

TECHNICAL SPECIFICATIONS AND OTHER ALLIED REQUIREMENT

SI No.	Description of items	Quantity
PUR/514/MPML/BB/E/2019-20		
1	SUPPLY INSTALLATION TESTING AND COMMISSIONING OF MULTICHANNEL ELECTROCHEMICAL WORKSTATION WITH EIS and RRDE SET UP	1

1. INSTALLATION, COMMISSIONING AND TRAINING

- 1.1. The ordered goods are required to be installed within 15 days of receipt of goods at final destination. Installation should be carried out only by expert engineers of Supplier / Manufacturer. During the course of installation, necessary training on operation and maintenance of the goods shall be imparted to Institute's, Scientist / Engineers/Technicians.

2. WARRANTY

- 2.1. Comprehensive on-site warranty for a period of three years must be provided to be effective from the date of completion of installation and commissioning and final acceptance of the items / equipment at the user's laboratory / Institute.

ANNEXURE – I

Multichannel Electrochemical Workstation with EIS and RRDE set up

Technical Specification		
1.	Number of channels:	2 (Expandable upto 6 more channels in a single cabinet)
2.	Compliance voltage:	Standard ± 16 V or better at ± 380 mA current Note: Adjustable compliance voltage configurations should be mentioned separately
3.	Maximum Output Current	± 380 mA or better at 16 V.
4.	Current boosting option:	Expandable to ± 10 A measured current or better with Current Booster at unchanging compliance voltage of ± 16 V and 0.0003% measured current resolution
5.	Output Voltage Range:	± 10 V or better
6.	Maximum scan rate:	900V/s with 15 mV steps – Required
7.	Current Ranges:	± 10 nA to current range 100 mA in multiple ranges
8.	Measured current accuracy:	0.0005% of current range (30 fA at 10 nA range): Must be a default hardware configuration without any additional external accessories or current boosters – Required
9.	Built-in Current Integrator:	We require to separate faradaic current from capacitive current and also directly measure integrated charge in real-time rather than current
10.	Built-in Electromagnetic Noise filter:	The system hardware must have internal third order Sallen-key filters for removing background noise that cannot be removed by simple measures such as faraday cage
11.	Measured Potential Resolution:	3 μ V or better
12.	Potentiostat Rise/fall Time:	< 400 ns or lower
13.	Interface:	USB interface for connection with PC.
14.	Input bias current:	< 2 pA
15.	Bandwidth of electrometer:	> 4 MHz
16.	Input impedance of electrometer:	> 90 GOhm
Electrochemical Impedance Spectroscopy: Qty. 1		
17.	Applied Frequency Resolution	0.003%
18.	At 1 Hz frequency, impedance of 0.01 Ω must be determined with 0.3° Phase accuracy & 0.3 % measured impedance accuracy. i.e – Measured impedance = 0.01 \pm 0.00003 Ω – Required.	
19.	Frequency Range with External Waveform generator:	10 μ Hz to 10 MHz
20.	Frequency Range with PSTAT/GSTAT:	10 μ Hz to 1 MHz at a maximum current of ± 380 mA currents
21.	Required – Real time fit-simulation, live lissejous plots, live 3D plotting.	
22.	Preferred Option in near future – An Advanced EIS software that selects equivalent circuit by itself and allows touch free fitting and simulation of upto 50+ EIS data files in single run	
Hardware for RRDE controller: Qty. 1		
23.	Rotation rate range:	100-10000 rpm with a resolution of 1 rpm
24.	Mercury less contact	
RRDE Cell Accessory: Qt. 1		
25.	A 300 mL or higher total volume three electrode set-up is required	
26.	Gas tight construction with flangeless fittings	
27.	A combination of chemically inert and organic solvent resistive materials including Teflon lid	
28.	GC disc Pt ring RRDE electrode 1no, double junction Ag/AgCl reference electrode 1 no, Pt wire counter electrode 1 no. Suitable Lid for the cell.	
Hardware for Bipotentiostatic Measurements: Qty. 1		
29.	Hardware for conversion of the system into a two channel potentiostat with two working electrodes sharing the same AE & RE. Specifications: Potential Offset Range: ± 10 V, Maximum Current 40 mA, Current Range: from mA to nA. Modes: Bipotentiostat, Scanning Bipotentiostat.	
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.		



Electrochemical Cell Accessory:	
30.	A 50 mL total volume three electrode set-up is required
31.	Gas tight construction with flangeless fittings (PEEK/TEFLON)
32.	A combination of chemically inert and organic solvent resistive materials including (i) PEEK/TEFLON: lid, electrode plugs and gas fittings, (ii) glass: chamber and RE body, (iii) FFKM O-Rings (iv) FEP tubing and (v) Epoxy resin: WE electrode body.
33.	2 mm GC electrode, Ag/AgCl electrode, platinum wire counter Electrode; Gas purging facility
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:	
34.	Corrosion: Linear polarization with Tafel Slope Analysis, Polarization resistance evaluation, Electrochemical Noise analysis, critical pitting technique, electrochemical frequency modulation, hydrogen permeation analysis etc.
35.	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.
36.	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.
37.	Electro-catalysis / Electro-deposition ORR analysis using RDE/RRDE at varying rotation speeds and built-in Kotecky-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.
38.	Trace Metal Analysis / Polarography: DPSV, ASV, Chrono Coulometry, etc.
39.	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.
40.	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.
Computer Station	
41.	A suitable branded Computer/Laptop like Dell or hp or equivalent for system control & data acquisition should be offered with the system. It should have following minimum specs: CPU Intel Core i5, RAM 8 GB RAM, HDD 500 GB, GPU DirectX 9.0c compliant display adapter with 1GB RAM, TFT Monitor 21 inch, 101 Keys Keyboard, Optical Mouse, 3 USB Ports. Software should be freely upgradable in future. The model and the software capability offered should be well documented in the brochure/catalogue and should be available at Principal website.
Warranty	
42.	1 year + 2 years AMC free or 3 Years Manufacturer's Warranty Certificate
Min. Eligibility Criteria	
43.	Bidder should have experience of supplying at least 10 such systems (Multichannel Electrochemical Workstation) from the same OEM (as offered) in last 5 years to different Govt. Institutes/IITs/Research Institutes.
44.	Standard quality certifications such (ISO 9001)