

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

No. IITD/RP02191/ BCHM

Dated: 02/11/2011

NOTICE INVITING QUOTATIONS

Sub: Purchase of a Fluorescence based Confocal Microscope capable of carrying out single molecule measurements and spectral imaging

Sealed quotations in separate envelopes of technical and commercial bid kept in one sealed outer envelope are invited for purchase of a Confocal Microscope System as per specifications given below. Your sealed quotation should reach latest by 5 PM on 25th November, 2011 to **Prof. A. K. Ganguli, Department of Chemistry, Indian Institute of Technology – Delhi (IIT Delhi), Hauz Khas, New Delhi - 110016**. Your quotation should be superscribed “Quotation for Confocal Microscope due on 25th November, 2011”.

Specifications: Confocal Microscope

The confocal microscope should be equipped with the following along with the necessary specifications as detailed below:

1) Inverted Fluorescence Microscope (having the following components):

- Inverted Research Grade Optical Microscope
- Fitted with 2 side ports, a front port and also preferably a bottom port
- Equipped with XY translation stage
- Providing clear optical access from above and below
- Objective Turret with at least 4 independent positions for objectives and equipped with turret controls
- Reflector Turret having multiple positions (greater than 2) for multiple filters/filter cubes and equipped with turret controls
- Halogen Lamp illumination with appropriate filters and adjustment controls
- Eyepiece
- Optics for deflection of light into the eyepiece, side ports, front and bottom port
- Coarse and fine adjustment knobs for moving the objective up and down i.e. in the z-direction
- Can easily be coupled to lasers and detectors with/without the use of optical fibers
- **Objectives:** (i) 10x objective with NA 0.3 (water immersion, WD > 5.0 mm)
(ii) 50x objective with NA ~ 0.7 or better
(iii) 100x with 1.2 NA (oil immersion, WD = 0.20 mm)

2) Detection Module:

- **Two** high sensitive single-photon avalanche photodiode (SPADs) or **two** HPM (hybrid photomultiplier) detectors for simultaneous detection of photons; should be able to show single photon sensitivity
- Dark counts for detectors: 50 – 100 cps

- Detection range: 400 – 700 nm with detection efficiency peaking within 500 – 650 nm
- Should be fitted with **variable confocal pinhole(s)** for rejecting out-of-focus light
- Detectors should come with their own control and electronic modules along with suitable power supply
- Should be equipped with suitable mechanical mounts with proper optical coupling to the microscope through appropriate focusing optics
- Enough room in front of the detectors for placing various filters, dichroic mirrors and beamsplitters
- Detectors should have enough active area for ease of alignment to maximize fluorescence signal

3) **Laser based excitation:**

- Laser emission wavelength: 405 nm
- Wavelength tolerance: ± 5 nm
- Should have a well-defined TEM₀₀ mode
- To be coupled to the microscope objective using single mode optical fiber in a manner that losses are minimized; fiber coupler has to be fitted with adjustment screws for realignment of light path
- Should be provided with attenuator/neutral density filter(s) for varying incident laser light intensity
- Operable in either continuous wave (CW) only mode or both CW and pulsed mode. If pulsed, the pulse width should be < 120 ps. Also the pulsed laser should be operable in CW mode too. If pulsed, the laser should have a variable repetition rate of at least 20 and 50 MHz. For pulsed laser, proper data acquisition card is to be provided.

- **EMCCD:**

- Either front or back-illuminated
- Greater than or equal to: 1000 x 1000 pixel format
- Pixel Size: 8 x 8 μm
- Maximum Frame Rate: ~ 31 fps (frames per second)
- Maximum Readout Rate: ~ 35 MHz
- Should be able to carry out real time processing
- Should be efficiently cooled (TE cooled) to < -75 °C to minimize dark current/thermal noise
- Must have high quantum efficiency in the visible region
- Should be coupled to the microscope with proper dispersive optics (monochromators with proper f# matching alongwith lenses and/or collimators) for high resolution imaging of fluorophores (see spectroscopy details below)
- Should be capable of fast exposure-time switching
- Read noise $< 1 e^-$ with EM gain
- Should come equipped with a filter wheel
- Should be equipped with relevant software for computerized control of EMCCD components
- **Spectroscopy details**
Base unit, triple grating turret, dual camera exit ports, power supply
Grating 150 l/mm 500nm blaze for spectroscopy
Mechanical Shutter for spectroscopy
Filter wheel
Optical Fibre 100 μm VIS/NIR SMA-ferrule 2m

- **FCS module:**

- Should be equipped with a correlator card having at least dual correlation mode, that is, should be able to receive photon signals from two independent detectors simultaneously
- Should be able to record photon time series or photon arrival times for individual photons
- Should be preferably in multiple tau format with delay time ranging from < 100 ns to an upper limit of 60 seconds
- Minimum sampling time to be < 100 ns
- Possibility of binning of sampling time should be provided
- Software should be provided that can correlate photons and automatically plot the autocorrelation traces with real time averaging
- Data should be extractable in ASCII format

PC requirements

- One desktop/laptop (preferred) for the whole microscope system with full integration of controls
- Should come with required configuration as needed for running the aforesaid hardware and software modules of the confocal microscope smoothly and efficiently
- CPU should be having enough slots for high speed USBs and controller cards
- Should be loaded with all necessary softwares as noted below

Software Requirements

- Microscope control software
- Control of imaging and image processing with EMCCD
- Software for calculation of FRET efficiencies from intensity ratios/photon bursts at the two detectors

Optional Accessories:

Please quote the following optional accessories. These are however not a part of the main commercial bid.

- CW Argon Ion Laser with multiple lines at 458 nm, 488 nm and 514 nm
- Pulsed 488 nm laser with pulsewidth ~ 100 ps
- Oil immersion objective with 100x magnification and 1.4 NA, having a working distance (WD) of ~ 0.15 mm
- Water immersion objective with 40x magnification and 0.8 NA
- Temperature dependent sample stage for thermal measurements

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 Confocal Microscope due on 25th November, 2011”. The quote should reach the following address on or before 25th November, 2011, by 5 PM.

Prof. A. K. Ganguli
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. Standard warranty details 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. Institute reserves the right to accept or reject any or all the quotations without assigning reasons thereof.