

	<p>INDIAN INSTITUTE OF TECHNOLOGY MADRAS Chennai 600 036</p> <p>Telephone: [044] 2257 9798/9723 E-mail: arpp@iitm.ac.in</p>	
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Senior Manager (Project Purchase)

Ref: PHY/GLAK/021/2019
Date: 28.06.2019

Open Tender No: PHY/GLAK/021/2019

Due Date: 18th July 2019, 3 PM

Pre-Bid meeting: - Not required.

Technical Bid opening meeting on 18th July 2019, 4:00 PM at Department of Physics, IIT-Madras.

Dear Sir/Madam,

On behalf of the Indian Institute of Technology Madras, offers are invited for the supply of **“Precision multiferroic test system for P-E hysteresis measurement of multiferroic samples”** conforming to the specifications given in Annexure I.

Instructions to the Bidder

- I. **Preparation of Bids:** - The tenders should be submitted under two-bid system (i.e.) Technical bid and Financial bid.
- II. **Delivery of the tender:** - The tender shall be sent to the addresses mentioned below, either by post or by courier so as to reach our office before the due date and time specified in our schedule. The offer/bid can also be dropped in the tender box on or before the due date and time specified in the schedule.
The tender box is kept in the office of the:

**The senior Manager,
Project Purchase,
IC & SR Building 2nd floor,
I.I.T. Madras,
Chennai – 600 036.**
- III. **Opening of the tender:** - The offer/bids will be opened by a committee duly constituted for this purpose. The technical bids will be opened first and will be examined by a technical committee which will decide the suitability of the bids as per our specifications and requirements. All bidders will be invited for opening of the technical bids. With respect to opening the financial bid, only technically qualified bidders will be called.
- IV. **Prices:** - The price should be quoted in net per unit (after breakup) and must include all packing and delivery charges to the **Department of Physics**. The offer/bid should be exclusive of taxes and duties.

The percentage of tax & duties should be clearly indicated separately. Kindly note that IIT Madras is eligible for concessional GST and relevant certificate will be issued.

In case of import supply, the price should be quoted without custom duty. IIT Madras is exempted from levy of IGST on Imports and eligible for concessional custom duty (not exceeding 5%) and the price should be quoted on CIP basis indicating the mode of shipment.

- V. Agency Commission:** - Agency commission, if any, will be paid to the Indian agents in rupees after receipt of the equipment and its satisfactory installation. Agency Commission will not be paid in foreign currency under any circumstances. The details should be explicitly shown in the tender document even in the case of 'Nil' commission. The tenderer should indicate the percentage of agency commission to be paid to the Indian agent. The foreign Principal should indicate the percentage of payment and it should be included in the basic price quoted originally (if any)..
- VI. Terms of Delivery:** - The item should be supplied to the **Department of Physics, IIT Madras** as per the Purchase Order. In case of import supply, the item should be delivered at the cost of the supplier to our Institution. The Installation/Commissioning should be completed as specified in our important conditions.
- VII. Technical Bid Opening:** The technical bid will be on 18th July, 2019, 4:00 PM at the **Department of Physics, IIT-Madras**. The financial bids of those tenders who are technically qualified will be opened at a later date under intimation to them.
- VIII. IIT Madras** reserves the full right to accept / reject any tender at any stage without assigning any reason.

Yours sincerely,

The Senior Manager (Project Purchase)
IC&SR Building, I.I.T. Madras,
Chennai - 600 036.

SCHEDULE

Important Conditions of the tender

1. The due date for the submission of the tender is **18.07.2019, 3 PM.**

The offers / bids should be submitted in two bids systems (i.e.) Technical bid and financial bid. The Technical bid should consist of all technical details / specifications only. The Financial bid should indicate item-wise price for each item and it should contain all Commercial Terms and Conditions including Taxes, transportation, packing & forwarding, installation, guarantee, payment terms, pricing terms etc. The Technical bid and financial bid should be put in separate covers and sealed. Both the sealed covers should be put in a bigger cover. The Open Tender for supply of "**Precision multiferroic test system for P-E hysteresis measurement of multiferroic samples**" should be written on the left side of the Outer bigger cover and sealed.

2. **EMD: - The EMD in the form of account payee DD for 2% value of the item in favor of The Registrar - IIT Madras, payable at Chennai should be enclosed in the cover containing financial bid.** Any offer not accompanied with the EMD shall be rejected summarily as non-responsive.

The EMD of the unsuccessful bidders shall be returned within 30 days of the end of the bid validity period. The same shall be forfeited, if the tenderers withdraw their offer after the opening during the bid validity period. The Institute shall not be liable for payment of any interest on EMD. EMD is exempted for Micro and Small Enterprises (MSE) as defined in MSE Procurement Policy issued by Department of Micro, Small and Medium Enterprises (MSME).

3. **Performance Security: -** The successful bidder should submit Performance Security for an amount of 5% of the value of the contract/supply. The Performance Security may be furnished in the form of an Account Payee DD, FD Receipt from the commercial bank, Bank Guarantee from any nationalized bank in India. **The performance security should be furnished within 21 days from the delivery of the purchase order.**

Performance Security in the form of Bank Guarantee:- In case the successful bidder wishes to submit Performance Security in the form of Bank Guarantee, the Bank Guarantee should be routed through the Beneficiary Bank to the end user bank. Otherwise, the Indian Agent of the foreign vendor has to submit a Bank Guarantee from a Nationalized Bank of India.

The Bank Guarantee should remain valid for a period of sixty days beyond the date of completion of all contractual obligations of the supplier including the warranty obligations.

4. **Indian agent:** If an Indian agent is involved, the following documents must be enclosed:
Foreign principal's proforma invoice indicating the commission payable to the Indian Agent and nature of after-sales service to be rendered by the Indian Agent.
 - ✓ Copy of the agency agreement with the foreign principal and the precise relationship between them and their mutual interest in the business.
5. The offer/bids should be sent only for a machine that is available in the market and supplied to a number of customers. A list of customers in India and abroad with details must accompany the quotations. Quotations for a prototype machine will not be accepted.
6. Original catalogue (not any photocopy) of the quoted model duly signed by the principals must accompany the quotation in the Technical bid.

7. Compliance or Confirmation report with reference to the specifications and other terms & conditions should also be obtained from the principal.
8. **Validity:** Validity of Quotation not less than 90 days from the due date of tender.
9. **Delivery Schedule:** - The tenderer should indicate clearly the time required for delivery of the item (subjected to the executive committee-IITMadras approval). In case there is any deviation in the delivery schedule, liquidated damages clause will be enforced or penalty for the delayed supply period will be levied.
If there is delay, the penalty will be @1% per week of delay subject to a max of 10% of the value of purchase order and if the delay is more than accepted time frame by IITM, the PO would be cancelled and liquidated damages will be enforced.
10. **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.
11. **Payment:-**
 - (i) 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).
 - (ii) **Advance Payment:** No advance payment is generally admissible. In case of specific percentage of advance payment is required, the Foreign Vendor has to submit a Bank Guarantee equal to the amount of advance payment and it should be routed through the Beneficiary Bank to the end user Bank. Otherwise, the Indian Agent of the foreign vendor has to submit a Bank Guarantee through a Nationalized Bank of India.
12. **On-site Installation:** - The equipment or machinery has to be installed or commissioned by the successful bidder within 15 to 20 days from the date of receipt of the item at site of IIT Madras.
13. **Warranty/Guarantee:** - The offer should clearly specify the warranty or guarantee period for the machinery/equipment. Any extended warranty offered for the same has to be mentioned separately (For more details please refer our Technical Specifications).
14. **Late offer:** - The offers received after the due date and time will not be considered. The Institute shall not be responsible for the late receipt of Tender on account of Postal, Courier or any other delay.
15. **Acceptance and Rejection:** - I.I.T. Madras has the right to accept the whole or any part of the Tender or portion of the quantity offered or reject it in full without assigning any reason.
16. **Do not quote the optional items or additional items unless otherwise mentioned in the Tender documents / Specifications.**

17. Disputes and Jurisdiction:

Settlement of Disputes: Any dispute, controversy or claim arising out of or in connection with this PO including any question regarding its existence, validity, breach or termination, shall in the first instance be attempted to be resolved amicably by both the Parties. If attempts for such amicable resolution fails or no decision is reached within 30 days whichever is earlier, then such disputes shall be settled by arbitration in accordance with the Arbitration and Conciliation Act, 1996. Unless the Parties agree on a sole arbitrator, within 30 days from the receipt of a written request by one Party from the other Party to so agree, the arbitral panel shall comprise of three arbitrators. In that event, the supplier will nominate one arbitrator and the Project Coordinator of IITM shall nominate on arbitrator. The Dean IC&SR will nominate the Presiding Arbitrator of the arbitral tribunal. The arbitration proceeding shall be carried out in English language. The cost of arbitration and fees of the arbitrator(s) shall be shared equally by the Parties. The seat of arbitration shall be at IC&SR IIT Madras, Chennai.

- a. **The Applicable Law:** This Purchase Order shall be construed, Interpreted and governed by the Laws of India, Court at Chennai shall have exclusive jurisdiction subject to the arbitration clause.
- b. 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 Chennai in Tamil Nadu.

18. All Amendments, time extension, clarifications etc., will be uploaded on the website only and will not be published in newspapers. Bidders should regularly visit the above website to keep themselves updated. No extension in the bid due date/ time shall be considered on account of delay in receipt of any document by mail.

Acknowledgement: - It is hereby acknowledged that the tenderer has gone through all the conditions mentioned above and agrees to abide by them.

**SIGNATURE OF TENDERER
ALONG WITH SEAL OF THE
COMPANY WITH DATE**

Precision multiferroic test system for P-E hysteresis measurement of multiferroic samples

Tenders are invited for the purchase of equipment "**Precision multiferroic test system for P-E hysteresis measurement of multiferroic samples**". The following vendor eligibility criteria apply.

1. The vendor must be an Original Equipment Manufacturer (OEM). Authorized dealer/partner of OEM can also participate in the tender (relevant document in this regard to be attached).
2. The quotation should be sent in a two-bid cover (technical bid and price bid). The rate should be quoted in C.I.P., IIT Madras, Chennai.
3. All the mandatory and optional items should be compatible with the proposed model.
4. Optional items will be considered based on the availability of funds.

Specification of the equipment:

1. The multiferroic test setup should be capable of investigating the P-E hysteresis, CV, IV and piezoelectric displacement as a function of applied electric field and temperature in multiferroic thin film measurements of non-linear materials and thin film Piezoelectric (d33, d31 and e31) measurement.
2. The output of the test system must be an arbitrary waveform generator in order to produce any waveform for hysteresis, pulse, leakage, and CV tests *without a hardware configuration change*.
3. For best resolution and flat frequency response, the charge measurement input should operate as an electrometer *over the entire test frequency from 50 mHz to 2 MHz*.
4. The voltage ramp rate of the output must be controlled such that the current capacity of the measurement input is not exceeded during a test.
5. The test frequency must extend from a test period of 30 s for accurate measurement of large area bulk ceramic capacitors down to 10 μ s in hysteresis for characterizing small-scale but leaky thin-film multiferroic capacitors (metal-ferroelectric-metal capacitors).
6. Pulse measurements should be as narrow as 0.5 μ s or better
7. The minimum required leakage resolution should be ≤ 1 pA.

8. Current range should be fixed while sweeping the voltage for the I-V measurements to avoid the breakdown of the ferroelectric thin film (current compliance).
9. The parasitic input capacitance must be less than 10 femto farads/volt (for accuracy on small area capacitors).
10. The software operating the tester must be programmable and capable of executing all measurement types in an arbitrary order *without configuration change*.
11. Captured data must be automatically stored and easily transferred to other testers using network protocols.
12. The tester software must be adaptable to future changes in the host computer operating system.
13. The tester/setup must be capable of capturing external sensor data synchronously with polarization measurements.
14. In particular, the setup must be compatible with non-contact optical displacement sensors and have dedicated software for capturing, correcting, and presenting displacement information.
15. Computer and Multiferroic Test System should be separate and connected through USB Cable, so that in future any advanced new computer can be utilized with Multiferroic Test System.
16. System should not work with any dedicated sample holder. Any kind of sample should be connected with appropriate wirings and measured & can be connected to any available cryogenic chamber or any available furnace.

Detailed specifications are listed below:-

❖ *Output Range: ± 100 V using built-in amplifiers*

- 16-bit Arbitrary Waveform Generator output
- 100 points in 10 μ s
- $\geq 32,000$ points from 16 ms to 30 s
- Pulse widths range from ≥ 0.5 μ s to 1s
- Controlled output ramp for maximum accuracy

❖ *Polarization Measurement*

- 18 bit analog to digital converters – 76 μ V sensitivity on 10 pF C_{sense}
- At-least 500 ns capture rate with a must of 100 ns interlace facility
- Polarization, output voltage, and SENSOR inputs captured simultaneously with no more than 10 ns skew between channels.
- Minimum charge sensitivity - 1.0 fC or better
- Minimum area resolution - 0.1 μ m² or better
- Maximum charge measurement - 5.0 mC or higher
- Maximum capacitor area > 50 cm² or higher
- Maximum hysteresis loop frequency- >250 kHz @+/-100 V Built-in
- Minimum hysteresis loop frequency – <50 mHz (<50 second period)
- Hysteresis Waveforms - Mono/Arb/Sine/Tri/Double bipolar/10% Pulse/Monopolar sine/Zero/inverse cosine/Custom

❖ System should be independent from Computer, so that in the future any available advance computer can be interface with System.

❖ 4 communication methods with accessories, USB, GPIB, RS232, or I2C.

❖ 2 external 18-bit, ± 10 V high-impedance voltage inputs for interfacing with external displacement, temperature, current, or magnetic sensors.

❖ Must execute hysteresis, remnant hysteresis, small signal CV, IV, fatigue, imprint, PUND, retention, pyroelectric, static and dynamic magneto-electric, and piezoelectric displacement from one hardware configuration.

❖ Software should allow user to create any custom test profile, execute that profile, store the results in a permanent but unalterable database assigned to the experiment, and recall that data at any time in the future to plot or export it as commanded by the user.

❖ Must correct displacement measurements for test fixture drift and offset.

- ❖ Compatible with Quantum Design PPMS and JANIS cryogenic chambers.
- ❖ Test System should be independent from dedicated Test Fixture and has facilities to connect any available sample holders for thin film / bulk ceramic samples. This makes hooking up external equipment to the test system simple to use.

Optional items

❖ Thin Film Piezoelectric (d33, d31 & e31) Measurement setup:-

- Accurately (Reproducible to 1%, unload and reload to 2%) determines the d33, d31 and e31 coefficients for piezoelectric thin films with 2% reload uniformity on 5 mm x 72 mm cantilevers. The Thin Film Piezoelectric Test System should be extremely reproducible (no variance for re-loading same sample) and Versatile (allows thin Films or Bulk and will accommodate various sample geometries). Piezoelectric Displacement Sensor Specifications - 1 μ m with a range of 6 mm.

Additional terms and conditions:-

- Vendors must submit a comprehensive compliance statement in a table format for the tender Specifications along with the offer.
- Vendor should provide the specifications in printed data sheet.
- The specifications should be listed in their website along with the equipment model.
- The bidders should have supplied at least 30 or more such units in centrally funded institutes including IITs / National Labs / Universities in India during the last five years. Submit the list of organizations with contact details to which this equipment has been supplied.
- On-site training for the operation, calibration, service and troubleshooting support should be provided

Guarantee, warranty, support and service

- Minimum three years warranty, on all parts and labor, from the date of commissioning and acceptance test on site, free software up gradation for the life time of equipment, availability of technical personnel/application scientist and service in India within 48 hours of intimation.
- Instrument should be upgradable to newer versions of the software and hardware as and when required.