High Performance Research FTIR Spectrometer

I. General System Description

The Fourier Transform infrared spectrometer must be high performance, optically flexible, rugged and user serviceable. The instrument is to be operated using vendor supplied software on a standard IBM compatible PC computer. The software must operate under Microsoft Windows 2000, or Windows XP. The instrument must incorporate a modular system design and be fully upgradeable to accommodate potential future applications in near- and far-infrared spectroscopy. The instrument must be upgradeable to accommodate a GC-IR interface, a TGA-IR interface, and/or an FT-Raman Accessory or an infrared microscope. The system must also be field upgradeable to do step scanning and other dual channel measurements.

1. The system shall be a benchtop FT-IR spectrometer requiring no external utilities other than 120/220 VAC power.
2. The system shall be sealed and desiccated to protect the hygroscopic internal optics (including the beamsplitter and detector window) from moisture.
3. The spectrometer manufacturer must possess ISO 9001 certification for the manufacturing facility where the spectrometer is produced.
4. The spectrometer shall be operated using vendor-supplied software on a standard IBM compatible Pentium PC computer or a laptop computer, connected through an USB 2.0 interface. All data processing functions are to be performed using the PC computer.

II. Performance Specifications

1. Resolution: The standard resolution of the spectrometer shall be better than 0.50 cm^{-1} apodized (Triangular or Happ-Genzel) measured full width at half height (FWHH) using a gas sample of CO at 4 torr pressure.
2. Spectral Range: The standard mid-infrared spectral range must be 7400 - 350 cm^{-1}.
3. Signal-to-Noise Ratio: The spectrometer shall be capable of achieving a signal-to-noise ratio of better than 45,000:1 peak-to-peak in a one minute measurement time at 4 cm^{-1} resolution with triangular apodization using a KBr beamsplitter and TGS detector.
4. ASTM Linearity: The spectrometer shall provide less than 0.07% deviation from 0.0%T (100%-0% scaling) for the optically thick peaks in 3 mil thick polystyrene when measured at 4 cm^{-1} resolution.

III. Accessories

1. The system must be compatible with all commercial accessories currently available from third party accessory manufacturers.

IV. System Software

1. The software must be fully compatible with Microsoft Windows 2000 and/or Windows XP. True multitasking in which searching, plotting, word processing, data collection etc., can be performed simultaneously is required. The software must support dynamic data exchange of infrared spectra through Windows cut, copy and paste. The Windows undo function must also be present. Systems operating under OS/2 or proprietary operating systems are not acceptable.

2. A real time display of a fully ratioed spectrum, single beam curve or interferogram at full resolution is required during data collection.

V. Installation, Warranty and Service

1. Installation must be performed by factory trained service personnel.
2. The system must be warranted for one year from the date of installation.
3. The interferometer and mid-infrared source must be covered by a full five year warranty.
4. Local on-site service must be available.

IR Microscope Specifications

I. General System Description

1. The infrared microscope must be designed for a multi-user environment and maximum versatility. Therefore, the microscope must have the capability of visual viewing and infrared collection simultaneously. The visual image must be live and in real-time. In addition, the microscope optical design must be infinity corrected with parallel, coaxial IR and visible light beams for the highest visual and infrared image quality.
2. The system must be equipped with Reflex aperture for pre- and post sample masking sample to minimize diffraction effects from a single viewer. For maximum ease-of-use, the pre- and post-aperture mask must be physically the same aperture. Standard motorized control of X, Y and θ positing of the aperture must be included. The aperture sizing must be able to be set from a live video image of the sample on the PC monitor.
3. The system must be supplied with a trinocular viewer. In addition, the system must be supplied with a color video camera, video capture board, associated optics, and cables. This video capture board must reside in the PC and allow a real-time display of a video image on the PC screen. Software must be supplied that allows annotation, measuring, storing and printing of the video image. Also, the software must allow control of the aperture sizing and rotation.
4. The system must be able to utilize an optional grazing angle objective. Grazing angle measurements have the sensitivity necessary for measuring samples down to monolayer thickness.
5. The system must be able to utilize an optional ATR objective for use exclusively on the infrared microscope. In addition, an applied force feedback device must be supplied when the ATR option is selected. This device allows the use of opaque ATR crystals. It allows quantitative sample/crystal contact and prevents possible damage to the crystal or sample by applying too much pressure. The minimum ATR crystal offerings must be ZnSe, Ge, Si and Diamond.
6. The microscope must be outfitted with a 0.25mm MCT detector. The dewar must be manufactured out of stainless steel and guaranteed to be free from artifacts due to icing. The dewar must provide a hold time of up to 18 hours for unattended overnight operation. The minimum spectral range of this detector must be to 600 cm^{-1}.