



## MAHATMA GANDHI UNIVERSITY

MGU/RUSA/ Etender/SCS/2023/01

29/07/2023

### NOTICE INVITING TENDER

The PI RUSA Project, Mahatma Gandhi University, Kottayam, invites online bid (technical and financial bid) for supply and installation of the Scientific equipment “**RRDE system including Bi-Potentiostat with EIS and Electrode Rotator**” from reputed firms.

1	Name of the scientific equipment	RRDE system including Bi-Potentiostat with EIS and Electrode Rotator
2	Earnest money deposit (EMD)	Rs. 20,000/-
3	Tender submission fee	Rs. 4000/-
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 <a href="http://www.etenders.kerala.gov.in">www.etenders.kerala.gov.in</a>
7	Last date and Time of submission of tender by online	23/08/2023, 4.00 pm
8	Last date and Time of submission of relevant documents by speed post	25/08/2023, 12.00 pm
9	Date and time of opening of technical bid	25/08/2023, 12.00 pm

General tender documents and tender schedule can be downloaded in A<sub>4</sub> plain size paper free of cost from the website [www.etenders.kerala.gov.in](http://www.etenders.kerala.gov.in). Duly filled up and signed tender schedule along with relevant documents should also be sent to “**The Director School of Chemical Sciences, 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

**Specification for Instrument**

**RRDE system including Bi-Potentiostat with EIS and Electrode Rotator**

**1) Bipotentiostat/Galvanostat**

**Bipotentiostat/Galvanostat with EIS facility**, it should include cell cable, data organization software, power adapter, USB cable, power cord and dummy/calibration cell.

**The potentiostat should have minimum following specifications:**

**Current:**

- Applied/Measured Current Ranges: 8 ranges or more.
- Resolution: 0.003% of full scale or better
- Autoranging: Yes
- Practical Current Range:  $\pm 20$  pA to  $\pm 1.0$  A
- Applied/Measured DC Accuracy:  $\pm 0.2\%$  of setting or better;  $\pm 0.05\%$  of range.
- DC Leakage Current:  $< 10$  pA or better at  $25^\circ\text{C}$
- ADC Input/DAC Output: 16 bits or higher

**Power Amplifier (Counter Electrode Amplifier):**

- Output Current:  $\pm 1.0$  A or higher
- Compliance Voltage:  $\geq \pm 17$  V
- Bandwidth:  $> 2.5$  MHz (on fastest speed setting)
- Noise and Ripple:  $< 35$   $\mu\text{V}_{\text{RMS}}$
- Slew Rate/Rise Time:  $10$  V/ $\mu\text{s}$  (on fastest speed setting)

**Electrometer (Reference Electrode Amplifier):**

- Input Impedance:  $> 10^{12}$   $\Omega$  or higher in parallel with  $< 10$  pF
- Input Current:  $< 10$  pA or better leakage/bias current at  $25^\circ\text{C}$
- CMRR:  $> 100$  dB  $0 - 1$  kHz,  $> 80$  dB  $\leq 10$  kHz,  $> 60$  dB  $\leq 100$  kHz,  $> 40$  dB  $\leq 1$  MH
- Electrometer Bandwidth:  $> 15$  MHz (3 dB)

**Potential:**

- Applied/Measured Potential Ranges: 3 ranges or more ( $\pm 15.0\text{V}$ ,  $\pm 10.0\text{V}$ ,  $\pm 2.5\text{V}$ )
- Resolution (at each range): 0.003% of full scale or better
- DC Accuracy:  $\pm 0.2\%$  of setting,  $\pm 0.05\%$  of range
- CV Sweep Rate:  $10\ \mu\text{V/s}$  (min) -  $75\text{V/s}$  (max) or better

**Data Acquisition (For DC Experiments):**

- Clock Resolution: 10 ns (minimum time base)
- Point Interval:  $80\ \mu\text{s}$  (minimum)
- Raw Point Total: <10 million per experiment

**Impedance (EIS):**

- EIS Capable: Yes
- EIS Frequency Range:  $10\ \mu\text{Hz}$  – 1 MHz
- EIS Frequency Resolution: < 1 ppm 1 MHz – 100 mHz, < 8 ppm 100 mHz – 10 mHz, < 90 ppm 10 mHz – 1 mHz, < 700 ppm 1 mHz –  $10\ \mu\text{Hz}$
- EIS Frequency Stability:  $\pm 10$  ppm
- Modes: Potentiostatic/Galvanostatic
- Voltage Excitation Setpoint: 1 mV – 200 mV peak,  $\pm 10\%$  of setting
- Frequency Sweeping: Linear/Logarithmic/Custom List

**General Specifications:**

- Input Power Supply: 220 VAC, 50Hz
- Instrument Dimensions:  $160 \times 324 \times 255$  mm
- Instrument Weight: 4.6 kg (10.2 lb)

**Accessories:**

- Dummy Cell: Should be included an external dummy cell.
- Cell Cable: Should be included D-SUB connector to multiple bananas plugs via shielded coaxial cables.

**Software:** Should be supplied single window experiment control data organizer and analysis (including EIS circuit fitting) software. Free upgradation for lifetime.

**The instrument should support all standard Electrochemical Techniques:**

- Open Circuit Potential (OCP)
- Bulk Electrocatalysis (BE)
- Chronoamperometry (CA)
- Double Potential Step Chronoamperometry (DPSCA)
- Cyclic Step Chronoamperometry (CSCA)
- Chronopotentiometry (CP)
- Ramp Chronopotentiometry (RCP)
- Staircase Potentiometry (SCP)
- Cyclic Step Chronopotentiometry (CSCP)
- Cyclic Voltammetry (CV)
- Linear Sweep Voltammetry (LSV)
- Staircase Voltammetry (SCV)
- Differential Pulse Voltammetry (DPV)
- Square Wave Voltammetry (SWV)
- Normal Pulse Voltammetry (NPV)
- Anodic Stripping Voltammetry (ASV)
- Differential Pulse Stripping Voltammetry (DPSV)
- Square Wave Stripping Voltammetry (SWSV)

- Potentiostatic Electrochemical Impedance Spectroscopy (EIS-POT)
- Galvanostatic Electrochemical Impedance Spectroscopy (EIS-GAL)
- Rotating Disk Electrochemical Impedance Spectroscopy (EIS-RDE)
- Impedance Uncompensated resistance (EIS-RU)
- Mott-Schottky (EIS-MOTT)
- Cable Calibration (EIS-CCAL)
- Rotating Disk Voltammetry
- Rotating Disk Koutecky-Levich
- Rotating Disk Electrolysis
- Rotating Disk Chronopotentiometry
- Rotating Disk Ramp Chronopotentiometry
- Rotating Ring-Disk Koutecky-Levich
- Rotating Ring-Disk Electrolysis
- Rotating Ring-Disk Voltammetry
- Dual Electrode Electrolysis
- Dual Electrode Voltammetry
- Dual Electrode Open Circuit Potential

## 2) Electrode Rotator

The rotator should have minimum following specifications:

### Rotation Head:

- Rate Accuracy: 100 to 200 RPM: should be accurate to within  $\pm 2$  counts of display reading and 200 to 8000 RPM: should be accurate to within  $\pm 1\%$  of display reading.
- Rate Control (front panel): 10-turn rotation rate control knob.
- Start/Stop (front panel): should have push-button toggle for pause and run.
- Rate Control (external): should have provision for rate control via input signal on external I/O port as optional with control ratios: 1, 2, or 4 *RPM/mV*, jumper selectable.
- Start/Stop (external): should have provision for digital motor stop input signal on external I/O port as optional. Available TTL logic: active high or active low, jumper selectable. Front panel LED indicates when external motor stop is active.
- Rate Output: should have provision for rate monitoring via output signal on external I/O port as optional including output signal ratio: 2 *RPM/mV*.

### Motor:

- Motor Power: 11 W
- Control Method: Closed loop servosystem (PWM) Temperature-compensated tachometer mounted on motor shaft.
- Motor Type: Permanent magnet
- Max. Continuous Torque: 18.7 milli Newton-meters
- Motor Protection: Motor current should be electronically limited.

### RDE / RRDE shaft:

- The shaft with 15.0 mm OD PEEK should be integrated with the rotator unit.
- It should be compatible with Change/fixed Disk RDE Tip of 5.0 mm disk OD, 15.0 mm OD PEEK/PTFE shroud.
- It should be compatible with RRDE Tip with Platinum Ring, 5.0 mm OD disk, 15.0 mm OD PEEK/PTFE shroud,

### Electrical:

- Input Power Supply: AC Mains: 220 VAC,  $\pm 10\%$ ; 50 Hz; 2A

**Instrument Dimensions:**

- W: 15 in (38 cm), D: 11 in (28 cm), H: 15 in (38 cm)

**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).
4. 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 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.
5. In case if sufficient number etender with complete documents are not received before the closing date, the closing date of the tender will be extended to another 10 days and in this single tenders will be considered.

*Sd/-*

**PI, Dr. Ditty Dixon**