Request for Quote (India based vendors only) for the procurement of an AFM-Raman spectrometer system. (Last date: 30 December 2021)

Ref: CeNSE/SG/05/21-22 Dt: 10/12/2021-AFM-Raman spectrometer system

This is a Request for Quote (RFQ) from **Class I and Class II local suppliers/ manufacturers** only for the procurement of an AFM-Raman spectrometer system, for the Centre for Nano Science and Engineering (CeNSE) at the Indian Institute of Science (IISc), Bangalore. IISc is India's best institution on higher learning and the Center for Nano Science and Engineering is home to one of the best academic fabs in the world that houses a 14,000 sq. ft. cleanroom.

Only the Indian Original Equipment Manufacturer (OEM) or their distributor shall submit a response demonstrating their capabilities to produce the requested equipment to the primary point of contact listed below. The quotations should be on FOR-IISc Bangalore basis in INR only.

With respect to this tender, the rules laid out by the Government of India in order No. P45021/2/2017-pp-BE-II issued by the Public Procurement Section, Department or Promotion of Industry and Internal Trade, Ministry of Commerce, and Industry, dated 4th June 2020 will be followed. The bidders must go through the Government of India order stated above and follow all the rules and regulations therein.

Relevant definitions as per Government of India order:

- **Class-I local supplier** - A supplier or service provider, whose goods, services or works offered for procurement, has local content equal to or more than 50%.
- **Class-II local supplier** - A supplier or service provider, whose goods, services or works offered for procurement, has local content more than 20% but less than 50%.
- **Local content** – The amount of value added in India which shall, unless otherwise prescribed by the Nodal Ministry, be the total value of the item procured (excluding net domestic indirect taxes) minus the value of imported content in the item (including all custom duties) as a proportion of the total value, in percent.

Procedure:

1. Vendors will be required to submit a technical proposal and a commercial proposal in **two separate sealed envelopes**. The technical bid should contain all commercial terms and conditions, except the price. **Only vendors who will be adjudged by the committee to meet the technical requirements will be considered for the commercial negotiation**.
2. The covering letter should clearly state that whether the vendor is a Class-I or Class-II local supplier distinguished by their "local content". Failing this the bid will be automatically rejected.
3. The vendor must state the percentage of the local content and provide self-certification that the item offered meets the minimum local content requirement. They should also give details of the location(s) at which the local value addition is made.

4. Separate detailed justification needs to be given to substantiate the qualification as Class 1 and Class 2 suppliers and the intender reserves the right to cross-check the factual validity of the same and one if some foreign parts or equipment is being put forward then please submit the "*bill of material*" details for the same for evaluation.

5. **The deadline for submission of proposals is the December 30, 2021, 5:00 pm Indian Standard Time.** Proposals should arrive at the Main office, GF-15, Centre for Nano Science and Engineering, Indian Institute of Science, Bangalore 560012, India, on or before the above deadline.

6. **The technical bid** must contain a point-by-point technical compliance document.
    a. The technical proposal should contain a compliance table with 5 columns.
        - First column must list the technical requirements, in the order that they are given in the technical requirements below.
        - The second column must provide specification of the instrument against the requirement (please provide quantitative responses wherever possible)
        - The third column should describe the compliance with a "YES" or "NO" only. Ensure that the entries in the column 2 and column 3 are consistent.
        - The fourth column should clearly state the **reasons/explanations/context** for deviations if any. Without clear explanation, just stating YES" or "NO" will not be considered.
        - The fifth column may contain additional remarks. It can be used to highlight the technical features, qualify response of previous columns, or provide additional details.
    b. Technical capabilities of any *suggested* accessories/add-ons that may enhance the usability, capability, accuracy or reliability of the tool. Vendors are encouraged to quote for as many add-ons as their tool portfolio permits.
    c. Vendors are encouraged to highlight the advantages of their tools over comparable tools from the competitors
    d. Items in addition to that listed in the technical table that the vendor would like to bring to the attention, such as data sheets, technical plots etc. can be listed at the end of the compliance table. Vendors are also encouraged to highlight the advantage of their tools over comparable tools from the competitors.
    e. If multiple systems can fulfil the requirements, vendors can submit multiple bids.

7. The technical proposal will be evaluated against the technical requirement. Deviations from the technical specifications requested are allowed. Such deviations must be highlighted and justified. Their acceptance or rejection will be left to the discretion of the technical committee. Only the vendors, adjudged by the committee to be suitable to meet the technical requirements, will be considered for the commercial negotiation.

8. The commercial bid must contain:
    a. Itemized cost of the system and *required* accessories, such as software, power supply, etc.
    b. All accessories needed for the instrument to function as per the technical specification must be listed.
    c. itemized cost, as an option, for any *suggested* accessories/add-ons that may enhance the usability, capability, accuracy or reliability of the tool. Vendors are encouraged to quote for as many add-ons as their tool portfolio permits.
    d. The cost of shipping plus insurance up to IISc has to be included. IISc will help the shipping company to take care of the customs clearance at Bangalore Airport.
    e. Please indicate the warranty provided with the tool. Warrant of 3 years or more is preferred.
    f. Provide itemized cost for *required/expected* spares for 3 years of operation. For sake of this calculation, the vendor may assume active tool usage of 40 hours/week. This number will be used to estimate the life cycle cost of the tool.
    g. The cost of annual maintenance contract (AMC). The details of AMC are given below. This number will be used to estimate the life cycle cost of the tool.
    h. Length of time that the tools will be supported with service and spares from the date of installation. Our requirement is that the tools be supported for at least 5 years from the date of installation. To quote lowest price, vendors often quote for obsolete or soon-to-be obsolete equipment. This is NOT acceptable. For a user-facility like CeNSE, it is vital that the equipment be serviceable and supported for the foreseeable future. The length of guaranteed support will be used to estimate the life cycles cost of the tool.
    i. The commercial bid should indicate the following separately: (a) equipment price (b) optional items (c) Freight and insurance cost (d) Shipping cost and (e) the Total cost.
    j. The quotations should be in INR only.

9. As an additional option, provide cost of an annual maintenance contract (AMC) for 3 years, post warranty. The AMC must
    a. cover 1 scheduled and 1 emergency visit per year.
    b. The emergency visit should be supported with a 48-hour response window.
    c. clarify if maintenance will be done by a trained onsite engineer (CeNSE employee) or a specialist from the OEM.
    d. in case the OEM is foreign, clarify if maintenance will be done by a trained engineer from India (local representative or Indian subsidiary) or by a trained engineer from abroad.
    e. include an itemized list of spares (e.g., maintenance kits) that are essential for scheduled visits.

10. The commercial bids will be evaluated based on life-cycle cost of the tool. This includes the cost of purchase, maintenance, spares, etc. The final decision will be me made by the committee.
11. The RFQ must include references of 5 previous installations, preferably in India. Please provide the names and contact addresses of the referees, so that the committee can contact them independently. Details of such systems with model numbers and users should be provided.

12. **The quotations should be on FOR-IISc Bangalore basis in INR only. Please quote the price of each optional line item, separately.**

All the proposals should be addressed to:

The Chairperson,
Attn: Dr. Sreetosh Goswami
Centre for Nano Science and Engineering
Indian Institute of Science
Bangalore – 560012, India

The Proposals should arrive at the Main office, GF-15, Centre for Nano Science and Engineering, Indian Institute of Science, Bangalore 560012, India, on or before the deadline of December 17, 2021, 5:00 pm Indian Standard Time. The parcels should be delivered between 9 am to 5 pm.

Questions regarding this tender should be addressed to Dr. Sreetosh Goswami at the email address sreetosh@iisc.ac.in with the subject line "Query _Tool name_Bidder's name".

Post such submission all vendors should send an email to sreetosh@iisc.ac.in with the subject line: "Submitted bid_Bidder's name_Tool Name" to intimate him of the submission within one day.

II. General terms and conditions:

1. The institute reserves the right to accept or reject any bid, or to annul the bidding process and reject all bids, at any time prior to the award of contract without thereby incurring any liability of the affected bidder or bidders.
2. Previous installations can be used by the committee to disqualify vendors with poor track record of service, build quality, system performance or poor availability of spares.
3. The bidder must not be blacklisted/banned/suspended or have a record of any service-related dispute with any organization in India or elsewhere. A declaration to this effect should be provided.
4. The vendor should be able to repair and maintain the equipment once it is installed. Clarify if periodic (preventive) maintenance can be done by a trained on-site engineer (i.e. IISc employee) or requires a specialist from the OEM. The bidder should have qualified technical service personnel for the equipment based in India and must assure a response time if <24 hours after receiving a service request.
5. All the quotations must be valid for at least 90 days at the time of submission.
6. The quotations should clearly indicate the terms of delivery, delivery schedule, tax, and payment terms.
7. In case of the award of purchase order, the vendor must provide an Order Acknowledgement within 30 days from the receipt of the Purchase Order.

8. The lead-time for the delivery of the equipment should not be more than 3 months from the date of receipt of our purchase order.
9. 100% payments will be released after the completion of delivery and satisfactory installation subject to TDS as per rules. As per GFR no advance payment can be made to domestic vendors, unless an equal amount of bank guarantee is provided.
10. The bidder is responsible for the installation of the equipment in the IISc campus.
11. Necessary training to operate the procured setup and required literature support (in English language) should be provided without additional cost.
12. Bidders should undertake to support the system with spares and software bugfixes, if any, at least for the next 5 years.
13. Data must be supplied along with the technical compliance documents. Technical bids without supporting data can be deemed as technically non-compliant.
14. Printed literature and published papers in support of all compliance to the prescribed specifications are encouraged.
15. All guaranteed specifications will have to be demonstrated, upon request, in an active installation. Failure to demonstrate any promised specifications will be deemed as technical non-compliance.
16. Technical evaluation by the institute must include demonstration to verify functionalities and capabilities of the system quoted. Any discrepancy between the promised specifications and demonstrated specifications will be deemed as technical non-compliance. If need arises, the vendor must be ready to physically visit IISc for a techno commercial discussion.
17. The intender reserves the right to withhold the placement of the final order. The right to reject all or any of the quotations and to split up the requirements or relax any or all the above conditions without assigning any reason.

III. Technical specifications of the AFM-Raman spectrometer system:

RAMAN PART SPECIFICATION:

Raman Spectrometer should have high stability open space research grade confocal microscope, transfer and filtering optics, an achromatic spectrograph equipped with gratings, multichannel detector, laser, Motorized stage and relevant software and computer platforms.	
1	**Spectrometer:** A Czerny-Turner type achromatic spectrograph with a large focal length: a >750 mm focal length is preferred for the resolution and other performances. It should be equipped with optics and with the following specifications. a. Spectra Range: 200nm – 2200nm is preferred b. Raman range – 100cm^{-1}-4000cm^{-1} or better c. Spectral resolution: <0.5 cm^{-1} or better

	d. Spatial Resolution: A lateral resolution should be better than 0.5 micron and an axial resolution typically should be better than 1.5 microns with a 100X objective in the visible range. e. Gratings – 1800 and 600 gr/mm to be mounted on a motorized turret driven by software, to vary spectral resolution. The gratings should be quickly and easily interchangeable without realignment. f. Interface: USB/RS-232 g. Power Supply: 220-230 VAC, Single phase.
2	**Entrance optics assembly:** a. A continuous power control for 0 to 100% of the laser power by software command or a software-controlled filter wheel with neutral density filters of multiple (preferably 9 or more) positions (%) for varying the laser power on samples is acceptable. b. Laser line filters. c. An adjustable kinematic rejection filter mount to allow fine tuning of the filter operation angle for low frequency cut-off adjustment and easy and quick exchange of excitation wavelength.
3	**Confocal Microscope with high stability:** a. It should have removable bottom stage. b. An internal white light illuminator. c. Objective turret with following plan-achromatic objectives: 1. 5X visible, NA = 0.1 2. 10X visible, NA = 0.25 3. 100X visible, NA = 0.9 4. 50X LWD visible objective, NA = 0.50 WD = ~8mm d. High grade Colour video camera should be provided for viewing the sample under white light illumination and to simultaneously visualize the laser spot. Switching between video and Raman mode is to be automated.
4	**Confocal coupling optics between the microscope and the spectrometer:** Software controlled continuously adjustable confocal pinhole from several from several microns to 1mm or pre-aligned true confocal pinhole should be provided.

5	**Automated Microscope Stage for Mapping:** Motorized XY (X 75mm – Y = 50mm) and motorized Z device stage to be controlled by software. XY specifications: resolution (minimum step size) =100nm. Z specifications: resolution (minimum step size) = 0.01 micron. Should include positioning joystick, an external controller, software package and Raman autofocus capability. Motorized XYZ stage should come with high-speed Raman Mapping mode for fast Mapping applications.
6	**UV-Visible-NIR area scanning mode based on the use of two XY scanners and offering 2 modes of operation should be provided.** 1. Scanning Mode: for average Raman data recorded from a large area, thereby also preventing damages of photo sensitive materials 2. Stepping Mode (confocal): discrete motions of the XY scanners to acquire Raman maps. The minimum step size should be 50 nm
6	**Backward alignment control system:** It should allow the visual control of the optical alignment of the laser from the sample to the detector.
7	**CCD Detector:** a. Spectral Range: 200nm to 1050nm or better b. Cooling Type: Peltier cooled to -60 deg C or better c. Pixel Format : Minimum 1024 x 256 d. Pixel Size: minimum 26x26 microns e. Chip size: Minimum 1 inch for maximum wavelength coverage and fast spectral measurement. f. Quantum efficiency: at least 55% but higher the better g. Interface: USB/RS-232
8	**Lasers:** a) 473nm Solid state laser with 25mW power or better b) 514nm Solid state laser with 50mW power or better c) 633nm He-Ne laser with 17mW power or better

AFM PART SPECIFICATION:

Atomic force microscope (AFM) should be coupled with Raman spectrometer by means of hard coupling using optical path having appropriate optics. The integration of AFM & Raman system should be in a manner so that for every pixel, co-related AFM & Raman data is available. Both AFM & Raman should get data synchronously & simultaneously using single software for each pixel. The AFM should be able to perform TERS (Tip enhanced Raman spectroscopy) in any mode/sample type. It should include optical platform and scanning probe microscope and should come with the following:	
1	A system capable of performing Contact AFM, Semi-Contact AFM, Non-Contact AFM, LFM, PFM, Phase contrast, MFM, Single-Pass MFM, EFM, Single-Pass EFM, SKM, SCM is preferred (Lateral force microscope, Piezoelectric force microscope, magnetic force microscope, electrostatic force microscope, scanning kelvin probe microscope, scanning capacitance microscope). The system should be able to perform tuning fork measurements, in shear force mode and in normal force mode with the proper holder. The system should allow introduction and removal of the sample in all these modes without removing the probe from the system.
2	The AFM feedback mechanism must avoid interferences with the spectroscopy CCD detector. Use of a feedback diode in the infrared region above 1100nm is preferred. The AFM feedback laser alignment must be motorized and automated through software control.
3	AFM measurements must be possible at all wavelengths within the spectroscopic CCD detector range (preferably from 200nm to 1050nm). Especially, Co-localized and TERS Raman measurements must be possible simultaneously with AFM measurements
4	It must be possible to exchange the AFM tip without interfering with the sample; the tip holder must be removable without having to remove the full head from the system
5	Tip replacement and sample replacement should not require any manual re-alignment of the Raman laser to the tip-apex.
6	The spectroscopic laser alignment must be decoupled from the AFM laser alignment and should not pass through the same objective lens.
7	The SPM probe (scanning probe microscope) must be in a fixed focus plane relative to the spectroscopic laser, and the system must be scanning the sample in X, Y and Z directions
8	The system should inherently be able to perform real-time autofocusing of the spectroscopy laser using the SPM probe in feedback while performing spectroscopy measurements

9	A system capable of performing STM measurements with a high-performance pre-amplifier, with a range of 100fA to 10uA is preferred. The STM (scanning tunnelling microscope) probe holder must be able to accommodate any type of STM probe
10	The system should allow for navigation around the sample surface using computer-controlled motion, over a range of 5x5mm
11	The SPM system should accept top-down and side spectroscopy excitation and collection
12	The system should include a high resonance frequency sample scanner with unloaded resonance of 15KHz or above. We prefer a system that can allow for very fast AFM mapping up to 70Hz per line, as well as reduce sensitivity to vibrations.
13	The system should be able to perform the high resolution measurements (preferably until molecular resolution) and large range scans with the same scanner, without the need for two dedicated scanners.
14	The system should be able to accommodate samples preferably up to 20x20x15mm in size
15	The system should be able to scan a range preferably up to 100umx100um in XY and 15um in Z
16	XYZ Objective closed loop piezo scanner with scanning range of 30x30x15um or better and LWD objective thread should be provided. 1. This scanner should allow fine positioning of the spectroscopy laser relative to the SPM probe with nanometer precision and closed-loop operation ensures that the position can be maintained over long periods of time. 2. It should also allow fast scanning of the spectroscopy laser on the SPM probe for easy alignment using spectroscopic or SPM signals
17	Following Plan achromatic objectives are preferred: - 10x 0.28 NA or better - 50X LWD visible objective, NA = 0.50 WD = 10.6 mm or better - 100x 0.7 NA or better
18	**Software and Computer:** The software must allow acquisition of spectral data and SPM signals simultaneously and visualize spectral intensity images and SPM signal images within the same interface. The software should allow recording preferably up to 20 signals simultaneously. Spectral data acquisition at speed down to 5ms per spectrum should be allowed.

	A software package is preferred that can allow processing of the spectroscopy data (as standard or as an optional module) including: 1. Intelligent baseline subtraction to remove fluorescence from Raman data 2. Efficient noise filtering preserving spectral integrity (noise filtering that does not distort bands or change peak intensity) 3. Univariate and multi variate analysis (Classical Least Square deconvolution, Principal component Analysis, MCR, Hierachical Cluster Analysis, Divisive Cluster Analysis…) A computer with latest configuration should be provided with monitor for operating the instrument and data analysis.

Definition of acronyms:

Lateral Force Microscopy (LFM),

Piezo Force Microscopy (PFM),

Magnetic Force Microscopy (MFM),

Electrostatic Force Microscopy (EFM),

Scanning Kelvin Probe Microscopy (SKM),

Scanning Capacitance Microscopy (SCM),

Optimal items/ spares:

Polarizer analyser – 514nm

Half and quarter wave plate – 514 nm

Thanking you,

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