

TECHNICAL SPECIFICATIONS AND OTHER ALLIED REQUIREMENTS

| Sl No. | Description of items | Quantity |
|--------------------------|--|----------|
| PUR/348/SET/SK/G/2021-22 | | |
| 1. | Supply and installation of Electrochemical Workstation and its accessories. (Details are as per ANNEXURE-I) | 01 No. |

1. QUALIFICATION CRITERION

- 1.1 OEM must be an ISO 9001:2015 certified organization. A copy of the ISO certificate to be enclosed with the bid. Bidders (OEM or their authorized agents) shall be disqualified in case they fail to furnish the relevant ISO certificate.

2. INSTALLATION/COMMISSIONING

- 2.1. To be done by Supplier/Manufacturer.

3. WARRANTY

- 3.1. Comprehensive on-site warranty for a period of two years must be provided to be effective from the date of successfully installation, Commissioning and Training and final acceptance of the items/equipment at the User's laboratory/Institute.

4. PERFORMANCE SECURITY

- 4.1 3 % of the Invoice Value.

Note: Manufacturer's Authorization Form must be submitted by Non- OEM bidders.

Annexure – I: Electrochemical Workstations

A compact size expandable Electrochemical Workstations is required that could be hand-carried across different labs as and when required. The specifications should be as follow:

Technical Specifications

- Number of channel: 1 or 2 (Note: Additional slots for up-gradation should be there; A high current booster for a full-range $\pm 8\text{A}$ measureable current with $\pm 18\text{V}$ compliance at a current resolution of 0.0005% or lesser.)
- Compliance voltage: $\pm 20\text{-}25\text{ V}$ or higher
- Electrode Configuration, Terminals: 3, 4
- IMP frequency range: $10\text{ }\mu\text{Hz}$ (or lower) to 2 MHz (or higher)
- IMP Amplitude range: $15\text{ }\mu\text{V}$ to 2.3 V
- Reference electrode input impedance: $1000\text{ G}\Omega$
- Reference electrode input bias current: $< 20\text{ pA}$
- Measured current: Potential resolution: 0.0033% full scale/bit
- Potentiostat rise time: $> 1\text{ }\mu\text{S}$
- Potential Bandwidth/Bandwidth of electrometer: $> 15\text{ MHz}$
- Interface: USB
- Scan rate: $10\text{ }\mu\text{V/Sec}$ to 10000 V/Sec or better
- Measured Potential Resolution: $3\text{ }\mu\text{V}$ or lesser
- Potentiostat Rise/fall Time: $< 400\text{ ns}$ or lower
- Interface: USB interface for connection with PC.
- Input bias current: $< 2\text{ pA}$
- Applied current resolution: $\pm 5\text{ PA}$ $\pm 0.3\%$ of Setting
- System configuration: I5, 8GB RAM, 500GB HDD, 4GB RAM, Keyboard & Mouse, I3 Processor, 19.5 LED Monitor
- Warranty: 2 years or more
- Electrochemical Techniques: Chronopotentiometry, Tafel Analysis (Corrosion Measurement), Multi-Current Steps, Chronoamperometry, Galvanostat, Chronopotentiometry With Current Ramp, AC Impedance, Pulsed Voltammetry (SCP, NPV, DPV & SWV), Amperometric I-T Curve, Impedance – Time, Differential Pulse Voltammetry, OCP Measurement, Bulk Electrolysis With Coulometry, Linear Polarization (Corrosion Measurement), IR Compensation Cyclic Voltammetry, Bode And Nyquist & Mott-Schottky Plot Can Be Done, Potentiometric Stripping Analysis, Linear Sweep Voltammetry, Galvanostatic Charge-Discharge, Open Circuit Potential – Time, Tafel Plot (TAFEL) Potentiodynamic Deactivation, Pitting Corrosion, Corrosion Rate, Linear Polarization, Corrosion Current Etc, Impedance – Potential, Chrono Coulometry
- Electrochemical Cell System & Accessories: GC Working Electrode-2 Nos, 4 Glass Cell (20 ml), Electrode Polishing Kit-1 no, Ag/AgCl Reference (Non-Aq)-1 No, Ag/AgCl Reference (Aq)-2 Nos, Pt Wire Counter Electrode-1no, Pt Working Electrode- 1no, GC Working Electrode-1 No
- Software: Licensed And Full Version Of Software

The system software must have capability for hybrid measurements such as Spectro-electrochemistry, E-SPR, SECM, IMPS-IMVS, EQCM, etc. It should have TTL triggering, ADC, DAC based communication ports. The Software must be able to be downloaded to unlimited computers, free updates& fully windows based. Software should be capable of supporting a wide variety of electrochemical techniques as mentioned below:

Corrosion: Linear polarization with Tafel Slope Analysis, Polarization resistance evaluation, Electrochemical Noise analysis, critical pitting technique, hydrogen permeation analysis etc.

Battery & Supercapacitor Analysis: Rectangular CV analysis at varying scan rates for pseudo capacitor analysis, complete charge and discharge with built in integration and 'linkable' cut-offs, Galvanostatic

charge discharge with cycle number vs specific capacitance plot, Voltage measurement on counter electrode, GITT, PITT, etc.

Solar Cell / Fuel Cell Studies: Linear polarization, I-V plotting with automatic determination for max power point & fill factor, IMPS-IMVS evaluation, EQE / IPCE Analysis, Charge extraction, Photo-current response, Mott-Schottky plots for single frequency scan, automated band-gap analysis, etc.

Electro-catalysis / Electro-deposition: ORR analysis using RDE/RRDE at varying rotation speeds and built-in Koutecky-levich plot generation, HER and OER Tafel based analysis for water splitting, Carbon dioxide reduction analysis, default plug-n-play protocol for spectro-electrochemistry based LSV, CV and Chrono evaluation, Galvanostatic CV and Chrono, ASV, DPSV, etc.

Trace Metal Analysis / Polarography: DPSV, ASV, Chrono Coulometry, etc.

Sensors: Automated one-click protocol for CV and LSV analysis at varying scan rates, fully automated single click amperometric detection protocol, EIS measurement with real-time equivalent circuit fit option, etc.

3D Based Live Plotting: Powerful graphic engine with useful features such as vector graphics, individual axis scaling, overlays, multiple Y-axes, plot addition, real-time 3D with zooming and rotation. Minimum 10+ plot could be plotted simultaneously.

Electrochemical Impedance Spectroscopy: Qt. 1

- Applied Frequency Resolution: 0.005%
- At 1 Hz frequency, impedance of 0.01Ω must be determined with 0.3° Phase accuracy & 0.3 % measured impedance accuracy. i.e – Measured impedance = $0.01 \pm 0.00003 \Omega$ - **Required**
- Frequency Range with External Waveform generator: 10 μHz to 7 MHz
- Frequency Range with PSTAT/GSTAT: 10 μHz to 1 MHz at a maximum current of $\pm 8\text{A}$ currents
- Required – Real time fit-simulation, live live plots, live 3D plotting.
- Preferred Option in near future – An Advanced EIS software that selects equivalent circuit by itself and allows touch free fitting and simulation

The system must have capability for hybrid measurements such as E-SPR, S-ECM, Spectro-electrochemistry, IMPS-IMVS, EQCM, etc. It should have TTL triggering, ADC, DAC based communication ports.