

	INDIAN INSTITUTE OF TECHNOLOGY MADRAS Chennai 600 036 Telephone: (044) 2257 4249 E-mail: rkraman@iitm.ac.in	
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Prof. Kothandaraman R
Project Coordinator

Ref: CHY/KOTH/2019-20/009/SPLX
Dated: 10.01.2020

Limited Tender No: CHY/KOTH/2019-20/009/SPLX

Due Date: 31.01.2020, 5:00pm

Pre-Bid meeting: - Not required.

Bid opening meeting on Due Date: 03.02.2020, 4:00pm

Dear Sir/Madam,

On behalf of the Indian Institute of Technology Madras, offers are invited for the supply of **“REDOX FLOW BATTERY TEST STAND”** conforming to the specifications given in **(Annexure-I)**.

Terms and Conditions of Limited Tender

1. **Preparation of Bids:** - The Limited tenders should be submitted under **Two bid system** (i.e.) Technical- and -Financial bid.
2. **Delivery of the tender:** - The tender shall be sent to the below-mentioned addresses either by post or by courier (duly sealed and super scribed on the envelope with the reference No and due date) so as to reach the following address before the due date and time specified in our Schedule:
Prof. Kothandaraman R,
Department of Chemistry
IIT Madras
Chennai - 600 036.
3. **Price:** - The price should be quoted in net per unit (after breakup) and must include all packing and delivery charges to **Department of Chemistry**.
 - a. The offer/bid should be exclusive of taxes and duties. The percentage of tax & duties should be clearly indicated separately. IIT Madras is eligible for concessional GST and relevant certificate will be issued.
 - b. In case of import supply, the price should be quoted without custom duty. IIT Madras is exempted from levy of IGST on Imports and eligible for concessional custom duty (not exceeding 5%) and the price should be quoted on EX-WORKS and CIP (stating the Cost, Insurance, Freight separately) and indicating the mode of shipment.
4. **Terms of Delivery:** - The item should be supplied to our Departments as per Purchase Order. In case of import supply, the item should be delivered at the cost of the supplier to our Institution. The Installation/Commissioning should be completed as specified in our important conditions.
5. **Catalogue:** Original catalogue (not any photocopy) of the quoted model duly signed must accompany the quotation in the Technical-cum-financial bid
6. **Late offer:** - The offers received after the due date and time will not be considered

7. **Payment:** - No Advance payment will be made for Indigenous purchase. However, 90% Payment against Delivery and 10% after installation are agreed to wherever the installation is involved. In case of import supplies the payment will be made only through 100% Letter of Credit i.e. (90% payment will be released against shipping documents and 10% after successful installation wherever the installation is being done).
8. **Advance Payment:** - No advance payment is generally admissible. In case of specific percentage of advance payment is required, the Foreign Vendor has to submit a Bank Guarantee equal to the amount of advance payment and it should be routed through the Beneficiary Bank to the end user Bank. Otherwise, the Indian Agent of the foreign vendor has to submit a Bank Guarantee through a Nationalized Bank of India.
9. **On-site Installation:** - The equipment or machinery has to be installed or commissioned by the successful bidder within number of days (as prescribed by PI's) from the date of receipt of the item at site of IIT Madras.
10. **Warranty/Guarantee:** - The offer should clearly specify the warranty or guarantee period for the machinery/equipment.
11. **Validity:** Validity of Quotation not less than 60 days from the due date of tender
12. **Technical Bid Opening:** The technical bid will be opened on **03.02.2020, 4:00pm** at the **Department of Chemistry**, IIT Madras and the **financial bids** of those tenders who are technically qualified will be opened at a **later date under intimation to them**.
13. **Performance Security:** -The successful bidder should submit Performance Security for an amount of 5% of the value of the contract/supply within 21 days from the issue of work/purchase order. The Performance Security should be furnished in the form of an Account Payee DD / FD Receipt from the commercial bank (or) Bank Guarantee from any nationalized bank in India.
14. **Accept /Reject:** IIT Madras reserves the full right to accept / reject any tender at stage without assigning any reason.
15. **Settlement of Disputes:** Any legal disputes arising out of any breach of contract pertaining to this tender shall be settled in the court of competent jurisdiction located within the city of Chennai in Tamil Nadu.
16. **Risk Purchase Clause:** - In the event of failure of supply of the item/equipment within the stipulated delivery schedule, the purchaser has all the right to purchase the item/equipment from other sources on the total risk of the supplier under risk purchase clause.
17. **Unsolicited offers:** "This notice is being published **for information only** and is not an open invitation to quote in this limited tender. Participation in this tender is by invitation only and is limited to the selected registered suppliers. Unsolicited offers are liable to be ignored. However, suppliers who desire to participate in such tenders in future may apply for registration as per procedure." The Website for Registration of vendors is <http://web.iitm.ac.in/supplier/> and the mail address for queries is "workflow@rt.iitm.ac.in".

Yours sincerely,

**Prof. Kothandaraman R,
Department of Chemistry
IIT Madras
Chennai - 600 036.**

TECHNICAL SPECIFICATION OF REDOX FLOW BATTERY TEST STAND

Complete Redox Flow Battery Setup as per the specifications and Schematic/Layout described below. Integrated with Multichannel Analyser/Electrochemical Workstation and Flow Instrumentation equipped with High quality Corrosion Resistance Rack and Table of standard Working Height.

Setup must include the following –

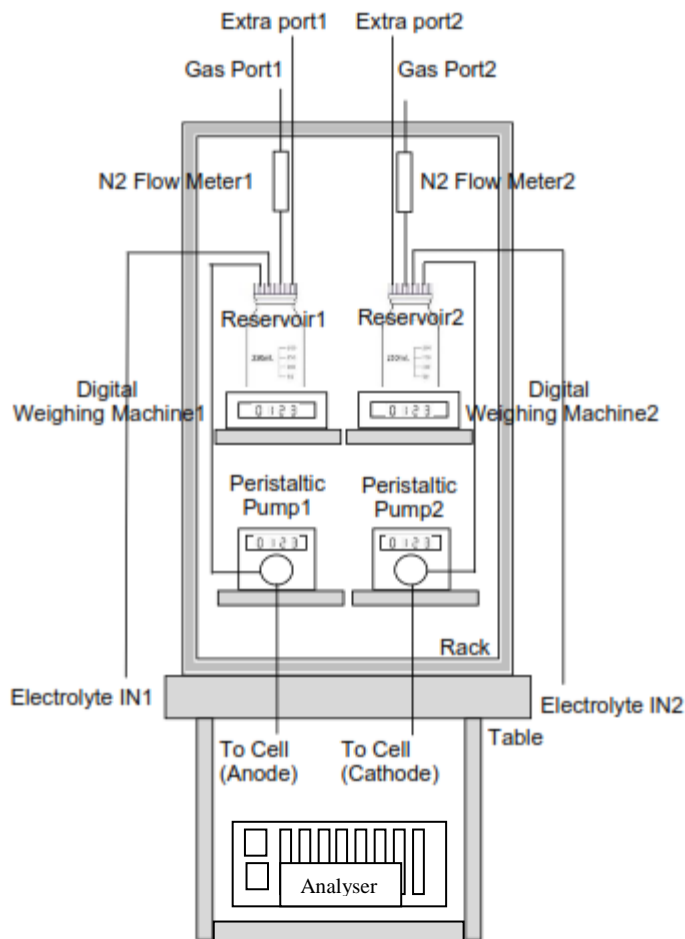
Part A. Electronics -

- 1) 8 or more Channel Multichannel Analyser/Electrochemical Workstation with EIS and Software
- 2) Channels should be operable Independently and in parallel
- 3) Suitable low-resistance Cell Cables for all channels
- 4) Current ranges : $\pm 1\text{mA}$ - $\pm 15\text{A}$ per channel OR better
- 5) Voltage Range : 0-9V per channel OR wider than that
- 6) Acquisition time : 2ms or better
- 7) Potential Resolution : $50\mu\text{V}$ or better
- 8) Current Resolution : 30 nA or better
- 9) Resolution : 18bit or better
- 10) EIS Facility on all channels -Frequency Range: 10mHz-10KHz
- 11) Data Acquisition Software
- 12) Charge / Discharge cycling & performance characterization
- 13) Fundamental Electrochemistry – Open circuit Voltage/Potential, Cyclic Voltammetry, Linear Sweep Voltammetry, Chrono Ampereometry, Chrono Potentiometry, Electrochemical Impedance Spectroscopy Technique - GEIS, PEIS
- 14) Analysis tool for Analysis tools for Battery Characterisation
- 15) Equivalent EIS fitting circuit software
- 16) One Additional low current module with cable should be provided for one channel – minimum current range $1\mu\text{A}$ or better.

Part B. Instrumentation -

- 1) Rack Mounted Setup with 5M sulfuric acid resistant and 3 M VO_2^+ resistant Electrolyte Reservoir, Tubing, Adapters and Valves. At least two three way valves or appropriate valves required to drain the electrolyte from the reservoir if need be. A layout of the flow stand (a) during filling of reservoir from external tank (b) during draining of reservoir to an external tank (c) during operation of battery should be provided as stickers for user reference and easy operation of valves.
- 2) Two sets of Electrolyte Reservoirs (R1 and R2 -250mL each) with Teflon/Non-Corrosive Cap (air tight) with inlet/outlets ports.
- 3) Supply two caps fitted with a glass condenser (this is required during high temperature operation)

- 4) Additional Two sets of Electrolyte Reservoirs 500mL each should be provided as spare
- 5) Compact Peristaltic pumps – 2 nos. (independent) with variable flow control including forward and reverse, Speed 0.1 to 300 rpm, Speed Resolution 0.1rpm, Flow Rate Range 0.1mL-900mL min⁻¹, OLED Display, Mechanical Keypad, Start/Stop Directional Control, Speed Control Digital Knob. This peristaltic pump should be controllable through a computer interface.
- 6) Mounted (on test stand) Nitrogen Flow meters – 2 nos. for purging
- 7) The reservoir must be resting on Digital Weighing Scale/Machine – 2 nos. (independent), Digital Readout, Backlit LCD display, Counting Memory, Capacity 1 - 10 Kg, Readability 0.1 - 2 gm, Programmable using numerical key board, Reference quantity, Optional RS-232C data interface
- 8) A flexible silicone pad heater (removable) or suitable should be provided around the reservoir along with the temperature controller having + or – 0.5° accuracy. Temperature range is RT to 60°C.
- 9) All components like pumps, electrolyte reservoirs, drain and purge valves should be non-metallic and able to handle 5M sulfuric acid system containing 2 M VO₂⁺ electrolyte
- 10) Additional Foldable Rack/stand should be provided for Cell arrangement
- 11) Additional set of Tubing's must also be provided as spare
- 12) A layout of test stand with electrochemical station is given below for the vendor's reference. This is only for reference, actual system can have any layout as long as it full fills above said requirements and occupies the space effectively and allowing easy operation without hindering the user accessibility to various parts of the flow system.



Schematic/Layout of Redox Flow Station

Part C: Other conditions

- 1) Warranty: Minimum of 2 years on flow system and electrochemical station.
- 2) Vendor should provide atleast five proof of installation of the similar or higher end system mentioned in Part A of the tender
- 3) A detailed compliance certificate along with the supporting documents like brochure/catalog should be included in the technical bid.