

INDIAN ASSOCIATION FOR THE CULTIVATION OF SCIENCE
2A & 2B, Raja S.C. Mullick Road, Jadavpur, Kolkata-700032

Corrigendum of Tender :- NIT No.: IACS/DKS/BC/2017-18/85 Date: 09-01-2018

Technical Bid

Technical Specification for 'Spectral Multiphoton Confocal Laser Scanning Spectroscopy System with Super-resolution Capability'

Amendments are indicated in red colour text in the following Specifications :-

1. TECHNICAL BID

The technical bid should contain technical specifications and should be kept in a separate sealed envelope duly superscribed as 'TECHNICAL BID' on the outer cover of the envelop as already detailed above. **It should be clearly mentioned on the envelope as "Technical Specification for SMCLSS-SR".**

Desired Technical Specification for . SMCLSS-SR: (Modifications are indicated in red)

A	Specification For Fully Motorized Inverted Fluorescence Research Microscope:
	A1 Motorized Inverted microscope for Bright field, DIC, phase contrast and fluorescence observations. A2. High resolution semi-apo/plan-fluor objectives with DIC prism set for all DIC objectives.10x NA 0.3 (phase/fluorescence); 20X (phase/fluorescence); 40X NA 0.6 (DIC/Phase/fluorescence); Apochromatic 60X 1.4 NA, (DIC/fluorescence); Apochromatic 100x NA 1.4,(DIC/fluorescence), Long Working distance is preferable for 60x. A2. High resolution Apochromatic objectives with DIC prism set for .10x NA 0.4 (fluorescence/confocal); 20X fluorescence/confocal); 40X NA 0.95(DIC/confocal); 60X/63X 1.4 NA oil, (DIC/confocal); 60x/63x water immersion,(DIC/fluorescence with long working distance of more than 1.5 mm). In addition separate phase contrast objectives of 10X and 40 X should be provided A3 Motorized Focus with minimum step size of 10 nm or better, A4 Intermediate magnification changer 1.5X or more A5 6-8 position motorized Fluorescence filter wheel with shutter & 6 position motorized nosepiece with DIC /Polarizer lot. The Magnification change should be automatically recognized by the software A6 Motorized Continuous Automatic Drift Correction in IR (LED or LASER >750 nm) based Z-drift compensator by sensing the position of the cover-slip for fine focusing during long duration live-imaging controlled by touch screen panel. It would be a plus if such z-drift compensator also works for plastic bottom dishes, including 96-well plates. A7 12V 100W Halogen lamp illumination for transmitted light with built in filters A7 12V 100W Halogen/LED lamp illumination for transmitted light with built in filters A8 130 watt or more, intensity tunable fluorescence illumination by Hg/metal halide lamp with lamp of life minimum 2000Hrs with heat filter, with various intensity setting for example

	100 %, 50 %, 25 %, 12 %, 6 %, 3 % 0 %. A8 120 watt or more, intensity tunable fluorescence illumination by Hg/metal halide lamp with lamp of life minimum 2000Hrs with heat filter, with various intensity setting for example 100 %, 50 %, 25 %, 12 %, 6 %, 3 % 0 %. A9 Fluorescence filter set for DAPI, CFP, EGFP,YFP and mRFP, should be provided. Apart from these filter sets; <i>one additional dichroic</i> for mRFP (543 nm excitation) and <i>one empty mirror mount</i> should also be provided separately. Motorized control of epi-fluorescence filter turret. Motorized shutter in the fluorescence illumination light path (either on the turret or preferably built-in in the light source). A10 7 position Motorized long working distance condenser for Phase and DIC. All the positioning of the prisms, analyzer and polarizer should be automated according to the objective. Phase Contrast rings PH1, PH2 and PH3 should be provided A10 6 position Motorized long working distance condenser for Phase and DIC. All the positioning of the prisms, analyzer and polarizer should be automated according to the objective. Phase Contrast rings PH1, PH2 and PH3 should be provided A11 Motorized XY-scanning stage with tile-scan capability and Multi well imaging capability with linear encoder for good accuracy, high XY stability and repeatability. Control by Joystick and touch pad (LCD-based display of XYZ position would be preferred). Fine and coarse control of speed. Holders for slides, 35/60 mm Petri dish, and 96-well dishes with multipoint, tile and mosaic imaging software (capable of fast 6D imaging). XY-motorized stage should accommodate stage top CO2 incubator. Suitable for mounting Z-Piezo. A12 Metallic stage heating and cooling system should be provided for 10 °C to 80°C heating in addition to the temperature controlled CO2 incubator (A16). A12 Metallic stage heating and cooling system should be provided for 10 °C to 50°C heating in addition to the temperature controlled CO2 incubator (A16). A14 Possibility of mounting a polarizer of appropriate size (preferably one inch) in the fluorescence lamp path of the microscope A15 Tilttable binocular eyepiece A16 Field stop/aperture diaphragm must be provided A17 Setup for long term live cell imaging including Incubation system with Temperature, CO2 , humidity control. High performance heating, humidity and CO2 control stage top incubator with built- in digital gas mixer for 100% CO2 gas cylinder use must be provided. It should come with multiple attachments such as 96-well Plate, 35mm, 50mm, 60mm petridish, Chamber slide, Chambered cover-glass. Touch panel controller. Setting Mode : Touch Panel, Humidity : Internal Humidifier more than 90%, CO2 Control - CO2 regulation : Digital, CO2 setting range : 5.0~20% , CO2 Accuracy : ±0.1% (at 5%), Gas flow rate : 160ml/min, Stage heater Regulation and Hi-speed ON/OFF. (Please attach the pamphlet including a complete description of the system.)
B	CONFOCAL (Point scanning confocal microscope with spectrally resolved detection feature and super resolution capabilities)
B1	Confocal system with the ability to acquire spectrally-resolved detection in each channel. Should have built-in Spectral detection unit (Spectral PMT or HyD/GaAsP Spectral

detectors.) User must have freedom to select the exact wavelength range, they wish to capture in every detection channel at minimum 5 nano-meter precision. Spectral band-pass selection using continuously variable slit/knife edge based mechanism in all the detectors down to 5nm would be preferred

B1 Confocal system with the ability to acquire spectrally-resolved detection in each channel. Should have built-in Spectral detection unit (Spectral PMT or HyD/GaAsP Spectral detectors.) User must have freedom to select the exact wavelength range, they wish to capture in every detection channel at minimum 10 nano-meter precision or better. Spectral band-pass selection using continuously variable slit/knife edge based mechanism in all the detectors down to 10 nm would be preferred

B2 Each detector must have independent gain and offset. Simultaneous as well as sequential detection of minimum 4 fluorophores is a must. All detectors should be capable of working in Intensity and Spectral mode Imaging. Should be capable of simultaneous detection and separation of minimum 2 fluorophores or more based on high sensitive GaAsP/HyD or equivalent detectors with QE 40% or more. *Simultaneous acquisition in spectral mode would be preferred* (The TSC could decide to make the Simultaneous acquisition of spectrum a mandatory criteria)

B2 Each detector must have independent gain and offset. Simultaneous as well as sequential detection of minimum 4 fluorophores is a must. All inbuilt spectral detectors should be capable of working in Intensity and Spectral mode Imaging. Should be capable of simultaneous detection and separation of minimum 2 fluorophores or more based on high sensitive in built GaAsP/HyD or equivalent detectors with QE 40% or more. *Simultaneous acquisition in spectral mode would be preferred* (The Technical .Specification. Committee (TSC), could decide to make the Simultaneous acquisition of spectrum a mandatory criteria)

B3 Spectral acquisition should be performed using either of the following methods: i.) Reflection Diffraction Grating (with 32 array GaAsP/HyD) ii.) Prism (with 32 array GaAsP/HyD) iii.) Holographic Transmission Diffraction Grating (with 32 array GaAsP/HyD). Other methods (but not the external filter based PMT) will also be considered, the technical committee will decide the suitability of other method

B4 Transmitted detector unit to conduct DIC with point laser scanning imaging.

B5 The galvo-mirror should have highest reflectivity from 400-1000nm (>90%) for better sensitivity from UV–near-IR Imaging.

B6 Fast scanning with at least 7-10 fps at 512X512, Higher speed acquisition capabilities would be given preference. Zoom range 40X or more with minimum increments of 0.5X, Scan rotation 180-360 degree, and various scanning mode including region of interest (ROI) scanning mode. An additional high speed scanner (**28 FPS at 512X512 resolution**) **should be quoted optionally possibility of simultaneous dual scanning with two scanners would be preferred.**

B6 Fast scanning with at least 7-10 fps at 512X512, Higher speed acquisition capabilities would be given preference (cost of this scanner should be mentioned separately) . Specified speed should be available without line skipping and interpolation for all channel imaging simultaneously Zoom range 40X or more with minimum increments of 0.5X, Scan rotation 180-360 degree, and various scanning mode including region of interest (ROI) scanning mode.

	An additional high speed scanner (28 FPS at 512X512 resolution) should be quoted optionally possibility of simultaneous dual scanning with two scanners would be preferred. In case the committee decides to go ahead with only high speed scanner the L1 will be decided by the cost of this scanner. B7 Scanner unit should have laser ports for Vis, UV and IR lasers. B8 The scan field diagonal should be 20 mm or better. B8 The scan field diagonal should be 18 mm or better. B9 At least 4 laser lines (405nm, 488nm, 550-570 nm and 630-640 nm, high power laser compatible with FRAP) having a lifetime of minimum 15000 hours (additional guarantee for minimum 15000 hr laser life must be provided, in case of breakdown, the laser must be replaced without any material cost) for single photon should be provided. All visible & UV lasers should be connected to the scan head through fiber optic cable and should be controlled through AOTF for fast laser switching and attenuation with the laser scanner for Real ROI scan for FRAP, FRET Photo activation/conversion experiments. Laser must switch fast synchronized manner for conducting photo-activation, photo-conversion and FRAP and FRET experiments at the particular ROI through AOTF. B9 At least 5 laser lines (405nm, 488nm, 514, 550-570 nm and 630-640 nm, high power (minimum of 20 m watts on each line) laser compatible with FRAP) having a lifetime of minimum 15000 hours (additional guarantee for minimum 15000 hr laser life on each line must be provided, in case of breakdown, the laser must be replaced without any material cost) for single photon should be provided. All visible & UV lasers should be connected to the scan head through fiber optic cable and should be controlled through AOTF for fast laser switching and attenuation with the laser scanner for Real ROI scan for FRAP, FRET Photo activation/conversion experiments. Laser must switch fast synchronized manner for conducting photo-activation, photo-conversion and FRAP and FRET experiments at the particular ROI through AOTF System should be capable of doing FRET of CFP-YFP and GFP-RFP pairs efficiently. If additional lines are required they must be provided.
C	ACCESSORIES
	C1 Microscope cover C2 microscope scale for calibrating the pixel size C3 Lens cleaning paper books (10 packs) C4 Objective Oil (5 bottles) C5 one 1X C-mount + one 1.2X C-mount C6 Two additional one inch round polarizes C7 Two spare bulb each for fluorescence (130 watt, Hg/metal halide) and DIC (12V 100W Halogen) C7 Two spare bulb each for fluorescence (120 watt, Hg/metal halide) and DIC (12V 100W Halogen) C8 Glass bottom 96 well plate (100 pieces) C9 power meter to measure the laser power
D	System control and imaging software (must be provided with life time license agreement)
	D1 Common software to control all the feature of the microscope, camera confocal unit

	and 2 photon system D2 License to design macros/write codes to perform inhomogeneous time/color/tile/3D/multipoint experiments according to the wish of the user. Multidimensional Image Acquisition and analysis software D3 Line, curved line, frame, Z-stack, Time series imaging capabilities. D4 Real ROI bleach for FRAP, Photo-activation/conversion experiments. D5 FRET and FRAP imaging as well as Quantitative data analysis capability. D5 FRET and FRAP imaging as well as Quantitative data analysis capability. System should be capable of doing FRET of CFP-YFP and GFP-RFP pairs efficiently. If additional lines are required they must be provided. D6 Standard geometry Measurements like length, areas, angles etc including intensity measurements. D7 Advanced 3D image reconstruction with rendering from a Z-stack image series. Orthogonal plane viewing /slicing of the 3D time-lapse data set D8 Co-localization and histogram analysis with individual parameters. D9 Spectral un-mixing with fingerprinting for separation of overlapping excitation/emission spectra of fluorophores. D10 Additional Offline software with complete features as the main software with high end dedicated PC and monitor should be made available for offline data processing and analysis.								
E	Camera specification								
	Cooled monochrome CCD camera optimised for high sensitivity, 1.4 million net effective pixel resolution controlled by the same confocal software, capable of multichannel imaging, z stack, time lapse wide field imaging with fluorescence/DIC/phase contrast alone or in combination. High frame rate, Peltier cooling -10 degree@ 25 degree ambient or more. An additional sCMOS camera for high speed BF/DIC/Phase-contrast imaging should also be provided Cooled monochrome CCD camera optimised for high sensitivity, 1.4 million net effective pixel resolution controlled by the same confocal software, capable of multichannel imaging, z stack, time lapse wide field imaging with fluorescence/DIC/phase contrast alone or in combination. High frame rate, Peltier cooling -10 degree@ 25 degree ambient or more. An additional Peltier cooling with water cooling arrangement (to reach minimum -30° C) sCMOS camera with A/D converter (16 bit / 12 bit / 8 bit) for high speed imaging with low noise (0.006 electrons/pixel/s)and high dynamic range (37 000:1) should also be provided with following specification. The camera should be compatible with micromanager and other 3rd Party software. <table border="1"> <tr> <td>Quantum efficiency</td><td>(peak QE: 80% or more)</td></tr> <tr> <td>Readout speed</td><td>40 frames/s (Full resolution, standard scan, USB 3.0, 16 bit)</td></tr> <tr> <td>Effective no. of pixels</td><td>2048 (H)×2048 (V)</td></tr> <tr> <td>Pixel Size</td><td>6.5 μm×6.5 μm</td></tr> </table>	Quantum efficiency	(peak QE: 80% or more)	Readout speed	40 frames/s (Full resolution, standard scan, USB 3.0, 16 bit)	Effective no. of pixels	2048 (H)×2048 (V)	Pixel Size	6.5 μm×6.5 μm
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F	Computer and Monitor
	At least 64 bit control computer with Intel Xeon Processor, DDR RAM 64 GB or better, HDD: 2 TB SATA upgradable to 4 TB or better, DVD, SuperMulti SATA +R/RW, Graphics : AT Fire GL V5200 256MB DH DVI, Gigabit Ethernet, Win 7 Ultimate 64 bit , USB 2.0, Fire wire. Large 32" LCD/ TFT monitor. The CPU should be accessible with at least 10 other PCS connected with LAN At least 64 bit control computer with Intel Xeon Processor, DDR RAM 64 GB or better, HDD: 2 TB SATA upgradable to 4 TB or better, Additional SSD should be provided for loading the operating system. DVD, Super Multi SATA +R/RW, Suitable Graphics :, USB 2.0/ USB 2.0 with latest operating system,. Two Large 32" LCD/ TFT monitor. The CPU should be accessible with at least 10 other PCS connected with LAN An additional workstation for image analysis should be provided
G	Service and Support
	G1 2 years warranty including for all the lasers and 5 years Annual Maintenance Contract (AMC) post warranty. G1 2 years warranty including for all the lasers and 5 years Annual Maintenance Contract (AMC) post warranty G2 One trained operator for a period of 12 month G3 Note The above mentioned technical specifications are highly desirable. However, lower technical specifications may be considered if the above mentioned specifications are found to be unsuitable in financial terms. The Institute reserves the right to go for lower specifications taking into considerations its financial constraints and technical preferences.
H	FCS/FCCS and Anisotropy module
	H1 Based on Minimum 2 channel GaAsP/HyD or APD's for FCS/FCCS with high sensitivity and minimum after pulsing. The FCS unit should perform auto and cross correlation measurements in live cells and solution for a wide range of dyes and proteins. The unit should have the facility for elimination/suppression of other excitation laser lines. All laser lines for confocal imaging should be capable of working in FCS/FCCS mode. Dedicated Plan Apo 40x/1.2 water or 63X/1.20 Water with correction collar should be offered with the system. FCS measurement software for auto and cross correlation capabilities should be quoted. Dedicated FCS/FCCS Module for curve fitting, diffusion, Count Rates, CPM and Structural Parameters available. H2 System should be included with POL Anisotropy accessories to perform quantitative fluorescence anisotropy experiments and should be duly supported
I	Super resolution (SR) Imaging: (to be offered optionally)
	I1 Fully automated and motorized SR attachment with suitable high sensitive Detectors for complete Vis Spectrum.

	The system should be able to work in SR mode online during confocal imaging Should be able to achieve Lateral resolution of minimum 140 nm and Axial resolution of 450nm I2 Any dye used for confocal system can be used for imaging without changing sample preparation techniques/protocol. I3 Should be able to perform live cell SR Imaging. All laser lines for Confocal Imaging should be used for imaging in SR mode.
J	Multiphoton attachment with coupling optics and NDD Imaging (to be offered optionally)
	J1 Totally integrated and software controlled FemtoSecond laser system for Multiphoton imaging with the below mentioned specs: Tuning range: 690 to 1040nm. (for DAPI, Green, Red fluorophores) Pulse width : < 100 femto seconds. Average power: > 2.0 W or better @ 800nm. Repetitive rate: 80 MHz All direct coupling optics of the laser to the scan head and the laser attenuation device AOM. J2 2 channel Detector for reflection NDD imaging with suitable filters for Violet, green , red fluorophores imaging for Deep Tissue Imaging using MP Laser should be quoted. J3 Note: • Bidders should clearly specify the after sales/service/application support capabilities. • Warranty for the complete system should be mentined. • Provide all information as regards pre-installation requirements (i.e. room, environment) for system installation. • Online UPS for the complete system including lasers should be included in the supply. • Detailed list of users of the system in India with contact details to be provided. • Training for personnel on the system should be provided.

7. Warranty: Warranty: Equipment should be offered with standard warranty followed by Annual Maintenance Contract (AMC) /Comprehensive Maintenance Contract for a total (AMC/CMC) duration of 5 year. The vendor should quote the charges for AMC and CMC separatly. The vendor should also quote for further 5 years AMC/CMC after the expiry of initial period of warranty & AMC. Taxes as applicable will be deducted at the time of payment of AMC/CMC amount.

7. Warranty: Warranty: Equipment should be offered with standard warranty (two years) followed by Annual Maintenance Contract (AMC) /Comprehensive Maintenance Contract for a total (AMC/CMC) duration of 5 year. The vendor should quote the charges for AMC and CMC separatly. The vendor should also quote for further 5 years AMC/CMC after the expiry of initial period of warranty & AMC. Taxes as applicable will be deducted at the time of payment of AMC/CMC amount.

Acting Registrar