Detailed Specifications of Global Tender Notice No: 09/2015

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RT & LT Photoluminescence Measurement Setup with Time Resolved and Electroluminescence facility

Steady state system for Photoluminescence measurements at room temperature as well as low temperature upto 10K with suitable detectors and pulsed lasers for life time measurements along with electroluminescence facility. The detailed specifications are given below:

(i) Computer-controlled double monochromators on excitation and emission for maximum stray light rejections. The excitation and emission arm should be made of two coupled monochromators with focal length ~ 300 mm for maximum stray light rejection and resolution.

(ii) A grating on the excitation monochromator is required at 250nm for improved excitation in deep-UV; a second grating on the excitation at 400nm for general UV-VIS purposes, and a NIR grating on excitation for excitation up to 1600nm.

(iii) High power excitation lamp (300 watt or higher) with excitation range 200nm to 1600nm. In particular, it must be demonstrated that the excitation light hitting the sample has got sufficient power at 213nm to perform steady-state bandgap measurement.

(iv) Reference detector 200 nm to 1600nm to calibrate against lamp fluctuations.

(v) The emission monochromator needs to have a grating for UV-Vis and a grating for NIR to 1700nm.

(vi) Computer-controlled and interlocked shutter for detector protection.

(vii) Large sample chamber for reduced stray light and easier use of advanced accessories such as CCR cryostats.

(viii) Excitation & emission both monochromators should have automated filter wheel for grating second and third order removal.

(ix) Front Face Sample Holder on XY Stage should be provided.

(x) Front face sample holder (single position) on linear slide should be provided which must be suitable for measurements of powder and film samples.

Sources:

(xi) He-Cd Kimmon Laser 30mW at 325nm along with filters for He-Cd plasma lines blocking.

(xii) Pulsed Laser for Fluorescence and Phosphorescence lifetime measurement from nanosecond to millisecond region.

a.) 213nm pulsed laser (5^{th} YAG harmonic) with energy >0.05 uJ @15kHz, Pulse repetition rate adjustable from single pulse to <20 kHz and pulse width FWHM < 1nsec.

b.) 266nm pulsed laser (4^{th} YAG harmonic) with energy >0.3 uJ @15kHz, Pulse repetition rate adjustable from single pulse to <20 kHz and pulse width FWHM < 1nsec.

(xiii) The 213nm laser must have its own direct input to the sample chamber and direct sample excitation to avoid signal loss on optics.

(xiv) The Laser must include all coupling optics and mounts to the sample chamber.

(xv) All lasers must be attached to the instrument and pre-aligned.

(xvi) A flip-mirror mechanism must allow for laser selection.

(xvii) Provision for attachment of 1 CW laser and 2 LED/diode laser sources.

Detectors:

(xviii) High sensitivity TCSPC-capable detector for UV-VIS to cover 200nm to 870nm.

(xix) TCSPC-capable detector for NIR measurement to cover the 300nm to 1700nm range (lower wavelength range for IFR purposes).

(xx) A single TCSPC electronic enable measurements down to 25ps with future detector upgrade.

(xxi) Signal to noise ratio should be ≥24000/1.

Low temp measurements:

(xxii) A closed-cycle cryostat must be included to cool the sample down to 10K±2K. The cryostat should have 4 thermally anchored wires and electrical feedthrough for low temperature electroluminescence measurement. A facility must exist to easily insert the cryostat in the sample chamber

- Cryostat must be provided with Chiller unit.
- Liquid holder and temperature controller and all necessary items must be provided for the Cryostat.
- Vacuum Pump system: Two stages, Rotary Vane Vacuum pump >5m^3/hr with vacuum gauge, thermocouple, hoses and vacuum valves with backfill feature.

Electroluminescence Measurements:

(xxiii) A sample clamp for room-temperature & low temperature electroluminescence, maximum sample thickness of 5 mm and maximum 20mmx20mm size.

(xxiv) An Interactive source meter for current, voltage, and resistance testing, voltage range Ranges 20mV - 200V and current range 10nA - 1A with precision power supply, true current source, digital multimeter, precision electronic load and trigger controller.

(xxv) A set of shortpass filters with cut-off wavelengths 265nm, 325nm, 385nm; and Longpass Filter with cut-on wavelengths 250nm, 275nm, 300nm, 340nm. This is required for further signal enhancement.

Quantum Yield Measurements:

(xxvi) Integrating sphere >110 mm for quantum yield via absolute method.

(xxvii) Integrating sphere should be easily removable and can be fully integrated in the sample compartment.

Acquisition Electronics:

(xxviii) Single Acquisition electronics for performing steady state PL, Phosphorescence (MCS) and Fluorescence Lifetime Measurement (TCSPC).

Software:

(xxix) Comprehensive spectrometer software for providing spectrometer control, performance monitoring, spectral and lifetime data acquisition and data analysis.

(xxx) User-friendly quantum yield and lifetime calculations in the main instrument software.

(xxxi) Capability to perform time-resolved emission spectra (TRES) and data slicing in the supplied software itself.

(xxxii) 3D and contour graphics should be available for TRES and excitation-emission matrices.

(xxxiii) Control over spectrometer components such as monochromator and detector settings.

(xxxiv) Spectral and fluorescence/phosphorescence lifetime acquisition.

(xxxv) Possibility for automatic or manual spectral correction.

(xxxvi) Numerical data reconvolution of up to 4 exponentials.

(xxxvii) Possibility for chromaticity and luminance calculation.

(xxxviii) Software control for sample temperature in Cryostat.

(xxxix) A dedicated computer system with min. i5 processor, 4GB RAM and 500GB hard disk) with all the necessary components and software along with laser printer.

Optional

(i) 261nm CW lasers for steady state excitation, Power 1mW, power stability <5% rms over 4h.

(ii) Electroluminescence measurements facility with AC sources.

(iii) Three exit ports on double monochromators in order to upgrade with further detectors in the future.

(iv) Possibility for upgrading with other steady state and lifetime lasers. The upgrade should keep all the lasers in place.

General Terms & conditions

(i) Standard samples for steady state PL & EL for calibration.

(ii) Power requirements: Compatibility as per Indian electrical standard.

(iii) Warranty: 1 year from date of installation.

(iv) Installation and Training must be provided by factory engineer at our premises.

(v) A strong and rigid table must be provided which should be suitable for the whole Instrument placement as per the system dimensions.

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Specifications for substrate temperature & film thickness measurement system for RF-Plasma Molecular Beam epitaxy system

Complete optical, non-contact, real-time temperature and thickness monitoring tool, which includes all temperature and layer thickness sensor hardware, a rack mounting unit, all interconnecting cable(s), all optical and mounting requirements with following specifications

1. Real time film thickness and growth rate monitoring on a single viewport: Integrated growth rate monitoring software platform, capable of measuring film thickness with resolution of 1-2nm or better and ability to measure static film thickness >1.2 micron or better.
2. Blackbody source and pyrometery temperature monitoring with emissivity correcting (EC) pyrometery system and growth rate monitoring.
3. Absolute temperature calibration of the EC temperature measurement without use of RHEED transitions, eutectic points or other sample dependent methods.
4. Real time temperature measurement of the substrate or film with capability to fit the black body emission spectra without user defined inputs to obtain accurate real time temperatures on a starting substrate with no other calibration.
5. Emissivity correcting temperature measurement for temperature in the range 450-1200°C with accuracy ±2°C or better.
6. Automatic as well as manual spectrometer exposure time to measure lower (350°C) and higher (1400°C) temperatures.
7. Selectable standard pyrometer wavelength band in the range of 900nm-1650nm
8. Capable of monitoring the blackbody emission and reflectivity of the substrate and depositing film within a narrow wavelength band (10nm or less).
9. Wobble correction and rotation trigger compatibility.
10. All temperatures measurements should be recorded by the same computer and within the same software program.
11. The temperature and thickness monitoring tool should be placed ~ 0.5 m on a non heated normal to wafer viewport (with shutter) – size 6'' from the source and should be able to focus within the radius of 2 -3 mm.
12. Substrate compatibility: Si, Mo coated SiC, Ge, Mo coated GaN, Mo coated Sapphire
13. Computer hardware with (at least i3 processor, 8GB RAM, 1TB harddisk) with windows 7 with pre-installed data acquisition& analysis software with backup for software.
14. Software for calculation of growth rate, film thickness, n & k values in real time with fitting capability and ability to re-analyze the growth rate and thickness on user defined data range during acquisition.
15. Software should have capability of showing spectral intensity versus wavelength and time in IR range with possibility to show pyrometer oscillation in real time.

16. Software license for analyzing data files on separate computer.
17. All the manuals for operation and troubleshooting of the equipment and software.
18. All essential cables required for the equipment.

General Terms & Conditions

19. Power requirements: Compatibility as per Indian electrical standard.
20. Warranty : 1 year from date of installation
21. Installation by the user

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