



**NATIONAL INSTITUTE OF TECHNOLOGY
ROURKELA-769008 (ODISHA)**

An Institute of National Importance under Ministry of HRD, GOI

NOTICE INVITING TENDER

Tender Notification No: NITR/PW-SR/CR/2019/138

Dated: 19/08/2019

The National Institute of Technology, Rourkela invites bids from the eligible bidders for procurement of **Research Grade Multichannel Battery Cyclers**.

Last date of Submission of Bid : **16/09/2019 at 03:00 PM**

Date of opening of techno-commercial Bid : **18/09/2019 at 11:00 AM**

For Details: http://nitrkl.ac.in/OldWebsite/Jobs_Tenders/9Equipment/Default.aspx

Contact: Dr. Partha Saha , CR; Ph: +91-661-2462211;

Email: sahap@nitrkl.ac.in

Bidding through: <https://eprocure.gov.in/eprocure/app>

**sd/-
REGISTRAR**



**NATIONAL INSTITUTE OF TECHNOLOGY
ROURKELA-769008, ODISHA**

(OPEN TENDER NOTICE NO.: NITR/PW-SR/CR/2019/138

dated: - 19/08/2019)

(Procurement of Research Grade Multichannel Battery Cycler)

Sl. No.	Description of Goods/Service	Quantity
01.	Multichannel Battery Cycler consisting of minimum 16 channels (Part A) (Detailed specification as per Annexure – I)	01 unit
02.	Multichannel Battery Cycler consisting of minimum 2 channels (Part B) (Detailed specification as per Annexure – I)	01 unit
03.	Computer System (Detailed specification as per Annexure – I)	02 units
04.	Online UPS (Detailed specification as per Annexure – I)	02 units
Accessories		
05.	Battery cell holders (Detailed specification as per Annexure – I)	01 unit
06.	Corrosion Flat Cell Kit (Detailed specification as per Annexure – I)	01 unit
07.	Small Voltammetry Cell kit (Detailed specification as per Annexure – I)	01 unit
08.	Two Electrodes Swagelok Cell (Detailed specification as per Annexure – I)	02 units
09.	Current booster (Detailed specification as per Annexure – I)	01 unit
10.	Air conditioner (Detailed specification as per Annexure – I)	01 unit
11.	Enclosed unit/hood (Detailed specification as per Annexure – I)	01 unit

1. Quantity required : **As mentioned above (All information regarding technical specification provided in the Annexure-I)**
2. Delivery : Within **60 days** from the date of purchase order
3. **Last Date of submission of Bid : 16/09/2019 at 03:00 PM**
4. **Date of opening of techno-commercial bid : 18/09/2019 at 11:00 AM**
5. The firm should not have been black listed at any time.
6. The submission of following bids by the tenderer should be through <https://eprocure.gov.in/eprocure/app>. Please follow the guidelines as per the portal

Procurement of research grade multichannel battery cycler

(Open Tender Notice No.: NITR/PW-SR/CR/2019/138 dated: 19/08/2019) Due on 16/09/2019 at 03:00 PM

7. **Liquidated damage clause** will be charged for any delay in supply of goods.
8. The validity of the tender shall be **90 days** from the date of opening of the bids.
9. Detailed advertisement including all tender documents is also available in our website at http://nitrkl.ac.in/OldWebsite/Jobs_Tenders/9Equipment/Default.aspx .
10. NIT reserves the right to qualify or deny prequalification of any or all applicants without assigning any reasons.

(REGISTRAR)
NIT, Rourkela
Fax No- 0661-2462022
Ph. No -0661-2462021

Technical specifications for research grade multichannel battery cycler

The multichannel battery cycler must be capable of testing: (1) two electrode swagelok cell (2) two/three electrode cell, (3) coin cell, (4) pouch cell, and (5) cylindrical cell.

- (1) Minimum 18 channels and upgradable and expandable to more channels for future customization.
- (2) All the channels should be independent and must operate simultaneously.
- (3) Suitable length connection cables/wires for each channel must be provided.
- (4) Minimum 16 channels unit/workstation must have the specifications outlined in **Part A**.
- (5) Minimum 2 channels unit/workstation must have the specifications outlined in **Part B**.

Sl. No.	Technical Specification
1	<p>Part A (Minimum 16 channels unit/workstation) Circuit Type: True Bipolar Linear; must allow cross-zero linearity, absolutely no switching time between charge / discharge or potentiostat/galvanostat operation</p> <p>Voltage range: 0-5 V or better Voltage Resolution control: 150 μV or better Voltage Resolution Measurement: 18 bit or better Voltage Accuracy: 0.02% FSR: \pm2 mV or better Voltage Compliance: 0-5V or better Current range: 0.5 μA-1 A or better Current Resolution control: 1nA or better Current Resolution Measurement: 18 bit or better Current Accuracy: < 0.05% of setting \pm 0.01% of FSR Input Impedance: 10 GΩ or better Acquisition time: 2 mS or better Data logging rate: 2000 points per second or better per system</p> <p>Safety The safety of unit/workstation must be ensured under all circumstances and the system shall be fail safe. The system must have its own inherent "watchdog/warning system" to warn the user by audio and visual alarms in case of any emergency related to power or otherwise.</p> <p>Software for Data Acquisition/Analysis The licensed control software of the battery cycler must have a logical menu-driven programming to set control types, termination conditions, and data logging conditions for tests. All results data must be automatically saved in an SQL database. The software must also provide control to customize tests with over 80+ meta variables in addition to using numeric values. Each step must have multiple modes of data logging, and a wide array of auxiliary options must be available to expand the interface and control capabilities. Additional two extra copies (CD-ROM) or more of licensed software should be provided.</p> <p>Software capability Software must be capable to provide following measurements as well as controls:</p> <ol style="list-style-type: none"> a. Current, Voltage, C-Rate b. Rest c. Power, Load d. Set Variables(s) e. Current Ramp & Voltage Ramp f. Current Staircase

	<p>g. Internal Resistance & CCCV</p> <p>h. Current Simulation & Power Simulation</p> <p>i. The Formula option enables to control and limit schedule steps according to dynamic mathematical equations using variables rather than fixed control value</p> <p>j. Ability to map auxiliary channels</p> <p>Computer A PC (Configuration: Intel i7 Processor, 3 GHz Processor Speed, 8 GB RAM, 1 TB HDD, 22-inch monitor, Keyboard and optical mouse, 64 bit compatible) with latest version of Windows compatible instrument operating software for smooth running of unit/workstation must be provided.</p> <p>Power back-up A 5 KVA or more online UPS from branded companies with minimum 1h battery backup must be provided for uninterrupted data acquisition and smooth operation of the unit/workstation.</p>
2.	<p>Part B (Minimum 2 channels unit/workstation)</p> <p>One channel has to be completely independent while functioning from second channel. Both channel/workstation must have basic electrochemical analysis facilities of the following: 1) Open Circuit, 2) Linear Scan Voltammetry, 3) Cyclic Voltammetry (Single), 4) Cyclic Voltammetry (Multiple Cycles), 5) Staircase Linear Scan Voltammetry, 6) Staircase Cyclic Voltammetry, 7) Staircase Cyclic Voltammetry (Multiple Cycles), 8) Multi-Vertex Scan, 9) Chronocoulometry, 10) Chronoamperometry, 11) Chronopotentiometry, 12) Recurrent Potential Pulses, 13) Recurrent Galvanic Pulses, 14) Linear Polarization Resistance (LPR), 15) Tafel, 16) Potentiodynamic, 17) Cyclic Polarization, 18) Potentiostatic, 19) Galvanic Corrosion, 20) Galvanostatic, 21) EN, 22) Split LPR, 23) Galvanic Control LPR, 24) Galvanodynamic, 24) Zero Resistance Ammeter (ZRA), 25) Potentiostatic EIS, 26) Galvanostatic EIS, 27) Mott-Schottky, 28) Constant Potential, 29) Constant Current, 30) Constant Power, 31) Constant Resistance, 32) 33) Current CCDPL, 34) Power CCD, 35) Resistance CCD, 36) CC-CV, 37) GITT, 38) PITT, 39) Charge-Discharge; while one channel/workstation must have dedicated electrochemical impedance spectroscopy (EIS) facilities. In future EIS upgradation should be available without changing cabinet/chassis.</p> <p>Compliance Voltage: $\pm 12V$ or better. Adjustable compliance voltage configurations will not be considered. Compliance voltage add-ons or modules have to be quoted separately.</p> <p>Current Compliance: ± 350 mA or better</p> <p>Applied Potential range: ± 10 V or better</p> <p>Current Ranges: ± 10 nA to ± 100 mA in minimum multiple ranges or better.</p> <p>Applied Current: ± 350 mA or better</p> <p>Voltage Resolution: $5\mu V$ or better</p> <p>Applied Voltage Accuracy: $\pm 0.2\%$ of value or better</p> <p>Applied Current Resolution: 0.02% of current range or better</p> <p>Current Accuracy: 0.03% at entire current range or better</p> <p>Rise/Fall time: < 500 ns or lower</p> <p>Acquisition speed/ Data Sampling: $50,000$ samples/second or better</p> <p>Auxiliary inputs/ outputs: 2 Analog Inputs and 1 Analog Output, 2 Digital Inputs and 1 Digital Output for both channels</p> <p>Maximum Scan Rate: 300 V/s or better</p> <p>Electrometer Bandwidth: greater than 4 MHz or better</p> <p>Input Impedance: 1 GigaΩ or better</p> <p>Bias/Leakage Current: < 10 pA or better</p> <p>Measured Voltage Range: $\pm 10V$</p>

Electrochemical Impedance Spectroscopy and Frequency Range: 10 μ Hz to 1 MHz or better Frequency resolution < 10 ppm of the setting Sinus amplitude 0.5 mV to 2.5 V with 1 mV resolution 0.1% to 100% of the current range with resolution of 0.004% of the range. Mode single sine, multisine, FFT analysis, EIS quality indicator, built-in EIS simulation software, real time or post analysis fit-simulation, live issejous plots, live 3D plotting, real-time view of 3+ plots. Built-in analog integrator and IR compensation, capability to measure plot integrated charge and integrated current in real time.

Safety

The safety of unit/workstation must be ensured under all circumstances and the system shall be fail safe. The system must have its own inherent warning system during emergency related to power failure or other external factor.

Software for Data Acquisition/Analysis

A suitable licensed software should be available for Data acquisition and analysis. Additional two copies of licensed software (CD-ROM) should be provided. The software must be able to be downloaded to unlimited computers & fully windows based.

Software capability

Software should be capable of supporting a wide variety of electrochemical techniques as mentioned: OCV, CV, LSV GEIS, PEIS –Electrochemical Impedance Spectroscopy Technique should be available with Equivalent EIS fitting circuit analysis. Analysis tools for CV, Battery, Corrosion–Rp and Tafel Fit, Solar IV-FF, Efficiency should be available. Battery Techniques like CC-CV, GITT and PITT should be available. Battery Capacity Determination Technique should be available. Corrosion: Linear polarization with Tafel Slope Analysis, Polarization resistance evaluation, Electrochemical Noise analysis, critical pitting technique, electrochemical frequency modulation, hydrogen permeation analysis etc. Battery & Supercapacitor Analysis: Rectangular CV analysis at varying scan rates for pseudocapacitor 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, etc. Solar Cell Characterization: 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, etc. Electro-catalysis: ORR analysis using RDE/RRDE at varying rotation speeds and built-in Kotecky-levich plot generation, HER and OER analysis for water splitting, Carbon dioxide reduction analysis, default technique for spectro-electrochemistry based LSV, CV and Chrono evaluation. 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.

Computer

A PC (Intel i5 Processor, 3 GHz Processor Speed, 16 GB RAM, 1TB HDD, 19-inch LED Monitor, Keyboard and optical mouse, 64 bit compatible) with latest version of Windows compatible operating software must be provided for smooth running of the unit/workstation.

Power back-up

A 2 KVA or more online UPS from branded companies with minimum 30 min battery backup must be provided for uninterrupted data acquisition and smooth operation of the unit/workstation.

Accessories	
3.	Battery cell holders Battery cell holders for coin cell (24 nos), cylindrical cell (1 no), and flat cell (1 no) must be provided (1 unit).
4.	Corrosion Flat Cell Kit A complete flat cell corrosion kit [250ml capacity with 1cm ² working area (exposure) as per ASTM Standard] with Ag/AgCl reference electrode, platinum mesh counter electrode, and glassy carbon working electrode must be provided (1 unit).
5.	Small Voltammetry Cell kit A 3-electrode Set-up: WE – 2 mm GC; CE – Pt; RE - Non-Aqueous Ag/AgCl and Aqueous Ag/AgCl; Vessel – 50 ml with teflon cap; inlet/outlet gas purging facilities must be provided (1 unit).
6.	Two Electrodes Swagelok Cell Easy to assemble Swagelok cell in PEEK (or equivalent) body with bore diameter of 8 mm must be provided (2 units).
7.	Current booster A current booster (current ± 10 A) compatible with the system must be provided (1 unit).
8.	Air conditioner 1.5 ton air conditioner (split A/C inverter type) with installation and necessary cables for uniform temperature control of the unit/workstation during testing and measurement must be provided locally (1 unit).
9.	An enclosed unit/hood A suitable enclosed unit/hood with overall dimension of 1200mm (W) x 900mm (D) x 2400mm (H) or equivalent should be provided to operate the equipment under contamination free environment and free from any external electrical/magnetic disturbances/noise etc. (1 unit).

Other qualification criteria

1. 3 numbers scanned copy of PO (not older than 7 years) of multichannel battery cyler (Part A and Part B) of similar or higher specification supplied within India (at least ONE from premier Government Institution and R & D Organization) and also 3 number of POs for supply in countries other than India (not older than 7 years) must be provided.
2. Detailed user list (at least 10) with the concerned person's valid contact details, in India and abroad where instrument is still in operational condition must be provided.
3. The ordered goods are required to be installed within 45 days of receipt of goods at this Institute. 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 Faculties / Engineers / Technicians. Installation and training must be free of cost.
4. Prior installation conditions / site preparation / electrical connection required must be clearly mentioned in the quotation along with technical bidding documents.
5. Make and model number should be mentioned in the technical bid.
6. There must be a local maintenance center with availability of the spares in India.

For goods manufactured in abroad

1. If the instrument is of foreign origin (i.e. manufactured in foreign country) then price must be quoted in foreign currency.
2. The price must be mentioned with clear demarcation at every stage such as instrument price, discount, packing and forwarding, transport, insurance whichever is applicable.
3. Bidder should mention the country of origin and the country from which goods will be finally shipped.
4. In case, an Indian agent is directly submitting a bid on behalf of its Principals, a copy of the Authorization Certificate issued by the Principals in favor of the Indian agent should be furnished along with a certified copy of the Agency Agreement between the foreign Principal and Indian agent. Both these certificates must be up-to-date.
5. A letter in the official letter head of the principal declaring the Indian agent as their authorized agency to bid must contain the official tender enquiry number as depicted in CPP portal must be included with the technical bid. (This must not be clubbed with Authorization Certificate).
6. The delivery up to NIT Rourkela is solely bidder's responsibility. The price must be quoted in foreign currency up to CIP Kolkata basis. NIT Rourkela will provide the custom duty concessional certificate for the clearance.

For goods manufactured in India

1. The price must be mentioned with clear demarcation at every stage such as instrument price, discount, GST calculated, packing and forwarding, transport, insurance whichever is applicable.
2. GST at applicable rates, which will be payable on the goods if the contract is awarded.
3. Bidders are requested to calculate GST @5% (in this regard necessary documents will be provided to the awardee bidder at the appropriate stage).
4. The delivery up to NIT Rourkela is solely bidder's responsibility. Therefore, charges for inland transportation, insurance and other local services required for delivering the goods at NIT Rourkela must be mentioned in the financial bid.

Earnest Money deposit/Bid Security (EMD/BS)

The Bidder must furnish, as part of its bid, a Bid Security (BS) for an amount as specified in the Invitation for e-procurement. In the case of foreign bidders, the BS shall be submitted either by the Principal or by the Indian agent and in the case of indigenous bidders; the BS shall be submitted by the manufacturer or their specifically authorized dealer/bidder.

The bid security may be forfeited:

1. If a Bidder withdraws or amends or impairs or derogates its bid during the period of bid validity specified by the Bidder on the Bid Form; or
2. In case of a successful Bidder, if the Bidder fails to furnish order acceptance within 21 days of the order or fails to sign the contract and/or fails to furnish Performance Security within 21 days from the date of Purchase order. or
3. In case selected L1 bidder (after qualifying the technical bidding) fails to comply or try to change the specification of the instrument after Purchase Order has been issued; or

4. In case selected L1 bidder (after qualifying the technical bidding) claims the inability to supply the instrument within quoted price. or
5. In case selected L1 bidder (after qualifying the technical bidding) declares their inability to supply the instrument. or
6. In case selected L1 bidder (after qualifying the technical bidding) impose any extra condition/cost which was not mentioned in their quotation with respect to technical specification and commercial terms and conditions. or
7. In case bidder impose any prior installation condition/ requirement of consumables during installation at NIT, involving extra cost at purchaser's side which is not mentioned in the quotation. or
8. In case of any violation of GFR17.

Performance Security (PS)

Within 21 days of receipt of the notification of award/PO, the Supplier shall furnish performance security in the amount specified in tender document, valid till 60 days after the standard warranty period.

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