Consumables like probes/cantilevers required for operation for a minimum of three years (at least 100 probes) are to be included for all modes of AFM modes as mentioned in the above specifications

10. Acoustic Enclosure: Suitable Acoustic Enclosure with required accessories to be quoted with the main unit. Locally made Acoustic Enclosure will NOT be accepted. The vibration table is available at the Institute.

11. Computer and Software:

- 11.1. Computer: i5 (or better), 8GB RAM (or better), 1TB Hard drive (or better), 27" LED monitor (or higher), Window 10 (or better), 64 bit (English)
- 11.2. Computer graphic cards should be provided for the complete operation of all modes of the system as mentioned in the specification.
- 11.3. Supporting TCP/IP for networking should be included.
- 11.4. Should be the latest generation for high-speed operation and high data storage
- 11.5. Appropriate cables and power cables to be provided

Software:

- 11.6 Microsoft Windows operating system is preferred.
- 11.7 Suitable software for data acquisition, optical view, and for image processing, F-d spectroscopy, analysis, and presentation for all modes in SPM should be provided.
- 12. All standard start-up accessories required for system operation should be included-like calibration gratings, standard samples, and other tools like tweezers, Allen keys, tools, etc., for sample handling and instrument operation.
- 13. A complete manual should be provided. Comprehensive onsite training for a week should be provided for selected students and operators during the installation of the instrument. Three days of advanced training for such trained students and operators after three months to be provided onsite.
- 14. The quoted AFM must have a standard warranty for one year. Extended warranty for three years to be quoted separately.

15. Mandatory Requirement:

- 15.1. Minimum 7 appreciation letters from any organization.
- 15.2. At-least 5 installations should be done for the quoted model. Provide the details.
- 15.3. Service should be directly from the manufacturer's engineers. They should be based in this region; provide the contact details. A call should be attended within 24-hours.

16. Delivery and Taxes:

- 16.1. Door delivery/CIP: both options should be provided for the quoted model
- 16.2. All Custom duty and service taxes must be paid by the respective company.

A clear compliance table (see below) including all the technical specifications including the mandatory requirement must be prepared and submitted along with the technical bid. Leaving any specification may be considered as not available with the quoted model.

Sr. No	Tender specification	Your offered instrument specification	Extent of compliance (With proof, Page No)
1			
1.1			
1.2			
1.7			
1.7.1			
1.7.2			

Tender will not be accepted if the technical compliance chart is NOT provided following the above format. A proof of the all quoted technical specification also must be provided and also highlighted.