

A Confocal Raman Spectrometer with the following specifications is to be procured:

Broad Technical specifications:

Any special features over and above these specifications are to be mentioned clearly in the Technical Bid.

Main purpose of this Raman Spectrometer is to analyze trace quantities of vapor/gas and liquid samples in small quantities.

I. Sample stage:

Sample size: Should be able to scan a solid surface of area 100 mm x 100 mm and if liquid a maximum volume of 10 ml. Please specify minimum area in the case of a solid and volume in the case of a liquid. The liquid cells are to be provided by the company.

The Raman spectrometer should also have the capability to measure biological samples .

1. A Confocal Microscope with the following broad specifications:

good quality optics with a depth of about 2 – 4 micrometers working in reflection light illumination.

Computer controlled platform for sample scanning : the scan range about 150 micrometers or more in X and Y directions and about 20 – 30 micrometers in Z direction. The step size should be ~ 0.1 micro meters.

Magnification of the Objectives are about 5x, 20x and 50x, 100 x

Binocular head with eyepieces and color video camera to see the sample and to capture the image.

2. A sample holder stage with manual (with Joy Stick) as well as computer-controlled X-Y-Z movements / mapping stage

- a. Resolution less than 1 μm (computer-controlled X-Y- movements)
- b. Scan Range: several of 100 μm to mm (short range) or several cm (long range)
- c. The sample table should have a size of 150 mm x 150 mm in X and Y directions and should be able to have a movement in Z direction to about 20 – 30 mm (height).

Microscope enclosure

Automation:

- Fully automated and self validation / calibrating podule with raman Spectrometer hardware with the following features:
 - o Auto align and optimization of input laser power
 - o Auto switch function for alignment of laser
 - o Auto calibration using built in reference sample
 - o Built in self calibration and intensity correction
 - o Switching mechanism to swith between laser and white light images using an integral video

Liquid sample holders of 5 ml (quartz) : 5 – 10 numbers

II. Excitation sources / Lasers stage:

The Raman Spectrometer should be working with FOUR Lasers: 325 nm 442 nm, 532 nm and 785 nm.

The 352 nm and 441.6 lasers are available with the laboratory : He-Cd laser: Model IK5751 I-G. (from M/s Kimmom Koha, Japan)

325 nm (36.0 mW) and 441.6 nm (147 mW).

TWO Laser sources (of high quality) are to be quoted.

532 nm Diode Laser: about 100 mW power (air cooled)

785 nm Diode laser : about 250 – 350 mW power (air cooled)

All the Four Lasers should be with Plasma filters (or Raman filter set), externally mountable and should be easily optically aligned (using a single laser base plate, similar to honeycomb baseplate, preferably controlled by a computer).

Raman filter set should include: High quality Long pass Raman Filter
Razor edge dichoric beam splitter, high transmission starting around the wave number compatible with excitation source wavelengths (for example for 532 nm, it is at 95 cm^{-1} , for 785 nm it should be at 65 cm^{-1} etc).

III. Detection and Raman signal acquisition stage:

The detection system should be capable of :

- Acquisition of Raman spectra emitted by the sample (Spectrometer)
- High efficiency ~250 mm focal length spectrograph (> 25 – 35 % throughput in spectrograph) with spectral resolution (FWHM) better than 1 cm^{-1}
- Focal length imaging spectrometer with dual gratings with good grating elements
- Laser spot size continuously variable from 1- 400 micro meters with fully optimized beam path
- Automated Rayleigh filter change over assembly
- Automated kinematically mounted Rayleigh line rejection filter sets for all the excitation sources (325 nm, 442 nm, 532 nm and 785 nm).
- Continually adjustable confocal arrangement using motorized slit with automated signal optimization
- Raman shifts measurement: (400 cm^{-1} - 2000 cm^{-1}) or (400 cm^{-1} - 4000 cm^{-1})
- Resolution: less than 5 cm^{-1} (a suitable grating)
- Wave length range : 90 – 4000 wave-numbers at 532 nm excitation
- Spectral resolution continuously variable via CCD binning control
- Rayleigh line rejection filter at a given excitation source wavelength allowing a ripple free measurement of Raman spectrum to about 100 cm^{-1} from the laser line
- Thermo electric cooled CCD/CMOS detector maintained at temperatures less than - 20°C
- Wavelength range: 400 nm – 1050 nm
- Automated Rayleigh filter change over capability
- CCD array detector / CCD chip with 1024 x 127 pixel format or 576 x 384 pixels
- CCD array Peltier cooled to about – 60 to -70 C (No liquid nitrogen or any other external coolant to be used)
- Motorized neutral density filters with wide power levels: 0.00005 to 100%

IV. Software :

A windows 7 / Windows 8 / lab view based software for all external motor controls (including the sample stage controls) and Raman data acquisition and data analysis with a standard library. Image viewing and capturing software is also to be included. Back up / recovery discs to be provided. All license key numbers of all software are to be provided.

V. Data acquisition and analyses:

A desk top / laptop computer : i5 Processor or equivalent , 04 / 06 GB RAM, 1 TB Hard disc Type (like SATA or Solid State) , DVD RW, 22" color monitor with standard key board (for Desk top) and an external mouse (for Desk top) with color / BW laser printer .

Accessories :

1. Technical details of sample holder with temperature variation (Liquid nitrogen/ liquid Helium temperature to about 300 C) should also be given. Lakeshore Temperature controller and a closed cycle helium cryostat are available in the laboratory.
2. The technical details of attaching an Atomic Force Microscope (AFM) with this Raman Spectrometer may also be furnished.

Warranty for All parts and the Raman Spectrometer are to be valid for TWO years from the date of installation. AMC after the warranty may be mentioned.

Details of the Spare parts kit is to be provided along with the technical bid.

A note on all your installations in India is to be provided.

A note on time scales of Servicing / repairing with required spares is to be mentioned separately.