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Enq. No.: CER/AD/ 2017/ T-01

Enquiry Dated: August 2, 2017

Closing date: August 24, 2017

Sub: Request for submission of quotation for Ferroelectric measurement unit

Electroceramics lab at Ceramic Engineering Department requires the quotation for Ferroelectric and Pyroelectric property measurement unit complying with or better than all of the specifications mentioned in **Appendix A**. The closing date for the above item is **5 PM, August 24, 2017**

The prospective supplies are required to send quotation in two parts in sealed envelopes, as "Technical Bid" and "Financial Bid". The Technical Bid should contain detailed technical specification of the product being offered and should not mention any prices. The Financial Bid should include the detailed price quotation clearly including the cost of the equipment, taxes, service charges if any, shipping and handling charges. The two separate and sealed envelopes should be clearly marked appropriately as "Technical Bid" and "Price Bid".

Terms and Conditions:

1. Maximum education discount, if any should be offered.
2. Validity of quotation should be at least for 90 days.
3. Prices should be on CIF and FOB separately (if imported)
4. Prices should include the installation and training cost.
5. Warranty should be for at least three years after installation
6. Normal payment terms for the Institute will be applicable.
7. Quotation should carry proper certifications like agency certificate, proprietary certificate, etc.
8. Compliance report of various specifications in the form of yes or no should be provided.
9. An undertaking that the vendor will supply all the spares and services for the equipment for at least 5 years from the date of commissioning.

Kindly send the Technical and Financial bids in sealed envelopes latest by 5 PM, **August 24, 2017** to:

Dr. Akansha Dwivedi
Department of Ceramic Engineering,
Indian Institute of Technology (BHU)
Varanasi-221005

Required Specification**

I. Measurement setup: Capable of measuring the P-E hysteresis, CV, IV and pyroelectric current as a function of temperature in thin film and bulk ceramics of non-linear materials. 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. 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. The test frequency must extend for accurate measurement of large area bulk ceramic capacitors as well as for characterizing small-scale but leaky thin-film multi-ferroic capacitors. The software operating the tester must be programmable and capable of executing all measurement types in an arbitrary order. Captured data must be automatically stored and easily transferred to other testers using network protocols. The tester software must be adaptable to future changes in the host computer operating system. The tester must be capable of capturing external sensor data synchronously with polarization measurements.

1. The measurement unit **MUST** execute following measurements:
   - Hysteresis, remanent hysteresis
   - Large signal electric polarization and displacement (uni- & bipolar)
   - Small signal capacitance, loss tangent
   - Leakage current measurements
   - Fatigue, imprint, retention.
2. P-E Hysteresis loop measurement:
   a. ±100V (In-built amp.),: ±10KV (with external amp.)
   b. Arbitrary Waveform Generator output
   c. Pulse Widths down to at least 1μs and up to 1s
   d. Controlled output ramp for maximum accuracy
3. High Voltage Interface Unit with High Voltage Amplifier Unit for ±10KV.
4. Pyroelectric current measurement: **Quote as optional item** for measuring Pyroelectric current up to1pico-amp (If the ferroelectric set up doesn't allow to measure)
5. Sample Holder: Should provide sample holder for measurement of bulk sample
   a. Temperature / High Voltage Test Fixture for ferroelectric measurement.
   b. Special High Voltage Displacement Test Fixture which is able to withstand exposures of up to 500°C, making it ideal for both high-voltage and high-temperature testing of the sample.
   c. Thin film sample holder should be **quoted as optional item**

6. Polarization Measurement
   - Analog to digital converters
   - Polarization, output voltage, and SENSOR inputs should be captured simultaneously
   - Minimum charge sensitivity: 1.0fC or better
   - Maximum charge measurement: 5.0mC or higher
7. Connections:
   Wiring should be capable of handling high DC field (up to 10 kV)
   Should provide extra (at least 4) measurement cables in addition to those, which are required for measurements

8. Software:
    a. The instrument should be installed with latest available version of software for control, operation and analysis.
    b. The supplier should upgrade the software as and when the upgradations become available for at least five years from installation
    c. Should have intelligent calibration logic
    d. Continuous automatic hardware diagnosis
9. (**Quote as optional item**) Computer and Printer: The equipment should come with a high performance computer with all the requisite software installed on it.
    a. A computer with the latest version of Windows operating system
    b. Minimum Configuration: Intel dual core processor,4 GB RAM, 500Gb Hard Disk, 24" Display with other essential peripherals.
    c. Laser printer should be provided with the computer
10. Any other accessory needed for carrying out the measurements may be listed as optional items.
11. Documentation:
    (a) Two sets of operating manuals for the equipment and control system should be provided in hard copies
    (b) A soft copy of the above manuals should also be provided in a CD/DVD
12. Safety Norms:
    a) The instrument should include safety devices for protection against water, power etc.
    b) The instrument should be compliant with international norms for safety and environment
13. Installation, Commissioning and Training:
    a. The delivery should be considered complete only after successful commissioning of the instrument
    b. The pre-installation requirements should be communicated to Department of Ceramic Engineering IIT (BHU) well in advance of the installation
    c. The supplier should provide training to at least two candidates at the installation site to make them familiar with smooth operation of the instrument
14. Guarantee/ Warranty: Preferably 3 years
15. After-sales Service:
    a. The supplier should provide a prompt after-sales service such as regular instrument maintenance, troubleshooting and fixing
    b. The list of service centers in India should be included.
16. Power Supply and UPS: **(Quote as optional item)**
    a. Specify the requirements of the power supply for the offered ferroelectric measurement unit
    b. UPS should be provided with the ferroelectric measurement unit with the minimum back-up of 30 minutes to run the ferroelectric tester, computer and printer
17. Annual Maintenance Cost **(Quote as optional item)**: Include the cost of annual maintenance for each year for five years after the guarantee/ warranty period. Provide the amount and the terms. Note that those providing better after sales service and support with proven track record will be given preference

****Additional optional accessories should be indicated separately along with their price. The above specs are desirable and the actual numbers achievable for your system should be indicated.**