TENDER

for

Procurement & Installation of Fully Automated and Integrated Confocal

Raman Spectroscopy, Raman Imaging and Photoluminescence Measurements with Accessories

at

IIT Mandi

Tender No.: IITMANDI/Admin/PUR-133/2014-15/7221-22

Tender date: 29th January, 2015

Last Date of submission of Bids: 18th February, 2015

Indian Institute of Technology, Mandi

Administrative Block: Mandav Hotel, 2nd Floor (Above Bus Stand), Mandi – 175001 (H.P)

Email: amrcoffice@iitmandi.ac.in, arsp@iitmandi.ac.in, ajay@iitmandi.ac.in

Ph. No.01905-237926

Indian Institute of Technology Mandi, Kamand, Mandi invites tender for the supply, delivery and installation of Fully Automated and Integrated Confocal Raman Spectroscopy, Raman Imaging and Photoluminescence Measurements with Accessories as per specifications given in the Annexure-I, 2 &3 attached to the Tender form. All offers should be made in English and should be written in both figures and words. Tender documents can be downloaded from the website (http://iitmandi.ac.in/administration/tenderseoi.html) of the Institute.

The bidders are requested to read the tender document carefully and ensure compliance with all specifications/instructions herein. Non-compliance with specifications/instructions in this document may disqualify the bidders from the tender exercise. The Director, IIT Mandi, reserves the right to select the item (in single or multiple units) or to reject any quotation wholly or partly without assigning any reason. Incomplete tenders, amendments and additions to tender after opening or late tenders are liable to be ignored and rejected.

Terms and Conditions:

1. The technical and financial bids **should be quoted separately for three items** and put in different sealed envelopes marked "**Technical bid**" or "**Financial bid**" as applicable. The bidder should also submit an undertaking to abide by all the terms and conditions laid down in the tender document along with the technical bid. These separate bids envelopes are to be put in an outer envelope which should also be sealed.

2. The Vendors who have earlier supplied the equipments to any of the IITs, IISc, IISERs and other Scientific Institute of National Repute may only tender. The details of such institutions and the cost with the name of equipment may also be supplied with the bids.

3. The technical and financial bids should be submitted in original. The financial bid should include the cost of main equipment/item and its accessories. If there is any separate cost for installation etc. that should be quoted separately.

4. Each individual sealed envelope as well as the outer envelope should be marked with the following reference on the top left hand corner: **"IITMANDI/Admin/PUR-133/2014-15/7221-22/Item Name.__ ____dated 29th January, 2015**.

5. The printed literature and catalogue/brochure giving full technical details should be included with the technical bid to verify the specifications quoted in the tender. The bidders should submit copies of suitable documents in support of their reputation, credentials and past performance.

6. The rates should be quoted in figures (typed or printed) and cutting should be avoided. The final amount should be in figures as well as in words. If there are cuttings, they should be duly initialed, failing which the bids are liable to be rejected.

7. Any bids received after **4:00 P.M. on 18th February, 2015** shall not be considered

8. The Technical Bids will be opened on **19th February, 2015 at 03:00 P.M.** The date & time for opening of Financial Bids will be informed later on to the technically qualified bidders.

9. **While sending rates, the firm shall give an undertaking to the effect that "*the terms/conditions mentioned in the enquiry letter/Tender Notice against which the rates are being given are acceptable to the firm*." In case the firms do not give this undertaking, their bids will not be considered.**

10. If the supplier/firm is original equipment manufacturer (OEM)/authorized dealer/sole distributor of any item, the certificate to this effect should be attached.

11. The quantity shown against the items is approximate and may vary as per demand of the Institute at the time of placing order.

12. All tender documents should have to be sent through courier, speed post or registered post only. All tender documents received after the specified date and time shall not be considered.

    The postal address for sending the sealed bids is:

    "**Assistant Registrar, Stores and Purchase"**
    Indian Institute of Technology Mandi (IIT Mandi),
    Administrative Block Kamand
    Mandi – 175001 (H.P), India"

13. In the event of any dispute or difference(s) between the vendee Institute (IIT Mandi) and the vendor(s) arising out of non-supply of material or supplies not found according to specifications or any other cause whatsoever relating to the supply or purchase order before or after the supply has been executed, shall be referred to "The Director, IIT Mandi", Mandi who may decide the matter himself or may appoint arbitrator(s) under the arbitration and conciliation Act1996. The decision of the arbitrator shall be final and binding on both the parties.

14. The place of arbitration and the language to be used in arbitral proceedings shall be decided by the arbitrator.

15. All disputes shall be subject to Mandi Jurisdiction only.

16. All tenders in which any of the prescribed conditions is not fulfilled or any condition is put forth by the tenderer shall be summarily rejected.

17. The bidders or their authorized representatives may also be present during the opening of the Technical Bid, if they desire so, at their own expenses.

Note: Price bids of only those bidders will be opened whose technical bids are found suitable by the committee appointed for the purpose. Date and time of opening of price bids will be decided after technical bids have been evaluated by the committee. Information in this regard will be posted on Institute's web site/Notice board. In exceptional situations, an authorized committee may negotiate price with the qualified bidder quoting the lowest price before awarding the contract.

18. **Clarifications**:

In case the bidder requires any clarification regarding the tender documents, they are requested to contact our office (e-mail: ajay@iitmandi.ac.in & arsp@iitmandi.ac.in on or before **10/02/2015**.

19. **Tender Cost**:

A Demand draft of **Rs. 1,000/-(Rupees One Thousand only)** towards non-refundable **tender fee, for each item being quoted, drawn in favour of "The Registrar, IIT Mandi"** payable at Mandi should accompany the Technical bid documents. If the same firm is submitting bids for more than one Item/ instrument, they should submit the same in separate envelopes along with respective tender cost for each. In the absence of tender cost, the tender will not be accepted.

20. **Earnest Money Deposit (EMD)**:

A refundable amount of EMD @ 2% of the quoted price as earnest money deposit (EMD) in the shape of DD from a scheduled banks in India (valid for a minimum period of 3 months from the date of opening of tender) should accompany the bid documents. The DD should be drawn in favour of "The Registrar, IIT Mandi" payable at Mandi should accompany the bid documents. The EMD should be kept in a separate

sealed envelope, should be marked clearly and put in the outer envelope that contains the technical and financial bid envelopes. The bidders should enclose a pre-receipted bill for the EMD to enable us to return the EMD of unsuccessful bidders. Failure to deposit **Earnest Money in each case** will lead to rejection of tender. The bidders should submit separate EMD for each item, if quoting for more than one item.

21. **Pre – Qualification Criteria**:

a. Bidders should be the manufacturer/authorized dealer. Letter of Authorization from original equipment manufacturer (OEM) on the same and specific to the tender should be enclosed.

b. An undertaking from the OEM is required stating that they would facilitate the bidder on a regular basis with technology/product updates and extend support for the warranty as well.

c. OEM should be internationally reputed Branded Company.

d. Non-compliance of tender terms, non-submission of required documents, lack of clarity of the specifications, contradiction between bidder specification and supporting documents etc. may lead to rejection of the bid.

e. Furnishing of wrong/ambiguous information in the compliance statement may lead to rejection of bid and further black listing of the bidder, if prima-facie it appears that the information in the compliance statement was given with a malafide/fraudulent intent.

22. **Prices**:

a) The Prices quoted should be inclusive of all taxes or duties, packing, forwarding, freight, insurance, delivery and commissioning etc. at destination site (IIT Mandi Kamand Campus, Kamand Mandi). IIT Mandi is registered with DSIR, Govt. of India and is exempted from Custom / Excise Duty. Exemption Certificate to this effect will be issued by IIT Mandi. **Hence, Customs/Excise Duty exempted price should be quoted**. The rates shall be firm and final. Nothing extra shall be paid on any account. **In the price bid/financial bid, the vendor should clearly mention the final price breakup i.e. ex-works price/FCA price, FOB price, CIP/CIF price & FOR IIT Mandi, Kamand Campus price, as applicable in their bid.**

b) In case of imported equipment(s)/item(s), the agency commission, if any, payable in Indian rupees should be mentioned separately. For imported equipments, the Letter of Credit will be opened for the amount excluding agency commission in Indian Rupees. The firm should clearly mention the address of foreign bank in the financial bid.

23. **Validity**:

The bid should be valid for acceptance up to a period of 180 Days. The Bidders should be ready to extend the validity, if required without any additional financial implications.

24. **Delivery**:

All the equipments are to be delivered at IIT Mandi, Kamand Campus, Kamand Mandi. The Equipment should be delivered and installed within the period as specified in the purchase order and be ready for use within 24 weeks of the issue of purchase order unless otherwise prescribed. If the bidder fails to deliver and place any or all the Equipments or perform the service by the specified date, penalty at the rate of 1% per week of the total order value subject to the maximum of 10% of total order value will be deducted.

25. **Training**:

Bidders need to provide adequate training to the nominated persons of IIT Mandi at their cost. IIT Mandi will not bear any training expenditure.

26. **Warranty Declaration**:

Bidders must give the comprehensive onsite warranty as required from the date of successful installation of Equipment against any manufacturing defects and also give the warranty declaration that "*everything to be supplied by us hereunder shall be free from all defects and faults in material, workmanship and shall be of the highest quality and material of the type ordered, shall be in full conformity with the specification and shall be complete enough to carry out the experiments, as specified in the tender document.*

Any deviation in the material, and the specifications from the accepted terms is liable to be rejected and the bidders need to supply all the goods in the specified form to the satisfaction of IIT Mandi and as per specifications specified in the order/contract and demonstrate it at the their own cost.

27. Performance Bank Guarantee: A performance bank guarantee from a scheduled bank in India for an amount equal to 10% of the price for duration of two months beyond the expiry of warranty period will be taken from the supplier or Indian agent.

28. **Terms of Payment**: Payment will generally be made only after delivery and satisfactory installation, testing, commissioning etc. of the equipments. **This must be specified in the tender/quotation.**

- In case of imported supplies, payment (excluding Indian agency commission, if any) will be made through irrecoverable Letter of Credit in two installments. 80 % of the money will be released on submission of shipping of documents. Remaining 20 % will be released after successful installation of the instrument and submission of a performance bank guarantee for 10% of the order value from a nationalized bank, valid for 2 months beyond the expiry of the warranty.

29. **Tender expenses and documents**: All costs incurred by the bidder in the preparation of the tender shall be at the entire expense of the bidder.

30. **Tender Evaluation Criteria**: The technical bids will be opened and evaluated by a duly constituted committee. After evaluation of the technical bid, the financial bid for only those offers which have qualified in the evaluation of technical bid will be opened.

31. **Return of EMD**:

- The earnest money of unsuccessful bidders will be returned to them without any interest within 30 working days after awarding the contract.

- The earnest money of the successful bidder will be returned to them without any interest within 30 Days after supply of material.

32. **Manual and documentation**: All the manuals necessary for operating and servicing the equipment (including details of electronic circuits) will have to be provided along with the instrument.

33. Bidders should go through the tender terms, conditions and specifications carefully and fill in the attached compliance statement accurately and unambiguously. They should ensure that all the required documents are furnished along with the bid.

Sd/-
Assistant Registrar
Stores & Purchase

BID PARTICULARS

1. Name of the Supplier :

2. Address of the Supplier :

3. Availability of demonstration of equipment : Yes / No

4. Tender cost enclosed: : Yes/No if yes

D.D. No._____ Bank_____ Amount_____

5. EMD enclosed : Yes / No if Yes

D.D. No._____ Bank_____

6. Name and address of the Officer/contact person to whom all references shall be made regarding this tender enquiry.

Name :

Address :

Telephone No. :

Fax No. :

Mobile No :

e-Mail :

Web

Annexure-I

Ref:-ENQUIRYNO:- IITMANDI/Admin/PUR-133/2014-15/ Raman Spectroscopy, Raman Imaging and Photoluminescence measurements with Accessories

Technical Specification for "Raman Spectroscopy, Raman Imaging and Photoluminescence measurements with Accessories"

IIT Mandi requires a fully automated and fully integrated computer controlled confocal Raman spectrometer with the capabilities of recording Raman spectrum, Raman Imaging and Photo-luminescence (PL) measurements on all kind of solids (crystalline and ceramics), glassy, polymer, thin films and liquids of micro and macros samples. The spectrometer should be inclusive of confocal microscope with objectives, detector, Lasers, optics and other necessary accessories for all components of the machine, along with computers & software for data acquisition and data analysis.

The machine should be capable of

A. Performing Raman measurements in the range of 10 cm^{-1} (or lower) to 5000 cm^{-1} (or higher) with a resolution better than 0.5 cm^{-1} with suitable optics.
B. Performing photo-luminescence measurements in the range of 300 nm (or lower) to 1050 nm (or higher) with a resolution better than 0.1 nm.
C. Performing confocal Raman Imaging/Mapping with a spatial resolution of 250 nm (or lower) on a large area of 0.5 mm (or higher).
D. Performing temperature dependent Raman and PL measurements down to 4 K using a close cycle refrigerator (CCR) with ultra-low vibrations, and for measurements above room temperature up to 800 K using a suitable heating stage.

Different companies may quote for the three items individually and, if necessary, a single vendor should quote separately for the three items.

ITEM 1: **Raman Spectrometer for Raman, PL measurements and Raman Imaging**

ITEM 2: Automated Close Cycle Refrigerator for Raman and PL Spectroscopy

ITEM 3: **Research Grade Vibrational Isolated Optical Table for Raman Spectrometer and accessories including LASERS**

Technical Specification for ITEM 1: One Raman Spectrometer for Raman, PL measurements and Raman imaging

Prospective vendors should quote for supply, delivery, installation, testing and commissioning with a list of other accessories required for complete and smooth installation and uninterrupted operation of the equipment. The technical offer should also include make and model number of facilities such as microscope, LASERS, optical components (objectives, filters, polarizers, mirrors, lenses and others), optics for interfacing with heating and cooling stages etc. The complete spectrometer system should have following specifications.

A. Raman Spectrometer:

A large focal length (not less than 250 mm) Czerny-Turner type achromatic spectrograph equipped with confocal microscope and reflective optics capable of producing Raman Spectra in the spectral range of 10 cm^{-1} (or less), to 5000 cm^{-1} (or higher).

A1. Spectral Range (Excitation wavelengths): 200 nm (or less) – 2100 nm (or higher),

A2. Spectral resolution: ~ 0.5 cm^{-1} (or better) with suitable optics,

The Vender should specify with suitable optics and gratings to achieve best spectral resolution for various excitation lasers.

@ 325 nm wavelength

@ 532 nm wavelength

@ 633 nm wavelength

@ 785 nm wavelength

A3. Spatial resolution: 500 nm or better

A4. Gratings: Holographic gratings with 300, 600, 1200, 1800 and 2400 gr/mm mounted on a motorized turret driven and controlled by software. The grating mount should be capable of holding at least two or more gratings at a time. The gratings should be quickly and easily interchangeable without realignment.

A5. Include Rayleigh scattering filters

A6. The low wave number cut-off for all LASERS preferably should be 50 cm^{-1} or lower and down to 10 cm^{-1} (or lower) for LASERS 633 nm and 532 nm with suitable optics. The technical quote should provide the details about the edge and notch filters for ultra-low frequency for Raman measurements down to 10 cm^{-1} (or lower). Vendor should also specify lower range of spectrum for each LASER with suitable optics.

A7. Spectral calibration should be automated. Vendor should provide the specific details in the technical documents if the calibration reference is built-in with the system.

A9. Suppression of Fluorescence: The machine should have fluorescence rejection mode for all laser lines.

A10. Spectra Repeatability: should be 0.1 cm^{-1} (or lower)

A11. Spectra Scanning Linearity: < ± 0.5 cm^{-1} or better

B. Lasers: **All the lasers should be air cooled for maximal confocal performance**.

All the LASERS should be solid state lasers, unless specified for 325 nm. The LASERS should be extremely stable for the long time Raman experiments (at least 48 hours continuously). All LASERS should be single mode, TEM00. Vendors also provide the information and data sheet about sensitivity (signal to noise ratio) for each LASER.

I. Excitation LASER 325 nm (20 mW or more),
II. Excitation LASER 532 nm (100 mW or more),
III. Excitation LASER 633 nm (17mW or more),
IV. Excitation LASER 785 nm (100 mW or more),

B1. Lasers switching preferably software controlled.

B2. Laser Power Control: The spectrometer should be fitted with a filter wheel with 9 neutral density filters (100%,50%,25%,10%,5%,3%,1%,0.1%,0.01%.) controlled by software to control the LASER power on the sample.

B3. Laser line filters should be provided if required for specific excitation laser.

B4. Laser Polarization: Must be for all the specified excitation laser wavelengths. Zero order half wave plate for all LASERs (with thickness ~ 1mm or less, 1 inch diameter) with a precision rotation mount. Zero order quarter wave plate for all LASERS (with thickness ~ 1mm or less, 1 inch diameter) with a precision rotation mount.

B5. Digital laser power meter: The power meter should be capable to measure LASER power (in the range 10 pW to 1W), with accessories to measure laser power. Power meter should have accuracy of 0.15 % (or less).

B6. Safety equipments and protective eye-glasses for LASERS (5 numbers)

B7. Fiber optic port for all LASERs for remote sampling probe.

C. Confocal Microscope: A high stability open space research grade microscope

C1. Microscope should be branded research grade microscope (for instance Olympus/Nikon/Zeiss/Leica or specify) with USB-PC controlled high resolution camera for viewing and white light polarization option. The vendor should clearly specify the geometry, model and make of the microscope.

C2. **Objectives:** Infinity corrected objectives suitable for Raman and PL Measurements

C21. Normal function: Magnification 5X, 20X, 50X (NA~ 0.75), 100X (NA~0.9),

C22. Long working distance (WD) objectives 20 X (WD ~12mm) 50X (WD ~10 mm or more) & 100X (WD~3 mm). Long working 50X objective should be compatible with heating stage (described below) to perform low temperature micro Raman measurements.

C23. Objectives for UV range: Include the suitable 40X objective for (WD~1 mm) and LWD 10X (~10 mm).

NOTE: The vendor should specify details of the available objectives such as magnification and working distance, <u>if not listed above</u>.

C4. Fiber coupled Raman probe for remote sampling option (for both excitation and collection of the scattered light from the sample to spectrometer). Optical fiber should maintain the polarization of the LASER light impinging on the sample and must be compatible with Raman Measurements (The fiber should not have Raman modes of its own in the required spectral range). Raman Probe should be capable of both motorized and manual exit/entrance for fiber coupling for probes and lasers,

C5. Microscope should have back scattering geometry for spectrum collection.

C6. The microscope should have provision for large free space under the objective turret to accommodate large sample holders like cryostat, high temperature and high pressure cells.

D. Confocal Raman Imaging

XYZ motorized stage with 100nm (or better) step size in XY & 16nm (or better) in Z direction. A detachable sample holder XYZ Mapping Stage with manual (with Joy Stick) as well as computer-controlled, XY-Z movements,

D1. Resolution ~ 100 nm or lower

D2. Scan Range: several 100 μm to mm (short range) or several cm (long range).

D3. Capability of scanning area of 30 um x 30 um with 50X objective,

D4. Spatial resolution of 250 nm or lower.

The vendor should mention the step sizes of the stage and spatial resolutions (for different required lasers with 50 X objectives) in technical document.

E. A multichannel Charge coupled device (CCD) detector:

High efficiency thermoelectrically cooled CCD: A fully automated multichannel detectors suitable for both Raman and PL measurements with active pixels 1024 X 256 pixels and pixel size of 26 µm X 26 µm (or better).

E1. The spectral range: 200 nm (or less) to 2100 nm (or more),

[Specify details of the detectors if numbers not matching with requirements]

E2. Very low noise levels and dark noise less than 0.002 e/pixel/sec or better,

E3. Quantum efficiency must be 30 % or more (in the required spectral range),

E4. Computer interface and software controlled: USB and/or RS-232/IEEE-488

- **NOTE: The institute is located at the altitudes of above 1000 meters, thus a detailed and careful specification of the quoted detector are essential**.

F. Computer and software:

F1. The state-of-the-art computer control system compatible-with and optimized for the application software to perform the various measurement options automatically. The desktop computer with i5 Processor or better, 8 GB RAM, 1 TB Hard drive, DVD RW, 23 inches color LED monitor, wireless key board and mouse with preinstalled software would be preferable.

F2. The data acquisition and analysis software should be compatible with Windows 7/8 or latest version of computer environment. Enough number of software licenses should be supplied to be used with more than two computers (one as main and one standby) for control of the instrument, data acquisition and data analysis for Raman, photoluminescence and Raman mapping with storage options. The software should have automatic spectral intensity corrections. The data file should be compatible for plotting in different data plotting and analyzing software.

F3. The vendor should provide more than 5 number of the latest software licenses for data/spectrum analysis.

F4. A latest library of Raman spectra for inorganic and organics materials should be provided.

G. Heating options: The technical offer should include heating/cooling stage for the temperature range of 77 K-800 K and having following specifications.

G1. Heating option (cryostat/stage) should be able to performing Raman and PL measurements covering the temperature range of 77 K-800 K (or more). The temperature controlled stage should be equipped for simultaneous electrical transport and high pressure measurements at all temperatures. The quoted option also should be able to accommodate high pressure cell.

G2. The technical quote must provide the details of the optical assembly and support for the smooth functioning of the low and high temperature Raman and PL measurements.

G3. Temperature controller for cryostat and other required accessories for low temperature micro-Raman measurements. The temperature control and stability should be of ~10 mK at 300 K.

G4. XYZ stage (manually controlled and compatible with load capacity of offered heating stage) -100 TPI or better with 2 inch movement in each direction.

G5. Calibrated sensor for temperature measurements and control of sample space,

G6. One 25.4 mm (or more) window ports for vertical optical access with a clear view of 23 mm (or more),

G7. Optical window material should be suitable for Raman measurements (i.e. no change in light polarization and should not have Raman modes of its own in the required spectral range) in the wavelength range of 325 nm-800nm and with transmission more than 90%.

G8. The sample space should be radiation shielded with oxygen free highly conducting cooper and nickel plated.

G9. The stage should have a smart interface for fully automated design for specified Raman and PL measurements.

G10. Working distance should be compatible with 50X objective (WD ~10 mm) for optical measurements.

H. Other Requirements: The vendor should provide declaration certificates for following

H1. Vendor should provide the standard samples for testing and calibrating the instruments at any time for the demonstration of the performance of equipment.

H2. Manuals (both electronic and hard copy) – technical aspects with required service details

H3. Installation – The satisfactory installation to the full specifications of the machine with all accessories at IIT Mandi campus. Any additional equipment/accessory for the

installation of the system should be quoted invariably. IIT Mandi will provide only space and electrical connection.

H5. Training – Free training to IIT Mandi operators and students/staffs to the satisfaction of IIT Mandi.

H6. Warranty – 3 year on-site warranty (give details including scope, no. of visits, etc). Any part(s) that are not covered under warranty should be mentioned clearly.

H7. The complete system should be compatible to 220-230 VAC 50Hz, single phase power supply. The vendor should **specify the power requirements for all the components in the technical quotation**.

H8. Vendor should provide the tools and Spare part for smooth functioning of the machine for 3-5 years.

H9: Set of Mirrors, Opto-mechanics accessories and tools made of stainless steel for macro Raman measurements.

I. Optional: The vendor should quote separately for following optional items providing the complete technical details of the listed items.

I1. Excitation LASERs of wavelength

i. 457 nm (20 mW or more)

ii. 355 nm (10 mW or more)

I2. Optional InGaAs detector compatible to the quoted spectrometer and optical assembly for measurements in NIR or above (~1.7 um),

I3. High Pressure Diamond Anvil Cell, having maximum pressure range of 50 GPa, and its accessories for Raman measurements using offered machine.

1. Branded Research Grade Gas Membrane driven high pressure Diamond Anvil Cell (DAC) (Cell material: Beryllium Copper) should also be compatible for low temperature (cryostat) measurements.
2. Top and bottom angle access should be 50° or more.
3. Lateral Access with 12° (or more) of 2θ should be accessible.
4. DAC diameter, height should be 38 mm (or less), 29 mm (or less), respectively.
5. Working distance should be ~10 mm or less.
6. With diamonds, manually controlled gas membrane drives, ruby spheres, gasket and other accessories required to perform high pressure Micro-Raman measurements.

List of the optional accessories for various options required for the machine should also be mentioned separately if not listed above.

J. Guarantee / Warranty and after sales technical support

The tender must be quoted with three years on-site comprehensive Warrant/Guarantee commencing from the date of complete and satisfactory installation of the equipment against the defect of any manufacturing, workmanship and poor quality of the components. The bidder also must agree and issue a certificate stating that technical query will be responded within 5 working days and the support will be provided within 15 working days from the date of reporting of the technical failure for down time free operation of the instrument.

Annexure 2

ITEM 2: One Automated Close Cycle Refrigerator for Raman and Photo-Luminescent measurements and Raman Imaging

IIT Mandi requires 'a fully automated temperature controlled and ultra-low vibration close cycle refrigerator' to be used with confocal Raman spectrometer for temperature dependent Raman, PL measurements and Raman Imaging/mapping. Vendor should provide a stage/platform to fix the CCR on the optical table (M6 holes with 1 inch gap) temperature controller, and other accessories to run smooth experiments.

The technical specifications of the desired CCR are following:

1. Temperature range: 4 K (or less) to 350 K (or higher) in a vacuum environment for sample.
2. The CCR should have a very high thermal stability of 10 mK (or better) at 4K and 300K,
3. Vibration and displacement at the sample should be ultra-low (typically of the order of ~ 1 um or less or else specify). The low vibration level should be declared with data sheet.
4. CCR should have provision for performing simultaneous electrical measurements (i.e. providing 4 probes for electrical connections) and Micro-Raman measurements at low temperatures.
5. Cool down time to 4 K should be 2 hour or less. The vendor should specify the typical cool down time for the offer with supporting data.
6. Temperature controller with sensors, cables for GPIB and RS-232 interface options should be included in the offer
7. The CCR should be air cooled (No liquid nitrogen or water cooled)
8. The CCR should have calibrated sensor for temperature measurements and control of sample space
9. One 25.4 mm (or more) window ports for vertical optical access (for microscope application) with a clear view of 23 mm. Vendor may also provide details of optional attachments for 3 sides horizontal access optical windows. Vendor should provide sample holders for corresponding geometry.
10. Optical window material should be suitable for Raman measurements (i.e. no change in light polarization and should not have Raman modes of its own in the required spectral range) in the wavelength range of 325 nm-800nm and with transmission more than 90%.

11. The sample space should be radiation shielded with oxygen free highly conducting cooper and nickel plated.
12. Smart interface and design for fully automated pumping, cool down, temperature stabilization and warmup in the specified temperature range.
13. Essential tools and spares for compressor, pumps, control electronics, gas handling manifold, connecting lines, cables, O-rings and electrical fuses etc must be provided for smooth functioning of the machine for 3-5 years.
14. Working distance of the sample should be compatible with the long working distance 50X objective (WD ~10mm) for optical measurements via top window (vertical access).

Guarantee / Warranty and after sales technical support:

The tender must be quoted with three years on-site comprehensive Warrant/Guarantee commencing from the date of complete and satisfactory installation of the equipment against the defect of any manufacturing, workmanship and poor quality of the components. The bidder also must agree and issue a certificate stating that technical query will be responded within 5 working days and the support will be provided within 15 working days from the date of reporting of the technical failure for down time free operation of the instrument.

Annexure 3

ITEM 3: One Research Grade Vibrational Isolated Optical Table for Raman Spectrometer

IIT Mandi requires an ultra-low vibration isolated optical table to be used with confocal Raman spectrometer for Raman, Photo-luminescent measurements and Raman Imaging/mapping. The table should be able to accommodate spectrometer, microscope, lasers, Close cycle refrigerator, high temperature stages and optics for Raman and PL measurements.

The technical specifications of the table are mentioned below:

1. Table Dimension: 5 feet wide, 8 feet long and 3 feet height with a table top of 8 inch thickness, [W x L x H of 5x8x3 ft]
2. Gross Load Capacities up to 900 Kgs (or more).
3. Table and table-top material should be non-magnetic stainless steel.
4. Surface flatness should be ± 0.004 mm (or better) over 2 feet.
5. Core design: Trussed honeycomb based and vertically bonded closed cell construction.
6. Mounting Holes – M6 diameter and 1 inch separated holes on 25 mm grid.
7. Maximum dynamic deflection coefficient should be 10^{-3} (or less).
8. Maximum deflection under load should be 10^{-5} mm (or less).
9. Maximum relative motion should be 10^{-9} mm (or less).
10. Tools and Spare part for smooth functioning of the machine for 3-5 years.
11. **Optional Accessories: One scientific grade honeycomb optical breadboard** made of stainless steel, 4.8 mm skin, mounting hole (M6-1 inch), dimension (900mm width, 900 mm length, 59 mm thickness). The surface flatness should be ± 0.1 mm (or less) over 600 mm. Maximum dynamic deflection co-efficient should be 10^{-4} (or less). Deflection under load should be 10^{-3} mm (or less).

Guarantee / Warranty and after sales technical support

The tender must be quoted with three years on-site comprehensive Warrant/Guarantee commencing from the date of complete and satisfactory installation of the equipment against the defect of any manufacturing, workmanship and poor quality of the components. The bidder also must agree and issue a certificate stating that technical query will be responded within 5 working days and the support will be provided within 15 working days from the date of reporting of the technical failure for down time free operation of the instrument.

Note: Common for all the three items in the tender document

1. Operation and service manual in English (electronic and hard copy) should be provided with all the equipments and components.
2. In the technical details, specify clearly about the kind of service/maintenance required for the system. Also mention that whether the service has to be carried out by a company engineer or it can be carried by trained service personnel within India.
3. The complete training of all measurement options should be free for IIT Mandi user staff/students members, onsite.
4. Enclose pre-installation guide for the details on electrical power, space and other for all components and essential accessories.
5. Bid should include all other essential auxiliary equipment and spares for its smooth operation for 3-5 years from date of installation (please provide list with the details).
6. All sample handling tool-kits/consumables should be provided. Wherever, consumables and other items required to handle the system while operating all measurement options, must be quoted separately for enough quantity.
7. Quote separately for all optional items/accessories, optical components and consumables which are not explicitly specified above however required for smooth functioning of the machines.
8. A list of institutes (with details) in India where the similar equipment (with all options in this tender) has been sold or is under operation should be provided. Prospective vendor should clearly mention the type of measurement options (along with the main system) supplied to these institutes.
9. The manufacturer has to stand guarantee for the relocation of the system from the present campus of IIT Mandi (at Kamand), to another campus of IIT Mandi (about 3 km) when it gets ready. They must be in a position to dismantle the setup in the present campus and re-install it to the new campus.

Compliance statement ***for Item No. 1 Fully Automated and Integrated Confocal Raman Spectroscopy, Raman Imaging and Photoluminescence Measurements with Accessories***

Note: The vendor should provide complete details with number and supporting data in the compliance statement.

S. N.	Required Indent Specifications	Please mention your remarks, details or mention the value of specifications
1	Is Tender fees attached?	
2	Is EMD attached? (if applicable)	
3	Is the bidder original equipment manufacturer (OEM)/authorized dealer?	
4	If authorized dealer, recent dated certificate to this effect from OEM,attached or not ?	
5	Undertaking from OEM regarding technical support & extended warranty present	
6	Validity of 180 days or not?	
7	Undertaking from bidder regarding acceptance of tender terms & conditions	
8	List of reputed users for the past three years specific to the instrument	
9	Whether special educational discount for IIT Mandi given	
10	Whether two weeks of training of operator and research students without any charge offered	
	Technical Specifications	
11	**A. Spectrometer** A large focal length (not less than 250 mm) Czerny-Turner type achromatic spectrograph equipped with confocal microscope and reflective optics capable of producing Raman Spectra**. Specify the focal length of the offered spectrometer.**	
i.	Spectral Range : 200nm–2100nm (**Specify the numbers for offer**)	
ii.	Spectral resolution: (Specify numbers with gratings for all LASERS) @325nm wavelength --- @532nm wavelength --- @633nm wavelength --- @785nm wavelength ---	
iii.	Spatial resolution : 500 nm or better (YES/NO, better or specify)	
iv.	Gratings: holographic 300, 600, 1200, 1800 and 2400 gr/mm mounted on a motorized turret driven by software. The gratings should be quickly and easily interchanged without realignment.	
v.	Rayleigh scattering Filtering: details of types of filters in quote.	
vi.	Spectral Intensity Correction : (Yes/No and specify)	
vii.	Spectral Calibration mode (Specify with details)	

viii.	Suppression of Fluorescence: fluorescence rejection mode must be available for all laser lines. (Yes/No)	
ix	The low wave number cut-off for all LASERS preferably should be 50 cm^{-1} or lower and down to 10 cm^{-1} (or lower) for LASERS 633 nm and 532 nm with suitable optics. (YES/NO and specify details)	
x	Spectra Repeatability: better than 0.1 cm^{-1} (YES/NO specify)	
12	**B. Lasers :** I. Excitation LASER 325 nm (20 mW or more), II. Excitation LASER 532 nm (100 mW or more), III. Excitation LASER 633 nm (17mW or more), IV. Excitation LASER 785 nm (100 mW or more), Preferably solid state lasers, unless specified for 325 nm. The LASERS should be extremely stable for the long time Raman experiments (at least 48 hours continuously). All LASERS should be single mode, TEM00. (**specify details of the offer**)	
i.	Laser Power Control: The spectrometer should be fitted with a filter wheel with 9 neutral density filters (100%,50%,25%,10%,5%, 3%,1%,0.1%,0.01%.) controlled by software to control the LASER power on the sample.	
ii.	LASER switching preferably software control else **specify**	
iii.	Laser Polarization: Must be for all the specified excitation laser wavelengths. Zero order half wave plate for all LASERS (with thickness ~ 1mm or less, 1 inch diameter) with a precision rotation mount. Zero order quarter wave plate for all LASERS (with thickness ~ 1mm or less, 1 inch diameter) with a precision rotation mount.	
iv	Fiber optic port for all LASERs for remote sampling probe should be provided (Specify details)	
v	Digital Laser power meter should be capable to measure LASER power (in the range 10 pW to 1W), with accessories to measure laser power. Power meter should have accuracy of 0.15 % (or less) for all specified LASERS	
13	**C. Confocal Microscope: (Specify make and model)** Microscope should be branded research grade microscope with USB-PC controlled high resolution cameras and white light polarization option. The vendor should clearly specify the geometry, model and make of the microscope.	
i	**Objectives**: Infinity corrected objectives suitable for Raman and PL Measurements (YES/NO and specify details if not listed) Normal function: Magnification: 5X, 20X, 50X (NA~ 0.75), 100X (NA~0.9), Long working distance (WD) objectives 20 X (WD ~12mm) 50X (WD ~10 mm or more) & 100X (WD~3 mm).	
ii.	Objectives for UV range: Include the suitable 40X objective for (WD~1 mm) and LWD 10X (~10 mm).	

	(Specify the details of the offer if not mentioned above)	
iii.	Fiber coupled Raman probe for remote sampling option (for both excitation and collection of the scattered light from the sample to spectrometer). Optical fiber should maintain the polarization of the LASER light impinging on the sample and must be compatible with Raman Measurements (The fiber should not have Raman modes of its own in the required spectral range). Raman Probe should be capable of both motorized and manual exit/entrance for fiber coupling for probes and lasers.	
iv.	Microscope should have back scattering geometry for spectrum collection	
v.	The microscope should have provision for large free space under the objective turret to accommodate large sample holders like cryostat, high temperature cells, high pressure cells.	
vi.	Raman Probe should be capable of both motorized and manual exit/entrance for fiber coupling for probes and lasers	
14.	**D. Confocal Raman Imaging** XYZ motorized stage with 100nm (or better) step size in XY & 16nm (or better) in Z direction. A detachable sample holder XYZ Mapping Stage with manual (with Joy Stick) as well as computer-controlled, XY-Z movements,	
ii.	Resolution ~ 100 nm or lower	
iii.	Scan Range: several 100 μm to mm (short range) or several cm (long range).	
iv.	Capability of scanning area of 30 um x 30 um with 50X objective,	
v.	Spatial resolution of 250 nm or lower.	
15.	**E. Multichannel charge coupled device (CCD) detector** High efficiency thermoelectrically cooled CCD	
i	The spectral range: 200 nm (or less) to 2100 nm (or more), (specify details if not matching with requirements)	
ii.	Very low noise levels and dark noise less than 0.002 e/pixel/sec or better	
iii.	Quantum efficiency must be 30 % or more (in the required spectral range), (Detailed specifications if not matching with the requirements)	
v.	Interface : Computer interface and software controlled: USB and/or RS-232/IEEE-488	
16.	**Computer and software:**	
i.	The desktop Computer with i5 Processor or better, 8 GB RAM, 1 TB Hard drive, DVD RW, 23 inches color LED monitor with wireless key board and mouse with preinstalled software. [specify if not matching with requirements]	
ii.	Software should be compatible with Windows 7/8 or latest version of computer environment. The data file should be compatible for plotting in different data plotting and analyzing software.	
iii	More than 5 number of the latest software licenses for	

	data/spectrum analysis.	
iv.	A latest library of Raman spectra for inorganic and organics materials should be provided. [specify if not available]	
17.	G. H**eating options: YSE/NO or Details of the heating option and stage**	
	G1. Provide the details of the optical assembly and support for the smooth functioning of the low temperature Raman and PL measurements. G2. Heating stage to be used in the temperature range of 77K-700 K G3. Temperature controller for cryostat and other required accessories for low temperature micro-Raman measurements. G4. XYZ stage (manually controlled and compatible with load capacity of offered heating stage) -100 TPI or better with 2 inch movement in each direction. G5. One 25.4 mm (or more) window ports for optical access with a clear view of 23 mm (or more), G7. Optical window material G8. The sample space should be radiation shielded with oxygen free highly conducting cooper and nickel plated. G9. Smart interface for fully automated design G10. Working distance should be compatible with 50X objective (WD ~10 mm) for optical measurements.	
18.	**Others (YES/NO and specific details)**	
i.	Manual – technical aspects with service details (electronic and hard copy)	
ii.	Installation – Details of the space, power provided	
iii.	Training – Free training to IIT Mandi operators and students.	
iv.	Warranty – 3 year on-site warranty (give details including scope, no. Of visits, etc.).	
v.	Power supply: 220-230 VAC, single phase or specify the power requirements for all the components in the technical quotation.	
vi	Standard sample for calibration provided	
20.	**I. Optional: (YSE/NO)** **1.** Excitation LASERs of wavelength **i.** 457 nm (20 mW or more) **ii.** 355 nm (10 mW or more) **2. InGaAs detector compatible to offered spectrometer** and optical assembly for measurements in NIR or above (~1.7 um). **3. High Pressure Diamond Anvil Cell** and its accessories for Raman measurements using offered machine. **4. List of the optional accessories for various options should also be mentioned and quoted separately if not listed above.**	
21	The bidder must agree and issue a certificate stating that technical query will be responded within 5 working days and the support will be provided within 15 working days from the date of reporting of the technical failure for down time free operation of instrument.	
22	A list of institutes (with details) in India where the similar	

	equipment (with all options in this tender) has been sold or is under operation should be provided. Prospective vendor should clearly mention the type of measurement options (along with the main system) supplied to these institutes.	
23	The vendor has to stand guarantee for the relocation of the system from the present campus of IIT Mandi (at kamand), to another campus of IIT Mandi (about 3 KM) when it gets ready. There must be in a position to disassemble the set-up in the present campus and re-install it to the new campus, if required.	

Compliance statement for Item No.2 Close Cycle Refrigerator with Accessories

Note: The vendor should provide complete details with number and supporting data in the compliance statement.

S. N.	Required Indent Specifications	Please mention your remarks, details or mention the value of specifications
1	Is Tender fees attached?	
2	Is EMD attached? (if applicable)	
3	Is the bidder original equipment manufacturer (OEM)/authorised dealer ?	
4	If authorized dealer, recent dated certificate to this effect from OEM,attached or not ?	
5	Undertaking from OEM regarding technical support & extended warranty present	
6	Validity of 180 days or not?	
7	Undertaking from bidder regarding acceptance of tender terms & conditions	
8	List of reputed users for the past three years specific to the instrument	
9	Whether special educational discount for IIT Mandi given	
10	Whether two weeks of training of operator and research students without any charge offered	
11	**Technical Specifications (YES/NO or specify details)**	
i	Temperature range: 4 - 350 K	
ii	A very high thermal stability of 10 mK (or better) at 4K and 300K,	
iii	Ultra-low Vibration and displacement at the sample typically ~1 um (or less or specify)	
iv	Provision for performing Micro-Raman measurements simultaneously with electrical measurements (4 probes for electrical connections) and at low temperature.	
v	Cool down time to 4K (~120 minutes)	
vi.	Temperature controller with sensors, cables for GPIB and RS-232 interface options	
vii.	The CCR should be air cooled (No liquid nitrogen/water cooled)	
viii.	Optical window and material: as per tender document	
ix.	The sample space: radiation shielded with oxygen free highly conducting cooper and nickel plated.	
x.	Smart interface and design for fully automated pump, cool down, temperature stabilization and warmup.	
xi.	Essential tools and spares for compressor, pumps, control electronics, gas handling manifold, connecting lines, cables, O-rings	

	and electrical fuses etc provided for smooth functioning of the machine for 3-5 years.	
xii.	Working distance of the sample should be compatible with the long working distance 50X objective (WD ~10mm) for optical measurements via top window (vertical access).	
xiii	A list of institutes (with details) in India where the similar equipment (with all options in this tender) has been sold or is under operation should be provided. Prospective vendor should clearly mention the type of measurement options (along with the main system) supplied to these institutes.	
xiv	The vendor has to stand guarantee for the relocation of the system from the present campus of IIT Mandi (at kamand), to another campus of IIT Mandi (about 3 KM) when it gets ready. There must be in a position to disassemble the set-up in the present campus and re-install it to the new campus, if required.	

Compliance statement for Item No.3 Research Grade Vibrational Isolated Optical Table for Raman Spectrometer and accessories including LASERS with Accessories

Note: The vendor should provide complete details with number and supporting data in the compliance statement.

S. N.	Required Indent Specifications	Please mention your remarks, details or mention the value of specifications
1	Is Tender fees attached?	
2	Is EMD attached? (if applicable)	
3	Is the bidder original equipment manufacturer (OEM)/authorised dealer?	
4	If authorized dealer, recent dated certificate to this effect from OEM,attached or not ?	
5	Undertaking from OEM regarding technical support & extended warranty present	
6	Validity of 180 days or not?	
7	Undertaking from bidder regarding acceptance of tender terms & conditions	
8	List of reputed users for the past three years specific to the instrument	
9	Whether special educational discount for IIT Mandi given	
10	Whether two weeks of training of operator and research students without any charge offered	
11	**Technical Specifications (YES/NO or specify details)**	
i	Table Dimension: [WxLxH of 5x8x3 ft] with 8 inch table top	
ii	Gross Load Capacities up to 900 Kgs (or more)	
iii	Table and table-top material should be non-magnetic stainless steel	
iv	Surface flatness should be ± 0.004 mm (or better) over 2 feet.	
v	Core design: Trussed honeycomb based and vertically bonded closed cell construction.	
vi.	Mounting Holes : M6-1 inch separated holes on 25 mm grid	
vii.	Maximum dynamic deflection coefficient : 10^{-3} (or less)	
viii.	Maximum deflection under load: 10^{-5} mm (or less).	
ix.	Maximum relative motion: 10^{-9} mm (or less).	
x.	Tools and Spare parts for smooth functioning of the table for 3-5 years.	
xi.	Optional Accessories (provided with the tender document)	
xii	The vendor has to stand guarantee for the relocation of the system from the present campus of IIT Mandi (at kamand), to another campus of IIT Mandi (about 3 KM) when it gets ready. There must be in a position to disassemble the set-up in the present campus and re-install it to the new campus, if required.	