

**Global Tender Notification (GTE Approval File No 51-03-2023-TS.VII (Bangalore) (2)) for the Procurement of an Integrated, automated and compact low temperature (1.8 K – 400 K) DC Magnetization with Fiber Optic Probe, AC Susceptibility, Electrical Conductivity, Heat Capacity and Dilution Refrigerator (9T magnet) system and accessories**

**(Last Date for Submission: January 10<sup>th</sup>, 2024)**

Indian Institute of Science, Bangalore invites best quotations from bonafide, resourceful and eligible manufacturer/exclusive distributor/vendors for the procurement of **an Integrated, automated and compact low temperature (1.8 K – 400 K) DC Magnetization with Fiber Optic Probe, AC Susceptibility, Electrical Conductivity, Heat Capacity and Dilution Refrigerator (9T magnet) system and accessories** with the following technical specifications on C.I.P. Bangalore basis (by **Air Freight** only). Your quotation should clearly mention the validity of quote (minimum 90 days validity), terms of delivery, delivery schedule, estimated delivery date, and payment terms. The tender should be submitted in two separate sealed and distinctly marked envelopes: one containing the technical bid and the other containing the commercial bid, both of which should reach us duly signed on or before 17:00 hours, January 10<sup>th</sup> 2024.

The bids should be addressed to:

**The Chairman,**

Solid State and Structural Chemistry Unit

Chemical Sciences Building

Indian Institute of Science (IISc)

Bengaluru, India - 560012

Kind attention: **Dr. Abhishake Mondal**

Email: [mondal@iisc.ac.in](mailto:mondal@iisc.ac.in)

The sealed bids should be sent to the following address:

**Dr. Abhishake Mondal**

Solid State and Structural Chemistry Unit

Room F-213, F-Block, Second Floor

Chemical Sciences Building

Indian Institute of Science (IISc)

Bengaluru, India - 560012

Ph: +91-9932207177

Email: [mondal@iisc.ac.in](mailto:mondal@iisc.ac.in)

**Please enclose a compliance statement along with the technical bid.**

## Section 1: Bid Schedule

1.	Tender No	<i>IISc/SSCU/2023-2024/Magnetometer</i>
2.	Tender date	December 19 <sup>th</sup> , 2023
3.	Instrument	Integrated, automated and compact low temperature (1.8 K – 400 K) DC Magnetization with Fiber Optic Probe, AC Susceptibility, Electrical Conductivity, Heat Capacity and Dilution Refrigerator (9T magnet) system and accessories
4.	Tender type	Global Tender
5.	Documents to be submitted	i) Technical bid (part A) ii) Commercial bid (part B)
6.	Place of tender submission	<b>Dr. Abhishake Mondal</b> Solid State and Structural Chemistry Unit Room F-213, F-Block, Second Floor Chemical Sciences Building Indian Institute of Science (IISc) Bengaluru, India – 560012
7.	Last date and time of tender submission	January 10 <sup>th</sup> 2024, 17:00 hours
8.	For Further clarification	<b>Dr. Abhishake Mondal</b> Solid State and Structural Chemistry Unit Chemical Sciences Building Indian Institute of Science (IISc) Bengaluru- 560012, India Ph: +91-9932207177 Email: <a href="mailto:mondal@iisc.ac.in">mondal@iisc.ac.in</a>

## Section 2 - Eligibility Criteria:

Prequalification criteria:

1. All documentations in the tender should be in English.
2. Tender should be submitted in two envelopes (two bid systems)
  - a) Technical Bid (Part-A) – Technical bid consisting of all technical details and check list for conformance to technical specifications. The proposal should contain a compliance table with 4 columns in addition to the ones in the technical requirements table that has been included with this RFQ above. The compliance table should include all the items in the same order and format. The first column should describe your compliance in a “Yes” or “No” response. If “No” the second column should state, the extent of deviation. The “third” column should state the reasons for the deviation if any. The fourth column can be used to compare your tool with that of your competitors or provide details as requested in the technical requirements table below. (Suppliers who include any indication of prices in the technical bid will be automatically disqualified).
  - b) Commercial Bid (Part-B) – Indicating item wise price for the items mentioned in the technical bid, as per the format of quotation provided in tender, and other commercial terms and conditions.

3. The technical bid and price bid should each be placed in separate sealed covers, superscripting on both the envelopes the tender no. and the due date. Both these sealed covers are to be placed in a bigger cover which should also be sealed and duly superscripted with the Tender No, Tender Description & Due Date.
4. The SEALED COVER superscripting tender number / due date & should reach the office of **Dr. Abhishake Mondal**, Solid State and Structural Chemistry Unit, Room F-213, F-Block, Second Floor Chemical Sciences Building, Indian Institute of Science, Bangalore – 560012, India, on or before due date mentioned in the tender notice. In case due date happens to be holiday the tender will be accepted and opened on the next working day. If the quotation cover is not sealed, it will be rejected.
5. Notwithstanding anything specified in this tender document, IISc Bangalore, in its sole discretion, unconditionally and without having to assign any reason, reserves the rights:
  - a) To accept OR reject lowest tender or any other tender or all the tenders.
  - b) To accept any tender in full or in part.
  - c) To reject the tender, offer not confirming to the tender terms.
6. The Bidder should sign and submit the declaration for Acceptance of Terms and Conditions as per - Annexure 4.
7. 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 has to be given as per Annexure 3.

**Section 3 - Technical Specifications for Integrated, automated and compact low temperature (1.8 K – 400 K) DC Magnetization with Fiber Optic Probe, AC Susceptibility, Electrical Conductivity, Heat Capacity and Dilution Refrigerator (9T magnet) system and accessories**

**Broad System Requirements and Usage**

We are seeking to procure a state-of-the-art cryogen free Integrated, automated and compact low temperature (1.8 K - 400K) DC Magnetization with Fiber Optic Probe, AC Susceptibility, Electrical Conductivity, Heat Capacity and Dilution Refrigerator (9T magnet) system and accessories, with computer controlled and user-friendly setup for our lab at the Solid State and Structural Chemistry Unit, Indian Institute of Science, Bangalore. Therefore, the following technical criteria are to be met by any Integrated, automated and compact low temperature (1.8 K - 400K) DC Magnetization with Fiber Optic Probe, AC Susceptibility, Electrical Conductivity, Heat Capacity and Dilution Refrigerator (9T magnet) system and accessories being quoted under this tender notice:

- 1) Access to the instrument being quoted should be multi-user friendly with an easy-to-use software interface, modular hardware design that allows for rapid user training. It should also be easy to change from one operational mode to another with relative ease so that our students can set up experiments and handle the instrument.
- 2) We are working in diverse areas of research at the intersection of fundamental chemistry, physics, biology, and new material synthesis and characterization. Therefore, the Integrated, automated and compact low temperature (1.8 K - 400K) DC Magnetization with Fiber Optic Probe, AC Susceptibility, Electrical Conductivity, Heat Capacity and Dilution Refrigerator (9T magnet) system and accessories being quoted should be an advanced and most recent version that can go far beyond the basic instruments with the highest level of accuracy.
- 3) In addition, the system being quoted should have a modular design providing the flexibility to support upgradation for the possibility of integrating future updates and additional options for measurement either at the time of procurement or at a later date.

**Principal:** Supply and installation of a fully automated computer controlled and user-friendly Integrated, automated and compact low temperature (1.8 K - 400K) DC Magnetization with Fiber Optic Probe, AC Susceptibility, Electrical Conductivity, Heat Capacity and Dilution Refrigerator (9T magnet) system and accessories with modular hardware design for the measurement of various physical properties as a function of temperature ( $\leq 1.8$  K to  $\geq 400$  K) and magnetic field up to 9 T. The system should be capable of performing measurements like DC Magnetization with Fiber Optic Probe, AC Susceptibility, electrical conductivity, heat capacity and must be integrated with Dilution Refrigerator unit for different kinds of samples such as polycrystalline, single crystalline, powders, thin films, nano-crystalline and liquid samples. The system will be used to measure a diverse range of physical properties and therefore, should be compatible with other physical property measurement probes like Raman spectroscopy, pressure induced magnetization *etc.* for future upgradation for next 5 years. The modular hardware design and software upgradation for the system is essential so that we can add these new measurement capabilities in future. However, this modular design should be multi-user-friendly so that the user can change the measurement probes rapidly and with minimal training. The bid should also include necessary accessories for day-to-day uninterrupted routine operations. A compliance statement with all the below mentioned specifications must be attached with the bid. Printed literature and published papers in well recognized international peer reviewed journals in support of all compliance to the prescribed specifications should be provided.

## **Detailed specifications:**

### **(A) Basic unit:**

1. The system being quoted should be a fully cryogen-free closed-loop cryo-cooling system, without the need for any liquid Helium and/or liquid Nitrogen. Only a small amount (< 500 psi) of Helium gas should be required for its fully automated start-up and operation. The system should consume less than 500 psi of gaseous helium for the initial cooldown. The vendors must specify the gaseous helium consumption for regular usage.
2. The vendors must specify the amount of liquid helium liquefied by the system for temperature control. The System should not liquefy more than 250 cc of Liquid Helium for temperature control.
3. Cryo-cooling should be based on a pulse tube cryocooler so that noise associated with mechanical vibrations is minimum. A two-stage pulse tube cryocooler is preferred for efficient and faster cooling. Pulse Tube cryocooler should be compliant in cooling both the superconducting magnet and the temperature control system. Mechanical vibrations should be low enough to attain all the mentioned specifications in the later sections.
4. The system should not use recirculation of any remotely located source of liquid helium/nitrogen as a refrigerant.
5. Any liquid Helium and/or cold Helium gas flowing into sample chamber or to any other parts within the system must be handled in fully automated way through electronic and computer controls. Inefficient mechanism of temperature control through needle valve is not preferred. Demonstration will be asked during technical evaluation.
6. A sample space with a bore diameter of at least 1 inch is required.
7. The sample chamber with thermal uniformity at both low and high temperature while maintaining the robust 12 pin sample puck interface. Measurement pucks should be high conducting copper for maintaining high thermal uniformity across the sample over the measurement temperature range of 1.8 K to 400 K and gold coated to prevent oxidation.
8. The system should be fully automated, and computer controlled with the latest technology for instrument interfacing and control. All communications on the system must either use a Universal Serial Bus (USB), Controller Area Network (CAN) or similar high speed and high-fidelity communications protocols. GPIB based communications is not preferred.
9. Necessary dedicated software for performing all measurements (the measurements requested in this tender and measurements to be acquired through possible future upgrades) should be included. The software should also enable sample loading, unloading, and provide system status - magnet temperature, sample temperature, magnetic field, system status such as measurement in progress or idle.
10. A dedicated window for monitoring cryostat status.
11. The system should be equipped with sufficient number of thermometers at different locations, on

cryocooler and magnet to monitor their temperatures through the main operating software.

12. Furthermore, communications to and data acquisition from the instrument should be possible with user-customizable programs such as LabVIEW. Supporting software modules in LabVIEW must also be provided for any customized measurements that the user wishes to set-up. Such programs should enable both magnetic field and temperature control and full data acquisition capabilities of the software provided with the system.

13. A fully integrated and automated vacuum/gas purging system.

14. A fully integrated and automated temperature control system with high fidelity PID control.

## **(B) Superconducting magnet:**

1. Longitudinal field strength along the axis of the sample bore:  $\pm 9$  Tesla (*please provide data*).

2. Sweep rate: Up to  $\geq 15$  mT/sec.

3. Magnet full charge time:  $\leq 10$  min for 0 to 9 T. Vendors must provide data files. Demonstration will be asked during technical evaluation.

4. Field uniformity:  $\leq \pm 0.01\%$  in the 3 cm of sample space region or better (*please provide data*).

5. Field Resolution: 0.016 mT

6. Field stability: 1-2 ppm/hr or better

7. Magnet Cooldown: Solid conduction cooling without the need of any liquid helium or liquid nitrogen.

8. Magnet Cooldown Time: For the base system:  $\leq 16$  hours. The cooling of the magnet should be efficient. After a service warm up, the magnet should cool down to its operating temperature in less than 16 hours. This is essential to ensure that the downtime of the system is minimized. Please provide the time needed for a full system cool down. Further, provide the amount of Helium gas required for the complete start-up of the system. This data is important to determine the resources (time and money) required for bringing the system back up after a service warm up. (*please provide data*).

9. Magnet Shield: An in-built magnetic shield to maintain the stray fields 5 gauss (or less) at a distance of 30 cm from the surface of the system when the magnet is fully charged to 9 tesla. This is important both from a safety standpoint and from ensuring that the stray magnetic fields do not interfere with other measurements in the proximity of the system. (*please provide data*).

10. The magnet charging or control modes should be completely software Integrated. Field control modes: Driven (Oscillating, No Overshoot and linear). Please specify the field overshoot in the 'no overshoot' mode for field strengths of 1, 3 and 9 Tesla. The magnet should have Oscillating mode to reduce remnant magnetic field as small as possible.

11. Highly stable bi-polar power supply with over voltage protection and indication.

12. Magnet should be protected from accidental quenches. Magnet control software should monitor the temperature of the magnet and cryostat at various locations to ensure proper operation of the magnet

system from quenches.

13. Magnet electronics and power supply should be fully interlocked so that the magnet is fully protected in case of a failure of other supporting systems such as the cryo-cooler.

14. Magnet ramping should not affect the base temperature stability or the temperature in the probe region.

15. Appropriate sensors must be provided at different stages of magnet to get accurate temperature.

### **(C) Temperature Control:**

A fully automated variable temperature option should be integral to the base system. The variable temperature option should meet the following specifications:

1. Temperature (T) range:  $\leq 1.8$  K to 400 K with milli-Kelvin stability and accuracy. Temperature stability should be at least  $\pm 0.1$  % for  $T < 20$  K and  $\pm 0.02$  % for  $T > 20$  K irrespective of the magnitude of applied magnetic field.

Vendor must provide temperature stability data collected as prescribed below:

i) Set sample temperature to 1.9 K at zero-field

ii) Stabilize sample temperature at 1.9 K for 10 min.

iii) Continuously ramp magnetic field to 9T while recording the temperature.

Please provide recorded data in a temperature versus time format, clearly indicating the steps as specified above. Vendors must provide data files. Demonstration will be asked during technical evaluation.

2. Various modes of operation: Fast settle, No overshoot, and sweep mode.

3. Time required for a cooling down from room temperature to stable 1.8 K or a warming up from 1.8 K to room temperature should both be less than 45 mins.

4. Temperature sweeps through 4.2 K should be smooth and monotonic in cooling and warming sequences.

5. Cryostat assembly which will include sample chamber and radiation shields and other assembly must be cooled by counter flow heat exchange mechanism for efficient cooling and efficient use of cooling resources. All the operations must be fully automated without user intervention. It should be equipped with double cold gas flow control systems: one for primary large impedance gas flow and a secondary fine flow of gas/liquid to achieve quick and good temperature control.

6. The sample chamber must be sealed for controllable sample environment (static He gas, vacuum).

7. Dual Helium impedance design (no mechanical cryogenic needle-valve) for continuous, fully automated, low temperature operation. Measurements at  $T < 4.2$  K should be possible for a continuous long time.

Vendors must provide Temperature Control Architecture indicating the dual impedance design.

8. The system should enable cooling of samples from highest temperature to the lowest at the highest specified cooling rate at any given magnetic field of up to  $\pm 9$  T without affecting the system performance including the heating of magnet. The same procedures should be held for heating of the samples as well.

9. System should have sophisticated temperature control and provide seamless transition between high

temperature (400 K) to low temperature (1.8 K). A high fidelity PID-Temperature control should be fully integrated with the base system and associated software.

10. Necessary thermometers and heaters for temperature control should be provided with the base system.

11. Appropriate sensors must be provided for different stages of the pulse tube.

12. Temperature control should be fully automated.

#### **(D) Vacuum pumps and fittings:**

1. Vacuum pumps and fittings along with vacuum gauges, meter, standard vacuum coupling essential for the uninterrupted functioning of the instrument and its various measurements options must be included.

2. All the pumps must be dry pumps. The system should not include any oil-based pumps. Turbo Molecular pumps for high vacuum application is not acceptable. Vendor must provide information on the high vacuum pumping system offered.

3. System must have a built in cryopump and vacuum gauge for controlling the sample environment. The cryopump must be able to pump out the sample chamber to less than  $10^{-4}$  Torr in under 10 minutes. This fully integrated option should allow changing the chamber environment during a programmed sequences or script.

4. Necessary vacuum and gas purging system should be integral to the base system and their operations should be fully automated such that minimum user intervention is required.

5. The sample chamber should be sealed to retain either vacuum or an inert gas environment during measurements.

#### **(E) Data acquisition and analysis:**

1. Licensed windows based operating software and a state-of-the-art computer control system compatible with the measurement options is required. Data acquisition system must be the latest version based on modular architecture (company must specify their data acquisition system). The software should be able to run the various measurement options automatically and in different modes. There must be a scope to control the external instruments by using different programs for the experiments designed by users.

2. Fully automated measurements (except changing samples) are required. Temperature, magnetic field control and different physical properties measurement shall be fully automated. The software shall control all aspects of the instrument's electronics, hardware, gas handling, data acquisition and data analysis. The software shall include a comprehensive sequence editor for setting up unattended measurement runs. Each user shall be able to set their own measurement sequences and data files so experimental set-ups and data are safe on a multi-user system.

3. Remote user access to the system via Internet. The software must allow the users to remotely control

and monitor experiments over any internet connection. All system operations including temperature changes and magnetic field changes should be completely remotely controllable using the software provided.

4. The computer should have the latest configuration with DVD writer.

5. A provision for having different software access levels such as user level, engineer or expert level is preferable.

6. Furthermore, communications to and data acquisition from the instrument should be possible with user-customizable programs such as LabVIEW or any other third-party software. Supporting software modules in LabVIEW must also be provided for any customized measurements that the user wishes to set-up. Such programs should enable both magnetic field and temperature control and full data acquisition capabilities of the software provided with the system.

## **(F) Measurement Options:**

### **1 DC Magnetization:**

a. Supported Temperature Range:  $\leq 1.8 \text{ K} - 400\text{K}$  (specify and provide supporting data indicating the complete temperature range for DC Magnetization) Vendor must provide data files. Demonstration will be asked during technical evaluation.

b. VSM must utilize the linear motor to vibrate the sample. Inefficient voice-coil design not accepted. Vendor must mention the details of the sample vibration technique used by the OEM.

c. VSM measurement data for the temperature range of 1.8 K to 400 K with 1 second averaging, measured during both cooling and heating must be provided with the offer by the bidders. Data files may be asked during technical evaluation. 1 second integration is a must for us to quickly resolve Magnetic phase transitions and hysteretic behavior. Vendors must provide data files. Demonstration will be asked during technical evaluation.

d. VSM system must perform rapid, completely automated centering operations. There should not be any need to perform manual adjustments to center the sample. Vendor must specify the centering process details and travel range of the motor.

e. Coil-set bore of  $< 7\text{mm}$ . A thermometer should be mounted on the VSM coil to measure the accurate temperature during the measurement.

f. Magnetic Field:  $\pm 9 \text{ Tesla}$ .

g. VSM Oscillation Frequency (calibrated): 40 Hz (Range of 10 to 60 Hz or wider).

h. The maximum amplitude should be at least 5 mm.

i. RMS sensitivity of  $6 \times 10^{-7} \text{ emu}/0.5\%$ , whichever is larger at zero field and  $< 2 \times 10^{-6} \text{ emu}$  with one second averaging or 0.5% below 400 K.

j. Accuracy: 0.5 percent using standard calibration sample.

k. Standard Sample Holders: Brass & Quartz sample holders for sample mounting. Suitable for powder, pellet and thin film.

l. Sample mounting station.

m. NIST based samples must be provided for calibration of magnetic moment at low and high magnetic fields/temperatures.

n. Please provide the following measurement data for a very small NbTi sample with your offer.

Vendors must provide data files. Demonstration will be asked during technical evaluation.

- i. Moment vs. temperature: 300 K --> 1.8 K in a 100 Oe field measured @ 5 K/min
- ii. Moment vs. temperature: 1.8 K --> 400 K in a 1 T field measured @5 K/min
- iii. Moment vs. temperature: 400 K --> 1.8 K in a 9 T field measured @ 5 K/min

## 2 AC Susceptibility and DC Magnetization Measurement:

- a. Temperature Range:  $\leq 1.8$  K to  $\geq 400$  K. Provide the measurement data of any standard sample from 1.8 K to 400 K measurement. Vendors must provide data files. Demonstration will be asked during technical evaluation.
- b. Along with AC magnetization option, DC magnetization measurement must be possible without any change in the hardware, sample, or sample mount. Vendors may be asked for a demonstration during technical evaluation.
- c. AC excitation fields of  $0.1 - \geq 12$  Oe must be available from 10 Hz – 10 kHz or higher.
- d. Magnetization sensitivity should be at least  $5 \times 10^{-8}$  emu (for AC measurements) and  $1 \times 10^{-5}$  emu (DC measurements).
- e. Standard sample (GGG) for demonstration of measurement sensitivity.
- f. Ability to accurately separate real and imaginary components of AC response.
- g. Thermometer should be mounted directly on the AC coil in order to reduce error from the thermal lags that may exist, particularly at higher temperature.
- h. Measurement mode like five, three- and one-point option should be available.
- i. The measurement unit must calibrate itself real-time at each measurement point while performing measurements.

## 3 VSM Fiber Optic Sample Holder Probe

- a. The Sample holder should enable light to be delivered to VSM sample during measurement
- b. Temperature Range should be 1.8 K to 400 K
- c. Magnetic field should be  $\pm 9$ T
- d. Magnetization sensitivity should be better than  $1 \times 10^{-4}$  emu
- e. Sample Space Parameters  
**Maximum Length: 1.6 mm** and Maximum Diameter: 1.6 mm
- f. Transmittance: > 60% of 325 nm to 900 nm; UV holder  
> 60% of 375 nm to 2250 nm; IR holder

## 4 Heat Capacity:

- a) Temperature Range: 1.8 K – 400 K or above, with a  $\pm 0.1\%$  between 1.8 K to 10 K. Provide supporting information to validate the complete temperature range.
- b) Magnetic Field:  $\pm 9$  Tesla.
- c) Using relaxation technique, two-tau model fit analyses, corrections of backgrounds from sample platform, adhesives through sophisticated software routines that are fully integrated to the main system software (claim need to be supported by references of the papers published and patents).
- d) Sample quantity should be as minimal as possible without compromising the quality and precise measurements (up to 1 mg).
- e) Measurement Accuracy: 5 % or better over 1.8 K – 300 K
- f) Heat Capacity resolution: less than 10 nJ/mole K at 2 K temperature (to be specified by the company)

and the claim needs to be supported by references of the papers published and patents).

- g) Thermometers on the platform should be provided to measure the accurate temperature.
- h) Software for data collection with advanced data fitting algorithm and alternate slope-fitting analysis mode should be provided.
- i) The system should include heat capacity pucks (2Nos), Apeizon N-grease, sample mounting assembly and vacuum pump for sample mounting.

### **Optional Items:**

#### **1 Dilution Refrigerator Capabilities**

- a. An insert with sealed Closed cycle 3He / 4He mixture designed to perform dilution refrigeration.
- b. Should operate from 50 mK to 4 K.
- c. Temperature stability should be better than 0.2%
- d. Temperature accuracy should be 10% or better @50mK, 2% or better@300 mK and 1%@4 K at 9 T.
- e. Cooldown from 300 K to <100 mK should be achieved in less than 8 hours.
- f. Sample space: at least 22 mm diameter x 35 mm length
- g. DR option must come with AC and DC, Heat Capacity measurements options.

#### **2 High Pressure Cell for Magnetometry**

- a. Temperature Range should be 1.8 K to 400 K
- b. Magnetic field should be  $\pm 9$ T
- c. Maximum Sample Pressure: 1.3 GPa
- d. Minimum sample space: 1.7 mm dia x 7mm length
- e. Magnetic moment background signal:  $4 \times 10^{-7}$  emu/T
- f. The High-Pressure Cell should be of BeCu construction for minimal background signal
- g. Should be compatible for AC Susceptibility measurements as well

#### **3 Electrical Transport (AC and DC resistivity):**

- a) Temperature Range:  $\leq 1.8$  K –400 K.
- b) Magnetic Field:  $\pm 9$  Tesla.
- c) Must have two built-in independent sources and meters so that two measurement channels are truly independent. Vendor must provide more information supporting the claim.
- d) 4-wire & 2-wire resistivity and simultaneous Hall effect measurement, I-V characteristics, and differential resistance measurement ( $dV/dI$  vs. I or  $dV/dI$  vs V) over temperature range 1.8 K to 400 K and magnetic field of 0 to 9 T.
- e) Current range: 3 nA to 5 mA.
- f) In addition to standard mode (4-wire resistance up to 10 M $\Omega$ ), there should be high impedance mode - 2-wire resistance measurement up to 5 Giga $\Omega$ . (Please provide the input impedance data)
- g) Current Source: DC & AC, 5 nA (or less) to 100 mA (or more) or better continuous (1 Hz to 200 Hz or better frequency range for ac).
- h) Sensitivity: 10 nV or better
- i) Resistance resolution: 20 n $\Omega$  at 0.1 A.
- j) Includes: sample wiring test station, sample mounting pucks.
- k) Continuous measurements during temperature sweeping provide high density of data
- l) During isothermal magnetoresistance measurement the temperature should be stable (less than or

equal to the general temperature stability limit).

## **(H) Essential Accessories**

1. Essential accessories for the smooth operation of the system like spare fuses, O-rings, Hoses for chiller unit, Helium gas regulator (two additional), Charging kit assemblies and purging adapter must be included.
2. Essential Cryogenic consumables like GE-7031 Varnish, Apiezon N, M & H Grease (each 2 nos), low thermal solder should be included.
3. Spare ETO pucks (2 nos), Heat capacity puck (2 nos), must be provided
4. Tip seal for the scroll pump – 2 nos
5. VSM Powder Sample holders (50 pairs), VSM Brass Half-tube Sample Holder (5 nos), VSM Quartz Sample Holder (5 nos), Replacement scrolls tips (5 nos)

**Future upgrade:** The system must be field upgradable to add measurement options including High Temperature VSM up to 1000 K, Electrical and Thermal Transport Options, AC and DC susceptibility, **Heat Capacity** measurement of samples down to 50 mK using Dilution Refrigerator, Thermal expansion measurements like Dilatometer, Raman and Luminescence measurement *etc.* Supporting data sheets must be attached in this regard. The temperature range for HC, ETO, DC **and DC coupled with FOSH** and AC Susceptibility must be from 1.8 K to 400 K.

#### Section 4 - Terms and Conditions

- 1) Comprehensive 3 years minimum on-site warranty with additional 3 years on all parts from the date of successful installation.
- 2) The vendor must quote for a non-comprehensive Annual Maintenance Contract (AMC) price beyond the 3-year warranty, with a price lock in for 3 years beyond the standard 3-year warranty period, 2/3 services per year should be included in the AMC. AMC should be clearly mentioned after the warranty period.
- 3) The tender document should also indicate what kind of service/maintenance is 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.
- 4) Power requirement: 220/240 Volts AC with frequency 50 Hz.
- 5) Operation and service manual in English (electronic and hard copy) with complete circuit diagram and PCB layout for all equipment should be provided with the instrument.
- 6) Standard samples (if required) to be provided by the company for testing the instruments at the time of installation on site to the quoted accuracy in the given technical specification for the demonstration of the performance of equipment.
- 7) Pre-installation site preparation requirements to be indicated and specified along with the bid.
- 8) Installation and on-site training of our staff (minimum three training courses with minimum three sessions each) in operation and maintenance is essential by factory trained personal free of cost.
- 9) Please provide the segmented quotation for each optional measurement capabilities. Depending upon the budgetary provision and priority, the items to be purchased will be decided.
- 10) Bid should include all other essential auxiliary equipment and spares for its operation, even which are not explicitly specified above (please provide list with details).
- 11) All sample handling kits/consumables should also be provided.
- 12) The vendor is responsible for the installation of the system at the institute.
- 13) The price quotation should include the cost of installation and training of potential users.
- 14) GST is applicable as per Govt. of India GST law and must be mentioned in the price bid. In case due to any error / oversight, the GST quoted by the bidder is less than the actual rate as per tariff, the bidder will not be permitted to rectify the error/oversight. The orders / contract will be placed for the total amount including the (lower) rate/s quoted by the bidder, with reduced basic amount to the extent of difference in tax/duty amount, so that the total amount (basic + actual rate as per tariff), remains same (quoted basic + quoted rate). The difference amount payable, if any, between the quoted rate and actual rate as per tariff shall be borne by the bidder.
- 15) The vendor should have a track record of having previously supplied at least five identical instruments in CFTIs such as JNCASR, IITs, IISERs, NITs with above mentioned specifications. **Details of such systems should be provided.** Vendor must provide the user list (with contact details including emails and phone numbers) of at least 5 customers from Indian Institutes/Labs with contact person name, address, phone, fax and email Ids should be provided. The primary focus of these installed systems should have included VSM, AC, DC magnetizations, Electrical conductivity, and Heat capacity measurement set up.
- 16) (a) List of 25 publications (separately for each measurement options such as VSM measurement, AC, DC magnetizations, ETO, and heat capacity) in highly renowned international peer reviewed journals should be provided.

(b) Separately, at least 2 publications covering measurement in the whole temperature range of 1.8 K to 400 K for AC, DC magnetizations, Heat Capacity, Electrical Transport Option should be provided.

- 17) The committee reserves the right to reject the technical bid if above condition is not satisfied.
- 18) The vendor should have qualified technical service personnel for the equipment based in India and should assure a response time of <48 hours.
- 19) The lead-time for the delivery of the equipment should not be more than 6 months from the date of receipt of our purchase order.
- 20) If the supplier fails to Supply, Install and Commission the equipment as per the specifications mentioned in the PO within the due date, the Supplier is liable to pay a penalty of @0.5% of order value per week of delay subject to a maximum of 10% beyond the due date. IISc reserves the right to cancel the order in case of excessive delay.
- 21) The indenter reserves the right to withhold placement of final order. The right to reject all or any of the quotations and to split up the requirements or relax any or all of the above conditions without assigning any reason is reserved.
- 22) Wherever requested data must be supplied along with technical compliance documents. Technical bids without supporting data will be deemed technically non-compliant.
- 23) All guaranteed specifications may have to be demonstrated at the time of installation. Any necessary standard samples for that purpose should be brought by the service engineers.
- 24) The vendor must provide a compliance statement in a tabular form concerning each technical specification in the tender document duly supported by the manufacturer's literature and published papers. Any other claim will not be accepted and may lead to rejection of the bid.
- 25) Technical evaluation by the institute may include a demonstration to verify functionalities and capabilities of the system quoted. The institute reserves the right to provide samples after opening the technical bids for verification of promised specifications. Any discrepancy between the promised specifications and measurements will be deemed as technical non-compliance. Committee also reserves the right to modify the stipulated eligibility criteria at any time during the tenure of procurement.
- 26) The quote should also include additional spares sufficient for 3 years.
- 27) Any statutory increase in the taxes and duties subsequent to bidder's offer, if it takes place within the original contractual delivery date, will be borne by IISc, Bangalore subject to the claim being supported by documentary evidence. However, if any decrease takes place the advantage will have to be passed on to IISc, Bangalore.
- 28) Any information furnished by the bidder found to be incorrect, either immediately or at a later date, would render the bidder liable to be debarred from tendering/taking up of work in IISc, Bangalore.
- 29) All Imported items should be shipped on C.I.P. Bangalore basis (by **Air Freight** only).
- 30) All quotations must be valid for at least 90 days at the time of submission.
- 31) When a foreign vendor does not have a local agent in India, he can submit a demand draft equal to 2% or wire transfer the amount to our account as detailed in the attachment (Annexure II) and enclose the proof with the financial bid.
- 32) **Payment:** - No Advance payment will be made for Indigenous purchase. However, 90% Payment against Delivery and 10% after installation are agreed to wherever the installation is involved. In case of import supplies the payment will be made only through 100% Letter of Credit i.e., (90% payment will be released against shipping documents and 10% after successful installation wherever the installation is being done). Any loss due to fluctuation in foreign exchange rates will be at the beneficiary account.
- 33) **Performance Security:** -The successful bidder should submit Performance Security for an

amount of 5% of the value of the contract/supply within 21 days from the issue of work/purchase order. The Performance Security should be furnished in the form of an Account Payee DD / FD Receipt from the commercial bank (or) Bank Guarantee from any nationalized bank in India.

- 34) **Accept /Reject:** IISc Bangalore reserves the full right to accept / reject any tender at stage without assigning any reason.
- 35) **Settlement of Disputes:** Any legal disputes arising out of any breach of contract pertaining to this tender shall be settled in the court of competent jurisdiction located within the city of Bangalore in Karnataka.
- 36) **Risk Purchase Clause:** - In the event of failure of supply of the item/equipment within the stipulated delivery schedule, the purchaser has all the right to purchase the item/equipment from other sources on the total risk of the supplier under risk purchase clause.

## Annexure 1:

Details of the Bidder: The Bidder must provide the following mandatory information & attach supporting documents wherever mentioned:

Sr. No.	Type	Details
1.	Name of the Bidder	
2.	Nature of Bidder (Attach attested copy of Certificate of Incorporation/ Partnership Deed)	
3.	Registration No/ Trade License, (attach attested copy)	
4.	Registered Office Address	
5.	Address for communication	
6.	Contact person- Name and Designation	
7.	Telephone No	
8.	Email ID	
9.	Website	
10.	PAN No. (attach copy)	
11.	GST No. (attach copy)	

Signature of the Bidder

Name:  
Designation, Seal

Date:

## Annexure 2:

Declaration regarding experience

To,  
Dr. Abhishake Mondal,  
Solid State and Structural Chemistry Unit,  
Chemical Sciences Building,  
Indian Institute of Science,  
Bangalore – 560012, India

Ref: Tender No: XXXXXXXXXX

Dated: XXXXX

Supply and installation of Integrated, automated and compact low temperature (1.8 K – 400 K) DC Magnetization with Fiber Optic Probe, AC Susceptibility, Electrical Conductivity, Heat Capacity and Dilution Refrigerator (9T magnet) system and accessories

Sir,

I have carefully gone through the Terms & Conditions contained in the above referred tender. I hereby declare that my company / firm has    years of experience in supplying and installing Integrated, automated and compact low temperature (1.8 K – 400 K) DC Magnetization with Fiber Optic Probe, AC Susceptibility, Electrical Conductivity, Heat Capacity and Dilution Refrigerator (9T magnet) system and accessories.

(Signature of the Bidder)

Printed Name Designation, Seal

Date:

### Annexure 3:

Declaration of track record

To,  
Dr. Abhishake Mondal,  
Solid State and Structural Chemistry Unit,  
Chemical Sciences Building,  
Indian Institute of Science,  
Bangalore – 560012, India

Ref: Tender No: XXXXXXXXXX

Dated: XXXXX

Supply and installation of Integrated, automated and compact low temperature (1.8 K – 400 K) DC Magnetization with Fiber Optic Probe, AC Susceptibility, Electrical Conductivity, Heat Capacity and Dilution Refrigerator (9T magnet) system and accessories.

Sir,

I have carefully gone through the Terms & Conditions contained in the above referred tender.

I hereby declare that my company / firm is not currently debarred / blacklisted by any Government / Semi-Government organizations / institutions in India or abroad. I further certify that I am competent officer in my company / firm to make this declaration.

OR

I declare the following:

Sr. No.	Country in which the company is debarred/ blacklisted / having pending case	Blacklisted / debarred by Government / Semi Government Organizations or Institutions / having pending case	Reason	Time Period

(Note: In case the company / firm was blacklisted previously, please provide the details regarding period for which the company / firm was blacklisted and the reason/s for the same).

(Signature of the Bidder)

Printed Name Designation, Seal

Date:

## Annexure 4:

Declaration of acceptance of terms and conditions

To,

Dr. Abhishake Mondal,

Solid State and Structural Chemistry Unit,

Chemical Sciences Building,

Indian Institute of Science,

Bangalore – 560012, India

Ref: Tender No: XXXXXXXXXX

Dated: XXXXX

Supply and installation of Integrated, automated and compact low temperature (1.8 K – 400 K) DC Magnetization with Fiber Optic Probe, AC Susceptibility, Electrical Conductivity, Heat Capacity and Dilution Refrigerator (9T magnet) system and accessories.

I have carefully gone through the Terms & Conditions contained in the above referred tender document. I declare that all the provisions of this tender document are acceptable to my company. I further certify that I am an authorized signatory of my company and am, therefore, competent to make this declaration.

Yours faithfully  
(Signature of the  
Bidder)

Printed Name Designation, Seal

Date:

## Commercial Bid:

The commercial bid should be furnished with all requirements of the tender with supporting documents as mentioned:

Addressed to:

**The Chairman,**

Solid State and Structural Chemistry Unit, Indian Institute of Science (IISc) Bengaluru, India - 560012

Kind attention: Dr. Abhishake Mondal

Email: [mondal@iisc.ac.in](mailto:mondal@iisc.ac.in)

The sealed bids should be sent to the following address:

Dr. Abhishake Mondal

Solid State and Structural Chemistry Unit

Room F-213, F-Block, Second Floor

Chemical Sciences Building

Indian Institute of Science (IISc)

Bengaluru, India - 560012.

Ph: +91-9932207177

Email: [mondal@iisc.ac.in](mailto:mondal@iisc.ac.in)

S. No	Description	Cat. Number	Quantity	Unit Price	Sub Total
1.	Essential items noted in the technical specification				
1.a	(details of essential items)				
1.b					
2.	Optional items noted in the technical specification				
2.a	(details of essential items)				
2.b					
3.	Accessories for operation and installation				
4.	All consumables, spares and software to be supplied locally				
5.	Warranty (3 years)				
6.	AMC 3 years beyond warranty				
8.	CIP/CIF IISc, Bengaluru				

Any additional items, such as Spares and Hardware/PCBs Likely to go obsolete after the next 3 Years

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## Checklist

**(This should be enclosed with a technical bid- Part A)**

**The following items must be checked before the Bid is submitted:**

**1. Sealed Envelope “A”: Technical Bid**

Technical bid (each page signed by the authorized signatory and sealed) with the below annexures:

- a. Annexure 1: Bidders details
- b. Annexure 2: Declaration regarding experience
- c. Annexure 3: Declaration of track record
- d. Annexure 4: Declaration of acceptance of terms and conditions
- e. Annexure 5: Details of item quoted
- f. Declaration of Local Content by Local supplier

2. Copy of this tender document duly signed by the authorized signatory on every page and sealed.

**3. Sealed Envelope “B”: Commercial Bid**

Your quotation must be submitted in two envelopes: Technical Bid (**Envelope A**) and Commercial Bid (**Envelope B**), superscribing on both the envelopes with, Tender description, Tender No. and due date and both of these in sealed covers and put in a bigger cover which should also be sealed and duly super scribed with Tender No., Tender description & Due Date.