INDIAN INSTITUTE OF SCIENCE EDUCATION AND RESEARCH

PUNE

CLARIFICATION ON TENDER NUMBER - IISER-PUR-0159-18

ITEM DESCRIPTION- PROCUREMENT OF MULTICHANNEL ELECTROCHEMICAL WORKSTATION

Refer our Press Tender Notice No.IISER/S&P/5/18 dated 16.6.2018 for procurement of Multichannel Electrochemical Workstation . Tender Reference Number – IISER-PUR-0159-18.

Pre-Bid meeting was held on June 21st , 2018 at 2.30 pm and minutes of meeting is as under.

At the outset, the Chairman welcomed all the Members and the representative of the Prospective Bidders and briefed in general the scope of the Project and thereafter requested Assistant Registrar (S&P) to brief the vendors on the salient features of the commercial terms and the indenting Officer to read out the clarification sought by the Prospective Bidders and replied thereto as detailed in Annexure -II

The representatives present were satisfied with the replies given and it was informed that the corrections / additons / clarifications given, as discussed during the Pre-Bid Conference would be hosted on the website of IISER Pune and all the Prospective Bidders are required to take cognizance of the proceedings of the Pre-Bid Conference before submitting their bids as stipulated in the Bidding Documents.

The other terms & conditions of the notice issued on our IISER website www.iiserpune.ac .in will remain unchanged. No more correspondence in this regard will be entertained

The meeting ended with vote of thanks to the Chair

Sd/-

21.6.2018 Assistant Registrar (S&P)

ANNEXURE -II

IISER PUNE

PRE-BID CONFERENCE FOR PROCUREMENT OF MULTICHANNEL ELECTROCHEMICAL WORKSTATION

TECHNICAL QUERIES AND CLARIFICATION

TENDER NUMBER - IISER-PUR-0159-18 DATE : 21.6.18

S.No	Query/Clarification Sought	Clarification / Amendment
1	Section A-D, Page 23 of the tender document. "Multi-Channel work station and the High frequency Impedance analyzer."	There needs to be 5 channels all with potentiostat-galvanostat dc measurement capabilities. We will use the same specifications mentioned in the Section B (Page 23) of the original tender document for each of these channels. We need electrochemical cells for 3-electrode measurements. The cells need to have a capacity of 25ml-30ml and should have a teflon cap with appropriate holes and inlets for accommodating the electrodes and gas inlets that are going to be provided as a part of this multichannel electrochemical workstation. The

		holes should be made with dimensions capable of accommodating 3mm inner dia. and 6mm outer dia. electrodes.
2	Page No -24, Section C "High Frequency Impedance Analyzer"	We need a dedicated High Frequency Impedance Analyzer that will not be attached to the other 5-channels. This needs to be moved around the lab space, and should be capable of being connected to the Humidity chamber and the high temperature impedance measurement cell, with all the necessary accessory cables and humidity production unit (water trough, pump (if required) etc.), which all needs to be provided. • Compliance Voltage: +/- 10V or more • Applied voltage: +/- 10 V • Voltage accuracy: 1mV or better • Voltage resolution: 5 micro volt or better • Current limit: 1 nA or less & 500mA or more – minimum 5 ranges should be provided • Current accuracy @ 0.1% of the range or better • Current resolution: 0-005 % or better • One channel should have impedance Frequency range from 10μHz (minimum) to 32Mhz or better • Amplitude: 1mV to 2 Volt or better with the single and multi sine facility • Electrometer input impedance: 1T Ohms or more • Bias current: 10 pA • Data acquisition rate: 1000000samples/sec.
3	Page No – 24 , Section D "details of four probe measurement set-up"	Points 1 and 7 have been removed and their mentions have been moved to the Section G in Page 25.
4	Page No-25, Section F	We preferably need the following humidity chamber

	"Specifications for the Humidity Chamber"	" Benchtop Temperature & Humidity chamber Espec-Japan Make, Model SH-222" or one with equivalent specifications.
5	Page No – 25, Section G More details have been added to the " DC electronic conductivity measurement system"	The following specifications need to be followed for the DC conductivity measurement system mentioned in the Section G A complete conductivity measurement system (4-probe) with controller, probe and measurement system. I-V plots and all related plots should be possible. 1. A 4-probe conductivity measurement full system (I-V measurement controller, probes and cables) with a temperature control and jacket. 2. 4 Probe sample Holder which can withstand up to 400˚C (ceramic with Pt or equivalent). One extra probe is to be supplied. 3. **Optional:** A two-probe measurement holder which can integrate into the 4-probe set-up for in-plane and out of plane conductivity measurements.
6	Page No – 26, Section J (Other requirements) **"Point 5 has been removed"**	Point 5 in this section stating that " The vendor should provide the vibration-resistant table platform for mounting the entire system" is not required.
7	Page No – 26, Section J (Other requirements) **"Point 13 has been removed"**	Point 13 of section J, Page 26, has been moved and merged with Section G, " DC conductivity measurement system ". Accordingly the 2-probe measurement holder which can integrate into the 4-probe set-up for in-plane and out of plane conductivity measurements needs to be included

		as an optional with the 4-probe set-up.
8	Page No – 25, Section H Under computer specifications, "Processor details and storage limits have been changed"	**Two separate computers needs to be provided with the following specifications** Minimum computer specifications for each computer: preinstalled Windows 10 or higher version, Intel Core i5 Duo or a higher processor 3.0 GHz, minimum 8 GB RAM, 2 TB hard disk in each or higher, mouse, English keyboard, 21-inches LCD monitor Graphics Media accelerator, USB Ports (at least 4 minimum), CD read-write, ethernet port, optical USB Mouse, DVD+ RW, laser or DeskJet printer (HP or Dell or equivalent) and 4-5 KVA online UPS with minimum 2 Hour backup. A full set of cartridges for HP-Laser jet Pro 300 color M351a needs to be supplied.
9	Chapter 4 – Schedule of Requirement , Specifications & Allied Technical Details	Chapter 4 – Schedule of Requirement , Specifications & Allied Technical Details – Revised specifications attached as Annexure IV

ANNEXURE -III

IISER PUNE

PRE-BID CONFERENCE FOR PROCUREMENT OF MULTICHANNEL ELECTROCHEMICAL WORKSTATION

COMMERCIAL QUERIES AND CLARIFICATION

TENDER NUMBER - IISER-PUR-0159-18 DATE : 21.6.18

S.No	Query/Clarification Sought	Clarification / Amendment
1.	Please clarify warranty period, whether it is 3 or 4 years – Refer page no 26 point no 7	Warranty / Support – Refer page no 18 point no 10 ***"The items covered by the schedule of requirement shall carry minimum three years of comprehensive warranty from the date of acceptance of the equipment".***

CHAPTER 4

SCHEDULE OF REQUIREMENTS, SPECIFICATIONS & ALLIED TECHNICAL DETAILS

The specifications for the desired systems are as follows:

Electrochemical workstation comprising High Frequency Impedance analyzer with humidity and temperature control and a dedicated four probe conductivity measurement system

Requirement:

A Multichannel Electrochemical Workstation with One Dedicated high frequency impedance analyser with a dedicated humidity/temperature control system equipped with both room temperature and high temperature measurement cells and a dc four probe conductivity measurement set-up.

Conditions:

1. The workstation will have computerized control system which will be shared by the impedance analyzer and the dc conductivity measurement for seamless integration, operation and service
2. All spares should be from the same genuine brand of the manufacturer
3. The quoted Impedance analyzer model should have at least 10 installations (until the date of bid submission) in government institutes/ universities in India. The vendor should support its claims with testimonials from respective institutes.

Electrochemical workstation should consist of Potentiostat / Galvanostat / EIS analyzer designed for electrochemical research.

A. Basic requirements:

1. No. of channels required: **5 channels all with potentiostat-galvanostat dc capability.**
2. **An dedicated high frequency Impedance analyzer capable of measuring ac-impedance with frequency >32MHz.**
3. Electrometer input impedance **10^12 ohms** or more parallel at 20 pF.
4. All **of** the channels should be independent & operate simultaneously**.**

B. Channels configuration for the multi-channel dc measurement system:

Channel 1-5:

- Current limit: **±100 nA to ± 1000 mA** or more
- Compliance voltage: **± 20V** or more
- Applied Potential range: **±10V** or more
- Voltage accuracy: **0.2%** or below vs. FSR
- Potential resolution: **10uV** or less
- Current resolution: Should able to measure **0.005%** or less for all channels.
- Current accuracy: **0.2%** or less
- Switching time: **100 u sec** or better
- Bias current: **5pA** or better

- At least two analog input and one analog output is required for various temperature and pH measurement
- We need electrochemical cells for 3-electrode measurements. The cells need to have a capacity of 25ml-30ml and should have a teflon cap with appropriate holes and inlets for accommodating the electrodes and gas inlets that are going to be provided as a part of this multichannel electrochemical workstation. The holes should be made with dimensions capable of accommodating 3mm inner dia. and 6mm outer dia. electrodes.
- Electrochemical workstation should consist of Potentiostat / Galvanostat / EIS analyzer designed for electrochemical research. It needs to have 6 or more coin-cell holders made out of low resistive and less oxidizable or reactive material (example gold). For the 3-electrode measurement preparation a Pt-C paste.

C. Dedicated High frequency impedance measurement instrument/electrochemical analyzer

We need a dedicated High Frequency Impedance Analyzer that will not be attached to the other 5-channels. This needs to be moved around the lab space, and should be capable of being connected to the Humidity chamber and the high temperature impedance measurement cell, with all the necessary accessory cables and humidity production unit (water trough, pump (if required) etc.), which all needs to be provided.

Specifications for the dedicated High Frequency Impedance Analyzer:

- Compliance Voltage: +/- 10V or more
- Applied voltage: +/- 10 V
- Voltage accuracy: 1mV or better
- Voltage resolution: 5 micro volt or better
- Current limit: 1 nA or less & 500mA or more – minimum 5 ranges should be provided
- Current accuracy @ 0.1% of the range or better
- Current resolution: 0-005 % or better
- One channel should have impedance Frequency range from 10µHz (minimum) to 32Mhz or better
- Amplitude: 1mV to 2 Volt or better with the single and multi sine facility
- Electrometer input impedance: 1T Ohms or more
- Bias current: 10 pA
- Data acquisition rate: 1000000samples/sec.

D. Accessories required.

4. Electro chemical cell with one platinum counter, One GC working and one Ag/AgCl ref electrode.
5. The sample holder should be suited for measurements using membranes.
6. A membrane cutter capable of cutting the membranes to size matching the sample holder diameter.
7. A micron digital Vernier calliper to measure membrane thickness
8. 3-electrode measurement cell with a teflon cap with sealable holes (3 for electrodes and 1 for purge in/out).
9. A hydraulic pellet press with die sets (two) matching the measurement holder dimensions.

E. Software Requirements:

The Software to be provided with the Multichannel system should be comprehensive with lifetime licence, fully 32-bit/ 64-bit Windows based platform.

Software should be capable of supporting a wide variety of electrochemical techniques as mentioned below and any up gradation of the software should be carried out free of cost on site.

Electrochemical Techniques:

- Open Circuit, Linear Scan Voltammetry, Cyclic Voltammetry ,Staircase Linear Scan Voltammetry, Staircase Cyclic Voltammetry, Chronoamperometry, Chronopotentiometry, Chronocoulometry , Recurrent Potential Pulses, Recurrent Galvanic Pulse , SquareWave Voltammetry , Differential Pulse Voltammetry, Normal Pulse Voltammetry, Reverse Normal Pulse Voltammetry, Zero Resistance Ammeter (ZRA), Galvanic Corrosion , Cyclic Polarization, Linear Polarization, Tafel, Electrochemical Noise, Split LPR, Potentiostatic, Potentiodynamic, Galvanostatic, Galvanodynamic , Dynamic iR, Potentiostatic EIS , Galvanostatic EIS, Mott – Schottky Auxiliary Interface , DAC Output Control Condition, Deposition, Equilibration , Purge , iR Determination etc. A galvanostatic charge-discharge cycling programme.
- Analysis Software: Equivalent Fitting analysis software for Impedance Analysis with the necessary multiple license key.
- Ability to overlay data from different experiments, with the additional capability to overlay previously acquired data on specific real-time plots for on the spot comparisons.
- Sample holder for the ambient as well as high temperature measurements need to be provided. Temperature range up to 200C or higher.
- The sample holder should be compatible with the humidity-temperature measurements.

F. **<u>Temperature and Humidity chamber set up.</u>**

We preferably need the following humidity chamber
" Benchtop Temperature & Humidity chamber Espec-Japan Make, Model SH-222" or one with equivalent specifications shown below.

Controlled Humidity and temperature chamber set up is required with min 20 L capacity .
The temperature range should be -20˚C to +150˚c
Humidity range should be 30%-95%RH or higher.
Facility to control through Impedance Analyzer software.
Necessary connecting cable and necessary exit/entry port in the chamber should be provided for inserting the cell cable into the chamber

G. <u>DC conductivity measurement system</u>

A complete conductivity measurement system (4-probe) with controller, probe and measurement system. I-V plots and all related plots should be possible. Full system (I-V measurement controller, probes and cables) with a temperature control and jacket.

4 Probe sample Holder which can withstand up to 400˚C (ceramic with Pt or equivalent). One extra probe is to be supplied.

<u>Optional:</u> A two-probe measurement holder which can integrate into the 4-probe set-up for in-plane and out of plane conductivity measurements.

H. Computer specifications

Facility to control the entire system either through the computer system (software and hardware) attached to the Impedance analyser or a separate computer with dedicated I-V curve measurement software and accessory cables to connect to this DC conductivity set-up needs to be provided.

Two separate computers needs to be provided with the following specifications
Minimum computer specifications for each computer: preinstalled Windows 10 or higher version, Intel Core i5 Duo or a higher processor 3.0 GHz, minimum 8 GB RAM, 2 TB hard disk in each or higher, mouse, English keyboard, 21-inches LCD monitor Graphics Media accelerator, USB Ports (at least 4 minimum), CD read-write, ethernet port, optical USB Mouse, DVD+ RW, laser or DeskJet printer (HP or Dell or equivalent) and 4-5 KVA online UPS with minimum 2 Hour backup. A full set of cartridges for HP-Laser jet Pro 300 color M351a needs to be supplied.

I. Warranty

03 Year comprehensive (should include all components).

J. Other requirements

1. The vendor should provide a copy of site-preparation checklist.
2. IISER will provide empty space with electricity and AC connections. It will be vendor's responsibility to install the equipment as well as the accessories as well as the infrastructure or essential facility to run the instrument. It may include but not restricted to plumbing, wiring, Zero air, N2, He and H2 cylinders, gas cylinder regulators, gas purifiers, gas pipe paneling, tubings, nuts, ferrules and computer hardware and software installations, extra electrical wiring, switches etc. to bring the instrument to PQ level.
3. Tendered price should include delivery, installation, commissioning and training at IISER Pune.
4. The vendor must also quote all the accessories for the smooth functioning of systems.
5. The vendor must highlight the desired specifications in their technical brochure sheets, give their website reference for all specifications and mention compliance with proposed specifications.
6. At least 3 years comprehensive warranty for the entire system should be quoted.
7. Supplier must have an active support in Pune. In the bid, supplier should clearly mention how instrument service and repair time will be minimized.
8. A qualified factory-trained engineer shall conduct on-site installation, commissioning and training.
9. The warranty shall commence only upon successful completion of the acceptance test or commissioning.
10. The vendor should provide on-site training at least twice for 5 users on the system start-up, usage, maintenance, quality control, trouble shooting, etc.
11. All the instruments should be provided with necessary toolkits.

INFORMATION TO TENDERERS

The tender shall be evaluated under 2 (two) bid system

1. Technical bid
2. Financial bid

Technical evaluation shall comprise of:

Technical evaluation criteria with marks		
Sr. no.	Technical requirement	Marks
	<u>Basic requirements</u>	
1	A Multichannel Electrochemical Workstation with One Dedicated high frequency impedance analyser equipped with a humidity/temperature control system and with both room temperature and high temperature measurement cells and a dc four probe conductivity measurement set-up. No. of channels required: 5 channels all with potentiostat-galvanostat dc capability. A dedicated high frequency Impedance analyzer capable of measuring ac-impedance with frequency >32MHz. Electrometer input impedance 10^12 ohms or more parallel at 20 pF. The workstation will have computerized control system which will be shared by the impedance analyzer and the dc conductivity measurement for seamless integration, operation and service. Electrochemical workstation should consist of Potentiostat / Galvanostat / EIS analyzer designed for electrochemical research. It needs to have 6 or more coin-cell holders made out of low resistive and less oxidizable or reactive material (example gold). For the 3-electrode measurement preparation a Pt-C paste.	12
2	All spares should be from the same genuine brand of the manufacturer	4
3	**<u>Accessories required.</u>** Electro chemical cell with one platinum counter, One GC working and one Ag/AgCl ref electrode. The sample holder should be suited for measurements using membranes. A membrane cutter capable of cutting the membranes to size matching the sample holder diameter. A micron digital Vernier calliper to measure membrane thickness 3-electrode measurement cell with a teflon cap with sealable holes (3 for electrodes and 1 for purge in/out). A hydraulic pellet press with die sets (two) matching the measurement holder dimensions.	8
4	The quoted model should have at least 10 installations (until the date of bid submission) in government institutes/ universities in India. The vendor should support its claims with testimonials from respective institutes.	3

5	Two separate computers needs to be provided with the following specifications Minimum computer specifications for each computer: preinstalled Windows 10 or higher version, Intel Core i5 Duo or a higher processor 3.0 GHz, minimum 8 GB RAM, 2 TB hard disk in each or higher, mouse, English keyboard, 21-inches LCD monitor Graphics Media accelerator, USB Ports (at least 4 minimum), CD read-write, ethernet port, optical USB Mouse, DVD+ RW, laser or DeskJet printer (HP or Dell or equivalent) and 4-5 KVA online UPS with minimum 2 Hour backup. A full set of cartridges for HP-Laser jet Pro 300 color M351a needs to be supplied.	6
6	Original and licensed perpetual operating software required to operate all the specified equipment. Software should include free upgrades up to 5 years. All software (and potential upgrades) should be compatible with the given operating system.	3
7	**DC conductivity measurement system** A complete conductivity measurement system (4-probe) with controller, probe and measurement system. I-V plots and all related plots should be possible. A complete conductivity measurement system (4-probe) with controller, probe and measurement system. I-V plots and all related plots should be possible. Full system (I-V measurement controller, probes and cables) with a temperature control and jacket. 4 Probe sample Holder which can withstand up to 400˚C (ceramic with Pt or equivalent). One extra probe is to be supplied. Optional: A two-probe measurement holder which can integrate into the 4-probe set-up for in-plane and out of plane conductivity measurements. **Computer specifications** Facility to control the entire system either through the computer system (software and hardware) attached to the Impedance analyzer or a separate computer with dedicated I-V curve measurement software and accessory cables to connect to this DC conductivity set-up needs to be provided. The 4-probe conductivity measurement system should be provided from a reputed internationally recognized manufacturer. With the sample cells and the high temperature chamber for carrying out variable temperature measurements and an additional probe (1 with the equipment + 1 extra). Contacts should be made of low-resistance metals.	10
8	**Temperature and humidity controller** Controlled Humidity and temperature chamber set up is required with min 20 L capacity . We preferably need the following humidity chamber " Benchtop Temperature & Humidity chamber Espec-Japan Make, Model SH-222" or one with equivalent specifications shown below. The temperature range should be -20˚C to +150˚c Humidity range should be 30%-95%RH or higher. Facility to control through Impedance Analyzer software. Necessary connecting cable and necessary exit/entry port in the chamber should be provided for inserting the cell cable into the chamber.	10
9	Facility to control the entire system either through the computer system (software and hardware) attached to the Impedance analyser or a separate computer with dedicated I-V curve measurement software and accessory cables to connect to this	4

	DC conductivity set-up needs to be provided. Two separate computers needs to be provided with the following specifications Minimum computer specifications for each computer: preinstalled Windows 10 or higher version, Intel Core i5 Duo or a higher processor 3.0 GHz, minimum 8 GB RAM, 2 TB hard disk in each or higher, mouse, English keyboard, 21-inches LCD monitor Graphics Media accelerator, USB Ports (at least 4 minimum), CD read-write, ethernet port, optical USB Mouse, DVD+ RW, laser or DeskJet printer (HP or Dell or equivalent) and 4-5 KVA online UPS with minimum 2 Hour backup. A full set of cartridges for HP-Laser jet Pro 300 color M351a needs to be supplied.	
10	**Additional software requirements** The Software to be provided with the Multichannel system should be comprehensive with lifetime license, fully 32-bit/ 64-bit Windows based platform. Software should be capable of supporting a wide variety of electrochemical techniques as mentioned below and any up gradation of the software should be carried out free of cost on site.	4
11	**Optional:** 2 –probe measurement set-up compatible with the 4-probe measurement that is being supplied in the main equipment with capabilities to withstand temperature up to 400C.	2
12	**Software capabilities** Open Circuit, Linear Scan Voltammetry, Cyclic Voltammetry ,Staircase Linear Scan Voltammetry, Staircase Cyclic Voltammetry, Chronoamperometry, Chronopotentiometry, Chronocoulometry , Recurrent Potential Pulses, Recurrent Galvanic Pulse , SquareWave Voltammetry , Differential Pulse Voltammetry, Normal Pulse Voltammetry, Reverse Normal Pulse Voltammetry, Zero Resistance Ammeter (ZRA), Galvanic Corrosion , Cyclic Polarization, Linear Polarization, Tafel, Electrochemical Noise, Split LPR, Potentiostatic, Potentiodynamic, Galvanostatic, Galvanodynamic , Dynamic iR, Potentiostatic EIS , Galvanostatic EIS, Mott – Schottky Auxiliary Interface , DAC Output Control Condition, Deposition, Equilibration , Purge , iR Determination etc. A galvanostatic charge-discharge cycling programme. Analysis Software: Equivalent Fitting analysis software for Impedance Analysis with the necessary multiple license key. Ability to overlay data from different experiments, with the additional capability to overlay previously acquired data on specific real-time plots for on the spot comparisons.	10
	Other requirements	
13	The vendor should provide a copy of site-preparation checklist; IISER will provide empty space with electricity and AC connections. It will be vendor's responsibility to install the equipment as well as the accessories as well as the infrastructure or essential facility to run the instrument. It may include but not restricted to plumbing, wiring and computer hardware and software installations, extra electrical wiring, switches etc. to bring the instrument to PQ level. The humidity chamber accessories to generate humidity and to hold the water etc should be provided.	6

14	The vendor must highlight the desired specifications in their technical brochure sheets, give their website reference for all specifications and mention compliance with proposed specifications.	4
15	At least 3 years comprehensive warranty for the entire system should be quoted.	5
16	Supplier must have an active support in Pune. In the bid, supplier should clearly mention how instrument service and repair time will be minimized. A qualified factory-trained engineer shall conduct on-site installation, commissioning and training.	3
17	The vendor should provide on-site training at least twice for 5 users on the system start-up, usage, maintenance, quality control, trouble shooting, etc.	4
18	All the instruments should be provided with necessary toolkits.	2
	Total	100