



MAHATMA GANDHI UNIVERSITY

MGU/SEM/APF/ Etender/2022-23/3

20/01/2023

NOTICE INVITING TENDER

The Registrar, Mahatma Gandhi University, Kottayam for and on behalf of Director, School of Energy Material, Mahatma Gandhi University invites online bid (technical and financial bid) for supply and installation of the Scientific equipment “Multichannel Electrochemical Workstation For Battery and Supercapacitors Applications” from reputed firms.

1	Name of the scientific equipment	Multichannel Electrochemical Workstation For Battery and Supercapacitors Applications
2	Earnest money deposit (EMD)	Rs. 16,000/-
3	Tender submission fee	Rs. 2,400/-
4	Period of supply and installation	Within 90 days from the LC Opening Date
5	Mode of submission of Bid	Online
6	Tender Documents	Can be downloaded from the website www.etenders.kerala.gov.in
7	Last date and Time of submission of tender by online	03/02/2023, 4.00 pm
8	Last date and Time of submission of relevant documents by speed post	06/02/2023, 4.00 pm
9	Date and time of opening of technical bid	06/02/2023, 4.00 pm

General tender documents and tender schedule can be downloaded in A4 plain size paper free of cost from the website www.etenders.kerala.gov.in. Duly filled up and signed tender schedule along with relevant documents should also be sent to “**Director, School of Energy Materials, Mahatma Gandhi University, Kottayam, Kerala Pin-686560**”, by speed post so as to reach before the date and time specified. The cover containing the documents should super scribe the name of the scientific equipment, tender number, and last date of submission of tender.

Documents to be submitted along with bid through online/speed post

Sl.No	Through online	Through speed post
1	Scanned copy of valid registration certificate/dealership certificate	Copy of valid registration certificate attested by a gazette officer/ dealership certificate
2	Scanned copy of duly filled e-payment form	Duly filled e-payment requisition.
3	Scanned copy of other certificates required, if any, for tender acceptance	Copy of other certificates required, if any, for tender acceptance.
4	Scanned Copy of duly filled preliminary Agreement in stamp paper of Rs.200/-	Preliminary Agreement in original
5	BOQ	Not Required

Technical Specifications for Multichannel Electrochemical Workstation For Battery and Supercapacitors Applications

Multi-channel electrochemical workstation with minimum of 8 channels (with 1 channel Electrochemical Impedance Spectroscopy (EIS) or more in a single chassis with future upgradation for Testing, Characterizing and Evaluating Battery and Supercapacitors.

Two electrode as well as Three Electrode Tests should be possible with provision to connect Independent Reference Electrodes for all Channels independently and Simultaneously.

Bi-potentiostat facility should be available for RRDE experiments

Provisions to connect 2 Working electrodes and provisions to measure EW1 and EW2 simultaneously in one Cell Setup with common Reference and common Counter Electrodes.

Detailed Specifications as below-

- Multichannel Chassis – expandable upto 8 Channels
- Channels Required: 1 channel EIS Facility
- Cell Cable 1.5 M long with Electrode Connection: 2, 3, 4 electrode + ground or more: 01 No
- Compliance voltage: 0-20 V or better
- Applied Voltage: ± 10 V or better
- Maximum Output Current: ± 1000 mA at ± 10 V or better
- Current Ranges: ± 10 μ A to 1000mA or better
- Current resolution: 0.760 nA
- Stability control mode (7 bandwidths)

- Accuracy of applied and measured current: $\pm 0.1\%$ of Full scale range or better for all available channels
- Voltage accuracy applied and measured: 0.1% of Full scan range or better
- Potentiostat Rise/fall Time: $< 2\mu\text{s}$ or better
- Electrochemical Impedance Spectroscopy: 1 Nos.
- Frequency range: 10 μHz to 1MHz or better
- Impedance accuracy of 1%, 1°
- Input Impedance: 1T Ω or better
- Bandwidth of electrometer with Booster: $>1\text{ MHz}$ or better
- Input bias current: $<5\text{pA}$ or better
- Acquisition: 200,000 samples/second or better
- Min acquisition time should be around 20-30 μs or better for all channels, suitable fast acquisition modules can be quoted as standard
- Interface for connection with PC: USB, Ethernet LAN
- Local Area Network to remote access to the instrument
- Possibility to upgrade to high current up to 200A for future expansion
- Safety limits in software on the current and voltage Max and Min values to avoid hazards.

Should have possibility to resume an experiment after a power cut and to merge the files before and after the power cut.

Possibility to Record/Measure and control Ewe (potential difference between Working and reference) and Ece (potential difference between Counter and Reference) simultaneously in one experiment and in real time

On site calibration of the channel should be available

Multi-electrode investigation cables: A Bipot (for bipotentiostat) cable to be quoted to perform RRDE experiments on channels using the same reference and same counter electrodes,.

Electrochemical Software:

- ❖ Complete battery and supercapacitor cycling software facility with following options:
- ❖ Galvanostatic Charge / Discharge (Including C rate control) with voltage vs. time
- ❖ Graph plots
- ❖ Multigraph window capable of displaying up to 50 graphs within a single window
- ❖ Customize variables graph plot for each axis
- ❖ Voltage vs. Capacity plot during Charge/Discharge Cycles

- ❖ Atleast 3 limits and 3 recording conditions per sequence/cycle (ability to limit a cycle or changeover to next sequence with Time, Voltage/Current, Charge/Power all simultaneously)
- ❖ Multiple recording conditions with “OR” commands
- ❖ Industrial CC-CV Method (Constant Current – Constant Voltage)
- ❖ Cyclic Voltammetry, Current Scan (Current/Galvano Dynamic), Voltage Scan (Potentio Dynamic)
- ❖ Constant Power / Constant Resistance
- ❖ GITT and PITT Techniques Battery Characterization -Polarization Curve measurement/IV Testing/ Linear
- ❖ Sweep Voltammetry should be available down to 0 Volt.OCV/OCP, Cyclic Voltammetry, Chrono Amperometry, Chrono Potentiometry,
- ❖ Staircase Voltammetry, Corrossion – Linear and Cyclic Polarization, Pitting
- ❖ Corrossion, ZRA

Software should have the facility to record additional signal viz RRDE, EQCM, etc. Import/export ASCII. Ready-to-use Vis & Generic interface should be included. It should have the facility to display up to 8 plots simultaneously. Comparison with previous experiments (online) should be possible while experiments are in progress.

20V Adjustable potential window should be available for the reference Electrode.

Analysis tools (peak, convection wave, integral), with classical fits (linear, circular) and CV fitting tool.

EIS measurements simultaneously on the working and on the counter electrodes.

EIS Software with facility for Equivalent Circuit fitting and simulation. Data presentation: Nyquist, Bode, Admittance, Dielectric, Mott-Schottky, Data analysis: Fit and Simulation, Find circle, Element subtraction, Kramers-Kronig,

Graphic Representation of Equivalent Circuit with user selectable circuit elements and their values in the circuit

Impedance fitting tool with battery diffusion elements available (restricted diffusion, restricted modified diffusion, restricted linear diffusion)

The impedance fitting tool should have at least 3 different fitting algorithms

Modify on Fly should be available to update experimental setting parameters on current running experiment without pausing/stopping

Terms and conditions:

1. Warranty: 2 year + 1 Year comprehensive on-site
2. Training: Training on operation, maintenance and troubleshooting should be imparted to two-three persons at the site of installation for atleast Three Days.
3. Compliance Statement: The supplier must submit technical brochures and proper application notes adequately explaining and confirming the availability of the features in the model of the equipment being quoted.

4. The supplier must submit a table indicating the compliance of the features of the model of the equipment being quoted with those given in the indent. Features not matching – must be clearly indicated.
5. Additional features and Features in the quoted equipment which are better than those in the indent – may be clearly explained.

Special Conditions

1. Instrument should be supplied with necessary manuals or Quotation should include the detailed description of each module with circuit diagram.
2. Complete set of service and operation manuals for diagnosis, trouble shooting, maintenance and electronic circuitry (hard and soft copies).
3. The Delivery Schedule, Payment Terms & Warranty/Guarantee etc must be clearly indicated in the technical bid. The bids shall be opened at the date and time specified. Further details can be had from the office on the undersigned on all working days during working hours.

The tender will be extended by 10 more days if sufficient number of bidders are not available at the time of opening. The bidders are advised to submit their bid well in advance to avoid any kind of network issues. If relevant documents through speed post are not submitted with in time, the tenders will not be considered. The undersigned reserves the right to reject any or all the tender without assigning any reason whatsoever.

Sd/-

**Director
School of Energy Materials**