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# INVITATION FOR BIDS OFFICE OF PROCUREMENT & CONTRACTS

## INSTRUCTIONS FOR BIDDERS

* 1. Sealed bids will be received in the Office of Procurement & Contracts, Mississippi State University, for the purchase of the items listed herein.
  2. All bids must be received in the Office of Procurement & Contracts on or before the bid opening time and date listed herein. Delivery of bids must be during normal working hours, 8:00 a.m. to 5:00 p.m. CST, except on weekends and holidays when no delivery is possible.
  3. Bidders shall submit their bids either electronically or in a sealed envelope. To submit electronically, follow the instructions below. Bids CANNOT be emailed.
     1. Sealed bids should include the bid number on the face of the envelope as well as the bidders’ name and address. Bids should be sent to: 245 Barr Avenue, 610 McArthur Hall, Mississippi State, MS 39762.
     2. At this time we only accept non-ITS bids electronically. For electronic submission of bids, go to:portal.magic.ms.gov.   
        and use the RFX number on the next page as your reference number.
  4. All questions regarding this bid should be directed to the Office of Procurement & Contracts at 662-325-2550.

## TERMS AND CONDITIONS

* 1. All bids should be bid “FOB Destination”
  2. Bidders must comply with all rules, regulations, and statutes relating to purchasing in the State of Mississippi, in addition to the requirements on this form. General Bid Terms and Conditions can be found here: <https://www.procurement.msstate.edu/procurement/bids/Bid_General_Terms_May_2019_V2.pdf>
  3. Any contract resulting from this Invitation for Bid shall be in substantial compliance with Mississippi State University’s Standard Contract Addendum: <https://www.procurement.msstate.edu/contracts/standardaddendum.pdf>

### Bid Number/RFX Number: ****22-130/RFX #3160005490**** Opening Date: ****November 1, 2022 @2:00 p.m.**** Description: ****Continuous FTIR Gas Analysis Instrument****

#### Vendor Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Vendor Address: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Telephone Number: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Days the Offer is Firm: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Authorized Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Title: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

| **Item** | **Quantity** | **Description** | **Unit Price** | **Total Price** |
| --- | --- | --- | --- | --- |
| 1 | 1 | Continuous FTIR Gas Analysis Instrument |  |  |

#### System Optics

1. The spectrometer cover shall be **sealed and desiccated** and must be equipped with CaF2 coated KBr sample compartment windows. The desiccant must be accessible without tools and without removal of any main covers of the instrument. There must also be a highly visible passive humidity indicator. The instrument must be equipped with the necessary internal plumbing and external connector for optional purge operation. The system can be equipped with optional, motorized sample compartment purge shutters, with operation under software control.
2. The spectrometer must include a user replaceable **helium-neon laser** reference source. Replacement of the laser must be done without exposing the optics of the instrument to the environment. The laser must be of a modular design permitting simultaneous replacement of the laser emission head and power supply.
3. The **infrared source** must have a guaranteed lifetime of 5 years and must be user replaceable. The system must be able to support an optional white light source to be used for near-IR or visible operations, mounted in a similar manner to the infrared source and similarly user-replaceable.
4. The **Interferometer** must be a dynamically aligned, non-air bearing Michelson design. The scan velocity must provide collection capabilities of up to **60 spectra independently archived, per second**, at a spectral resolution of 16 cm-1 or 95 scans per second at 32 cm-1 resolution. The interferometer must be capable of **spectral resolution better than 0.09 cm-1** with boxcar apodization. The spectrometer must have a motorized, continuously variable aperture, for optimal peak shape collection of data.
5. Standard warranty on the interferometer must be 5 years.
6. The interferometer must permit insertion of a wide range of beamsplitters without requiring replacement. Beamsplitters must be available for the instrument to cover the spectral range from 27,000 to 50 cm-1.
7. The instrument must be capable of at **55,000:1 peak to peak** signal to noise, measured at 4 cm-1 resolution by collecting 80 seconds background, 60 seconds sample, in the region 2200-2100 cm-1, with purge. The **wavelength precision** must be within 0.01 cm-1 with no need for software intervention or calibration.
8. The instrument must include **buttons for single press operations** for all sampling locations. These buttons must cause the spectrometer to set up the optics for a specific sampling location and select the correct experimental parameters file. If the spectrometer includes the optional Automatic Beamsplitter Exchanger, the button will activate that unit for proper beamsplitter selection. The button associated with the sample compartment must also activate the identification of any installed accessory and enable appropriate setup.
9. The instrument must support up to **three detectors**, selectable by an optional rotating mirror, for use with the sample compartment; up to one user exchangeable room temperature, one user exchangeable liquid nitrogen cooled, and a permanently installed DLaTGS mid-infrared detector.

1. The **accessory sample compartment** must have automatic recognition and smart lock-in mechanical design. Optional software-controlled purge shutters may be installed.
2. The spectrometer must support an optional **internally mounted diamond attenuated total reflection accessory.** This accessory will have the performance characteristics outlined below. This accessory must be available at the point of sale, or as a field upgrade.
3. The spectrometer must include a **motorized Validation Wheel**. The wheel must provide beam attenuation screens for high sensitivity detectors, NG-11 glass for detector linearity test and NIST-traceable 1.5 MIL (38 microns) polystyrene film. The validation wheel must be serialized and labeled with expiration date information.
4. The system must be able to provide left and right **external beams** for supporting additional sampling modules or infrared microscopes.
5. The instrument must support an optional **filter wheel** for use with standard 25 mm diameter optical filters, such as bandpass, high pass or low pass filters.
6. The instrument must support an automated **infrared polarizer**. This polarizer must allow software to insert the polarizer into (or remove it from) the IR beam path and to control the rotation.
7. The size of the instrument when simultaneously configured for FT-Raman, far-, mid- and near-IR operation with the automated beamsplitter changer, diamond ATR, validation and filter wheels, purge shutters and polarizer must not exceed (W x D x H) 63 x 70 x 51 cm (25 x 27 x 20 inches).
8. Has continuous measurement capabilities for real-time gas analysis.
9. Must provide calibration package including these analytes: Carbon Dioxide CO₂ Carbon Monoxide CO Hydrogen Fluoride HF Hydrogen Chloride HCl Hydrogen Bromide HBr Hydrogen Cyanide HCN Sulfur Dioxide SO₂ Nitrogen Oxide NO Nitrogen Dioxide NO₂ Hydrocarbons C¹ – C⁴ Formaldehyde CH₂O Acrolein C₃H₄

#### Sampling System

1. FTIR Gas Cell Heating Jacket up to 185 C with pressure and temperature control for protection against condensation of semi volatile samples.
2. Pressure control specifications:
   1. Provides temperature and flow control throughout the FTIR system
   2. Temperature controllers for heated sample lines and valve drawer
   3. Control valve to select between sample and span gas inputs
   4. Flow meters and needle valves to adjust gas pressure and flow rate
   5. Condensing filter with peristaltic pump at outlet
3. Heated sampling line
4. Diaphragm pump included

#### Software

1. The software must be fully compatible with Microsoft Windows XP (32-bit) and Windows 7 (32-bit and 64-bit).
2. Software must support one-click operation using clearly visible icons to switch to any sample compartment from any other sample compartment and load proper experiment settings to collect data.
3. The software must support stability testing for sample compartments such as built-in ATR, NIR Integrating Sphere and Main Sample compartment to indicate to users when the instrument is ready for collection.
4. Software must support loading of Automatic Beamsplitter Exchanger beamsplitters and identifying them.
5. Software must support Advanced Diagnostics on the instrument.
6. Software must support the hardware one touch (“Touch Point”) setup for each sampling location. The first press will prepare the optics for data collection. Subsequent button presses will cause the software to collect data with options for post-collection analysis and report preparation.
7. Software must support both Advanced and Basic experiment setup functionality. The Basic functionality must support measurement time/number of scans, resolution, final format, spectral region (over the full range supported by the available hardware) and indicate current source, beamsplitter and detector. The Advanced experiment setup functionality must support additional parameter settings such as Corrections, Background collection number of scans, Gain selection, Optical Velocity selection and Aperture settings.
8. Software must support easy selection of experiment files that are filtered specifically for a particular sample compartment. Experiment files that are present on the computer for other sample compartments will not be displayed when not appropriate.
9. Software must support background handling options such as:
   1. Before every sample
   2. After every sample
   3. After a specified amount of time
   4. Use stored background
10. Software must support Auto Reporting for Search Results, Quant Results, Find Peaks and QCheck Results and these results must be stored with the spectrum for review at a later date. Auto Reports must display multiple sets of data and results in one report that can be Previewed, Printed or Added to a Report Notebook.
11. Software must support Preview Data collection and must allow the user to perform a search on the spectrum when previewing and during data collection.
12. Automated purge shutters must be supported in manual and automatic modes. Operation of the shutters will include a timing function to enable stabilization of the environment and stability of the detection optics prior to data collection, with a user-variable time delay setting.
13. An automated polarizer for the IR beam passing into the sample compartment must be supported. This must include movement of the polarizer into and out of the IR beam and control of the rotational angle of the polarization.
14. Linked spectra, for spectra acquired using one or multiple techniques, must be supported in the software. These linked spectra must be able to be selected as a group, ungrouped and grouped and retain linking information.
15. Software must be able to support the Integrating Sphere module. This must include automation of an internal gold flag for background collection. A “dark background” correction must be available to correct for reflections off the internal optical components in cases where low-reflectivity samples are being measured..
16. Software support must be available for FT-IR microscopy and for a wide range of third-party accessories.
17. Software must be able to support macros for collecting from all sample compartments, controlling instrument options such as the purge shutters and polarizer and displaying auto reports.
18. Software must support validation for all modules when those modules have appropriate, traceable standards available. This must include all appropriate documentation.
19. An extensive set of spectral libraries must be available, including Raman, NIR and mid-IR spectral references.
20. A direct linkage to software enabling multi-component searching must be provided by the software.
21. Software must support easy migration from previous version even when moving from Windows XP to Windows 7.