

Corrigendum -4

Date: 23.06.2022

Tender reference no. RGIPT/JAIS/Project/2022-23/01 dated 21.06.2022

Subject: Modification in the Technical Specifications for the Procurement of Multichannel Electrochemical Workstation

It is being notified that a modifications have been done in the technical specification in published tender for the procurement of Multichannel Electrochemical Workstation. Therefore, a corrigendum is being published for the same. Revised technical specification are attached with the Corrigendum.



Dr. U. Ojha

(Chairman, DST Project Purchase Committee)

Revised Technical Specifications of Multichannel Electrochemical Workstation

Tender reference No. RGIPT/JAIS/Project/2022-23/01

	Technical Specifications	Bidders Specification	Compliance	Deviation
Sl. No.	MULTICHANNEL ELECTROCHEMICAL WORKSTATION SYSTEM : Qt. 2 – Expandable up to total 10			
1	No of Channels: 2 (Possibility to upgrade to upto 10 channels in future)			
2	Independent EIS Configuration: Each channel should have its own independent EIS option so that if EIS is not functioning on one channel it will not stop the functioning for the remaining channels.			
3	Compliance voltage: ± 18 V or better at ± 380 mA current in complete range – Adjustable compliance voltage configurations will not be considered			
4	Maximum Output Current: ± 380 mA or better at 18 V.			
5	Current boosting ± 10 A option: Each channel expandable anytime to ± 10 A measured current with unchanging current accuracy of 0.0003% or better as well as compliance voltage of ± 18 V – Qt. 1			
6	Output Voltage Range: ± 10 V or better			
7	Current Ranges: ± 10 nA to current range 100 mA in multiple ranges			
8	Measured current accuracy: 0.0003% at entire current range. Must be a default hardware configuration without any additional external accessories or current boosters			
9	Maximum Scan Rate: 1000 V/s with 20			

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	mV steps			
10	Measured Potential Resolution: 5 μ V or better			
11	Potentiostat Rise/fall Time: < 350 ns or lower			
12	Interface: USB interface for connection with PC or better			
13	A single Master USB control for all channels			
14	Multiple USB Connectivity: Electrochemical workstation should also have 3 or more channels such that each could be independently controlled via dedicated computer station.			
15	Input bias current: < 1 pA			
16	Bandwidth of electrometer: > 1 MHz or better			
17	Input impedance of electrometer: > 90 GOhm // 8 pF			
18	Modular Multichannel Configuration: Each channel should have plug and play type expandability options for following:			
19	Electrochemical Impedance Measurements - Qt. 1			
20	High Current Amplification Upto \pm 10A – Qt. 1			
21	Multiplexing options to conduct experiments upto 64 independent cells –			
22	Bi-potentiostat options from desired channel An internal dual-mode bi-potentiostat option is required. Parallel measurements should be possible on two working electrodes sharing the same counter and reference electrode. The bi-potentiostat feature should be functional in at least two modes. In the first mode, a fixed potential is required to be applied to			

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	the second Working Electrode while applying a potential step or a sweep to the first Working Electrode. In the second mode, a potential offset with respect to the first working electrode is required to be applied to the second working electrode			
23	The systems should be compatible with following for anytime upgradation using 'single software' application:			
24	Electro-catalysis ORR measurements with Bi-pot based RRDE set-up			
25	Photo-electrochemical Water-Splitting for HER, OER and Carbon Dioxide Reduction tests			
26	Spectro-electrochemistry with one-software control of integration time			
27	<p>EIS Add-on: Qt. 1</p> <ul style="list-style-type: none"> • Hardware and software for EIS measurements should be available in potentiostatic and galvanostatic control, over frequency range of 10 μHz to 1 MHz. It should be possible to perform EIS measurements over entire frequency range from 10 μHz to 1 MHz upto ± 380 mA currents. The frequency range in combination with a commonly available external waveform generator should be 10 μHz - 10 MHz. The frequency range in combination with potentiostat / galvanostat should be 10 μHz - 1 MHz. The applied frequency resolution should be 0.003% or better. • Measured EIS Data presentation: Real-time fit and simulation analysis as well as 'live' data plotting option for the simulation 			

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	<p>plot must be available as default software protocol. Also real-time measurement plots needed for – Lissajous curve, Nyquist, Bode, Admittance, Dielectric & Mott-Schottky. The fit and simulation software should include basic options such as find circle, element subtraction and an equivalent circuit library with all the modern EIS equivalent circuit models (Randle's, transmission line, etc.). Minimum visible plots in real time should be 8 or more.</p>			
28	<p>High Current Booster Option for Each Channel: Qt 1 (Optional)</p> <ul style="list-style-type: none"> The booster should not use any additional slots and should have capability to be added to any of the two existing channels. At present, the current booster option is required on any one of the two channels to boost the measurement as well as applied current capability of the channel upto $\pm 10A$. A compliance voltage of $\pm 18V$ or better with booster is preferred. Measurement current accuracy of 0.0003% with booster is highly required for accurate high precision measurements as well as optimizing parameters for electrodeposition research. 			
29	<p>Electrochemical Cell Set-up 50 milliliter volume of aqueous or non-aqueous electrolyte: Qt.1</p> <ul style="list-style-type: none"> PEEK or related cell wall material Gas-in – out apparatus Glassy carbon disc 2mm Working Electrode – Qt. 1 Metal Wire Auxillary Electrode - Platinum (99.9%) –Qt. 1 			

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	<ul style="list-style-type: none"> • Non-aqueous silver / silver chloride Reference Electrode – Qt. 1 			
30	<p>Corrosion cell set up: Qt. 1 250 ml Acrylic reservoir, calomel reference electrode, graphite counter 6mm dia., Acrylic side support, Sample exposed Area 1 Cm², Sample size 16 * 16mm ~65*65mm, thickness 0.5~6mm (optional)</p>			
31	<p>Photoelectrochemical Cell: Qt. 1</p> <p>Photoelectrochemical Cell for Studying Photo-based Water Splitting using Solar simulator</p> <ul style="list-style-type: none"> • Includes 50ml reservoir having port for working , ref & counter electrodes Quartz window 20mm dia., Black Acrylic Box Silicon septa with 5mm hole, 3 Nos Silicon septa without hole, 3 Nos. Pt coil counter electrode, Pt coil 500mm, Ag/AgCl reference electrode (optional) 			
32	<p>Polishing set-Qt.1 A Rotating Ring Disk Electrode and RRDE Cell Set-up: Qt. 1 A complete set-up for rotating disk electrode measurements is required including a dedicated RRDE cell for oxygen reduction reaction (ORR) studies. The RRDE should be high end unit with at least two numbers of sealed liquid Hg contacts for very low noise measurements. The electrode shaft should fit in cell lids. There must be a provision to easily mount exchangeable electrode tips on the shaft of RRDE that is controlled by a motor control unit. The set-up must be suitable for measurements at very low currents or electrochemical impedance measurements. The rotor should have the capability for remote as well as manual control. A maximum rotating speed of 10,000 rpm or</p>			

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	<p>more is required for high speed hydrodynamic EIS evaluation of diffusion coefficients for ORR measurements. The RRDE software should have fully automated analysis and plotting option for Levich and Koutecky-Levich analysis.</p> <p>Motor speed range setting 100 - 10,000 RPM in 1 RPM steps</p> <p>Manual speed setting 100 - 10,000 RPM in 1 RPM steps</p> <p>Acceleration/deceleration 4,000 RPM/s</p>			
33	<p>A specialized RRDE Vessel for ORR measurement:</p> <p>The RRDE vessel (Volume 300 mL deep vortex creating vessel - Jacketed) should have nitrogen-purging, temperature control as well as advanced options for remote controlled liquid dosing of moisture-sensitive electrolytes. GC RDE tips 3mm should be supplied along with Ag/AgCl reference electrode, Pt sheet counter electrode (1 cm²), Gas introduction system for purging and gas jacket, Thermometer, stand, lid and stoppers</p>			
	Warranty			
34	<p style="text-align: center;">Warranty</p> <p>3 years comprehensive warranty from the date of successful installation and demonstration.</p>			
35	<p>Electrochemical Software for Multichannel Workstation</p> <p>The Software to be provided with the Potentiostat / Galvanostat should be comprehensive, fully windows based with three-dimensional view of graphics and analysis software. Software should record current, voltage and time for cyclic and linear sweep-voltammetric measurement. It should be possible to record current, voltage and time data in tabular format for each measuring point in voltammogram. Software should be capable of supporting a wide variety of electrochemical techniques as mentioned below.</p> <ul style="list-style-type: none"> • Electrochemical Frequency 			

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	<p>Modulation Technique</p> <ul style="list-style-type: none"> ● Cyclic & Linear Sweep Voltammetry – HER, OER, Kotecky –Levich based default protocols ● Linear Polarization – Fully automated Tafel Slope analysis ● Differential Pulse, Sampled DC & Square Wave Voltammetry ● Chrono-amperometry, chrono-coulometry and chrono-potentiometry ($\Delta t > 1$ ms) ● It should have facility to display up to 10 or more plots simultaneously 			
36	<p>Software Development Kit to control the workstation using Labview Software</p> <ul style="list-style-type: none"> ● Tutorials to help the user to familiarize with software ● Sequential programming of different electrochemical methods and optional accessories ● Comprehensive database structure & powerful data analysis tool. ● Inbuilt electrochemical spread sheet ● User programmable formulae to new plots. ● Powerful graphic engine with useful features such as individual Axis scaling, overlays, multiple Y axes, plot addition, zooming and rotation. ● Each plot should be saved as a vector image file to use directly in paper or presentation ● Software should have facility to record additional signal viz EQCM, bi-potentiostat etc. Import/export ASCII, Ready-to-use Vis & Generic interface for Net applications should be included. 			
37	<p>Computer:</p> <ul style="list-style-type: none"> ● Compatible branded PC with EPSON Color Printer should be quoted. 			

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	<ul style="list-style-type: none">• CPU Intel Core i7, RAM 8 GB, CDD 500 GB, GPU Direct X 9.0c compliant display adapter with 1GB RAM, LED Monitor, 101 Keys Keyboard, Optical Mouse, 3 USB Ports.			
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