May 19th 2023

Reuploaded with minor edits on 25th May 2023. Changes are in red.

Global Tender for TCSPC Photoluminescence Spectrometer

The last date of the tender is June 12th 2023

This is an RFQ (Request for Quote) for supply, installation, and commissioning of Photoluminescence Spectrometer with time-correlated single photon counting capability. The system will be used for R&D and characterization of semiconductor devices. The equipment will be installed in Micro-Nano Characterization facility at the Centre for Nano Science and Engineering (CeNSE.) at IISc., Bangalore. CeNSE is a multidisciplinary research department at IISc that houses a 14,000 sq. ft. cleanroom and characterization facility used by 75 faculty members from various disciplines at IISc. CeNSE also runs a program called Indian Nano electronics Users Program (INUP) which has allowed 8000 participants and 1500 faculty from more than 700 universities and institutes all over India to use the facilities at CeNSE. Consequently, any utility/facility at CeNSE receives significant exposure to scientific community at IISc and beyond. The vendors are requested to factor in the value of this exposure into their quotes. Details of existing facilities are available at:
http://mncf.cense.iisc.ac.in/
http://nnfc.cense.iisc.ac.in/

The Process

1. The tender is being launched as per Government of India rules, specifically GFR 2017. We shall follow the GFR rules as they stand on the date the tender has been released. As per recent edits to the GFR, there are three classes of vendors distinguished by their "local content".
    a. Class 1 supplier: Goods and services have a local content of equal to or more than 50%
    b. Class 2 supplier: Goods and services have a local content more than 20% but less than 50%
    c. Non-local supplier: Goods and services have a local content of equal to or less than 20%
2. **This order is open to all global and local Original Equipment Manufacturer (OEM) or their Indian authorized distributor**, i.e., Class 1, Class 2 and non-local suppliers are eligible to send a bid.
3. Purchase preference as defined by the recent edits to GFR (within the "margin of purchase preference") will be given to the Class-1 supplier.
4. MSMEs can seek an exemption to some qualification criteria. IISc follows GFR2017 for such details.
5. Vendors will be required to submit a technical proposal and a commercial proposal in **two separate sealed envelopes**. Quotes in violation of this will be rejected.
6. **The deadline for submission of proposals is June 12th 2023, 5:30 pm Indian Standard Time.** Proposals should arrive at the CeNSE office, GF-15, Centre for Nano Science and Engineering, Indian Institute of Science, Bangalore 560012, India, by the above deadline. Please mention **"Tender for TCSPC Spectrometer"** on the envelopes.
7. The technical proposal should have:
    a. Relevant technical datasheets. The committee reserves the right to cross-check the information in these datasheets with publicly available information.

b. A compliance table with 5 columns. The first column must list the technical requirement, in the order that they are given in the table 1 and 2 below. The second column should describe the capability of the tool for that specific requirement. Please be quantitative and consistent with the technical datasheets. In case the technical requirement is a text, second column must provide a technical answer. In case the requirement is a number, please provide a number. Third column must specify whether the technical requirement is met with a "Yes", "No", or "Partially". If the response is "Partially" or "No" the third column, the fourth column must explain the extent of the deviation and, if possible, the reasons for the deviation. The fifth column is for other "Remarks". You can use it to compare your tool with that of your competitors or provide more details/justifications.
c. Technical capabilities of any *suggested* accessories/add-ons that may enhance the usability, capability, accuracy or reliability of the tool. Vendors are encouraged to quote for as many add-ons as their tool portfolio permits.
d. Any additional capabilities or technical details, which you would like to bring to the attention of the purchase committee. Vendors are encouraged to highlight the advantages of their tools over comparable tools from the competitors

8. If multiple systems fulfil the requirement, vendors can offer multiple bids.
9. The technical proposal will be evaluated against the technical requirement. Only vendors who meet the technical requirement will be considered for the commercial comparison and negotiation.
10. The commercial bids will be evaluated based on life-cycle cost of the tool. This includes the cost of purchase, maintenance, spares, etc. **For the calculation of L1 we shall use combined cost of 3 years of operation.** Part of this period will be covered by warranty, the rest with AMC. The methodology for the calculation is:
    a. The cost of maintenance during the warranty period will be considered *zero unless* there any are any mandatory replacements (mentioned in point #8.d.iv). Longer the warranty, lower the implied life cycle cost.
    b. For the balance years, (3 – warranty), the cost of operation will be the quoted AMC charges (mentioned in point #8.e). Lower the AMC charges, lower the life cycle cost.
11. The commercial bid must conform to the following:
    a. The quotations should be CIF Bangalore ~~on FOR-IISc Bangalore basis in INR only~~. Mention itemized cost of the system and *required* accessories, such as software, power supply, etc.
    b. Mention itemized cost, as an option, for any *suggested* accessories/add-ons that may enhance the usability, capability, accuracy, or reliability of the tool. Vendors are encouraged to quote for as many add-ons as their tool portfolio permits.
    c. **The quotes must be FOR IISc-Bangalore, India.** So please include cost of shipping to Bangalore.
    d. Mention the warranty provided with the tool.
        i. Warranty of 1 year is mandatory. Warranty of 3 years or more is preferred.
        ii. All electronics, optics, and instrumentation must be covered under the warranty.
        iii. Clearly indicate any part that is not included in the warranty.
        iv. Mention the cost of any mandatory spares that must be replaced during regular maintenance, even in the warranty period. This number will be used to estimate the life cycle cost of the tool, as explained in point #7.a.
    e. Provide yearly cost of AMC for (3 – warranty) years beyond the warranty period. The AMC must satisfy the following:

i. Provide itemized cost for *required/expected* spares for operation during the AMC period. This number will be used to estimate the life cycle cost of the tool, as explained in point #7.b.
ii. Cover 2 scheduled preventive maintenance and 1 emergency visits per year.
iii. The emergency visit should be supported with a 24-hour response window.
iv. In case the OEM is foreign, clarify if maintenance will be done by a trained local engineer (OEM representative within India) or a specialist from abroad.
v. Cost of AMC must include an itemized list of spares (e.g., maintenance kits) that are essential for preventive maintenance.

f. Mention the length of time that the tools will be supported with service and spares from the date of installation. Our requirement is that the tools be supported for at least 5 years from the date of installation. To reach a lower price, vendors often quote for obsolete or soon-to-be obsolete equipment. This is **NOT** acceptable. For a user-facility like CeNSE, it is vital that the equipment be serviceable and supported for the foreseeable future. The length of guaranteed support will be used to estimate the life-cycles cost of the tool.

12. The decision of the purchase committee on the execution and evaluation of the tender, is absolute and final.
13. The RFQ must include references of 3 previous installations, preferably in India. Please provide the names and contact addresses of the referees, so that the committee can contact them independently.
14. We encourage vendors to give technical presentations, physically or online, so that we can better understand the technical capabilities of their tools and vendors can better understand the requirements.
15. To schedule the presentations or for technical questions, please contact Dr. Suresha, COO Micro and Nano Characterization Facility (MNCF), Centre for Nano Science and Engineering, Indian Institute of Science, Bangalore 560012, India. (sureshasj@iisc.ac.in)

Table 1: General Requirements

1.	Description & capabilities	We are seeking a customizable and upgradable photoluminescence system capable of advanced photophysical measurements. The system should support the following: a) Transient PL using time-correlated single photon counting (TSSCP) with a pulsed laser source b) Steady-state emission PL with a laser source c) A seamless user software that integrates all accessories. d) Advanced analysis software. The system should also support the following optional capabilities that are field upgradable: e) Steady-state excitation PL with a broadband source f) PL quantum yield with integrating sphere. g) Fiber-coupling attachment to interface the system to an external optical microscope h) Cryostat for temperature-dependant measurements

2.	TCSPC Lifetime	Feel free to offer multiple choices of emitter or detector. Emitter: a) Emission pulse width of 1 ns or narrower b) Pulsed LED or laser with wavelength between 350-450 nm. c) **Mention intensity or fluence achieved at the sample**. Detector: d) Time resolution of 1 ns or better. e) Response width of 50 ns to 1 ms f) Detection spectrum: 300 nm to 800 nm g) **Provide the quantum efficiency curve**.
3.	Steady-state emission PL	a) Software-selected emission spectra. b) Fixed excitation LED or laser with wavelength between 350-450 nm c) Detection spectrum: 350 nm to 800 nm d) SNR of 1:30000 or better.
4.	Upgradability	The system should be field upgradable with the following capabilities. At our request, the vendor must be able to add these capabilities in the future, with software and firmware integration for a seamless plug and play experience. a) Double monochromators in excitation pathway, similar in capabilities to the monochromator in the emission pathway. b) Broadband Xe-lamp for excitation spectra with 350 nm to 800 nm light c) A supercontinuum laser source (Visible/NIR) in an independent software selectable channels d) An extra pulsed LED or laser source in an independent channel that is software selectable e) Up to two additional detectors in independent channels that are software selectable f) Coupling to a confocal microscope with optical fibres for spatial characterization or imaging. g) Accommodating a closed-cycle cryostat with temperature range of 4K-400 K. h) Accommodating an integrating sphere for PL absolute quantum efficiency.
5.	Software	The tool will be housed in a multi-user facility. So it must be idiot-proof and robust. It must also be upgradable and customizable. Specifically: a) The user interface should be tiered with atleast 2 levels of access: user, and engineer. b) The system should have interlocks that prevent user from unsafe or damaging operations. c) The software must integrates all accessories in one seamless experience. d) The software must accommodate all future upgrades listed in point #4. e) Software must support data analysis for TCSCP data with 2/3 exponential fits.

		f) Software should provide calibration to correct for spectral errors due to source and detector. g) Software must support easy extraction of measured data.
6.	Optics	a) Must support introduction of at least two standard 50 mm square filters and at least one polarization element (e.g. polarizer, retarder) in the optical path. The filter can be wavelength selective or neutral density. b) All the optics in the path must support wavelengths from 200 nm to 2000 nm. This range is wider than the immediate requirement to enable future upgrades.
7.	Monochromators	a) Double monochromators in emission pathway. b) Focal length 2x300 mm or better c) Aperture F/4.1 or better d) Accuracy: 0.2 nm e) Resolution: 0.5 nm f) Repeatability: 0.1 nm g) Stray-light rejection: $1:10^{-10}$
8.	Sources	Collection of sources that can accomplish points #2 and #3. For e.g. a steady-state source + pulsed source. **a) Give intensity or fluence achievable at the sample** b) Should have reference detector in the optical path to monitor variation in the excitation power and correct for it in the software. h) The drive frequency of the pulsed source must be tuneable over a range of 1 kHz to 10 MHz range. This allows is to measure lifetime response from 50 ns to 1 ms.
9.	Detector	A detector that satisfies requirement for points #2 and #3. Additionally: a) Detection spectrum: 300 nm to 850 nm b) Detector dark count rate < 50 cps c) Detection efficiency of >10 % for the full range of 400-800 nm. Provide quantum efficiency curve of the detector.
10.	Samples holder	a) Static thin-film sample holder for 1 cm2 square samples. Capable of measuring on the front face geometry. b) Single cuvette sample holder.
11.	Mandatory accessories as options	a) An adapter that couples the system to an optical (including confocal) microscope via optical fibres for micro-scale imaging. Mention light-coupling efficiency (or loss). b) Integrating sphere for measuring quantum yield over a range of 200-2000 nm for solution and thin-films. c) Closed-cycle cryostat with temperature range of 10K-350K. Include mandatory accessories like pumps.
12.	Shipping	All costs should be FOR Bangalore. Include shipping costs.
13.	Footprint & weight	a) The system should not take more than 3 m^2 of space. b) Must weigh less than 250 kg.
14.	Periodic maintenance & repairs	a) The system should require minimal maintenance. Mention the recommended preventive maintenance schedule for the system. Provide details of what constitutes preventive maintenance.

		b) Can the preventive maintenance be done by a trained on-site engineer (IISc employee) or requires a specialist from the OEM? c) As stated above, we require yearly cost of AMC for (3 – warranty) years beyond the warranty period. The AMC must satisfy the following: i. Cover 2 scheduled preventive maintenance and 1 emergency visits per year. ii. The emergency visit should be supported with a 24-hour response window. iii. In case the OEM is foreign, clarify if maintenance will be done by a trained local engineer (OEM representative within India) or a specialist from abroad. d) Even outside AMC, the system should be supported by a trained local representative with a 48-hour response window.
15.	Installation and training	a) Installation and training at customer site, by the experts from OEM should be part of the package. b) During the installation all the specifications of the processes should be verified for acceptance by the customer.
16.	Safety	a) Mention any special safety requirement of the system. b) The system must come with a complement of interlocks to prevent common user errors. c) If the system produces ozone, the emissions must be managed so the user is not exposed.
17.	User recommendation	a) The system must give references from at least 3 previous installations, preferably from India. b) The names and contact addresses of the referees must be given with the proposal, so the purchase committee can contact them directly.
18.	Acceptance tests	Material/films for testing will be provided by IISc. a) Measure emission PL for AlGaN/GaN on Si thin film. b) Measure excitation PL spectra of an organic chromophore with incident light intensity of 100 mW/cm2. c) Measure TCSCP response of an organic chromophore with incident light intensity of 100 mW/cm2. d) Measure TCSCP response of a lead halide perovskite thin-film with incident light of 10 mW/cm2 on glass with response window of 100 ns to 10 us. e) Demonstrate the dark CPS of the detector. f) Demonstrate the specified stray light isolation of the light path. g) Demonstrate functionality of all the accessories.