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

Dated: 2nd March 2012

NOTICE INVITING QUOTATIONS

Sub: Purchase of time-resolved fluorescence spectrometer

Sealed quotations in ***separate envelops of technical and commercial bid*** kept in a one sealed outer envelope are invited for purchase of a **time-resolved fluorescence spectrometer** as per specifications given below. Your sealed quotation should reach latest by 5 PM on 26th March 2012 to **Dr Sameer Sapra, Department of Chemistry, Indian Institute of Technology – Delhi (IIT Delhi), Hauz Khas, New Delhi - 110016**. Your quotation should be superscribed "Purchase of time-resolved fluorescence spectrometer due on 26th March 2012".

SPECIFICATIONS

1. Computer controlled Fluorescence Spectrometer that can measure steady-state fluorescence and lifetime fluorescence of solids, liquid, powders, crystal ,thin films ; lifetime range from 30 picoseconds to 50 microseconds and system upgrade capability for the range from 5ps to seconds.

2. The spectrometer must have a large sample chamber with capability for fitting a regular front face sample holder and optionally front face sample holders on XY, XYZ and XYZ-R stages.

3. Lens focusing optics must be standard with optional capability for mirror optics.

4. The spectrometer must have future upgrade possibilities for integrating sphere and quantum yield studies, steady state X-Ray excitation, fibre coupling to external plate reader and microscopy options.

5. The spectrometer must be upgradeable for NIR and MIR measurements with PMT and analogue detectors and appropriate gratings.

6. Ozone free high power (450W or more) continuous Xenon Lamp with air cooled housing and power supply for steady-state measurements is mandatory

7. Capability to upgrade to a nanosecond flash lamp excitation source for fluorescence lifetime measurements and a microsecond flashlamp for phosphorescence lifetime measurements.

8. TCSPC lifetime measurement sources :

a. Supercontinuum source with pulse picker, variable rep rates, total power > 2W, power across visible region from 400-750nm > 300mW, average spectral power density > 2mW/nm, spectral flatness < 6dB, power stability < +/- 1%, variable repetition rate or fixed rep rate at 20MHz, fundamental pulsewidth of ~6ps
b. Pulsed picosecond diode laser 375nm with pulsewidth < 90ps, 10 pre-set rep rates, cooled and temperature stabilized, collimated, spectrally purified, beam conditioning optics, built in controller together with the laser head with laser coupling flange

Integration hardware for the supercontinuum source with the spectrometer should be supplied. Also, a fiber optic cables and coupler to send the laser beam to a microscope and receive the signal back to the detectors should be included. The specifications of the microscope will be sent to the successful bidder.

Excitation Monochromator:

Czerny-Turner, triple grating turret enabling software selection of gratings, computer controlled slits, computer controlled swing mirror to select between entrance slits for different excitation sources.

Focal Length: 600 mm, aperture f/4.1

Stray Light rejection: ≥ $1:10^{10}$

- supplied with a pair of gratings with 1200g/mm blazed at 300nm providing;
  - linear dispersion 1.35 nm/mm
  - spectral band width 0.07 to 13.5 nm
  - min step 0.07nm

Emission Monochromator:

Czerny-Turner, triple grating turret enabling software selection of gratings, computer controlled slits, one entrance and multiple exits for fitting two detectors on a single grating monochromator (and upgradeable to three detectors and three pairs of gratings with a double grating monochromator), all gratings selectable from software.

Focal Length: 300 mm

Stray Light rejection: ≥ $1:10^{5}$

- ruled grating with 1800grooves/mm, optimised for 500nm providing;

- linear dispersion 1.8nm/mm

- minimum step 0.05nm

- slew speed 200nm/s

- spectral band pass 0.1-18nm

The monochromator to have the possibility for upgrading with alternative gratings, with up to 3 gratings fitted simultaneously.

Sensitivity of the system: Should provide a signal-to-noise ratio of >6000:1 for water Raman signal with excitation and emission wavelength: 350 and 397 nm respectively.

System Calibration : when switched on the spectrometer must automatically recalibrate the gratings

Spacious Sample Chamber:

1. Single or multiple sample holder to hold liquid, solid, powder, thin film, etc.
2. Possibility of I/O fibre optics.
3. Temperature control and monitoring of the sample via Liquid Helium, Liquid Nitrogen and Closed cycle cryostats, water bath and peltier cooled sample holder options.
4. Lens optics as standard and optional mirror optics.
5. Upgrade facility for quantum yield accessory.

Detectors:

Red sensitive photomultiplier in peltier (air cooled) housing, featuring Hamamatsu R928P side window photomultiplier. Cooler power supply included. Operating temperature -20 ^{o}C.

- detector response width: 600ps
- dark count rate: 100 cps at -20^{o}C

Red sensitive high speed photomultiplier in peltier (air cooled) housing, featuring Hamamatsu H5773-04 detector, amplifier, Peltier cooler and interlock.

- detector response width: 250ps
- dark count rate: 150cps at 0^{o}C

Polarisers:

Automated anisotropy measurements - both excitation and emission polarisers should be present.

Excitation - Glan Thompson polarising prism (α-BBO; spectral range 220nm-900nm) in computer controlled mount. The polarisation angle to be computer controlled.

Emission - Glan Thompson polarising prism (α-BBO; spectral range 220nm-900nm) in computer controlled mount.

Data acquisition electronics :

TCSPC electronics

- time ranges from 2.5ns – 50µs full scale.
- time resolution from 610fs/ch
- ultra-low time jitter <25ps
- forward and reverse modes
- low dead time, ca 400ns

PCS900 plug-in PC card for fast photon counting for use for steady state measurements

- 100MHz counter

Software

One integrated software package for steady state and lifetime measurements.

Software Loaded on one PC.

Comprehensive software providing spectrometer control, performance monitoring, steady state and fluorescence lifetime data acquisition and data analysis:

- control over spectrometer components such as lamps, monochromator and detector settings
- spectral acquisition modes for excitation, emission, and synchronous scans
- acquisition of excitation-emission matrix, standard or synchronous (offset)
- automatic or manual spectral correction
- kinetic measurements
- fluorescence lifetime acquisition
- time resolved excitation and emission spectra (TRES)
- data handling routines (normalisation, scaling, arithmetic, integration, differentiation, smooth etc)
- numerical data reconvolution of up to 4 exponentials based on Marquardt-Levenberg algorithm
- full reconvolution analysis of up to 4096 channels of data
- residuals analysis, Durbin-Watson analysis and autocorrelation analysis
- 2D, 3D and contour graphics including functions for peak/trough searches and data slicing
- file import/export options, including ASCII
- routines for quantum yield, reflectance and absorption measurements (if optional integrating sphere or absorption accessory fitted)
- fully automated acquisition of time resolved anisotropy with G-Factor correction (if polarisers fitted)
- fully computer controlled sample temperature (if optional cryostat or TE cooled sample holder is fitted)
- communication to lasers and oscilloscopes

Ability to integrate low rep rate high energy lasers + offer an MSA card.

The spectrometer must have the capability to include three cards - PCS900, TCSPC card and the MSA card for the most thorough steady state and time resolved data.

Computer and Monitor – to be included.

Cryostat

Liquid nitrogen cryostat. The assembly comprises the cryostat head, the temperature controller and a mounting collar and pedestal.

- temperature range: 77-300K
- temperature stability ±0.1K (over 10min)
- hold time at 77K: ≥ 15hours
- includes heater and platinum temperature sensor
- cuvette holder,optical sample holder and sample rod
- two sets of outer and inner Spectrosil B quartz windows, arranged in L-geometry
- cryostat operation can be computer controlled from the spectrometer control software

Optional Accessories

1. Integrating sphere for quantum yield measurements of liquids, films, solids
2. Pulsed LED sources for excitation at approximately 250 nm, 300 nm and 350 nm.
3. Supercontinuum sources with higher powers may be quoted here as options.

TERMS AND 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, clearly marked as "Quotations for Purchase of time-resolved fluorescence spectrometer due on 26th March 2012". The quote should reach the following address on or before 26th March 2012, upto 5 PM.

   Dr. Sameer Sapra
   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. CIP charges should be quoted separately.
3. The quotations should be in the currency of the country of origin as well as Indian Rupees 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. Standard warranty details (minimum 3 years) should be provided.
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. SALES TAX : This Institute is not exempted from the payment of Sales Tax/Service Tax/VAT. The rate (i.e. percentage of Sales Tax should be clearly indicated included or excluded) wherever chargeable.
17. Institute reserves the right to accept or reject any or all the quotations without assigning reasons thereof.