

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

**Ref: CHE/PREE/2019/FTIR**

Date: 02.12.2019

**Open Tender No: CHE/PREE/2019/FTIR**

**Due Date: 23rd December 2019, 3 PM**

**Pre-Bid meeting: - NA**

**Technical Bid opening meeting on 23rd December 2019, 4:00 PM at Department of Chemical Engineering, IIT-Madras.**

Dear Sir/Madam,

On behalf of the Indian Institute of Technology Madras, offers are invited for the supply of “**FTIR SPECTROMETER**” 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, 2<sup>nd</sup> 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 Chemical 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 Chemical 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 23rd December, 2019, 4:00 PM at the **Department of Chemical 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 **23.12.2019, 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 “**FTIR SPECTROMETER**” 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/Fixed Deposit Receipt/ Banker’s Cheque or Bank Guarantee 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: Spares and maintenance for three years of continuous operation of the instrument should be provided with on-site warranty of three years**
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 one 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**

**SPECIFICATIONS FOR FTIR SPECTROMETER****Application**

The equipment sought is an online FTIR for the analysis of gases in a fixed bed reactor under 1-2 bar pressure and in the temperature range (300 to 800 °C) and a flow rate of 300 ml/min - 2 L/min. The application is selective catalytic reduction (SCR) of NO<sub>x</sub> for automotive after treatment. The typical reactions involve the reduction of NO<sub>x</sub> to various products in the presence of NH<sub>3</sub>, hydrocarbons and O<sub>2</sub>. The impact of water vapor (H<sub>2</sub>O), CO, CO<sub>2</sub> and sulfur (SO<sub>2</sub> and SO<sub>3</sub>) are also to be examined. Hence, **the FTIR instrument must be capable of qualitative and quantitative analysis of NH<sub>3</sub>, NO, NO<sub>2</sub>, N<sub>2</sub>O, CO, CO<sub>2</sub>, H<sub>2</sub>O and light hydrocarbons such as CH<sub>4</sub>, C<sub>2</sub>H<sub>4</sub>, C<sub>3</sub>H<sub>6</sub>; and be unaffected by the presence of SO and SO<sub>2</sub>.**

**A. Technical Specification for FT-IR Instrument**

1. The instrument should be used to measure the following gases: **NO, NO<sub>2</sub>, N<sub>2</sub>O, NH<sub>3</sub>, CO, CO<sub>2</sub>, and light hydrocarbons: CH<sub>4</sub>, C<sub>2</sub>H<sub>4</sub>, C<sub>3</sub>H<sub>6</sub>.**
2. The entire unit should be suitable for continuous- mode operation up to 72 h in the temperature range of 100 - 800 °C under a continuous flow rate of the specified gas mixtures in the range 300 ml/min to 2 L/min.
3. The material of construction of all the components in the unit should be suitable and non-corrosive under the flowing of following gases: **SO<sub>2</sub>, SO<sub>3</sub>, CO<sub>2</sub>, NH<sub>3</sub>, NO, NO<sub>2</sub>, N<sub>2</sub>O** and **C<sub>3</sub>H<sub>6</sub>** (ppm level).
4. The minimum spectral resolution should be 0.5 cm<sup>-1</sup>.
5. Spectral range should cover mid-IR in the range of **4,000 - 400 cm<sup>-1</sup>.**
6. Frequency of measurement should be **>= 1 Hz.**
7. Scanning speed should be **>=1 scan/s at 0.5 cm<sup>-1</sup>** resolution.
8. Detection limits for the above mentioned gases should be **1 - 1000 ppm with accuracy 1ppm.**
9. It should be capable of eliminating cross-interference from water and the detection accuracy should be obtained even in the presence of more than 10% H<sub>2</sub>O.
10. The gas line fitting and tubing to the instrument and to the venting should be 1/8" dia wherever it is applicable.
11. No manual injection of the gases is done, all the analysis is online with the flow reactor.

12. The interferometer should be air-bearing type, dynamically aligned, advanced Michelson design and supporting an automatic beam splitter & vibration resistant.
13. The instrument should be equipped with the necessary internal plumbing and external connectors for optional purge operation.

#### **Detector**

14. Liquid nitrogen cooled **MCT (Mercury Cadmium Telluride)**.
15. Maintenance conditions for MCT detector and its safety operation in a liquid nitrogen temperature should be provided.

#### **Software Suite & Spectral Library**

16. An appropriate software package should be provided for performing gas phase quantification of the specified gases. The software package should be compatible with **Windows 10/8.1/7 Professional (64-bit)**.
17. Complete spectral library for standard gases should be provided for performance of a specific calibration of each probe gas. Input for the choice of the gases to be analyzed should be provided in the software package.
18. The software should provide the profile [(number of scans, scanning rate, resolution, concentration, time reading, low and high limits of Wavenumber (or limiting the Wavenumber for particular reaction applications)] about the qualitative and quantitative analysis of individual gases. The data should be exported into an MS excel and notepad format. Pressure, gas flow rate and temperature variation inside the gas cell should be controlled and indicated in the software window.
19. The software should be used to perform background corrections in an automatic mode.

#### **B. General Specifications**

20. Suitable features for maintaining safety pressure and temperature should be incorporated in the system wherever it is possible.
21. Integrated gas flow rate and temperature control with digital display should be provided in the instrument.
22. The entire unit should be suitable for Indian power supply systems
23. The spectral data should be repeatable with ease of method of calibration and continuous operation.

24. A detailed flow diagram of the entire unit with the specifications of the individual components (gas flow rate controller and temperature controller, detector etc.,) and its manufacturer, should be supplied along with the technical quotation.
25. **A list of organizations in India where the similar model has been installed should be provided.**
26. To be installed with operator training at the **Department of Chemical Engineering, IIT Madras, Chennai.**
27. **Spares and maintenance for three years of continuous operation of the instrument should be provided with on-site warranty of three years.**

### **Optional Items:**

#### **I FT-IR Gas Cell**

1. The Gas Cells should be made of suitable components resistant to NO<sub>x</sub>, NH<sub>3</sub>, SO<sub>2</sub> and SO<sub>3</sub> gases with **200 to 300 ml volume** for performing the analysis.
2. Gas path length should be **2 to 5 meters** ensuring **ppm range detection and quantification of NO, NO<sub>2</sub>, N<sub>2</sub>O, NH<sub>3</sub>, CO, CO<sub>2</sub>, SO<sub>2</sub>, SO<sub>3</sub>, and light hydrocarbons: CH<sub>4</sub>, C<sub>2</sub>H<sub>4</sub>, C<sub>3</sub>H<sub>6</sub>.**
3. FT-IR gas cells can be easily cleaned for frequent uses, designed in such a way for getting better sensitivity.
4. The gas cells should be **gold coated mirrors** can be heated up to 200 - 300°C.
5. Gas cell seal should be resistant to the typical exhaust gases.

#### **II DRIFTS**

The spectrometer should support the additional set up for **up gradation of the current system or instrument for performing Diffuse Reflectance Infrared Fourier Transform Spectroscopy (DRIFTS)** in the future.

#### **III Computer**

A branded computer to be connected to the instrument





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.

*K. M. Gopinath*  
DEPUTY REGISTRAR (IC&SR) (Vc)  
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 Vijayalakshmi*  
DEPUTY REGISTRAR(IC & SR) i/c

This is to certify that particulars furnished are correct.

*[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