Pl.A1/Chemistry/ARLMS/WS/2020

Department Chemistry, University of Kerala, Kariavattom, Thiruvananthapuram, Kerala, India – 695 581

14/08/2020

E-Tender Notice

Department of Chemistry, University of Kerala, Kariavattom invites open tenders through e-Procurement (in two bid system), from reputed manufacturers/authorized distributors/ Indian Agents for the purchase of the equipment 'Electrochemical Workstation and Allied Instruments' in the Department, in connection with the implementation of the Specific Project "Advanced Research Laboratory for Molecular Sensing and imaging".

Last date and time for submission of tender online	**21/08/2020: 5 PM**
Date and time of opening of Technical bid	**26/08/2020: 11AM**
Date and time of opening of Financial bid	After technical Evaluation.
For technical details contact	Dr. Sony George Assistant Professor and Head Department of Chemistry Mobile : +91-9446462933 Email : emailtosony@gmail.com

TECHNICAL SPECIFICATIONS

Advanced Spectro - Electrochemical Workstation coupled with spectro-electrochemistry Accessories. Integrated & synchronized spectro-electrochemical system that can be used independently as a Potentiostat/Galvanostat or as a Spectrometer.

The package should include all cables, cell set-up, electrodes and accessories for fully integrated one click Insitu spectro-electrochemical studies **using single software window.**

The detailed specifications are attached below:

Sl. No:	Description / Specifications	Quantity
1	**A fully equipped expandable multichannel configuration with EIS and Bipotentiostat options for spectro-electrochemical studies is required with following specifications:** (a) (*i*) Multi Channel (No of Channels = 2 - One EIS channel and One channel with bi-potentiostat.) Electrochemical (Potentiostat/Galvanostat) analyzer with power supply 220V/50Hz, Interface Cable for serial port / USB Port, Cell Cable, windows based acquisitions & Installation. (*ii*) 2, 3, 4 **or** five electrode configuration (+1ground) (b) System should be capable for Electrochemical/ Spectroelectrochemical sensing of Biomolecules. Must also be Adaptable for Corrosion measurement & analysis, Electro plating, Battery/ Fuel cell, Super capacitor testing, Solar cell testing, Spectro/ Nano-electrochemical testing, and other User defined techniques, etc. © Should Enable Measurements of Voltammetry, amperometry, Pulse & stripping techniques, Double pulse, AC impedance with Impedance vs E (Mott-Schottky plots), Hydrodynamic, Chronopotentiometry techniques, OCP, RDE controls	
2	**Specification for Electrochemical work station (The following Specification is Mandatory for Both Channels for simultaneous Operation)** Channel 1 Photo electrochemical channel dedicated and Channel 2 Dedicated for Bipot Specifications provided below: (a)Compliance voltage : ± 12V or better (b)Maximum Current : ±500mA or better (c)Potential range : ±10V or better (d)Input Bias current : < 1 pA or better (e)Current Ranges : ± 10 nA to 1A in several ranges (f)Resolution of measured potential : 0.1 micro Volt or Better (g)Input impedance of electrometer : >1TOhm (h)Potentiostat rise fall time : < 250 nS or better (i)Maximum scan rate : 1000 V/s with 15 mV step	1

	Interface to PC : USB, Ethernet (j)Hardware & Software for Electrochemical Impedance spectroscopy (EIS) Measurements (k)Hardware and software for EIS measurements in potentiostatic and galvanostatic control, over a wide frequency range of 10 μHz to 5 MHz. (l) Apart from the classical EIS, it should be possible to modulate other outside signals such as rotation speed of a rotating disk electrode or the intensity of a light source to perform **Electrohydrodynamic and Photo-modulated Impedance Spectroscopy.**	
3	Spectrometer with following utilization modes (emission, absorbance, transmission, reflectance), (a)This instrument should be internally designed to work in standalone or paired in combination with quoted multichannel potentiostat/galvanostat without any complex integration procedures and should be equipped with all dedicated spectro-electrochemistry protocols for plug n play analysis. (b)The spectrophotometer should have options for individual control or could also be synchronized anytime with electrochemical measurements at desired voltage steps and integration time (2 ms to 500 seconds or better) ©UV-Visible-NIR Spectrophotometer for measurement of change in, absorbance or transmittance. (d) UV VIS Spectrophotometer with spectral range from 200 nm to 1100 nm. (e)Detector: 2048 pixel CCD Detector. (f)Light Sources: Wavelength range: 200-400 nm (deuterium), 400-2500 nm (halogen), (g) Wave length resolution 1.3 nm or better (h) Four Port Cuvette holder for absorbance and emission measurements (i)Quartz glass cuvette, four-walled (one no.) and two-walled (one no.) with optical path length of 1 cm and gas-tight Teflon lids should be included in the offer. (j) In situ spectroscopy– Transmission mode and reflection mode, Photo modulated Impedance Spectroscopy (To monitor the online spectral changes at the surface for ITO plates and Pt grid) (k), Spectroelectrochemical- Reflection mode (I)Reflection probe and suitable sample holder to hold the electrode to monitor online reflection changes when the potential is applied (m) Spectroelectrochemistry in Dip Mode Dip-probe option (For the species generated in liquid not on the solid surfaces or at the electrodes) Bulk electrolysis cell with large area Pt wire gauze and Pt flag counter electrode (n). Software for the spectrophotometer should be supplied with the system and should be capable of control and spectroscopic data acquisition for both UV-VIS and VIS-NIR modules simultaneously. It should have history channel, auto calibration and external triggering functions included.	1

4	**A, Accessories** and **Electrodes for spectro-electrochemistry** Complete Cell setup with required accessories for performing Spectro-Electrochemical Measurements with following (*i*) Spectroelectrochemical Cell: specification: Optical path length **1 mm**, Pt gauze WE 6mm X 6mm Pt Gauze with connection wire, Pt wire CE wire dia 1mm, length 40 m, Ag/AgCl reference electrode (*ii*) Cuvette Holder, 10 mm path, 1 beam, 2 x UV/VIS/NIR collimating lenses and cover. Gas tube for purging, Teflon lid Cuvette holder 4 side SMA *(iii*)1 cm path length spectroelectrochemical cell, 2 way clear 1 no. 4 way clear 1 no.	1 1 1 1 1
5	**b, Electrodes for electrochemistry:** *(i)*Pt Working Electrode- 6 Nos. *(ii)*GC Working Electrode- 9 Nos. *(iii)*Reference electrode (Ag/AgCl) Non Aqueous- 3 Nos. *(iv)*Reference electrode (Ag/Ag+)- 3 Nos. *(v)*Calomel Reference Electrode- 3 Nos. *(vi)*Pt Wire Counter Electrode- 3 Nos. *(vii)*Electrode Polishing Kit- 1 No. *(viii)*Thermo jacketed cell- 1 Nos. *(ix)*$Hg/HgSO_4$- 1 No. *(x)*Hg/HgO ref electrode1 Nos. *(xi)*Reversible H_2 std electrode- 3 Nos. *(xii)*Pt flag counter electrode 3 Nos. *(xiii)*Au Working electrode- 1 No. (*xiv*)Ag Working electrode- 1 No. (*xv*)Polishing Kit – 2 No. (*xvi)*Rotating Disk Electrodes (RDE) RRDE -3A - 1 No. *(xvii)*Rotating Ring Disk Electrode Apparatus - 1 No. *(xviii)*RRDE-3A Rotating Ring Disk Electrode Apparatus (regular) - 1 No. *(xix)*RDE Pt Platinum disk electrode- 1 No. *(xx)*RDE GCE- 1 No.	
6	**Software:** **(I) An advanced Spectro-electrochemical software:** (a)The system software must have capability for hybrid measurements such as Spectro-electrochemistry, It should have TTL triggering, ADC, DAC based communication ports. The Software must be able to be downloaded to unlimited computers & fully windows based. (b)Spectrophotometer to PC connection should be through USB Port. Software	1

	for system control and data acquisition should be supplied with the system. It should be possible to control the Spectrophotometer using Potentiostat/ Galvanostat Software for in situ spectro-electrochemical measurements. Potentiostat/ Galvanostat Software should have complete integration of spectrophotometer to decide the no of data points on CV or LSV where to record spectrum, dark current and blank spectra recording etc. Should Enable (c) Single software control of electrochemistry and spectroscopy (d)Automated lamp control: Automatic dark and reference (e)Real Time 3D panel that collects the generated spectra not only during the electrochemical measurement but continuously at any time. (f)Spectroscopic measurements shown in Counts, Absorbance, Transmittance or Reflectance during the electrochemical process with auto-subtraction (g)Plot of Optical Spectra vs. Electrochemical Curves at a specified wavelength (h)Plot overlay, peak integration, smoothing, subtraction, derivative curve, baseline fitting. (i)3D plotting of curves & export .csv of over-layed plots (3D Based Live Plotting: Powerful graphic engine with useful features such as individual Axis scaling, overlays, multiple Y-axes, plot addition, 3D zooming and rotation. Each plot should be saved as a vector image file to use directly in paper or presentation. Minimum 10+ plot could be plotted simultaneously.) (j) The Vendor should supply proper softwares to incorporate/ analyse user customized/drawn equivalent circuit models to EIS analysis	
	(II). **For Electrochemistry** (a)The software should support following basic electrochemical measurements: Cyclic Voltammetry with scan rates from10 µV/Sec to 200V/Sec, Sampled DC Voltammetry. Taffel Plots, Differential Pulse Voltammetry, Square WaveVoltammetry. Electrochemical methods like Chrono- Amperometry, Chrono-Coulometry & Chrono-Potentiometry. (b)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. (C)Software should have facility to record additional signal viz EQCM, bi-potentiostat etc.Import/export ASCII. (d)Ready-to-use Vis & Generic interface for .Net applications should be included. It should have facility to display up to 4 plots simultaneously. Comparison with previous experiments should be possible while experiments are in progress. (e)EIS Software Required – Real time fit-simulation, live lissejous plots, live 3D plotting. (f)Software should be capable of supporting a wide variety of electrochemical techniques as mentioned below:	1

	Corrosion Battery & Supercapacitor Analysis, Solar Cell Characterization: Electro-catalysis: Sensors: (g)Automated protocol for CV and LSV analysis at varying scan rates, fully automated amperometric detection protocol.	
7	Computer & Printer: **PC for controlling the system:** The set – up should come with a personal computer (desktop) capable of controlling the instrument. The system should have at least: Intel i8 processor, 500 GB SSD hard drive, 6 GB RAM (minimum), USB 3.0 or higher communication port, and Wireless LAN connection card. The system should also have a HD graphics card with 21 inch (minimum) HD LED monitor (with HDMI cable) for aesthetic display of experimental data in real time. A good set of keyboard – mouse – printer should also be provided. A genuine copy of Microsoft Windows based operating system (or whichever OS is compatible with the software used for controlling the system) should be provided.	1 each
8	Online UPS system with isolation transformer (Power backup of 5KV with batteries for at least 2h of power backup)	1
	+ Optional Requirements	
O1	**VIS-NIR Spectrophotometer adaptable for Integration and Synchronization with with Electrochemical Workstation** (with spectral range 1000 nm to 2500 nm. 256 pixel linear array InGaAs thermoelectrically cooled detector. The Grating should be with 100 lines/mm, it should be blazed at 2500 nm.)	
O2	**Advanced Software** **An Advanced EIS software that selects equivalent circuit by itself and allows touch free fitting and simulation of upto 100+ EIS data files in single run**	
O3	**Specialized Electrodes and Accessories Electrodes** (a) Transparent ITO screen-printed electrode (b) Transparent Screen-Printed electrode made of PEDOT (c) 3mW Laser with SMA connector 405, 532, 650nm one each with power supply for excitation (Or compatible LED Light Sources) (d)Quartz glass spectroelectrochemical cell kit (Static Cell) (e)Spectroelectrochemical flow cell (f)Thin layer spectroelectrochemical cell kit (Thin Layer Cells) (g)Inter Digitated Array (IDA) electrodes of Appropriate dimension with adapter	50 Nos 50 Nos 1Nos Each 1Nos 1Nos 1 Nos 50 Nos
O4	**Screen Printed Electrode: 3 electrode** Working electrode Counter electrode Ref. electrode Substrate Graphite Graphite Ag/AgCl Alumina Platinum Graphite Ag/AgCl Alumina Gold Graphite Ag/AgCl Alumina Note: The U-GEM adaptor or connector assembly should be supplied.	50 50 50 pieces

O5	**Engineering and Electronics for Fluorescence and Electroluminescence measurement**	1

Terms and Conditions

1. Every tenderer should submit Tender fee of **Rs. 2,500/-.**
2. Every tenderer should submit Earnest Money Deposit (EMD) of **Rs.50,000/-.**
3. The bidder shall have executed "Similar Nature" of single order for an amount not less than Rs.50 lakhs in last three financial years in Government Department/PSU/Autonomous Body or any reputed organization. References order copy along with proof of completion certificate for the project must be provided.
4. Quantities can be increased or decreased by purchaser and bidder has to supply deviated quantities at the rates prescribed and approved by the purchaser in the tender document. Purchase of optional items will be finalized at the time of financial evaluation. However, the bidder must quote the optional items. The bidder should quote all items, partial quote will not be accepted.
5. Original Equipment Manufacturer (OEM) Certificate/ Undertaking. If the bidder is not an OEM, Certificate of authorized dealership/ distributorship from the OEM. A Certificate from the OEM for technical support to the bidder and supply of spares.
6. Incomplete & conditional tenders and tenders received after the due date will be summarily rejected without assigning any reasons thereof.
7. Commercial bids of Short–listed vendors will only be opened. Please note that the Vendor(s) who do not qualify in the technical bid will not be considered for commercial bid.
8. The bidder must not sub-contract the work to other providers.
9. The prices quoted must be on "all-inclusive till destination" basis. The prices quoted should be inclusive of all Taxes Freight, Packing & Forwarding Charges, Handling, Delivery Charges, installation charges etc.
10. The configuration given is the minimum configuration that is/are required. Vendors may choose to supply higher/better/ enhanced systems/peripherals, but their financial quotes shall be treated as if they have been offered for the specified configuration only.
11. The Bidder shall bear all the costs associated with the preparation of the documents, submission of its bid and we will in no case be responsible or liable for these costs, regardless of the conduct or outcome of the bidding process.
12. The bid shall be typed and shall be signed by the bidder or a person duly authorized to bind the bidder to the contract.

13. The bid shall contain no interlineations erasures or overwriting except as necessary to correct errors made by the Bidder. In such case the person or persons signing the bid shall initial such corrections.

14. The bidder is expected to examine all instructions, forms, terms, condition, and technical specifications in the tender Documents. Failure to furnish all information required by the tender Documents or submission of a bid not substantially responsive may result in the rejection of its bid.

15. The bidders shall give undertaking that all the Components used in the equipment's shall be original make as per the technical specifications submitted and the hardware/software shall be supplied with the authorized license certificates, if found contrary the supplier shall replace the component/equipment with original one at their own cost.

16. Validity of tender: Tender submitted shall remain valid at least for 90 days from the date of opening the tender. Validity beyond three months from the date of opening of the tender shall be by mutual consent.

17. Delivery and installation: Proposed delivery schedule should be mentioned clearly. **Delivery and installation should be made at Department of Chemistry, University of Kerala, Kariavattom Campus Trivandrum - 695581, without any extra cost. Complete installation, testing and demonstration of the system and day to-day maintenance are to be provided at site.** The Supply and installation of items must be made within four weeks from the date of issue of supply order. Delay in supply will lead to penalty @1% of the value of tender for every week of delay or part thereof. (i.e. exceeding three days will be calculated as one week). If it is found that the items so supplied are not as per supply order specifications, the supply made will be rejected and Earnest Money Deposit will be forfeited.

18. Warranty period will start from the date of successful installation of all the items at site.

19. Service facility: Supplier should mention their details of service setup and manpower in Trivandrum who are responsible for after sales support.

20. In case of any dispute, the decision of the University authority shall be final and binding on the bidders. The undersigned reserves the right to reject any or all of the tenders received without assigning any reason thereof.

Documents to be uploaded:

1. Signed Compliance Matrix
2. Detailed Technical Brochure
3. BoQ
4. Detailed Financial Bid in pdf format.

Registrar