

# **Tender Notification for the procurement of an Electrochemical scanning tunnelling microscope (EC-STM) and atomic force microscope (AFM) setup**

To Whom It May Concern

11-11-2019

This is a Request for Quotations for procurement of an electrochemical scanning tunnelling microscope (EC-STM) and atomic force microscope (EC-AFM) for establishing the "Single molecule Science laboratory" in the Department of Inorganic and Physical Chemistry (IPC) at IISc, Bangalore.

## Procedure:

1. Vendors will be required to submit a technical bid and a commercial bid in two separate sealed envelopes. Quotations should clearly indicate the terms of delivery, delivery schedule, entry tax, payment terms etc. Only vendors who meet the technical requirements will be considered for the commercial negotiation.
2. The decision of purchase committee will be final.
3. The technical proposal should contain a compliance certificate with table with 5 columns. The first column must list the technical requirements, in the order that they are given in the technical configuration below. The second column should indicate compliance in a "Yes" or "No" response. If "No" the third column should provide the extent of the deviation (please provide quantitative responses). The fourth column should state the reasons for the deviation, if any. The fifth column can be used to compare your tool with that of your competitors or provide details as requested in the technical requirements table below.
4. Any additional capabilities or technical details, that you would like to bring to the attention of the purchase committee, can be listed at the end of the technical specifications table.
5. The quotes should be CIP Bangalore, India.
6. Please provide itemized quotes for the instruments and any additional options/attachments/packages.
7. Comprehensive warranty for all the items must be 5 years (calculated from date of installation and commissioning of the instrument). As an additional option, please provide cost of an annual maintenance contract (AMC) for 3 years, post warranty.
8. Vendors are encouraged to highlight the advantages of their tools over comparable tools from the competitors.
9. The deadline for submission of proposals is the 1<sup>st</sup> of December 2019, 5:30 pm Indian Standard Time. Quotations should arrive at the office of Dr. Veerabhadrarao Kaliginedi, A-104, Department of Inorganic and Physical Chemistry, Indian Institute of Science, Bangalore 560012, India, by the above deadline.
10. Any questions or clarifications can be directed to:  
Dr. Veerabhadrarao Kaliginedi  
Assistant Professor  
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## Specifications

S.No.	Parameter	Specifications
1	Major SPM imaging modes required	<ol style="list-style-type: none"> <li>1. Scanning tunnelling microscopy <ul style="list-style-type: none"> <li>○ In air and liquid</li> <li>○ Electrochemical STM</li> </ul> </li> <li>2. Atomic force microscopy <ul style="list-style-type: none"> <li>○ Contact mode and non-contact mode (Air and liquid)</li> <li>○ Tapping mode (including all advanced tapping modes; in air and liquid)</li> <li>○ Lateral/frictional force microscopy</li> <li>○ Kelvin Probe Force Microscopy</li> <li>○ Electrostatic Force Microscopy</li> <li>○ Piezoelectric Force Microscopy</li> <li>○ Force modulation (air and liquid)</li> <li>○ Nanoindentation</li> <li>○ Nanolithography</li> <li>○ Phase imaging</li> <li>○ Conductive-AFM</li> <li>○ Electrochemical AFM (including an option for Electrochemical conductive AFM)</li> </ul> </li> </ol> <p>All required latest version of hardware/software along with the starter kits must be provided.</p> <p>For EC-STM, all required cells, connections, bipotentiostat that is interfaced with SPM controller software should be provided.</p> <p>For EC-AFM, all required cells, connectors, two cantilever holders (one for conducting cantilevers and second one for non-conducting tip), hardware and software for performing EC-AFM should be provided.</p> <p>A minimum of 5 boxes (5 x 10 cantilevers) of standard cantilevers for each mode mentioned above should be provided.</p>
2	Electrical and mechanical properties	<ol style="list-style-type: none"> <li>3. Scanning tunnelling spectroscopies under electrochemical and non-electrochemical conditions <ul style="list-style-type: none"> <li>○ Current-distance spectroscopy (I-d) in liquid. With large dynamic current range: <math>\approx 100 \mu\text{A}</math> to <math>0.1 \text{ pA}</math> and with high sampling rate <math>&gt;10 \text{ kHz}</math>. Capability to perform this experiment under both electrochemical and non-electrochemical conditions is must.</li> <li>Alternatively, options must be provided for using external current amplifier if required current ranges are not available inherently with the system.</li> <li>○ Current-voltage spectroscopy (I-V) with similar current ranges as above mentioned experiment mode.</li> <li>○ Both current-distance spectroscopy and current-voltage spectroscopy should be programmable and should be able measure to measure large sets of curves (<math>&gt;1000</math>)</li> <li>○ Electrochemical Scanning tunnelling spectroscopy (EC-STSS; constant bias mode and variable bias mode)</li> <li>With large dynamic current range: <math>\approx 100 \mu\text{A}</math> to <math>0.1 \text{ pA}</math> and with high sampling rate <math>&gt;10 \text{ kHz}</math>.</li> <li>○ All the following measurement modes should be as per user specifications and should be programmable for further applications.</li> </ul> </li> </ol>

		<ul style="list-style-type: none"> <li>○ Support from engineers must be provided for the complete demonstration and training of the above-mentioned experimental modes.</li> <li>○ Conductive AFM (C-AFM)</li> <li>○ Current-voltage spectroscopy mode capable of large sets of I-V curves, with programmable option. Current range: 100 <math>\mu\text{A}</math> to 0.1pA with high sampling rate &gt;10 kHz.</li> <li>○ Simultaneously measure Current-distance curves together with force-distance curves (In air and liquid). Current range: 100 <math>\mu\text{A}</math> to 0.1pA with high sampling rate &gt;10 kHz. This mode should be as per user specifications and should be programmable. Bias range: mV to 10 V.</li> <li>○ Additionally, Capability to perform this experiment under both electrochemical and non-electrochemical conditions is preferable.</li> <li>○ Alternatively, options must be provided for using external current amplifier if required current ranges are not available inherently with the system.</li> <li>○ Options for further modifications measuring the current between tip/sample externally using current amplifier should made be available.</li> <li>○ Support from engineers must be provided for the complete demonstration and training of the above-mentioned experimental modes.</li> </ul>
3	Controller hardware and software	<ul style="list-style-type: none"> <li>○ Latest version of SPM Control Station with Software and Windows Operating System (windows 10) should be provided</li> <li>○ Analysis software package for data analysis in real time should be provided.</li> <li>○ All required hardware and software modules and with option for user programming should be provided.</li> <li>○ Two 30-inch LCD monitor, 2560x1600, 50/60 Hz refresh rate, auto switching or better should be provided.</li> </ul>
4	Signal access module for SPM controller and application modules	<ul style="list-style-type: none"> <li>○ Signal access module should be provided for custom experimentation involving adding or modifying electronic hardware to the SPM controller Station or to the SPM application modules. This module should allow user to access all the signals to and from the SPM controller through BNC connectors. Similarly, it should allow access signals to and from the application modules through BNC connectors. This unit should be properly shielded, isolated and should not induce any additional noise.</li> </ul>
5	Scanners and STM/AFM convertor head	<ul style="list-style-type: none"> <li>○ High resolution small scanner (~ 0.4 micron maximum scan range) and a medium scanner options (~ 10micron maximum scan range) or a single scanner option for high resolution (including all measurement ranges and resolutions, capable of obtaining atomic resolution) STM/AFM applications must be provided</li> </ul>
6	Optical microscope	<ul style="list-style-type: none"> <li>○ A video optical microscope for observing and positioning tip-sample, integrated with the controller software should be provided.</li> </ul>
7	Vibration isolation and acoustic enclosure	<ul style="list-style-type: none"> <li>○ An integrated active or pneumatic vibration isolation table with all required accessories</li> </ul>

		(compressor and other parts) must be provide. Weight and dimensions should be compatible with the system. Acoustic enclosure should have EM shielding and openings for the connectors.
8	o Comprehensive warranty for all the items must be 5 years.	
<b>Optional items</b>		
9	Large scanner	o Large scanner ≈100 micron range
10	Scanner and sample holder for nonmagnetic samples	o An additional scanner and STM/AFM converter head, sample holders for studying nonmagnetic samples (spintronics applications) should be provided
11	Temperature control for sample heating	o Should provide in-situ heating and temperature control from ambient temperature to 80-degrees Celsius for samples in air and liquid. This should be compatible with all operating modes of STM and AFM.
12	Photocurrent mapping	o To measure photoelectric response to a time-resolved illumination. o Illuminator module and software (control and analysis) should be provided
13	Humidity control system	o To perform measurements under control humidity, a small and compact environmental control glovebox like option should be provided.

**Terms and conditions:**

1. The vendor should have a track record of having previously supplied similar equipments in India in the last 5 years (please furnish the contact details of the customers).
2. The lead time for the delivery and installation of the equipment should not be more than three months from the date of receipt of our purchase order. The delivery time should be indicated in the quote.
3. The bid will be considered valid for 90 days after the last date of bid acceptance.
4. The payment terms should be specified in the commercial proposal and is subject to negotiation.
5. The vendor should have qualified technical service personnel in India for service/repair of the equipment.
6. Vendor should quote the latest model available with them to meet the tender specifications.
7. Complete demonstration and training all advanced modes of AFM/STM, I-d, I-V, electrochemical STM/AFM measurements using large current range amplifiers during installation is a MUST.