

	INDIAN INSTITUTE OF TECHNOLOGY MADRAS Chennai 600 036 Telephone: [044] 2257 9723/9798 E-mail: tender@iimail.iitm.ac.in	
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The Senior Manager (Project Purchase)

Ref: CE/STORES/2019/PHYSISORPTION & CHEMISORPTION
Date: 17.12.2019

Open Tender No: CE/STORES/2019/PHYSISORPTION & CHEMISORPTION

Due Date: 06 January 2020, 3 PM

Pre-Bid meeting: - NA

Technical Bid opening meeting on 06 January 2020, 4.00 PM at Department of Civil Engineering, IIT-Madras.

Dear Sir/Madam,

On behalf of the Indian Institute of Technology Madras, offers are invited for the supply of **“AUTOMATIC PHYSISORPTION AND CHEMISORPTION ANALYZER”** conforming to the specifications given in Annexure I.

Instructions to the Bidder

- I. **Preparation of Bids:** - The tenders should be submitted under two-bid system (i.e.) Technical bid and Financial bid.
- II. **Delivery of the tender:** - The tender shall be sent to the address mentioned below, either by post or by courier so as to reach our office before the due date and time specified in our schedule. The offer/bid can also be dropped in the tender box on or before the due date and time specified in the schedule.

The tender box is kept in the office of the:

**The Senior Manager,
Project Purchase,
IC & SR Building, 2nd floor,
I.I.T. Madras,
Chennai – 600 036.**

- III. **Opening of the tender:** - The offer/bids will be opened by a committee duly constituted for this purpose. The technical bids will be opened first and will be examined by a technical committee which will decide the suitability of the bids as per our specifications and requirements. All bidders will be invited for opening of the technical bids. For opening the financial bid, only technically qualified bidders will be called.

- IV. Prices:** - The price should be quoted in net per unit (after breakup) and must include all packing and delivery charges to the **Department of Civil Engineering**. The offer/bid should be exclusive of taxes and duties. The percentage of tax & duties should be clearly indicated separately. Kindly note that IIT Madras is eligible for concessional GST and relevant certificate will be issued.

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 basis (stating the Cost, Insurance, Freight separately) and indicating the mode of shipment.

- V. Agency Commission:** - Agency commission, if any, will be paid to the Indian agents in rupees after receipt of the equipment and its satisfactory installation. Agency Commission will not be paid in foreign currency under any circumstances. The details should be explicitly shown in the tender document even in the case of 'Nil' commission. The tenderer should indicate the percentage of agency commission to be paid to the Indian agent. The Foreign Principal should indicate the percentage of payment and it should be included in the basic price quoted originally (if any)..
- VI. Terms of Delivery:** - The item should be supplied to the **Department of Civil Engineering, IIT Madras** as per the 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.
- VII. Technical Bid Opening:** The technical bid will be opened on 06 January 2020, 4.00 PM at the **Department of Civil Engineering, IIT-Madras**. The financial bids of those tenderers who are technically qualified will be opened at a later date under intimation to them.
- VIII. IIT Madras** reserves the full right to accept / reject any tender at any stage without assigning any reason.

Yours sincerely,

The Senior Manager (Project Purchase)
IC&SR Building, I.I.T. Madras,
Chennai - 600 036.

SCHEDULE

Important Conditions of the tender

1. The due date for the submission of the tender is **06.01.2020, 3 PM.**

The offers / bids should be submitted under two bid system (i.e.) Technical bid and financial bid. The Technical bid should consist of all technical details / specifications only. The Financial bid should indicate item-wise price for each item and it should contain all Commercial Terms and Conditions including Taxes, transportation, packing & forwarding, installation, guarantee, payment terms, pricing terms etc. The Technical bid and financial bid should be put in separate covers and sealed. Both the sealed covers should be put in a bigger cover. The Open Tender for supply of **“AUTOMATIC PHYSISORPTION AND CHEMISORPTION ANALYZER”** should be written on the left side of the Outer bigger cover and sealed.

2. **EMD: - The EMD (Should be in INR) in the form of Account Payee Demand Draft/Banker's Cheque for 2% of the quoted value of the item; drawn in favor of The Registrar-IIT Madras, payable at Chennai should be enclosed in the cover containing financial bid. Any offer not accompanied with the EMD shall be rejected summarily as non-responsive.**

The EMD of the unsuccessful bidders shall be returned within 30 days of the end of the bid validity period. The same shall be forfeited, if the tenderers withdraw their offer after the opening during the bid validity period. The Institute shall not be liable for payment of any interest on EMD. EMD is exempted for Micro and Small Enterprises (MSE) as defined in MSE Procurement Policy issued by Department of Micro, Small and Medium Enterprises (MSME).

When a foreign vendor does not have a local agent in India, he can submit a demand draft equal to 2% or wire transfer the amount to our account as detailed in the attachment (Annexure II) and enclose the proof with the financial bid.

3. **Performance Security: -** The successful bidder should submit Performance Security for an amount of 5% of the value of the contract/supply. The Performance Security may be furnished in the form of an Account Payee DD, FD Receipt from the commercial bank, Bank Guarantee from any nationalized bank in India. **The performance security should be furnished within 21 days from the delivery of the purchase order.**

Performance Security in the form of Bank Guarantee: - In case the successful bidder wishes to submit Performance Security in the form of Bank Guarantee, the Bank Guarantee 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 from a Nationalized Bank of India.

The Bank Guarantee should remain valid for a period of sixty days beyond the date of completion of all contractual obligations of the supplier including the warranty obligations.

4. **Indian agent:** If an Indian agent is involved, the following documents must be enclosed:

Foreign principal's proforma invoice indicating the commission payable to the Indian Agent and nature of after-sales service to be rendered by the Indian Agent.

- ✓ Copy of the agency agreement with the foreign principal and the precise relationship between them and their mutual interest in the business.

5. The offer/bids should be sent only for a machine that is available in the market and supplied to a number of customers. A list of customers in India and abroad with details must accompany the quotations. Quotations for a prototype machine will not be accepted.
6. Original catalogue (not any photocopy) of the quoted model duly signed by the principals must accompany the quotation in the Technical bid.
7. Compliance or Confirmation report with reference to the specifications and other terms & conditions should also be obtained from the principal.
8. **Validity:** The validity of Quotation should not be less than 90 days from the due date of tender.
9. **Delivery Schedule:** - The tenderer should indicate clearly the time required for delivery of the item (subjected to the executive committee-IITMadras approval). In case there is any deviation in the delivery schedule, liquidated damages clause will be enforced or penalty for the delayed supply period will be levied.
If there is delay, the penalty will be @1% per week of delay subject to a max of 10% of the value of purchase order and if the delay is more than accepted time frame by IITM, the PO would be cancelled and liquidated damages will be enforced.
10. **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.
11. **Payment:** -
 - (i) 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).
 - (ii) **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.
12. **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) from the date of receipt of the item at site of IIT Madras
13. **Warranty/Guarantee:** - The offer should clearly specify the warranty or guarantee period for the machinery/equipment. **The equipment should have a minimum of 3 years warranty in all respects.**
14. **Late offer:** - The offers received after the due date and time will not be considered. The Institute shall not be responsible for the late receipt of Tender on account of Postal, Courier or any other delay.
15. **Acceptance and Rejection:** - I.I.T. Madras has the right to accept the whole or any part of the Tender or portion of the quantity offered or reject it in full without assigning any reason.
16. **Do not quote the optional items or additional items unless otherwise mentioned in the Tender documents / Specifications.**

17. Disputes and Jurisdiction:

Settlement of Disputes: Any dispute, controversy or claim arising out of or in connection with this PO including any question regarding its existence, validity, breach or termination, shall in the first instance be attempted to be resolved amicably by both the Parties. If attempts for such amicable resolution fails or no decision is reached within 30 days whichever is earlier, then such disputes shall be settled by arbitration in accordance with the Arbitration and Conciliation Act, 1996. Unless the Parties agree on a sole arbitrator, within 30 days from the receipt of a written request by one Party from the other Party to so agree, the arbitral panel shall comprise of three arbitrators. In that event, the supplier will nominate one arbitrator and the Project Coordinator of IITM shall nominate on arbitrator. The Dean IC&SR will nominate the Presiding Arbitrator of the arbitral tribunal. The arbitration proceeding shall be carried out in English language. The cost of arbitration and fees of the arbitrator(s) shall be shared equally by the Parties. The seat of arbitration shall be at IC&SR IIT Madras, Chennai.

- a. **The Applicable Law:** This Purchase Order shall be construed, Interpreted and governed by the Laws of India, Court at Chennai shall have exclusive jurisdiction subject to the arbitration clause.
- b. 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.

18. All Amendments, time extension, clarifications etc., will be uploaded on the website only and will not be published in newspapers. Bidders should regularly visit the above website to keep themselves updated. No extension in the bid due date/ time shall be considered on account of delay in receipt of any document by mail.

Acknowledgement: - It is hereby acknowledged that the tenderer has gone through all the conditions mentioned above and agrees to abide by them.

**SIGNATURE OF TENDERER
ALONG WITH SEAL OF THE
COMPANY WITH DATE**

Technical Specifications of Automatic Physisorption and Chemisorption Analyser

Fully automatic, gas sorption analyser is required for high-throughput micropore surface area and pore size distribution measurements. The system should be able to handle all types of sample in powder, pellet & monolith forms. The equipment shall have the following technical & general specifications.

A. Technical Specifications of Physisorption and Chemisorption Analyser

- [1] The instrument must be capable of measuring specific surface area and pore size distribution of porous media containing pore sizes ranging from 0.45 nm to 450 nm or wider range.
- [2] The equipment shall have the capability to perform complete chemisorption analysis using temperature-programmed desorption (TPD), temperature-programmed reduction (TPR), temperature-programmed oxidation (TPO) and pulse chemisorption modes.
- [3] The equipment must be fully automated, supplied with all the accessories and features for sample preparation, as well as sample treatment.
- [4] The equipment must have dedicated gas cell and transducer for continuous P_0 measurements without interrupting the analysis.
- [5] It should include a minimum three dedicated degassing stations with access to a turbo vacuum pump via cold-trap. At least two degassing stations should be operated simultaneously using different degassing protocols.
- [6] The equipment must be capable of performing degassing and analysis, simultaneously.
- [7] It should be able to handle gases, including non-corrosive gases, such as carbon dioxide, methane, hydrogen, nitrogen, oxygen, argon, krypton, butane, and carbon monoxide.
- [8] The system should have physisorption and chemisorption analysis capability and system should be able to switch between physisorption and chemisorption with the help of equipment's software.
- [9] The physisorption port should be fitted with at least 1000 Torr, 10 Torr & 0.1 Torr transducers to perform extended micropore measurements.
- [10] It should have a fully integrated (using the equipment's software), built-in/external vacuum system using an oil-free turbopump.
- [11] The equipment shall have high-vacuum construction using metal-to-metal seals for long-life performance. The system shall also be fitted with EPDM elastomeric seals for measurements using ammonia.
- [12] Void volume should be automatically measured or re-use earlier measurements.
- [13] The instrument should use low cold zone technology to enhance sensitivity as well as to prevent the cooling of the stem of the sample cell.
- [14] The equipment must monitor the manifold temperature and pressure continuously.

- [15] The system should have multiple dosing modes using a target P/P_0 or fixed volumes in multiple ranges. The dosing feature should use the prior analysis as a template in subsequent runs to achieve precise dosing.
- [16] The equipment must measure the saturation pressure continuously. It should have an option to use user-entered value.
- [17] The system must be supplied with liquid nitrogen Dewar of capacity 3 L or more to perform an uninterrupted analysis time of at least 70 hours without refilling liquid nitrogen.
- [18] The P_0 cell option must be available to maintain the liquid nitrogen at the desired level.
- [19] The water level sensor must be supplied for CO_2 analysis.
- [20] The system should have an automatic selection of analysis gas from five inputs and an additional input for the injection loop for chemisorption.
- [21] The system should have a fully integrated vapor analysis.
- [22] The vapor analysis facility should have a glass container, fully enclosed inside heated manifold container kept at $50\text{ }^\circ\text{C}$, adjustable to a lower temperature also.
- [23] The vapor-phase analysis to gas-phase analysis switching should be completely automatic. The vapor analysis should enable the user to use cells of different sizes.
- [24] The degassing should be able to program multiple heating ramps and holding times, with the smart degassing facility, which would monitor the pressure and pause heating on command.
- [25] The degassing unit should be able to terminate heating, as per the program.
- [26] The system should have programmable evacuation to avoid elutriation.
- [27] The system should have an automatic backfill facility from dedicated gas input or isolate under vacuum at the end of degassing.
- [28] The degassing protocols should be stored along with analysis data and should be available for later use.
- [29] The vacuum path should have a refillable cold trap for best degas vacuum levels.
- [30] The heating mantles should be able to reach at least $350\text{ }^\circ\text{C}$ and must be supported by retractable tethers to eliminate hot metal clips for ease of use. It should have dual, independent thermocouples for over-temperature safety.
- [31] The furnace temperature should be able to go up to $1100\text{ }^\circ\text{C}$. Accuracy should be of 0.1% of span & stability of $\pm 1\text{ }^\circ\text{C}$. User-selectable ramp rates ranging from $1\text{ }^\circ\text{C}$ to $50\text{ }^\circ\text{C}$ per minute must be available. It should have a rapid cooling mechanism without using utility air. It should also offer dual thermocouples for independent control and over-temperature protection.
- [32] The system should have automatic furnace lid placement and removal for improved thermal control and user safety.

- [33] The thermal conductivity detector (TCD) filament should be made of tungsten/rhenium (W/Re) and oxidation and ammonia resistant for all applications.
- [34] Pulse titration with both automatic and manual loop should be available.
- [35] The system should be compatible with the integration of the mass spectrometer at the site, at a later date.
- [36] The system should offer complete software, including peak deconvolution for quantitative TPX results.
- [37] The equipment should also offer built-in calibration ports for reliable quantitative results.
- [38] The instrument should have the following basic measurement specifications:
- The specific surface area of 0.01 m²/g and above should be measured accurately using nitrogen (at liquid nitrogen temperature).
 - Adsorbed/desorbed gas should be measured with a sensitivity of 2 x 10⁻⁹ moles with 0.1 Torr transducer.
 - Maximum P/P₀ using nitrogen/argon should be 0.999.
 - The ultimate vacuum that can be attained should be 5x10⁻¹⁰ mbar or better.
- [39] The instrument should have the following measurement criteria:
- It should be able to compute specific surface area using at least BET, Langmuir, t-plot, BJH/DH, DR, and DFT techniques.
 - Mesopore size should be calculated using NLDFT, BJH/DH, and Kr thin-film computations, and micropore size should be computed using NLDFT, QSDFT, SF, HK, MP method, DA and Monte Carlo methods.
 - There should be provision for estimation of pore volume using Gurvich, α -s, BJH/DH, DFT, and DR techniques.
 - Adsorption energy should be computed using the techniques of Clausius-Clapeyron, and DR.
 - Fractals should be computed using the techniques of FHH, and NK.
 - Chemisorption should be computed using the Clausius-Clapeyron method.
 - Catalyst parameters such as active (metal) area, dispersion, and crystallite size should be estimated.
 - Extrapolation, Langmuir, dissociative Langmuir, Freundlich, Temkin should be employed to estimate chemisorption parameters.
 - For all the above analyses, the relevant libraries must be included in the software.
- [40] The instrument operation and data management must be done by Windows-based software. The calibration procedures must be controlled by the software. The software should have in-built features for automatic start and shutdown procedures, real-time display of the sample analysis progress. The software should have all the data handling features like user-defined report generation, data/figure export to spreadsheets & offline data processing.

- [41] The software should monitor the analysis in real-time and display warnings and cautions if necessary. The equipment should have safety features that are integrated with the software to prevent the user from performing potentially dangerous actions.
- [42] Suitable reference standards for micropore & mesopore range and for chemisorption must be included.
- [43] The system should have provisions for an onsite upgrading for additional one or more micropore analysis stations, without any hardware upgrade to host such stations.
- [44] The system must be supplied with five of each 12 mm, 9 mm, 6 mm long sample cells and short cells of 9 mm. An additional 20 O-rings for all the cell sizes should be provided.
- [45] Suitable vacuum pump oil for three years of operation shall be supplied.

B. General Specifications of Automatic Physisorption and Chemisorption Analyser

- [1] The equipment must be installed by the technical persons of the vendors/principals.
- [2] The vendor should provide installation details of at least 10 similar installations in India in the past three years.
- [3] Proper demonstration and 3-day training should be given to the users by the application specialist after successful installation by the well-trained service engineer.
- [4] All the necessary accessories should be provided.
- [5] The equipment should have a minimum of 3 years' warranty in all respects.
- [6] Software upgrades should be provided free of cost.
- [7] The list of at least ten users of quoted model installations in India including contact details (name of the person-in-charge, email and phone number) is to be provided. This information will be used for obtaining technical and after-sales support of the bidder.
- [8] The cost should include a 36-month warranty and CIP up to Chennai or in INR.
- [9] There must be a local service engineer in Chennai or nearby cities in India. The downtime should not be more than two days. Detail of service persons to be provided during bid submission along with their training certificates at the principals.
- [10] Payment conditions: 90% LC at site and 10% after installation and training, in the case of CIP. 100% after installation and training, in case the price is quoted in INR.
- [11] The vendor must be an OEM.
- [12] The system should be delivered within 8 to 10 weeks from the opening of the letter of credit or issue of the purchase order, whichever is later.
- [13] Individual costs should be indicated for the different items (parts) quoted. IIT Madras reserves the right to exclude some items from the purchase. Items must be quoted separately.
- [14] Costs and related information should be given only in the financial bid.



CENTRE FOR INDUSTRIAL CONSULTANCY & SPONSORED RESEARCH (IC&SR)
INDIAN INSTITUTE OF TECHNOLOGY MADRAS
CHENNAI 600 036



**ELECTRONIC CLEARING SERVICE (Credit Clearing) / REAL TIME
GROSS SETTLEMENT (RTGS) FACILITY FOR RECEIVING PAYMENTS**

A. Details of Account Holder

Name of the Institution	Indian Institute of Technology - Madras
Complete Contact Address	Industrial Consultancy and Sponsored Research Indian Institute of Technology-Madras, IIT- Madras Campus Post Office, Sardar Patel Road, Guindy, CHENNAI - 600 036
Telephone No./ Fax No.	Tel - 044-22578355 / Fax - 044-22570545
E- mail ID of the FO/AO/REG/DIR	dricsr@iitm.ac.in

B. Bank Account Details:

Institution Account Name (As per Bank Record)	The Registrar, Indian Institute of Technology - Madras
Account No.	2722101001741
Account Print Name	IIT F A/C , The Registrar IIT Madras
IFSC CODE	CNRB0002722
Bank Name (in full)	Canara Bank
Branch Name	IIT-Madras Branch
Complete Branch Address	Canara Bank, IIT-Madras Branch, IIT- Madras Campus Post Office, Sardar Patel Road, Guindy, CHENNAI - 600 036
MICR No.	600015085
Account Type	Savings Account

Certified that the Institute's account is in an RTGS enabled branch.

I hereby declare that the particulars given above are correct and complete.

Date:

Signature of the Competent Authority
of the Institution with seal.

KM...
DEPUTY REGISTRAR (IC&SR) (IC)
IC & SR, I.I.T. MADRAS
CHENNAI - 600 036

Certified that the particulars furnished above are correct as per our records.

Date:



For CANARA BANK
B. Sekar
SENIOR MANAGER
I.I.T. CHENNAI-600 036.

Signature of the Authorized
Bank Official with Bank Seal.

B. SEKAR
Senior Manager
SP No 39312



CENTRE FOR INDUSTRIAL CONSULTANCY & SPONSORED RESEARCH (IC&SR)
INDIAN INSTITUTE OF TECHNOLOGY MADRAS
CHENNAI 600 036



K VIJAYALAKSHMI
DEPUTY REGISTRAR (IC&SR) *KL*

Project Accounts
July 5, 2019

TO WHOMSOEVER IT MAY CONCERN

In connection with project, US currency may be transferred to CANARA BANK, IIT – MADRAS
Branch In connection with the following details.

FOR TRANSFER OF CURRENCY US DOLLAR

Please Credit in USD

(THROUGH)

JP MORGAN CHASE, NEW YORK
SWIFT CODE: CHASUS33

For credit to

USD ACCOUNT No: 001 – 1395969, of CANARA BANK INTERNATIONAL DIVISION MUMBAI

For Further Credit to

ACCOUNT NO: 2722101001741 of IIT Chennai – Swift Code: CNRBINBBIIT OF THE
REGISTRAR, IIT, MADRAS

K Vijay
DEPUTY REGISTRAR(IC & SR) i/c

This is to certify that particulars furnished are correct.

for CANARA BANK
[Signature]
Senior Manager
Canara Bank – IIT Madras branch

B. SEKAR
Senior Manager
SP No. 39312



DEPUTY REGISTRAR (IC&SR) (i/c)
IC & SR, I.I.T. MADRAS
CHENNAI - 600 036