

DEPARTMENT OF CHEMISTRY  
INDIAN INSTITUTE OF TECHNOLOGY - DELHI  
HAUZ KHAS, NEW DELHI - 110016

No. IITD/PLN03/ BCHM

Dated: 22/01/2013

**NOTICE INVITING QUOTATIONS**

**Sub: Purchase of a FTIR Spectrometer**

Sealed quotations in separate envelopes of technical and commercial bid kept in one sealed outer envelope are invited for purchase of a FTIR (Fourier Transform in the Infra red) spectrometer as per specifications given below. The technical specifications should include a compliance statement with regards to the below mentioned technical requirements of the spectrometer. Your sealed quotation should reach latest by 5 PM on 22<sup>nd</sup> February, 2013 to **Dr. S. Nagendran, Department of Chemistry, Indian Institute of Technology – Delhi (IIT Delhi), Hauz Khas, New Delhi - 110016**. Your quotation should be superscribed “Quotation for FTIR Spectrometer due on 5 PM on 22<sup>nd</sup> February, 2013”.

**Specifications: FTIR Spectrometer**

The FTIR Spectrometer should be equipped with the following along with the necessary specifications as detailed below:

Fully computer controlled FTIR Spectrometer with sealed and desiccated optics and built-in purge facility. System should be complete with all necessary hardware & software. System should have following minimum specifications:

1. Spectral range: 7500 – 375  $\text{cm}^{-1}$  and can be increased to cover the range of 25000 – 50  $\text{cm}^{-1}$ .
2. Spectral Resolution:  $\leq 0.4 \text{ cm}^{-1}$
3. Wavenumber accuracy/precision:  $\leq 0.01 \text{ cm}^{-1}$
4. Photometric Performance: linearity better than 0.1%T
5. Signal to noise ratio:  $\geq 50000:1$  peak to peak (at 4  $\text{cm}^{-1}$  resolution, measurement time of 1 minute)
6. Beam-splitters: Beam-splitters should be of the KBr type and should at least cover the aforesaid spectral range of 7800-375  $\text{cm}^{-1}$ . System should be upgradeable with automatic beam splitter change covering range from FIR to NIR range.
7. Detectors: System should have built-in TE cooled detectors to cover required spectral range and preferably of the DLaTGS type. (**The detector should not be liquid nitrogen cooled**). System should be able to accommodate three detectors and upgradeable with automatic detector change covering range from FIR to NIR range.
8. Sources: To cover spectral range of 7800-375  $\text{cm}^{-1}$ . System should be upgradeable in future with manual/automatic source change covering range from FIR to NIR range.

9. Interferometer: The interferometer should be vibration insensitive with fast continuous dynamic alignment/fixed alignment and must have optics with gold coating.
10. Scan Rates for spectra: Scan speeds  $\geq 25$  scans (spectra)/sec at  $16 \text{ cm}^{-1}$  spectral resolution.
11. Spectrometer Enclosure: Should have the capability to be purged and with proper purge controls (automated); purge protection for the core of the spectrometer should be there.
12. A/D converter:  $\geq 24$  bit Analogue-to-Digital Converter (ADC)
13. Software: Advanced latest software for complete automatic control of spectrometer, data collection and processing (conversion of Transmission to Absorbance scale; Kubelka-Munk, Kramers-Kronig, derivative spectra), automatic storage of sample and instrument parameter history, automatic recognition of spectrometer components and accessories, complete fault diagnosis, help menu for setting experiments. Software should also have in-built Biochemical library of spectra of  $\sim 2000$  compounds (including proteins and peptides).
14. Validation: System should have built-in validation wheel with NIST traceable standards for automatic software controlled validation of spectrometer.

#### **Accessories (to be supplied along with the FTIR spectrometer)**

1. Liquid Transmission Cell Accessory: Accessory should be having the following features:
  - (a) Transmission cell should be demountable and have proper fittings to hold the transmission windows ( $\text{CaF}_2$  windows) in place
  - (b) Temperature of the cell should be controllable and should be least be varied from  $5$  to  $95 \text{ }^\circ\text{C}$  preferably using a TE cooled or heating system; temperature ramping should be done automatically using the instrument software
  - (c) Proper wrenches should be provided for complete dismantling of the transmission cell to take apart the  $\text{CaF}_2$  windows, spacers and gaskets
  - (d)  **$\text{CaF}_2$  windows** should be used for the demountable cell
  - (e) **4 pairs of 32 mm x 3 mm  $\text{CaF}_2$  windows** should be provided along with the instrument; for each pair one window should be drilled with holes for inlet and outlet of liquid samples.
  - (f) **Assortment of Spacers (12)** of variable thickness to be placed between the  $\text{CaF}_2$  windows should be provided for the following pathlengths ranging from  $6 \text{ }\mu\text{m}$  to  $50 \text{ }\mu\text{m}$ .
  - (g) This accessory should be complemented with a Protein Analysis Software for the analysis of secondary structure of proteins.
  - (h) 1 ml Hamilton glass syringe (quantity - 2) should be provided
2. Praying Mantis Diffuse Reflectance Infrared Fourier Transform Spectroscopy (DRIFTS) accessory: A DRIFTS accessory with reaction chamber has to be quoted for analysis of powders, catalysts etc. It should be having the following features:
  - (a) Should be able to remove specular reflected energy, allowing the acquisition of distortion-free diffuse reflection spectra
  - (b) Environment inside should be controllable; it should have the provision of carrying out temperature and pressure dependent measurements; temperature should be ramped to  $\sim 900 \text{ }^\circ\text{C}$  and pressure should go upto as high as  $\sim 1200 \text{ psi}$  (at a lower temperature); the accessory should also have separate dome assembly for working in vacuum with pressure as low as  $10^{-4}$  torr.
  - (c) Should be equipped with proper alignment mirrors
  - (d) 4 micro and 4 macro-sampling cups should be provided along with a funnel

- (e) Should be having proper hardware interface with the spectrometer such that data collection is automated through the software
- (f) IR grade KBr powder (100g) should be supplied for reference
- (g) Purging inside should be possible to reduce atmospheric contributions but without damaging the optics or interrupting data collection

Ambient Sample Chamber: The DRIFTS accessory should be equipped with an Ambient Sample Chamber that is designed for analysis of air-sensitive samples. It should be possible to load the samples in a glove box or similar enclosed environment. The chamber can then be sealed, removed from the glove box, and inserted in the DRIFTS accessory for analysis.

- 3. ATR: Diamond ATR accessory covering Mid IR range. ATR accessory should be automatically recognized & all the parameters should be optimized automatically when it is installed in the sample compartment.
- 4. Other Spectrometer Accessories: KBr die set (imported), 15 Ton hydraulic press, Nujol Oil, Pallet holder, Agate Mortar & Pestle.
- 5. UPS: Suitable online UPS to run the complete spectrometer with at least 30 minutes back up should be quoted.
- 6. PC: The system should be quoted with Branded PC (Desktop) having **i7 (3<sup>rd</sup> generation)** processor with colour TFT monitor (21 inches wide or above) & Laser Printer.
- 7. External Ports: Should be having at least two external ports for coupling to auxiliary units or other instruments (see point number 8 below)
- 8. Upgradation: System should have facilities to upgrade with GC, TGA, and Raman microscope attachment and step scan, modulation experiment.
- 9. Warranty: **Five** years (comprehensive) for the complete Instrument. This should cover consumable accessories and service charges.

### Terms & Conditions:

- 1. Please submit the TECHNICAL and FINANCIAL bids in separate sealed envelopes. Mark the two envelopes clearly as “Technical Bid” and “Financial Bid”. Both the sealed envelopes should be sent in a single sealed envelope, with clearly marked as “Quotations for FTIR spectrometer due on 22<sup>nd</sup> February, 2013”. The quote should reach the following address on or before 22<sup>nd</sup> February, 2013 by 5 PM.

Dr. S. Nagendran  
Department of Chemistry  
Indian Institute of Technology Delhi (IIT Delhi)  
Hauz Khas, New Delhi-110016

- 2. Please quote prices at FOB New Delhi, inclusive of installation charges.
- 3. The quotations should be in Indian Rupees as well as international currency wherever possible and should be valid for at least three months.
- 4. Please attach all the technical literature and a list of similar installations done in India.
- 5. Warranty details should be provided (*Please refer to item 9 above*). Extra financial charges (if applicable) for the asked warranty details should be included in the financial bid and mentioned very clearly.

6. Payment should be through irrevocable letter of credit.
7. If the quote is being submitted by the representative of the Principals/manufacturer themselves, a valid Agency ship/Dealership Certificate authorizing the agent to quote to IIT Delhi on behalf of the Principals should be enclosed.
8. Complete set of manuals for the operation of equipment should be given.
9. Clearly specify the installation requirements—such as space, power, frequency, environment (Temperature and humidity) etc.
10. If the items quoted are proprietary in nature, please enclose proprietary certificate from the principals stating “certified that \_\_\_\_\_ is a proprietary item M/s. \_\_\_\_\_ and no other manufacturer makes these items.
11. If the bidder is an Indian agent, the agency certificate should be enclosed.
12. Please produce compliance certificate for the specification.
13. Training should be provided free of cost.
14. Delivery period should be specifically mentioned and should be as small as possible.
15. The products will be used for educational purposes. Hence any applicable institutional discounts should be offered and stated.
16. Institute reserves the right to accept or reject any or all the quotations without assigning reasons thereof.