

Technical specifications for micro-Raman/Photoluminescence spectrometer compatible to be integrated with cryogenic temperature stages (Liquid Nitrogen and up to 3.2K)

This is a tender advertisement for the procurement of a low temperature micro-Raman/Photoluminescence spectrometer at the Department of Physics, Indian Institute of Technology Madras, Chennai.

- We aim to buy a confocal micro-Raman/ Photoluminescence Spectrometer for single shot as well as areal mapping. Spectrometer should be supplied with a good quality optical microscope with binocular eyepieces, objectives, lasers, optics, detector, and other necessary accessories. System should be equipped with a computer and related software for all operations i.e., data acquisition and analyses, stage control for Raman/PL/EL mapping, objectives movement, focusing, grating change etc. More technical details are given below in the table.
- Vendor should provide a compliance sheet with clear “Yes” and “No” against each point of this advertisement. In case of any deviation, extent of the deviation should be added in a separate column. Vendor should attach the complete technical brochure having model number of the quoted system. The vendor should provide the sufficient supporting real time data to validate the specifications of the quoted model.

| Technical specifications for micro-Raman/Photoluminescence spectrometer compatible to be integrated with cryogenic temperature stages (Liquid Nitrogen and up to 3.2K). | |
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| 1 | <p>Mainframe</p> <p>1.1 Mainframe should be able to support multiple lasers (at least up to 4 or more) and detection ports (at least 3 or more) and related optics. At least one detector port (which is not dedicated for RAMAN detection) should provide output (collimated output preferred) of emitted luminescence and reflected laser light to enable customized measurements. The choice of output port should be computer controlled by the user.</p> <p>1.2 The mainframe should be compatible to be integrated with variable temperature cryogenic platforms achieving temperatures from ~ 4K to room temperature. All other accessories required to integrate it with lower temperature stages (~ up to 4K) should be provided. The vendor should provide the sufficient supporting information.</p> <p>1.3 As we plan to integrate the system with cryogenic platforms (~ 4K, cryogenic free/closed cycle), the vendor should provide the list of cryogenic platforms (make and model no.) that their system is compatible with. List of users where such integration is done should be provided with the technical bid.</p> |
| 2 | <p>Lasers</p> <p>2.1 Laser sources at wavelengths 405 nm and 532 nm should be provided. Necessary optics for each laser should be included in the quote.</p> <p>2.2 Power level for the lasers should be: For 405 nm = up to 30 mW or more For 532 nm = up to 100 mW or more</p> <p>2.3 All the lasers should be air cooled and laser selection and its control should be fully computer controlled.</p> <p>2.4 System should be upgradable to add extra UV laser (in the range of 229 nm -355 nm) and IR laser (785 nm) and related optics in future.</p> |

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| 3 | <p>Raman Spectrometer:</p> <p>3.1 Range: 100 cm⁻¹ to 4000 cm⁻¹ (or better).</p> <p>3.2 Spectral resolution (FWHM): 0.5 cm⁻¹ (or better).</p> <p>3.3 Grating: System should be supplied with 3 gratings, 600 gr/mm, 1800 gr/mm and 2400 gr/mm. Grating manipulations should be controlled through software. Change of gratings, if required, must be quick and should not require realignments. The grating should work with UV-VIS-NIR Lasers with high resolution.</p> <p>3.4 Grating selection should be fully computer controlled.</p> <p>3.5 Spatial resolution: 0.5µm or better in XY and 1 µm or better in Z (axial)</p> <p>3.6 User should be able to control the power up to at least 9 levels (or more) from 0.01% to maximum laser power through computer interface</p> <p>3.7 System should be upgradable to extend the measurement range towards lower wavenumber side up to 10 cm⁻¹.</p> <p>3.8 The vendor should provide the sufficient supporting real time data to validate the specifications of the quoted model.</p> |
| 4 | <p>Detector:</p> <p>4.1 A high efficiency CCD detector(s) ready for Raman, photoluminescence, and Electroluminescence measurements in the range 200 nm – 1050 nm with detailed specifications should be included.</p> <p>4.2 CCD should be cooled to -70 °C or better.</p> <p>4.3 Quantum efficiency (QE) greater than 40 % (in the range of 530 nm – 850 nm).</p> <p>4.4 The vendor should provide the sufficient supporting real time data to validate the specifications of the quoted model.</p> |
| 5 | <p>Optics and Filters:</p> <p>5.1 All necessary optics and filters should be included (with specification) for the lasers mentioned above.</p> <p>5.2 Polarizer-Analyzer setup: The system should be able to excite the sample with linear and circular polarization with free angle adjustment. The system should also be able to analyse the degree of polarization of the emitted signal (linear or circular). Necessary half-wave plates, quarter wave plates and analyser should be included for VISIBLE (532 nm) light.</p> <p>5.3 The system should be able to accommodate similar set of polarizer-analyzer setup for IR wavelengths in future.</p> |

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| 6 | <p>Microscope:</p> <p>6.1 Objectives: (5X, 10X, 20X, 50X, 100X) in visible range, 50X LWD VIS. (For LWD objectives working distance should be 6 mm or greater). All the objectives should be usable (with respect to working distance and temperature range) with the cryostat mentioned in point no. 7 below.</p> <p>6.2 Laser spot size \leq 1 micrometers under 100x objective.</p> <p>6.3 User should be able to switch between white light imaging and Raman/PL mode through computer interface. User should be able to view the sample on the computer screen and control the sample stage through joy stick or similar arrangement. It should have a high-resolution digital colour camera for sample visualization in white light. User should be able to view the sample through binocular eyepieces. Safety feature to avoid accidental LASER exposure through the eyepieces should be provided.</p> <p>6.4 Motorized mapping XYZ stage: A motorized mapping stage should be included with XY travel range of 50mm x 50mm or more and spatial resolution \sim50 nm. System should have motorized Z movement with option of autofocus.</p> <p>6.5 The vendor should provide the sufficient supporting real time data to validate the specifications of the quoted model.</p> |
| 7 | <p>Low temperature cryostat (Operating at liquid Nitrogen temperatures)</p> <p>7.1 System should be supplied with a variable temperature cryostage (operating with liquid Nitrogen and achievable minimum temperature \sim 80K and maximum temperature 300°C or more).</p> <p>7.2 Ultra-low vibration (< 20 nm RMS).</p> <p>7.3 Should have at least 4 electrical pins and necessary feedthroughs for electro luminescence measurements.</p> <p>7.4 Should be able to carry out Raman/Photoluminescence/Electroluminescence mapping. Microscope objectives mentioned in point 6.1 above, should be compatible with this cryostat with respect to working distance and temperature ranges (i.e. 80K to 300°C.)</p> <p>7.5 Software to control the temperature through the computer interface should be provided.</p> <p>7.6 The vendor should provide the sufficient supporting real time data to validate the specifications of the quoted model.</p> |

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| 8 | <p>PC and software:</p> <p>8.1 Software to control the equipment for all operations (data acquisition and analyses, stage control for Raman/PL/EL mapping, objectives movement, focusing, grating change etc.) should be provided.</p> <p>8.2 A high end computer with windows 10, 16 GB RAM, 500 GB SSD, and latest up to date processor with 24" or bigger monitor, Keyboard and mouse should be provided.</p> <p>8.3 Software license for (at least 2) additional offline workstations for offline data processing.</p> |
| 9 | <p>9.1 Power meter: A power meter (in the μW to 100 mW range) to measure the power of the lasers should be included.</p> |
| 10 | <p>Calibration Source:</p> <p>10.1 A standard calibration samples (such as Silicon) to calibrate the wavelength and intensity should be supplied with the system.</p> <p>10.2 A set of basic tools required for performing routine maintenance. A tool cart that can be locked and that can accommodate these tools should be provided.</p> |
| 11 | <p>11.1 Installation and training for at least 3 people</p> |
| 12 | <p>Warranty</p> <p>12.1 Vendor should provide at least 2 years warranty. Cost of AMC beyond warranty period should be mentioned in the price bid.</p> <p>12.2 Warranty for all LASERS should be mentioned separately.</p> |
| 13 | <p>The instruments will be considered successfully installed only upon the demonstration of the following at IIT Madras:</p> <p>13.1 Demonstration of different power levels for LASERS from minimum to maximum using a power meter as specified in the tender.</p> <p>13.2 Demonstration of the RAMAN and PL and EL mapping as per the tender and the technical data sheet of the bid.</p> <p>13.3 In case of LN2 cryostage, demonstration of the base pressure and non-condensation upon cooling.</p> |
| 14 | <p>14.1 Vendor should provide a compliance sheet with clear "Yes" and "No" against each point of this advertisement. In case of any deviation, extent of deviation should be added in a separate column. Vendor should attach the complete technical brochure having model number of the quoted system.</p> |
| 15 | <p>15.1 Vendor should provide a list of at least 10 customers who are using the same system (as quoted by the vendor in their bid). Vendor must provide the complete contact details of the users: name, mobile number, email id, address.</p> |
| 16 | <p>16.1 The vendor should have technical service team for the equipment based in India.</p> |

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| 17 | 17.1 Bidder should provide the breakup of each item/accessory to the best possible extent in the price bid. |
| 18 | 18.1 Delivery time should be clearly mentioned in the quote, preferably it should not be more than 4 months from the date of issuance of purchase order. |
| 19 | <p>Optional items:</p> <p>19.1 Quote for UV lasers (229 nm and 355 nm and IR laser 785 nm) and related optics.</p> <p>19.2 Quote for InGaAs detector for NIR region (up to 1.6 μm or better)</p> <p>19.3 Spares for up to one year should be included.</p> <p>19.4 Polarizer-Analyser setup as mentioned in point 5.3 for IR wavelength.</p> |

ELIGIBILITY CRITERIA:

- 1.0 The Bidder's firm should be registered in India. (Necessary document proof should be submitted).
- 2.0 They should have at least 10 users in the south region of India in the last 5 years. Necessary document proof should be submitted along with minimum 3 performance certificates from the south region purchases (Purchase order copies should be attached).
- 3.0 There should be a minimum of 5 users of the quoted model. (Necessary purchase order copies should be attached).