

Tender for Procurement of Impedance Spectrometer with accessories.

IIT-Madras is looking for an Impedance Spectrometer with accessories for research on materials. The following technical specifications should be met, to qualify the technical bid. A detailed compliance statement should be provided and it should be supported by the manufacturer's (OEM) product brochure or website. Information provided in the supplier/redistributor/vendor/reseller's brochure or website cannot be considered as supporting document. Technical bids without proper compliance statement will not be considered. The bidder should be an Original Equipment Manufacturer or their authorized vendors/dealers/partners. If vendors/dealers/partners are participating in the bidding, an authorization certificate should be provided.

The system should contain

- (i) Dielectric Impedance Measurement System with Frequency range of 30 MHz or better
- (ii) Sweep Generator with capability of sweeping frequency in voltage & current mode. Sweep type should have options for both linear and logarithmic AC/DC Voltage, AC/DC Current.
- (iii) High Precision low temperature cryogenic setup that can operate between 80 K to 600K or better with liquid nitrogen option to characterize material.
- (iv) Impedance Analyzer requirements
 - a. Operational frequency range: 10 μ Hz to 30MHz or better
 - b. Frequency Resolution: 0.015ppm or better
 - c. Polarization Voltage \pm 40V or higher
 - d. Maximum DC Current: \pm 100mA or better
 - e. AC Amplitude Voltage: 3V rms or better, Resolution: 5mV
 - f. AC Amplitude Current: 50 mA rms or better, Resolution: 100 μ A or better
 - g. Impedance measurements: 10^{14} Ω or better
 - h. Tan delta measurements: $<10^{-4}$ or better
 - i. Independent Current & Voltage Analyzers should be available.
 - j. Voltage Ranges: Different ranges between mV to 3V
 - k. Current Range: <10 μ A to 50mA or better
 - l. Current measurement: 1fA to 100mA or better
- (v) Tubular Cryostat & Sample holders
 - a. The sample holder should be able operate in temperature ranges between 80 K to 600K with liquid nitrogen option
 - b. Temperature Stability: \pm 0.05 K
 - c. Gold coated solid sample holder with possibility of holding samples of upto 30 mm diameter.
 - d. Liquid sample holder with at least 0.5 ml holding capacity.
 - e. High and low impedance materials samples should be accurately tested using two terminal sample connections.
 - f. A dewar that can hold at least 20 litres of liquid nitrogen
 - g. Suitable turbo molecular pump from a reputed manufacturer should be provided.
 - h. All the necessary high temperature cables for measurements should be included.
 - i. Temperature sensors and necessary thermocouple should be provided.
 - j. Suitable temperature controller to control the cryostat should be included
 - k. The cryostat should be synchronized with Impedance Analyser software. All the operations should be done remotely.

- I. The cryostat system should have proven technology and the provider/manufacturer should have experience for more than 10 years in low temperature community. (Necessary proof of experience should be submitted)

- (vi) Room Temperature Sample holders
 - a. Solid and liquid sample holders should be provided for testing a wide range of materials including solids, gels, oils, and powders
 - b. The sample holder should be able to hold samples of 10, 30 and 40 mm diameter in size.
 - c. The Impedance range 1Ω to $10^{14} \Omega$ or better
 - d. The sample holder should hold at least sample of thickness of 0.2 mm

- (vii) High Temperature Furnace
 - a. Benchtop High Temperature Furnace that will operate upto 800°C
 - b. Sample holder to hold samples of 10-20mm in diameter
 - c. Should provide platinum electrodes for electrical measurements
 - d. Holder for thin film measurements.
 - e. The furnace chamber should have provision for inert gas measurements
 - f. Temperature controller to use the furnace as stand-alone and also should interface with impedance analyzer software for remote access.

- (viii) Interface & Accessories
 - a. All the necessary cables, for interfacing cryostat, and various sample holders with impedance spectrometer should be provided.
 - b. Required data acquisition cards and interface cables should be provided.

- (ix) Software
 - a. The software should be capable of controlling all the parameters in the impedance analyzer, cryostat, sample holders, high temperature furnace, data acquisition systems and all other necessary components of the system.
 - b. All the functions should be completely automated including temperature control and monitor.
 - c. The software should be capable of viewing and processing the impedance plots
 - d. All the necessary measurement parameters including real and imaginary component of impedance, phase, inductance, capacitance, constant phase element, current, voltage and temperature should be measured and displayed.
 - e. Software should be able to apply and measure- DC voltage and current along with AC sine wave.
 - f. Should be able to sweep frequency, amplitude in both current and voltage mode.
 - g. Gain, and phase measurements should be possible along with display of parameters on Bode & Complex plane
 - h. Software should be capable of calculating tan delta, epsilon, permittivity, relative permittivity, impedance, admittance and other related parameters.
 - i. Equivalent circuit fitting software for circuit/modeling techniques for detailed analysis of results.
 - j. All the software provided should be multi license and lifetime free upgradation.

- (x) A suitable computing system with a minimum of 256GB SSD hard disk, 4 GB RAM, and 24 inch monitor, necessary to control/monitor the entire impedance spectrometer, cryostat, furnace and sample holders should be provided
- (xi) Warranty: Minimum of two years warranty should be provided for all the quoted products (excluding consumables). Additional warranty or AMC shall be added as optional components.
- (xii) The bidder should have installed at least one such instrument in India in the past five years.
- (xiii) Installation & Training should be done onsite.

