



## NOTICE INVITING TENDER

भारतीय विज्ञान शिक्षा एवं अनुसंधान संस्थान पुणे

INDIAN INSTITUTE OF SCIENCE EDUCATION AND RESEARCH

An Autonomous Institution, Ministry of Education, Govt. of India

Dr. Homi Bhabha Road, Pashan Pune – 411008.

Tel: +91-020-25898017; [Email-purchase@iiser.pune.ac.in](mailto:Email-purchase@iiser.pune.ac.in)

Website: [www.iiserpune.ac.in](http://www.iiserpune.ac.in)

### Invitation for Expression of Interest - 01/2020-21

Dated: 24/12/2020

#### **Brief Introduction:**

Indian Institute of Science Education and Research Pune invites Expression of Interest from manufacturers/local suppliers for supply of listed items manufactured in India strictly as per PPP-MII Order dated 4<sup>th</sup> June 2020 from all over India and INR payment terms only (Refer attached sheet for list of items and technical specifications).

**NON LOCAL SUPPLIERS NEED NOT APPLY.**

#### **I) Instruction to Bidders/Applicants:**

1. EOI Documents, list of equipments/services and Technical Specifications have been hosted on the website <http://www.iiserpune.ac.in/links/tender-notices-and-eoi> and may be downloaded from the website.
2. Applicants need to go through the EOI and Technical Specification thoroughly and apply for the item complying with the technical specification mentioned in the EOI.
3. Corrigendum for extensions of due date or any other changes in the EOI will be notified online through <http://www.iiserpune.ac.in/links/tender-notices-and-eoi> and will not be published in newspapers.
4. The complete EOI document should be submitted in sealed envelope super scribing “Expression of Interest for Item No, Reference No, Item Description (mentioned in the list) & due date. It is required to submit in a sealed envelope at the following address on or before 14<sup>th</sup> Jan, 2021 till 3.30 pm.

**Assistant Registrar (Stores & Purchase)**

**Indian Institute of Science Education and Research (IISER), Pune**

**Dr. Homi Bhabha Road, Pashan, Pune– 411008.**

**Tel: +91-020-25898246/8017; Email: [purchase@iiserpune.ac.in](mailto:purchase@iiserpune.ac.in)**

**Website: [www.iiserpune.ac.in](http://www.iiserpune.ac.in)**

5. All the pages of EOI document should to be duly signed with date and seal by the competent authority.
6. The offer for EOI as per this document shall be valid for a period of 180 days initially which may be extended further if required.
7. Canvassing in any form would disqualify the bidder from further participation.
8. IISER Pune may seek clarification or further information to evaluate the EOI/application submitted.
9. An undertaking (self-certificate) is to be submitted that the organization has not been black listed by any Central/State Government Department /Organization.
10. The bidder shall bear all cost during the preparation and submission of the proposal, attending pre-indent meetings etc.
11. Fax/E-mail/Telephonic offers will not be accepted.

## **II) Submission of EOI:**

1. The complete EOI document should be submitted in sealed envelope super scribing **“Expression of Interest for Item No, Reference No, Item Description (mentioned in the list) & due date. It is required to submit in a sealed envelope at the following address on or before 14<sup>th</sup> Jan, 2021 till 3.30 pm.**

**Assistant Registrar (Stores & Purchase)**

**Indian Institute of Science Education and Research (IISER), Pune**

**Dr. Homi Bhabha Road, Pashan, Pune– 411008.**

**Tel: +91-020-25898246/8017; Email: [purchase@iiserpune.ac.in](mailto:purchase@iiserpune.ac.in)**

**Website: [www.iiserpune.ac.in](http://www.iiserpune.ac.in)**

2. If a bidder intends to submit the response for more than one equipment, they should submit separate EOI for each equipment in a separate sealed envelope on or before the due date.
3. All communications are to be addressed to the undersigned only. In case due date happens to be holiday the EOI will be accepted and opened on the next working day.
4. The following information has to be provided mandatorily on the letterhead of the bidder firm along with technical proposal :
  - a. Annexure 1- Bidder Information Form.
  - b. Annexure 2- Declaration of Local Content.
  - c. Annexure 3- An Undertaking/declaration regarding clean track/non-blacklisting
  - d. MSME/NSIC Certificate (in case registered with them).
  - e. Technical Specification/Brochure/catalogue of the item.

### **III) Clarification:**

**Assistant Registrar (Stores & Purchase)**

**Indian Institute of Science Education and Research (IISER), Pune**

**Dr. Homi Bhabha Road, Pashan, Pune– 411008.**

**Tel: +91-020-25898246/8017; Email: [purchase@iiserpune.ac.in](mailto:purchase@iiserpune.ac.in)**

**Website: [www.iiserpune.ac.in](http://www.iiserpune.ac.in)**

### **IV) Evaluation:**

1. Evaluation will be conducted by the concerned purchase committee constituted by IISER Pune for this EOI.
2. Detailed formal tender document for the listed equipments will subsequently be issued to the qualified applicants/bidders only.
3. It is not binding on IISER Pune to issue tender enquiries for all the responses generated against this EOI.
4. We may float open tenders for items in this EOI against which no responses are received, with a tender condition that global vendors can participate in the process, tenders received from domestic manufactures will be given first preference as per PPP-MII Order dated 4<sup>th</sup> June 2020.

### **V) Pre-Indent Conference:**

After submission of EOI, selected bidder/s may be called for presentation in online mode, if required. The details for which will be shared in due course of time.

### **VI) Terms and Conditions:**

1. IISER Pune reserves all the rights to accept or reject any application/suggestions without assigning any reasons, whatsoever.
2. The bidders are expected to examine all instructions, forms, terms and other details in the EOI document carefully. Failure to furnish complete information as mentioned in the EOI document or submission of a proposal not substantially responsive to the EOI documents in every respect will be at the Bidder's risk and may result in rejection of the proposal.
3. Delivery of the material should be at site, IISER Pune for all the listed equipments.
4. The EOI is not an offer and is issued with no commitment. IISER Pune reserves the right to withdraw EOI and or vary any part thereof at any stage.

**Assistant Registrar (S&P)**

**BIDDER INFORMATION FORM**

Company Name : \_\_\_\_\_  
Registration Number : \_\_\_\_\_  
Registered Address : \_\_\_\_\_  
\_\_\_\_\_

Name of Partners /Director : \_\_\_\_\_  
\_\_\_\_\_

City : \_\_\_\_\_  
Postal Code : \_\_\_\_\_

Company's Establishment Year : \_\_\_\_\_

Company's Nature of Business : \_\_\_\_\_

Company's Legal Status (tick on appropriate option )  
1) Limited Company  
2) Undertaking  
3) Joint Venture  
4) Partnership  
5) Others

Company Category  
1) Micro Unit as per MSME  
2) Small Unit as per MSME  
3) Medium Unit as per MSME  
4) Ancillary Unit  
5) SSI  
6) Others

**CONTACT DETAILS**

Contact Name: \_\_\_\_\_  
Email Id : \_\_\_\_\_  
Designation : \_\_\_\_\_  
Phone No : (\_\_\_\_\_) \_\_\_\_\_

Mobile No : \_\_\_\_\_

**BANK DETAILS**

Name of Beneficiary : \_\_\_\_\_  
A/c. No. CC/CD/SB/OD: \_\_\_\_\_  
Name of Bank : \_\_\_\_\_  
IFSC NO. (Bank) : \_\_\_\_\_

**Enclose scan copy of cancelled Cheque.**

Branch Address and Branch Code: \_\_\_\_\_  
\_\_\_\_\_

**Other Details**

Vendor's PAN No. \_\_\_\_\_

Vendor's GST No: \_\_\_\_\_x

**ANNEXURE 2 – DECLARATION OF LOCAL CONTENT  
AND AVAILABILITY/COMPLIANCE OF EQUIPMENT**

(To be given on company’s letter head - For equipment value below Rs.10 crores)  
(To be given by Statutory Auditor/Cost Auditor/Cost Accountant/CA for equipment value  
above Rs.10 crores)

Date: \_\_\_\_\_

To,  
The Director  
Indian Institute of Science Education and Research Pune  
Dr.Homi Bhabha Road, Pashan  
Pune-411008

Sub: Declaration of Local content and availability/compliance of equipment

| Item No. | Name of equipment | Currency (must be INR) | Local content % | Country of Origin | Comply/capable to provide (yes/no) |
|----------|-------------------|------------------------|-----------------|-------------------|------------------------------------|
| 1        |                   |                        |                 |                   |                                    |
| 2        |                   |                        |                 |                   |                                    |
| 3        |                   |                        |                 |                   |                                    |
| 4        |                   |                        |                 |                   |                                    |
|          |                   |                        |                 |                   |                                    |
|          |                   |                        |                 |                   |                                    |

*“Local Content”* means the amount of value added in India which shall, be the total value of the item being offered minus the value of the imported content in the item (including all customs duties) as a proportion of the total value, in percent.

*“\*False declaration will be in breach of Code of Integrity under Rule 175(1)(i)(h) of the General Financial Rules for which a bidder or its successors can be debarred for up to two years as per Rule 151 (iii) of the General Financial Rules along with such other actions as may be permissible under law.”*

**Yours faithfully,  
(Signature of the Bidder, with Official Seal)**

**CERTIFICATE**  
**(to be provided on letter head of the firm)**

I hereby certify that the above firm neither blacklisted by any Central/State Government/Public Undertaking/Institute nor is any criminal case registered / pending against the firm or its owner / partners anywhere in India.

I also certify that the above information is true and correct in any every respect and in any case at a later date it is found that any details provided above are incorrect, any contract given to the above firm may be summarily terminated and the firm blacklisted.

**Date:**

**Authorized Signatory**

**Name:**

**Place:**

**Designation:**

**Contact No.:**

### Annexure-A List of Item

| Sr. No. | File No. | Description                                   |
|---------|----------|-----------------------------------------------|
| 1       | 1060/20  | ICDD PDF-2 2021 Edition                       |
| 2       | 0529/20  | FPLC SYSTEM                                   |
| 3       | 1102/20  | Laser system                                  |
| 4       | 1103/20  | Laser system                                  |
| 5       | 1104/20  | Laser system                                  |
| 6       | 1105/20  | Laser system                                  |
| 7       | 1107/20  | Laser system                                  |
| 8       | 1044/20  | Monochromator                                 |
| 9       | 0470/20  | Multimode plate reader                        |
| 10      | 0325/20  | Multimode plate reader                        |
| 11      | 0554/20  | Helium Cryostat                               |
| 12      | 0851/20  | Multimode plate reader                        |
| 13      | 0782/20  | High voltage source                           |
| 14      | 0326/20  | Temperature Control Stage-PAC                 |
| 15      | 0481/20  | PP Plates-PAC                                 |
| 16      | 0390/20  | Fluorescent stereomicroscope                  |
| 17      | 0194/20  | Super Continuum Laser                         |
| 18      | 0171/20  | Isothermal calorimeter                        |
| 19      | 0123/20  | Automated DNA/RNA Oligonucleotide synthesizer |

|    |         |                                                                                                            |
|----|---------|------------------------------------------------------------------------------------------------------------|
| 20 | 0177/20 | Electrochemical workstation                                                                                |
| 21 | 0209/20 | Mixer Mill                                                                                                 |
| 22 | 1154/20 | Teflon Acid Distillation unit                                                                              |
| 23 | 1189/20 | Micro Sample Osmometer                                                                                     |
| 24 | 0624/20 | veterinary hematology analyser                                                                             |
| 25 | 1153/20 | Hotplate                                                                                                   |
| 26 | 0625/20 | Biochemistry analyser                                                                                      |
| 27 | 0487/20 | LC-MS System                                                                                               |
| 28 | 1535/20 | Electromagnet and Accessories                                                                              |
| 29 | 1542/20 | Laboratory Grade Vibration Isolation Optical Table                                                         |
| 30 | 1537/20 | Computer controlled vector network analyzer                                                                |
| 31 | 1061/20 | Automated Flash column preparative HPLC chromatography system                                              |
| 32 | 1544/20 | Dual beam system comprising of FIB-FE SEM (Focused ion beam + Field Emission Scanning Electron microscope) |
| 33 | 1193/20 | Multiplex Suspension Array System                                                                          |
| 34 | 0306/20 | Low Temperature Powder X-Ray Diffractometer                                                                |
| 35 | 1157/20 | Research Grade Steady State Fluorescence Spectrometer                                                      |
| 36 | 0307/20 | EPR Spectrometer                                                                                           |
| 37 | 1446/20 | Closed cycle refrigerator                                                                                  |

**1) File no: 1060/20**

**ICDD**

International Centre for Diffraction Data PDF-2 2021 Edition

PDF-2 2021 edition with 5 years single license.

2) File no: 0529/20

**Fast Protein Liquid Chromatography (FPLC) System**

Technical Specifications

| S. No. | Technical requirement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1      | <b>Versatility in applications</b> <ul style="list-style-type: none"><li>• Capability in managing size-exclusion, affinity, ion-exchange and reverse-phase chromatography</li><li>• Capability of monitoring multiple wavelengths (range 200-700 nm) simultaneously</li><li>• Capability of continuous monitoring of conductivity of solutions passing through the system</li><li>• Capability of continuous monitoring of pH of solutions passing through the system</li><li>• Capability of automatic fraction collection into vials ranging from 12– 30 mm diameter</li></ul> |
| 2      | <b>System safety monitoring and tolerance features</b> <ul style="list-style-type: none"><li>• Capability of up to 25 ml/min and handling pressures of up to 20 MPa</li><li>• Capability of monitoring system pressure continuously</li><li>• Capability of automatically adjusting flow rate to avoid exceeding set pressure limit</li></ul>                                                                                                                                                                                                                                    |

### 3) File no: 1102/20

#### 481.3 nm 35 mW solid state Laser

##### Technical Specifications

| S.N.      | Specifications                                                                                                                                                                                                                                                                 |
|-----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>1</b>  | LASER with the following capabilities- <ul style="list-style-type: none"> <li>- Stable, single-mode (TEM00) output, with a feature of locking at the desired wavelength.</li> <li>- LASER controller with precise control over current, temperature, and piezo.</li> </ul>     |
|           | <b><u>LASER Specifications:</u></b>                                                                                                                                                                                                                                            |
| <b>2</b>  | Laser central wavelength : 481.3 nm                                                                                                                                                                                                                                            |
| <b>3</b>  | Output power : > 35 mW                                                                                                                                                                                                                                                         |
| <b>4</b>  | Average free running linewidth (1 sec) : <300 kHz                                                                                                                                                                                                                              |
| <b>5</b>  | Coarse tuning range : >5 nm                                                                                                                                                                                                                                                    |
| <b>6</b>  | Mode hop free tuning range : >15 GHz                                                                                                                                                                                                                                           |
| <b>7</b>  | Built in piezo electric element for frequency tuning                                                                                                                                                                                                                           |
| <b>8</b>  | Piezo operating voltage range : 0 - 150 V                                                                                                                                                                                                                                      |
| <b>9</b>  | Capability of Externally modulating the current                                                                                                                                                                                                                                |
| <b>10</b> | External current DC modulation Range : DC to 10 MHz<br>(Modulation Voltage range $\geq \pm 2V$ )                                                                                                                                                                               |
| <b>11</b> | External current AC modulation Range : 10 kHz to 10 MHz<br>(Modulation Voltage range $\geq \pm 2V$ )                                                                                                                                                                           |
| <b>12</b> | RF bias-T based current modulation Range : > 2GHz<br>(Modulation Voltage range $\geq \pm 2V$ )                                                                                                                                                                                 |
| <b>13</b> | Fiber coupling efficiency : >65%                                                                                                                                                                                                                                               |
| <b>14</b> | Optical isolator at output: > 35 db isolation                                                                                                                                                                                                                                  |
|           | <b><u>LASER Controller Specification:</u></b>                                                                                                                                                                                                                                  |
| <b>15</b> | Built in or modular current, temperature, and piezo control                                                                                                                                                                                                                    |
| <b>16</b> | Noise in current : <15 nA rms                                                                                                                                                                                                                                                  |
| <b>17</b> | Capability of built in external current modulation should be there                                                                                                                                                                                                             |
| <b>18</b> | External current modulation bandwidth : (with specs same as in item nos 10, 11 and 12)                                                                                                                                                                                         |
| <b>19</b> | Piezo scan rate : 1 - 100 Hz                                                                                                                                                                                                                                                   |
| <b>20</b> | Capability of Externally providing a feedback to the piezo                                                                                                                                                                                                                     |
| <b>21</b> | Temperature stability : $\geq 5mK$ (for laser set point temperature between 10 and 25 Deg C)                                                                                                                                                                                   |
| <b>22</b> | Temperature range : 0 - 30 °C                                                                                                                                                                                                                                                  |
| <b>23</b> | Should have a built-in Lock-in amplifier for generating error signal from frequency modulation                                                                                                                                                                                 |
| <b>24</b> | Lock-in Amp frequency modulation output freq. range : >200 kHz                                                                                                                                                                                                                 |
| <b>25</b> | Lock-in amplifier reference phase adjustment range (0-180 Degree)                                                                                                                                                                                                              |
| <b>26</b> | Built-in Proportional-Integral-Differentiator control should be there                                                                                                                                                                                                          |
| <b>27</b> | Laser Frequency locking option on both the current and Piezo, with separate slow and fast feedback should be there                                                                                                                                                             |
| <b>28</b> | Feedback loop bandwidth (slow, fast) : (>500 Hz for slow loop, >50 kHz for fast loop)                                                                                                                                                                                          |
| <b>29</b> | Capability of accepting externally generated error signal should be there                                                                                                                                                                                                      |
| <b>30</b> | External interlock : yes                                                                                                                                                                                                                                                       |
| <b>31</b> | All necessary current, temperature, and feedback signal generators, Feedback signal conditioner (PID), Piezo drivers should be provided and should be as modular as possible. All the external control signals to be easily accessible and one should be able to monitor them. |
| <b>32</b> | Lifetime of all-solid-state components : Should be at least trouble-free for 2 years, with a suitable warranty                                                                                                                                                                 |
| <b>33</b> | Service and warranty : At least 3 years from the date of installation                                                                                                                                                                                                          |
|           | Laser with the above-said specifications should be provided along with the following accessories:<br>1) Dielectric mirror ( $\varnothing 1"$ , 400-750 nm, $R_{avg} > 99\%$ ): QTY (4)                                                                                         |

|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>2) Polarizing beam splitter (1/2" PBS, 400 - 750 nm, <math>R_s &gt; 99.5\%</math>, <math>T_p &gt; 90\%</math>, Anti-Reflection(AR) Coating range 400-750nm, AR Coating Reflectance <math>R_{avg} &lt; 0.5\%</math>): QTY (2)</p> <p>3) Half-wave plate (<math>\varnothing 1"</math>, Zero-Order Half-Wave Plates, 460nm, Retardance Accuracy: <math>&lt; \lambda/100</math>, Anti-Reflection(AR) Coating range 400-750nm, AR Coating Reflectance <math>R_{avg} &lt; 0.5\%</math>): QTY (2)</p> <p>4) Fiber (400-750 nm, single mode, polarization maintaining, FC/APC connector, 5m): QTY (2)</p> <p>5) Adjustable fiber Coupler with provision to mount independently (Adjustable X, Y, and Z, Low Hysteresis, Anti-Reflection(AR) Coating range 400-750nm, AR Coating Reflectance <math>R_{avg} &lt; 0.5\%</math>): QTY (2)</p> <p>6) Acousto-optic modulator (450-750 nm, Center Frequency: 80MHz, Diffraction efficiency <math>&gt; 80\%</math>, Anti-Reflection(AR) Coating range 400-750nm, AR Coating Reflectance <math>R_{avg} &lt; 0.5\%</math>): QTY (1)</p> <p><b>7)</b> Acousto-optic modulator (450-750 nm, Center Frequency: 120MHz, Diffraction efficiency <math>&gt; 80\%</math>, Anti-Reflection(AR) Coating range 400-750nm, AR Coating Reflectance <math>R_{avg} &lt; 0.5\%</math>): QTY (1)</p> |
|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

4) File no: 1103/20

698.4 nm 35 mW solid state Laser

Technical specification

| S.N. | Specifications                                                                                                                                                                                                                                                                 |
|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | LASER with the following capabilities- <ul style="list-style-type: none"> <li>- Stable, single-mode(TEM00) output, with a feature of locking at the desired wavelength.</li> <li>- LASER controller with precise control over current, temperature, and piezo.</li> </ul>      |
|      | <b><u>LASER Specifications:</u></b>                                                                                                                                                                                                                                            |
| 2    | Laser central wavelength : 698.4 nm                                                                                                                                                                                                                                            |
| 3    | Output power : > 35 mW                                                                                                                                                                                                                                                         |
| 4    | Average free running linewidth (1 sec) : <200 kHz                                                                                                                                                                                                                              |
| 5    | Coarse tuning range : >5 nm                                                                                                                                                                                                                                                    |
| 6    | Mode hop free tuning range : >15 GHz                                                                                                                                                                                                                                           |
| 7    | Built in piezo electric element for frequency tuning                                                                                                                                                                                                                           |
| 8    | Piezo operating voltage range : 0 - 150 V                                                                                                                                                                                                                                      |
| 9    | Capability of Externally modulating the current                                                                                                                                                                                                                                |
| 10   | External current DC modulation Range : DC to 10 MHz<br>(Modulation Voltage range $\geq \pm 2V$ )                                                                                                                                                                               |
| 11   | External current AC modulation Range : 10 kHz to 10 MHz<br>(Modulation Voltage range $\geq \pm 2V$ )                                                                                                                                                                           |
| 12   | RF bias-T based current modulation Range : > 2GHz<br>(Modulation Voltage range $\geq \pm 2V$ )                                                                                                                                                                                 |
| 13   | Fiber coupling efficiency : >65%                                                                                                                                                                                                                                               |
| 14   | Optical isolator for output: >35 db isolation                                                                                                                                                                                                                                  |
|      | <b><u>LASER Controller Specification:</u></b>                                                                                                                                                                                                                                  |
| 15   | Built in or modular current, temperature, and piezo control                                                                                                                                                                                                                    |
| 16   | Noise in current : <15 nA rms                                                                                                                                                                                                                                                  |
| 17   | Capability of built in external current modulation should be there                                                                                                                                                                                                             |
| 18   | External current modulation bandwidth : (with specs same as in item nos 10, 11 and 12)                                                                                                                                                                                         |
| 19   | Piezo scan rate : 1 - 100 Hz                                                                                                                                                                                                                                                   |
| 20   | Capability of Externally providing a feedback to the piezo                                                                                                                                                                                                                     |
| 21   | Temperature stability : $\geq 5mK$ (for laser set point temperature between 10 and 25 Deg C)                                                                                                                                                                                   |
| 22   | Temperature range : 0 - 30 °C                                                                                                                                                                                                                                                  |
| 23   | Should have a built-in Lock-in amplifier for generating error signal from frequency modulation                                                                                                                                                                                 |
| 24   | Lock-in Amp frequency modulation output freq. range : >200 kHz                                                                                                                                                                                                                 |
| 25   | Lock-in amplifier reference phase adjustment range (0-180 Degree)                                                                                                                                                                                                              |
| 26   | Built-in Proportional-Integral-Differentiator control should be there                                                                                                                                                                                                          |
| 27   | Laser Frequency locking option on both the current and Piezo, with separate slow and fast feedback should be there                                                                                                                                                             |
| 28   | Feedback loop bandwidth (slow, fast) : (>500 Hz for slow loop, >50 kHz for fast loop)                                                                                                                                                                                          |
| 29   | Capability of accepting externally generated error signal should be there                                                                                                                                                                                                      |
| 30   | External interlock : yes                                                                                                                                                                                                                                                       |
| 31   | All necessary current, temperature, and feedback signal generators, Feedback signal conditioner (PID), Piezo drivers should be provided and should be as modular as possible. All the external control signals to be easily accessible and one should be able to monitor them. |
| 32   | Lifetime of all-solid-state components : Should be at least trouble-free for 2 years, with a suitable warranty                                                                                                                                                                 |
| 33   | Service and warranty : At least 3 years from the date of installation                                                                                                                                                                                                          |
|      | Laser with the above-said specifications should be provided along with the following accessories:                                                                                                                                                                              |

|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>8) Dielectric mirror (Ø1", 400-750 nm, <math>R_{avg} &gt; 99\%</math>): QTY (4)</p> <p>9) Polarizing beam splitter (1/2" PBS, 620 – 1000 nm, <math>R_s &gt; 99.5\%</math>, <math>T_p &gt; 90\%</math>, Anti-Reflection(AR) Coating range 620-1000 nm, AR Coating Reflectance <math>R_{avg} &lt; 0.5\%</math>): QTY (2)</p> <p>10) Half-wave plate (Ø1", Zero-Order Half-Wave Plates, 689nm, Retardance Accuracy: <math>&lt; \lambda/100</math>, Anti-Reflection(AR) Coating range 620-1000 nm, AR Coating Reflectance <math>R_{avg} &lt; 0.5\%</math>): QTY (2)</p> <p>11) Fiber (620-850 nm, single mode, polarization maintaining, FC/APC connector, 5m): QTY (2)</p> <p>12) Adjustable fiber Coupler with provision to mount independently (Adjustable X, Y, and Z, Low Hysteresis, AR Coated 400-750 nm): QTY (2)</p> <p>13) Acusto-optic modulator (620 – 1000 nm, Center Frequency: 80MHz, Diffraction efficiency<math>&gt;80\%</math>, Anti-Reflection(AR) Coating range 620-1000 nm, AR Coating Reflectance <math>R_{avg} &lt; 0.5\%</math>): QTY (1)</p> <p>14) Acusto-optic modulator (620 – 1000 nm, Center Frequency: 120MHz, Diffraction efficiency<math>&gt;80\%</math>, Anti-Reflection(AR) Coating range 620-1000 nm, AR Coating Reflectance <math>R_{avg} &lt; 0.5\%</math>): QTY (1)</p> <p>15) Fast PID controller (To lock the laser using PDH method): Feedback loop bandwidth: <math>&gt;30</math> MHz, External modulation<math>&gt;25</math> MHz, Parallel FAST (PID) and SLOW (P, or PI) control loops, signal delay time<math>&lt;50</math> ns, QTY (1)</p> <p>16) Amplified photodetector: Wide spectral response 300 – 1060nm, Photodetector bandwidth DC – 30 MHz, Active area: 1.2 mm (Diameter), Quantum efficiency <math>&gt;0.6</math> @peak wavelength(800-900 nm) QTY (1)</p> |
|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

5) File no: 1104/20

689.4 nm 35 mW solid state Laser

Technical specifications

| S.N. | Specifications                                                                                                                                                                                                                                                                 |
|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | LASER with the following capabilities- <ul style="list-style-type: none"> <li>- Stable, single-mode (TEM00) output, with a feature of locking at the desired wavelength.</li> <li>- LASER controller with precise control over current, temperature, and piezo.</li> </ul>     |
|      | <b><u>LASER Specifications:</u></b>                                                                                                                                                                                                                                            |
| 2    | Laser central wavelength : 689.4 nm                                                                                                                                                                                                                                            |
| 3    | Output power : > 35 mW                                                                                                                                                                                                                                                         |
| 4    | Average free running linewidth (1 sec) : <200 kHz                                                                                                                                                                                                                              |
| 5    | Coarse tuning range : >5 nm                                                                                                                                                                                                                                                    |
| 6    | Mode hop free tuning range : >15 GHz                                                                                                                                                                                                                                           |
| 7    | Built in piezo electric element for frequency tuning                                                                                                                                                                                                                           |
| 8    | Piezo operating voltage range : 0 - 150 V                                                                                                                                                                                                                                      |
| 9    | Capability of Externally modulating the current                                                                                                                                                                                                                                |
| 10   | External current DC modulation Range : DC to 10 MHz<br>(Modulation Voltage range $\geq \pm 2V$ )                                                                                                                                                                               |
| 11   | External current AC modulation Range : 10 kHz to 10 MHz<br>(Modulation Voltage range $\geq \pm 2V$ )                                                                                                                                                                           |
| 12   | RF bias-T based current modulation Range : > 2GHz<br>(Modulation Voltage range $\geq \pm 2V$ )                                                                                                                                                                                 |
| 13   | Fiber coupling efficiency : >65%                                                                                                                                                                                                                                               |
| 14   | Optical isolator for output: > 35 db isolation                                                                                                                                                                                                                                 |
|      | <b><u>LASER Controller Specification:</u></b>                                                                                                                                                                                                                                  |
| 15   | Built in or modular current, temperature, and piezo control                                                                                                                                                                                                                    |
| 16   | Noise in current : <15 nA rms                                                                                                                                                                                                                                                  |
| 17   | Capability of built in external current modulation should be there                                                                                                                                                                                                             |
| 18   | External current modulation bandwidth : (with specs same as in item nos 10, 11 and 12)                                                                                                                                                                                         |
| 19   | Piezo scan rate : 1 - 100 Hz                                                                                                                                                                                                                                                   |
| 20   | Capability of Externally providing a feedback to the piezo                                                                                                                                                                                                                     |
| 21   | Temperature stability : $\geq 5mK$ (for laser set point temperature between 10 and 25 Deg C)                                                                                                                                                                                   |
| 22   | Temperature range : 0 - 30 °C                                                                                                                                                                                                                                                  |
| 23   | Should have a built-in Lock-in amplifier for generating error signal from frequency modulation                                                                                                                                                                                 |
| 24   | Lock-in Amp frequency modulation output freq. range : >200 kHz                                                                                                                                                                                                                 |
| 25   | Lock-in amplifier reference phase adjustment range (0-180 Degree)                                                                                                                                                                                                              |
| 26   | Built-in Proportional-Integral-Differentiator control should be there                                                                                                                                                                                                          |
| 27   | Laser Frequency locking option on both the current and Piezo, with separate slow and fast feedback should be there                                                                                                                                                             |
| 28   | Feedback loop bandwidth (slow, fast) : (>500 Hz for slow loop, >50 kHz for fast loop)                                                                                                                                                                                          |
| 29   | Capability of accepting externally generated error signal should be there                                                                                                                                                                                                      |
| 30   | External interlock : yes                                                                                                                                                                                                                                                       |
| 31   | All necessary current, temperature, and feedback signal generators, Feedback signal conditioner (PID), Piezo drivers should be provided and should be as modular as possible. All the external control signals to be easily accessible and one should be able to monitor them. |
| 32   | Lifetime of all-solid-state components : Should be at least trouble-free for 2 years, with a suitable warranty                                                                                                                                                                 |
| 33   | Service and warranty : At least 3 years from the date of installation                                                                                                                                                                                                          |
|      | Laser with the above-said specifications should be provided along with the following accessories:                                                                                                                                                                              |

|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>17) Dielectric mirror (Ø1", 400-750 nm, <math>R_{avg} &gt; 99\%</math>): QTY (4)</p> <p>18) Polarizing beam splitter (1/2" PBS, 620 – 1000 nm, <math>R_s &gt; 99.5\%</math>, <math>T_p &gt; 90\%</math>, Anti-Reflection(AR) Coating range 620-1000 nm, AR Coating Reflectance <math>R_{avg} &lt; 0.5\%</math>): QTY (2)</p> <p>19) Half-wave plate (Ø1", Zero-Order Half-Wave Plates, 689nm, Retardance Accuracy: <math>&lt; \lambda/100</math>, Anti-Reflection(AR) Coating range 620-1000 nm, AR Coating Reflectance <math>R_{avg} &lt; 0.5\%</math>): QTY (2)</p> <p>20) Fiber (620-850 nm, single mode, polarization maintaining, FC/APC connector, 5m): QTY (2)</p> <p>21) Adjustable fiber Coupler with provision to mount independently (Adjustable X, Y, and Z, Low Hysteresis, AR Coated 400-750 nm): QTY (2)</p> <p>22) Acusto-optic modulator (620 – 1000 nm, Center Frequency: 80MHz, Diffraction efficiency<math>&gt;80\%</math>, Anti-Reflection(AR) Coating range 620-1000 nm, AR Coating Reflectance <math>R_{avg} &lt; 0.5\%</math>): QTY (1)</p> <p>23) Acusto-optic modulator (620 – 1000 nm, Center Frequency: 120MHz, Diffraction efficiency<math>&gt;80\%</math>, Anti-Reflection(AR) Coating range 620-1000 nm, AR Coating Reflectance <math>R_{avg} &lt; 0.5\%</math>): QTY (1)</p> <p>24) Fast PID controller (To lock the laser using PDH method): Feedback loop bandwidth: <math>&gt;30</math> MHz, External modulation<math>&gt;25</math> MHz, Parallel FAST (PID) and SLOW (P, or PI) control loops, signal delay time<math>&lt;50</math> ns, QTY (1)</p> <p><b>25) Amplified photodetector:</b> Wide spectral response 300 – 1060nm, Photodetector bandwidth DC – 30 MHz, Active area: 1.2 mm (Diameter), Quantum efficiency <math>&gt;0.6</math> @peak wavelength(800-900 nm) QTY (1)</p> |
|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

6) File no: 1105/20

**813 nm 2000 mW solid state Laser**

Technical specifications

| S.N.      | Specifications                                                                                                                                                                                                                                                                        |
|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>1</b>  | LASER with the following capabilities- <ul style="list-style-type: none"> <li>- Stable, high power, single-mode(TEM00) output, with a feature of locking at the desired wavelength.</li> <li>- LASER controller with precise control over current, temperature, and piezo.</li> </ul> |
|           | <b><u>LASER Specifications:</u></b>                                                                                                                                                                                                                                                   |
| <b>2</b>  | Laser central wavelength : 813 nm                                                                                                                                                                                                                                                     |
| <b>3</b>  | Output power : > 2000 mW                                                                                                                                                                                                                                                              |
| <b>4</b>  | Average free running linewidth (1 sec) : <200 kHz                                                                                                                                                                                                                                     |
| <b>5</b>  | Coarse tuning range : >5 nm                                                                                                                                                                                                                                                           |
| <b>6</b>  | Mode hop free tuning range : >15 GHz                                                                                                                                                                                                                                                  |
| <b>7</b>  | Built in piezo electric element for frequency tuning                                                                                                                                                                                                                                  |
| <b>8</b>  | Piezo operating voltage range : 0 - 150 V                                                                                                                                                                                                                                             |
| <b>9</b>  | Capability of Externally modulating the current                                                                                                                                                                                                                                       |
| <b>10</b> | External current DC modulation Range : DC to 10 MHz<br>(Modulation Voltage range $\geq \pm 2V$ )                                                                                                                                                                                      |
| <b>11</b> | External current AC modulation Range : 10 kHz to 10 MHz<br>(Modulation Voltage range $\geq \pm 2V$ )                                                                                                                                                                                  |
| <b>12</b> | RF bias-T based current modulation Range : > 2GHz<br>(Modulation Voltage range $\geq \pm 2V$ )                                                                                                                                                                                        |
| <b>13</b> | Fiber coupling efficiency : >65%                                                                                                                                                                                                                                                      |
| <b>14</b> | <b><u>Output optical isolator: &gt;35 dB optical isolation</u></b>                                                                                                                                                                                                                    |
|           | <b><u>LASER Controller Specification:</u></b>                                                                                                                                                                                                                                         |
| <b>15</b> | Built in or modular current, temperature, and piezo control                                                                                                                                                                                                                           |
| <b>16</b> | Noise in current : <15 nA rms                                                                                                                                                                                                                                                         |
| <b>17</b> | Capability of built in external current modulation should be there                                                                                                                                                                                                                    |
| <b>18</b> | External current modulation bandwidth : (with specs same as in item nos 10, 11 and 12)                                                                                                                                                                                                |
| <b>19</b> | Piezo scan rate : 1 - 100 Hz                                                                                                                                                                                                                                                          |
| <b>20</b> | Capability of Externally providing a feedback to the piezo                                                                                                                                                                                                                            |
| <b>21</b> | Temperature stability : $\geq 5mK$ (for laser set point temperature between 10 and 25 Deg C)                                                                                                                                                                                          |
| <b>22</b> | Temperature range : 0 - 30 °C                                                                                                                                                                                                                                                         |
| <b>23</b> | Should have a built-in Lock-in amplifier for generating error signal from frequency modulation                                                                                                                                                                                        |
| <b>24</b> | Lock-in Amp frequency modulation output freq. range : >200 kHz                                                                                                                                                                                                                        |
| <b>25</b> | Lock-in amplifier reference phase adjustment range (0-180 Degree)                                                                                                                                                                                                                     |
| <b>26</b> | Built-in Proportional-Integral-Differentiator control should be there                                                                                                                                                                                                                 |
| <b>27</b> | Laser Frequency locking option on both the current and Piezo, with separate slow and fast feedback should be there                                                                                                                                                                    |
| <b>28</b> | Feedback loop bandwidth (slow, fast) : (>500 Hz for slow loop, >50 kHz for fast loop)                                                                                                                                                                                                 |
| <b>29</b> | Capability of accepting externally generated error signal should be there                                                                                                                                                                                                             |
| <b>30</b> | External interlock : yes                                                                                                                                                                                                                                                              |
| <b>31</b> | All necessary current, temperature, and feedback signal generators, Feedback signal conditioner (PID), Piezo drivers should be provided and should be as modular as possible. All the external control signals to be easily accessible and one should be able to monitor them.        |
| <b>32</b> | Lifetime of all-solid-state components : Should be at least trouble-free for 2 years, with a suitable warranty                                                                                                                                                                        |
| <b>33</b> | Service and warranty : At least 3 years from the date of installation                                                                                                                                                                                                                 |
|           | Laser with the above-said specifications should be provided along with the following accessories:                                                                                                                                                                                     |

|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <ol style="list-style-type: none"> <li>1) Dielectric mirror (Ø1", 750 - 1100 nm, <math>R_{avg} &gt; 99\%</math>): QTY (4)</li> <li>2) Polarizing beam splitter (1/2" PBS, 620 – 1000 nm, <math>R_s &gt; 99.5\%</math>, <math>T_p &gt; 90\%</math>, Anti-Reflection(AR) Coating range 620-1000 nm, AR Coating Reflectance <math>R_{avg} &lt; 0.5\%</math>): QTY (2)</li> <li>3) Half-wave plate (Ø1", Zero-Order Half-Wave Plates, 689nm, Retardance Accuracy: <math>&lt; \lambda/100</math>, Anti-Reflection(AR) Coating range 620-1000 nm, AR Coating Reflectance <math>R_{avg} &lt; 0.5\%</math>): QTY (2)</li> <li>4) Fiber (620-850 nm, single mode, polarization maintaining, FC/APC connector, 5m): QTY (2)</li> <li>5) Adjustable fiber Coupler with provision to mount independently (Adjustable X, Y, and Z, Low Hysteresis, AR Coated 400-750 nm): QTY (2)</li> <li>6) Acusto-optic modulator (620 – 1000 nm, Center Frequency: 80MHz, Diffraction efficiency<math>&gt;80\%</math>, Anti-Reflection(AR) Coating range 620-1000 nm, AR Coating Reflectance <math>R_{avg} &lt; 0.5\%</math>): QTY (1)</li> <li>7) Acusto-optic modulator (620 – 1000 nm, Center Frequency: 120MHz, Diffraction efficiency<math>&gt;80\%</math>, Anti-Reflection(AR) Coating range 620-1000 nm, AR Coating Reflectance <math>R_{avg} &lt; 0.5\%</math>): QTY (1)</li> <li>8) Fast PID controller (To lock the laser using PDH method): Feedback loop bandwidth: <math>&gt;30</math> MHz, External modulation<math>&gt;25</math> MHz, Parallel FAST (PID) and SLOW (P, or PI) control loops, signal delay time<math>&lt;50</math> ns, QTY (1)</li> <li>9) Amplified photodetector: Wide spectral response 300 – 1060nm, Photodetector bandwidth DC – 30 MHz, Active area: 1.2 mm (Diameter), Quantum efficiency <math>&gt;0.6</math> @peak wavelength(800-900 nm) QTY (1)</li> </ol> |
|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

7) File no: 1107/20

460.8 nm 600 mW solid state Laser

| S.N. | Specifications                                                                                                                                                                                                                                                                        |
|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | LASER with the following capabilities- <ul style="list-style-type: none"> <li>- Stable, high power, single-mode(TEM00) output, with a feature of locking at the desired wavelength.</li> <li>- LASER controller with precise control over current, temperature, and piezo.</li> </ul> |
|      | <b><u>LASER Specifications:</u></b>                                                                                                                                                                                                                                                   |
| 2    | Laser central wavelength : 460.8 nm                                                                                                                                                                                                                                                   |
| 3    | Output power : > 600 mW                                                                                                                                                                                                                                                               |
| 4    | Average free running linewidth (1 sec) : <300 kHz                                                                                                                                                                                                                                     |
| 5    | Coarse tuning range : >5 nm                                                                                                                                                                                                                                                           |
| 6    | Mode hop free tuning range : >15 GHz                                                                                                                                                                                                                                                  |
| 7    | Built in piezo electric element for frequency tuning                                                                                                                                                                                                                                  |
| 8    | Piezo operating voltage range : 0 - 150 V                                                                                                                                                                                                                                             |
| 9    | Capability of Externally modulating the current                                                                                                                                                                                                                                       |
| 10   | External current DC modulation Range : DC to 10 MHz<br>(Modulation Voltage range $\geq \pm 2V$ )                                                                                                                                                                                      |
| 11   | External current AC modulation Range : 10 kHz to 10 MHz<br>(Modulation Voltage range $\geq \pm 2V$ )                                                                                                                                                                                  |
| 12   | RF bias-T based current modulation Range : > 2GHz<br>(Modulation Voltage range $\geq \pm 2V$ )                                                                                                                                                                                        |
| 13   | Fiber coupling efficiency : >65%                                                                                                                                                                                                                                                      |
| 14   | <b><u>Output optical isolator: &gt; 35 dB Optical isolation</u></b>                                                                                                                                                                                                                   |
|      | <b><u>LASER Controller Specification:</u></b>                                                                                                                                                                                                                                         |
| 15   | Built in or modular current, temperature, and piezo control                                                                                                                                                                                                                           |
| 16   | Noise in current : <15 nA rms                                                                                                                                                                                                                                                         |
| 17   | Capability of built in external current modulation should be there                                                                                                                                                                                                                    |
| 18   | External current modulation bandwidth : (with specs same as in item nos 10, 11 and 12)                                                                                                                                                                                                |
| 19   | Piezo scan rate : 1 - 100 Hz                                                                                                                                                                                                                                                          |
| 20   | Capability of Externally providing a feedback to the piezo                                                                                                                                                                                                                            |
| 21   | Temperature stability : $\geq 5mK$ (for laser set point temperature between 10 and 25 Deg C)                                                                                                                                                                                          |
| 22   | Temperature range : 0 - 30 °C                                                                                                                                                                                                                                                         |
| 23   | Should have a built-in Lock-in amplifier for generating error signal from frequency modulation                                                                                                                                                                                        |
| 24   | Lock-in Amp frequency modulation output freq. range : >200 kHz                                                                                                                                                                                                                        |
| 25   | Lock-in amplifier reference phase adjustment range (0-180 Degree)                                                                                                                                                                                                                     |
| 26   | Built-in Proportional-Integral-Differentiator control should be there                                                                                                                                                                                                                 |
| 27   | Laser Frequency locking option on both the current and Piezo, with separate slow and fast feedback should be there                                                                                                                                                                    |
| 28   | Feedback loop bandwidth (slow, fast) : (>500 Hz for slow loop, >50 kHz for fast loop)                                                                                                                                                                                                 |
| 29   | Capability of accepting externally generated error signal should be there                                                                                                                                                                                                             |
| 30   | External interlock : yes                                                                                                                                                                                                                                                              |
| 31   | All necessary current, temperature, and feedback signal generators, Feedback signal conditioner (PID), Piezo drivers should be provided and should be as modular as possible. All the external control signals to be easily accessible and one should be able to monitor them.        |
| 32   | Lifetime of all-solid-state components : Should be at least trouble-free for 2 years, with a suitable warranty                                                                                                                                                                        |
| 33   | Service and warranty : At least 3 years from the date of installation                                                                                                                                                                                                                 |
|      | Laser with the above-said specifications should be provided along with the following accessories:<br>10) Dielectric mirror ( $\varnothing 1"$ , 400-750 nm, $R_{avg} > 99\%$ ),: QTY (4)                                                                                              |

|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>11) Polarizing beam splitter (1/2" PBS, 400 - 750 nm, <math>R_s &gt; 99.5\%</math>, <math>T_p &gt; 90\%</math>, Anti-Reflection(AR) Coating range 400-750nm, AR Coating Reflectance <math>R_{avg} &lt; 0.5\%</math>): QTY (2)</p> <p>12) Half-wave plate (<math>\varnothing 1"</math>, Zero-Order Half-Wave Plates, 460nm, Retardance Accuracy: <math>&lt; \lambda/100</math>, Anti-Reflection(AR) Coating range 400-750nm, AR Coating Reflectance <math>R_{avg} &lt; 0.5\%</math>): QTY (2)</p> <p>13) Fiber (400-750 nm, single mode, polarization maintaining, FC/APC connector, 5m): QTY (2)</p> <p>14) Adjustable fiber Coupler with provision to mount independently (Adjustable X, Y, and Z, Low Hysteresis, Anti-Reflection(AR) Coating range 400-750nm, AR Coating Reflectance <math>R_{avg} &lt; 0.5\%</math>): QTY (2)</p> <p>15) Acousto-optic modulator (450-750 nm, Center Frequency: 80MHz, Diffraction efficiency <math>&gt; 80\%</math>, Anti-Reflection(AR) Coating range 400-750nm, AR Coating Reflectance <math>R_{avg} &lt; 0.5\%</math>): QTY (1)</p> <p>16) Acousto-optic modulator (450-750 nm, Center Frequency: 120MHz, Diffraction efficiency <math>&gt; 80\%</math>, Anti-Reflection(AR) Coating range 400-750nm, AR Coating Reflectance <math>R_{avg} &lt; 0.5\%</math>): QTY (1)</p> |
|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

**8) File no: 1044/20**

**Monochromator, EMCCD and InGaAs Array Detector**

Technical specification

|                                                                                                                                                                |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>1) MONOCHROMATOR</b>                                                                                                                                        |
| Focal length 300 mm or more                                                                                                                                    |
| Spectral Resolution with CCD: 0.07 nm or better at 532 nm                                                                                                      |
| 3 gratings (Preferably 600 g/mm, 1200 g/mm, $\geq 1800$ g/mm) covering Spectral Regions from 240-2000nm, Grating size (mm): 68 x 68                            |
| Equipped with Al+MgF <sub>2</sub> Coated Broad band Mirrors                                                                                                    |
| No. of Input Slit: One motorized, software-controlled entrance Slit with Shutter.                                                                              |
| No. of Exit ports: Two Exit ports                                                                                                                              |
| Range of All Slit widths: 10 $\mu$ m to 2.5 mm                                                                                                                 |
| Optical fiber of 2 or 3 meters, core size 200 or 400 micron, Both Visible & NIR range, Universal Fiber Coupler(s) & Compatible X-Y adjustable fiber adapter(s) |
| Interface port(s) with computer and External Triggering Options                                                                                                |
| Software: Latest software to be provided and same software should be able to control both the Spectrometer and EMCCD and InGaAs Detector.                      |
| <b>TOTAL MARKS for Monochromator</b>                                                                                                                           |
| <b>Technical Qualification Marks for Monochromator is &gt; 45 out of 50</b>                                                                                    |
|                                                                                                                                                                |
| <b>2) EMCCD</b>                                                                                                                                                |
| Vacuum Shielded Grade 1 Sensor: Back Illuminated, Vis-optimized with UV Coating                                                                                |
| Active pixels: 1600 x 200 with Grade 1 Sensor                                                                                                                  |
| Pixel size: 16 x 16 $\mu$ m (or smaller)                                                                                                                       |
| Thermoelectric Cooling and related accessories included for -60°C                                                                                              |
| Peak Q.E: > 95%                                                                                                                                                |
| Dark current, e-/pixel/sec @ -60°C: 0.01 or better                                                                                                             |
| Read noise at < 1 e- rms in EM mode                                                                                                                            |
| Electron Multiplier gain: 1 - 1,000 times (software controlled)                                                                                                |
| Digitization: 16 bit                                                                                                                                           |
| Software: Latest software to be provided and same software should be able to control both the Spectrometer and EMCCD.                                          |
| <b>TOTAL MARKS for EMCCD</b>                                                                                                                                   |
| <b>Minimum Technical Qualification Marks for EMCCD is &gt; 45 out of 50</b>                                                                                    |
|                                                                                                                                                                |
|                                                                                                                                                                |
| <b>3) InGaAs Array Detector</b>                                                                                                                                |
| Wavelength range: 800 nm - 1.7 $\mu$ m                                                                                                                         |
| Array Size: Around 25 mm wide with around 1024x1 pixels                                                                                                        |
| Pixel Size: 25 $\mu$ m X 500 $\mu$ m                                                                                                                           |
| Peak QE > 80% for 1.7 $\mu$ m cut-off                                                                                                                          |
| Cooling and related accessories included for -75°C or lower                                                                                                    |
| Interface port(s) with computer and External Triggering Options                                                                                                |
| Software: Latest software to be provided and same software should be able to control both the Spectrometer and InGaAs detector.                                |
| <b>TOTAL MARKS for InGaAs Array Detector</b>                                                                                                                   |
| <b>Minimum Technical Qualification Marks for InGaAs Array Detector is &gt; 45 out of 50</b>                                                                    |
|                                                                                                                                                                |
|                                                                                                                                                                |
| <b>ONE YEAR WARRANTY AFTER INSTALLATIONS FOR ALL 3 ITEMS</b>                                                                                                   |

|                                                                                                                                 |
|---------------------------------------------------------------------------------------------------------------------------------|
| <b>* COMPLIANCE CHARTS for the above specifications of the Monochromator, EMCCD and InGaAs Array Detector must be provided.</b> |
|---------------------------------------------------------------------------------------------------------------------------------|

|                                                                                                                                          |
|------------------------------------------------------------------------------------------------------------------------------------------|
| <b>ITEM 2 &amp; 3 must be compatible with ITEM 1 using supplied software(s) for Synchronized Operation(s) from the same manufacturer</b> |
|------------------------------------------------------------------------------------------------------------------------------------------|

|  |
|--|
|  |
|  |

9) File no: 0470/20

**Multimode Plate Reader**

Technical specifications

| S. No. | Technical requirement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1      | <p><b>Multimode microplate reader</b> should be a high-performance system with dual optical modules, a quadruple grating monochromator optical module &amp; a filter-based optical module.</p> <p><b>The system should be capable for advanced detection modes such as UV-Vis Absorbance, Fluorescence intensity, Luminescence, Filtered Luminescence, Fluorescence Polarization &amp; Time-Resolved Fluorescence.</b></p> <p>The user should be able to switch and use all these technologies set in the multimode reader easily. Include all of the following technology modules together in the system without replacing one for the other: Absorbance, Fluorescence Intensity (top/bottom), Luminescence, Filtered Luminescence, Fluorescence Polarization, Time-Resolved Fluorescence, Filters and Monochromators in one system.</p> <p>Monochromator optical module should be equipped with a light source Xenon flash lamp, a Photodiode detector for Absorbance &amp; a PMT detector for top and bottom fluorescence intensity, high performance luminescence detection &amp; Time-Resolved Fluorescence.</p> <p>The monochromator optics should work at 200 - 999 nm wavelength range with 1 nm increments.</p> <p>The filter module should be completely independent add-on that includes its own light source Xenon flash lamp, a PMT detector and a high performance dichroic based wavelength selection system.</p> |
| 2      | <p>a) The system should have the capacity to read different <b>plate formats</b> from 6- to 384-well plates.</p> <p>b) Automated z-focusing capability for adjusting the reading height for low volumes and different plate types should be available.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 3      | <p><b>System temperature control</b></p> <p>a) from ambient +4 °C to 50 °C. The temperature must be uniform across the plate.</p> <p>b) Acceptable limit: not more than <math>\pm 0.2</math> °C variation across the plate at 37 °C, applicable to any plate used.</p> <p>c) Must have temperature gradient settings to minimize condensation on plate lids during the incubation processes.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 4      | <p>System should be capable of <b>plate shaking in linear, orbital and double-orbital modes</b>. Shaking should be software supported along with provision to set duration, speed and amplitude.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 5.     | <p><b>Instrument sensitivity</b> in various detection modes should be as follows:</p> <p><b><u>a) Absorbance:</u></b><br/> Monochromator optical module:<br/> Wavelength range: 200 – 1000 nm at 1 nm increments</p> <p>Dynamic range: 0 – 4.0 OD<br/> OD accuracy: &lt;1 % at 2.0 OD, &lt;3% at 3.0 OD</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|---|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   | <p>Monochromator bandwidth: 4 nm (230-285 nm), 8 nm (&gt;285 nm)<br/> Monochromator wavelength accuracy: <math>\pm 2</math> nm<br/> OD linearity: &lt;1% from 0 to 3.0 OD<br/> OD repeatability: &lt;0.5% at 2.0 OD</p> <p><b><u>b) Fluorescence Intensity:</u></b><br/> Monochromator optical module:</p> <p>Excitation wavelength range: 200 – 1000 nm at 1 nm increments<br/> Emission wavelength range: 270 – 840 nm<br/> Sensitivity:<br/> Top reading: &lt; 0.25 fmol Fluorescein/well (384 well plate, black)<br/> Bottom reading: &lt; 0.4 fmol fluorescein/well (384 well plate, clear bottom, black)<br/> Dynamic range:<br/> Top reading: &gt; 6 decades<br/> Bottom reading: &gt; 6 decades<br/> Filter optical Module:<br/> Top: &lt; 0.025 fmol Fluorescein/well (384 well plate, black)</p> <p><b><u>c) Luminescence:</u></b><br/> Monochromator system: &lt; 20 amol ATP (flash)<br/> Filter system: &lt; 20 amol ATP (flash)<br/> Wavelength range: 360 – 670 nm<br/> Dynamic range: &gt; 6 decades</p> <p><b><u>d) Fluorescence Polarization:</u></b><br/> Filter system: 1.2 mP standard deviation at 1 nM fluorescein<br/> Wavelength selection mode: filters<br/> Wavelength range:<br/> Excitation range: 330 – 700 nm<br/> Emission range: 400 – 700 nm</p> <p><b><u>e) Time-Resolved Fluorescence:</u></b><br/> Monochromator system: Europium 1200 fM (120 amol/well in 384-well plate)<br/> Filter system: Europium 40 fM (4 amol/well in 384-well plate)<br/> Wavelength range:<br/> Monochromator: 250 – 800 nm<br/> Filter: 200 – 700 nm</p> |
| 6 | <p>System should be in future upgradable to connect a dual reagent injection system to automate inject/read assays such as ion channels assays, ATPase or flash luminescence assays.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 7 | <p>A system compatible Fluorescence Polarization filter with the specifications mentioned above, and a UV Fluorescence Polarization filter set (EX 284/10 &amp; EM 340/30) should be quoted separately along with main quote.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 8 | <p><b>Computer:</b></p> <p>Computer and monitor equipped with necessary software for operation, data collection and analysis, viewing and data transfer (USB, hard disk drives and ethernet ports) and printer should be provided.</p> <p>The workstation computer supplied along with instrument should meet the following minimum specifications:<br/> Intel Core i7 or higher processor with 32 GB RAM with additional 2 or more free memory slots, 1 no. x 1 TB SSD for operating systems and 2 nos. x 4TB SATA HDD 1 TB SSD, additional 2 TB or more external HD, USB ports, optical CD/</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

|    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    | DVD drive, Color monitor with a 23.8 " or higher LED display, resolution HD 1920 x 1080. Monitor must be same make as that of the workstation. Should contain expansion slots, workstation security software, high definition integrated audio with speakers, high quality keyboard and mouse with Windows 10, professional edition, 64-bit software O.S. & MS office 2010 or higher and Ubuntu Linux 19.04 or higher (dual boot, so either OS can be used). Additional software for data analysis and creating high resolution figures should be provided.                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 9  | <p><b>Software:</b></p> <p>Instrument should come with licensed software for reader control, advanced data analysis and flexible Excel export in one software package.</p> <p>It should be easy to export and use data in other formats.</p> <p>Future software updates necessary for operation and analysis, compatible to the model provided, should be available free of cost and periodically updated.</p> <p>Analysis software: should provide copies of offline analysis software and should not require a separate software supporting license.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 10 | <p><b>Service and Maintenance:</b></p> <p>(a) Trained technicians should install the instrument and ensure that it is operating correctly and within specifications. User training at site should also be provided.</p> <p>(b) There should be at least one service engineer and one application scientist based in India trained on the same quoted instrument.</p> <p>(c) They should provide user manual, warranty for <b><u>minimum of three years</u></b>, and also long term regular service of the instrument. There should be periodic visits (at least one per year) from both service engineer and application scientist for periodic training of new users and software/application updates, in addition to visits due to break down or specific requests.</p> <p>(d) User training at site should be provided by the application scientist, including instructions for maintenance and optimal usage.</p> <p>(e) Price should include installation, operating instructions and training at site.</p> |

10) File no: 0325/20

**Multimode plate reader**

Technical specification

| S. No. | Technical requirement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1      | <p><b>Multimode microplate reader</b> should be a high-performance system with dual optical modules, a quadruple grating monochromator optical module &amp; a filter-based optical module.</p> <p><b>The system should be capable for advanced detection modes such as UV-Vis Absorbance, Fluorescence intensity, Luminescence, Filtered Luminescence, Fluorescence Polarization &amp; Time-Resolved Fluorescence.</b></p> <p>The user should be able to switch and use all these technologies set in the multimode reader easily. Include all of the following technology modules together in the system without replacing one for the other: Absorbance, Fluorescence Intensity (top/bottom), Luminescence, Filtered Luminescence, Fluorescence Polarization, Time-Resolved Fluorescence, Filters and Monochromators in one system.</p> <p>Monochromator optical module should be equipped with a light source Xenon flash lamp, a Photodiode detector for Absorbance &amp; a PMT detector for top and bottom fluorescence intensity, high performance luminescence detection &amp; Time-Resolved Fluorescence.</p> <p>The monochromator optics should work at 200 - 999 nm wavelength range with 1 nm increments.</p> <p>The filter module should be completely independent add-on that includes its own light source Xenon flash lamp, a PMT detector and a high performance dichroic based wavelength selection system.</p> |
| 2      | <p>a) The system should have the capacity to read different <b>plate formats</b> from 6- to 384-well plates.</p> <p>b) Automated z-focusing capability for adjusting the reading height for low volumes and different plate types should be available.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 3      | <p><b>System temperature control</b></p> <p>a) from ambient +4 °C to 50 °C. The temperature must be uniform across the plate.</p> <p>b) Acceptable limit: not more than <math>\pm 0.2</math> °C variation across the plate at 37 °C, applicable to any plate used.</p> <p>c) Must have temperature gradient settings to minimize condensation on plate lids during the incubation processes.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 4      | <p>System should be capable of <b>plate shaking in linear, orbital and double-orbital modes</b>. Shaking should be software supported along with provision to set duration, speed and amplitude.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 5.     | <p><b>Instrument sensitivity</b> in various detection modes should be as follows:</p> <p><b><u>a) Absorbance:</u></b><br/>Monochromator optical module:</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   | <p>Wavelength range: 200 – 1000 nm at 1 nm increments</p> <p>Dynamic range: 0 – 4.0 OD<br/> OD accuracy: &lt;1 % at 2.0 OD, &lt;3% at 3.0 OD<br/> Monochromator bandwidth: 4 nm (230-285 nm), 8 nm (&gt;285 nm)<br/> Monochromator wavelength accuracy: <math>\pm 2</math> nm<br/> OD linearity: &lt;1% from 0 to 3.0 OD<br/> OD repeatability: &lt;0.5% at 2.0 OD</p> <p><b><u>b) Fluorescence Intensity:</u></b><br/> Monochromator optical module:</p> <p>Excitation wavelength range: 200 – 1000 nm at 1 nm increments<br/> Emission wavelength range: 270 – 840 nm<br/> Sensitivity:<br/> Top reading: &lt; 0.25 fmol Fluorescein/well (384 well plate, black)<br/> Bottom reading: &lt; 0.4 fmol fluorescein/well (384 well plate, clear bottom, black)<br/> Dynamic range:<br/> Top reading: &gt; 6 decades<br/> Bottom reading: &gt; 6 decades<br/> Filter optical Module:<br/> Top: &lt; 0.025 fmol Fluorescein/well (384 well plate, black)</p> <p><b><u>c) Luminescence:</u></b><br/> Monochromator system: &lt; 20 amol ATP (flash)<br/> Filter system: &lt; 20 amol ATP (flash)<br/> Wavelength range: 360 – 670 nm<br/> Dynamic range: &gt; 6 decades</p> <p><b><u>d) Fluorescence Polarization:</u></b><br/> Filter system: 1.2 mP standard deviation at 1 nM fluorescein<br/> Wavelength selection mode: filters<br/> Wavelength range:<br/> Excitation range: 330 – 700 nm<br/> Emission range: 400 – 700 nm</p> <p><b><u>e) Time-Resolved Fluorescence:</u></b><br/> Monochromator system: Europium 1200 fM (120 amol/well in 384-well plate)<br/> Filter system: Europium 40 fM (4 amol/well in 384-well plate)<br/> Wavelength range:<br/> Monochromator: 250 – 800 nm<br/> Filter: 200 – 700 nm</p> |
| 6 | <p>System should be in future upgradable to connect a dual reagent injection system to automate inject/read assays such as ion channels assays, ATPase or flash luminescence assays.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 7 | <p><b>Computer:</b></p> <p>Computer and monitor equipped with necessary software for operation, data collection and analysis, viewing and data transfer (USB, hard disk drives and ethernet ports) and printer should be provided.</p> <p>A suitable computer should be supplied along with instrument of following minimum specifications:<br/> Intel Core i3 or higher processor with 16 GB RAM, 256GB SSD, 1 TB HDD, USB ports, Colour monitor, keyboard, mouse with Windows 10, professional editions, 64-bit software O.S. &amp; MS office 2010 or higher.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|---|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 8 | <p><b>Software:</b></p> <p>Instrument should come with licensed software for reader control, advanced data analysis and flexible Excel export in one software package.</p> <p>It should be easy to export and use data in other formats.</p> <p>Future software updates necessary for operation and analysis, compatible to the model provided, should be available free of cost and periodically updated.</p> <p>Analysis software: should provide copies of offline analysis software and should not require a separate software supporting license.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 9 | <p><b>Service and Maintenance:</b></p> <p>(a) Trained technicians should install the instrument and ensure that it is operating correctly and within specifications. User training at site should also be provided.</p> <p>(b) There should be at least one service engineer and one application scientist based in India trained on the same quoted instrument.</p> <p>(c) They should provide user manual, warranty for <b><u>minimum of three years</u></b>, and also long term regular service of the instrument. There should be periodic visits (at least one per year) from both service engineer and application scientist for periodic training of new users and software/application updates, in addition to visits due to break down or specific requests.</p> <p>(d) User training at site should be provided by the application scientist, including instructions for maintenance and optimal usage.</p> <p>(e) Price should include installation, operating instructions and training at site.</p> |

11) File no: 0554/20

### Superconducting Magnet system with liquid helium cryostat

Technical specification

| Technical Requirement                       |                                                                                                                                                                                           |
|---------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Cryostat Specifications                     |                                                                                                                                                                                           |
| 1                                           | Non magnetic stainless steel vessel with multilayered super insulator shielding for efficient operation of the Superconducting magnet                                                     |
| 2                                           | Magnet fixed into the base of the cryostat                                                                                                                                                |
| 3                                           | Vapor or liquid nitrogen shielded                                                                                                                                                         |
| 4                                           | Inbuilt overpressure relief valve                                                                                                                                                         |
| 5                                           | Easily accessible Vacuum evacuation valve                                                                                                                                                 |
| 6                                           | Nominal Helium capacity of 25 liters or more.                                                                                                                                             |
| 7                                           | Static hold time (including the heat loads of the magnet & the magnet leads): at-least 48 hours                                                                                           |
| 8                                           | Liquid helium sensor and level meter (USB/IEEE-488 compatible)                                                                                                                            |
| 9                                           | A calibrated temperature sensor and heater attached to the base of the cryostat                                                                                                           |
| 10                                          | Compatible with a top loading flange of at least 5 inches                                                                                                                                 |
| 11                                          | All necessary electrical leads (including that for the magnet voltage, persistent switch & helium level indicator, sensors etc) should be inbuilt & easily accessible from the top flange |
| Magnet & Magnet power supply Specifications |                                                                                                                                                                                           |
| 12                                          | A (multifilamentary Nb-Ti or equivalent) Superconducting magnet with high mechanical strength & electrical insulation.                                                                    |
| 13                                          | Guaranteed Central Field (Vertical) : 7 Tesla                                                                                                                                             |
| 14                                          | Central field homogeneity: $\pm 0.1$ % over a $1 \text{ cm}^3$ volume                                                                                                                     |
| 15                                          | Clear magnet bore size: at least 50 mm                                                                                                                                                    |
| 16                                          | Should have a persistent current switch for operation in the persistent mode                                                                                                              |
| 17                                          | High stability four quadrant superconducting power supply (typically 5 V and current < 50 Amps)                                                                                           |
| 18                                          | Typical stability of not less than 20 ppm/hour                                                                                                                                            |
| 19                                          | Fully programmable using IEEE-488 with programmable field sweep capabilities                                                                                                              |
| 20                                          | Automatic Quench Detection & protection                                                                                                                                                   |
| 21                                          | Vapor cooled (superconducting) magnet current leads                                                                                                                                       |
| TOTAL                                       |                                                                                                                                                                                           |

| Other Mandatory Specifications |                                                                                                                                                                                   |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1                              | An appropriate helium transfer line should be included                                                                                                                            |
| 2                              | Any future upgrades with a Variable Temperature Insert should be possible                                                                                                         |
| 3                              | The integrated system has to be tested at the vendors facilities prior to delivery to IISER Pune, and the specified performance criteria has to be demonstrated prior to shipping |
| 4                              | On site installation, demonstration & training to be provided by trained engineers                                                                                                |
| 5                              | Detailed instruction manuals, test data and all necessary components for operation to be included with the delivery of the system.                                                |

**12) File no: 0851/20**

**Multimode Plate reader**

Technical specifications

| S. No. | Technical requirement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1      | <p><b>Multimode microplate reader</b> should be a high-performance system with dual optical modules, a quadruple grating monochromator optical module &amp; a filter-based optical module.</p> <p><b>The system should be capable for advanced detection modes such as UV-Vis Absorbance, Fluorescence intensity, Luminescence, Filtered Luminescence, Fluorescence Polarization &amp; Time-Resolved Fluorescence.</b></p> <p>The user should be able to switch and use all these technologies set in the multimode reader easily. Include all of the following technology modules together in the system without replacing one for the other: Absorbance, Fluorescence Intensity (top/bottom), Luminescence, Filtered Luminescence, Fluorescence Polarization, Time-Resolved Fluorescence, Filters and Monochromators in one system.</p> <p>Monochromator optical module should be equipped with a light source Xenon flash lamp, a Photodiode detector for Absorbance &amp; a PMT detector for top and bottom fluorescence intensity, high performance luminescence detection &amp; Time-Resolved Fluorescence.</p> <p>The monochromator optics should work at 200 - 999 nm wavelength range with 1 nm increments.</p> <p>The filter module should be completely independent add-on that includes its own light source Xenon flash lamp, a PMT detector and a high performance dichroic based wavelength selection system.</p> |
| 2      | <p>a) The system should have the capacity to read different <b>plate formats</b> from 6- to 384-well plates.</p> <p>b) Automated z-focusing capability for adjusting the reading height for low volumes and different plate types should be available.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 3      | <p><b>System temperature control</b></p> <p>a) from ambient +4 °C to 50 °C. The temperature must be uniform across the plate.</p> <p>b) Acceptable limit: not more than <math>\pm 0.2</math> °C variation across the plate at 37 °C, applicable to any plate used.</p> <p>c) Must have temperature gradient settings to minimize condensation on plate lids during the incubation processes.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 4      | <p>System should be capable of <b>plate shaking in linear, orbital and double-orbital modes</b>. Shaking should be software supported along with provision to set duration, speed and amplitude.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 5.     | <p><b>Instrument sensitivity</b> in various detection modes should be as follows:</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   | <p><b><u>a) Absorbance:</u></b><br/> Monochromator optical module:<br/> Wavelength range: 200 – 1000 nm at 1 nm increments</p> <p>Dynamic range: 0 – 4.0 OD<br/> OD accuracy: &lt;1 % at 2.0 OD, &lt;3% at 3.0 OD<br/> Monochromator bandwidth: 4 nm (230-285 nm), 8 nm (&gt;285 nm)<br/> Monochromator wavelength accuracy: <math>\pm 2</math> nm<br/> OD linearity: &lt;1% from 0 to 3.0 OD<br/> OD repeatability: &lt;0.5% at 2.0 OD</p> <p><b><u>b) Fluorescence Intensity:</u></b><br/> Monochromator optical module:</p> <p>Excitation wavelength range: 200 – 1000 nm at 1 nm increments<br/> Emission wavelength range: 270 – 840 nm<br/> Sensitivity:<br/> Top reading: &lt; 0.25 fmol Fluorescein/well (384 well plate, black)<br/> Bottom reading: &lt; 0.4 fmol fluorescein/well (384 well plate, clear bottom, black)<br/> Dynamic range:<br/> Top reading: &gt; 6 decades<br/> Bottom reading: &gt; 6 decades<br/> Filter optical Module:<br/> Top: &lt; 0.025 fmol Fluorescein/well (384 well plate, black)</p> <p><b><u>c) Luminescence:</u></b><br/> Monochromator system: &lt; 20 amol ATP (flash)<br/> Filter system: &lt; 20 amol ATP (flash)<br/> Wavelength range: 360 – 670 nm<br/> Dynamic range: &gt; 6 decades</p> <p><b><u>d) Fluorescence Polarization:</u></b><br/> Filter system: 1.2 mP standard deviation at 1 nM fluorescein<br/> Wavelength selection mode: filters<br/> Wavelength range:<br/> Excitation range: 330 – 700 nm<br/> Emission range: 400 – 700 nm</p> <p><b><u>e) Time-Resolved Fluorescence:</u></b><br/> Monochromator system: Europium 1200 fM (120 amol/well in 384-well plate)<br/> Filter system: Europium 40 fM (4 amol/well in 384-well plate)<br/> Wavelength range:<br/> Monochromator: 250 – 800 nm<br/> Filter: 200 – 700 nm</p> |
| 6 | System should be in future upgradable to connect a dual reagent injection system to automate inject/read assays such as ion channels assays, ATPase or flash luminescence assays.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 7 | A system compatible Fluorescence Polarization filter with the specifications mentioned above, and a UV Fluorescence Polarization filter set (EX 284/10 & EM 340/30) should be quoted separately along with main quote.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 8 | <b>Computer:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

|    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    | <p>Computer and monitor equipped with necessary software for operation, data collection and analysis, viewing and data transfer (USB, hard disk drives and ethernet ports) and printer should be provided.</p> <p>A suitable computer should be supplied along with instrument of following minimum specifications:<br/>Intel Core i3 or higher processor with 16 GB RAM, 256GB SSD, 1 TB HDD, USB ports, Colour monitor, keyboard, mouse with Windows 10, professional editions, 64-bit software O.S. &amp; MS office 2010 or higher.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 9  | <p><b>Software:</b></p> <p>Instrument should come with licensed software for reader control, advanced data analysis and flexible Excel export in one software package.</p> <p>It should be easy to export and use data in other formats.</p> <p>Future software updates necessary for operation and analysis, compatible to the model provided, should be available free of cost and periodically updated.</p> <p>Analysis software: should provide copies of offline analysis software and should not require a separate software supporting license.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 10 | <p><b>Service and Maintenance:</b></p> <p>(a) Trained technicians should install the instrument and ensure that it is operating correctly and within specifications. User training at site should also be provided.</p> <p>(b) There should be at least one service engineer and one application scientist based in India trained on the same quoted instrument.</p> <p>(c) They should provide user manual, warranty for <b><u>minimum of three years</u></b>, and also long term regular service of the instrument. There should be periodic visits (at least one per year) from both service engineer and application scientist for periodic training of new users and software/application updates, in addition to visits due to break down or specific requests.</p> <p>(d) User training at site should be provided by the application scientist, including instructions for maintenance and optimal usage.</p> <p>(e) Price should include installation, operating instructions and training at site.</p> |

**13) File no: 0782/20**

**High Voltage Source**

Technical specification

NIM-Bin based High Voltage Source

(A) 4 kV Dual Unit -- Qty 2

0--4 kV, 0--1 mA

100 nA least count

High frequency ripple better than 10 mV pp

Voltage Stability  $10^{-4}$  of nominal value

Remote and Local control

Single or Double width cassette with 2 independent output channels per unit

(B) 1 kV Dual Unit -- Qty 2

0--1 kV, 0--5 mA

100 nA least count

High Frequency ripple better than 5 mV pp

Voltage Stability  $10^{-4}$  of nominal value

Remote and Local control

Single or Double width cassette with 2 independent output channels per unit

**14) File no: 0326/20**

**Temperature Control Stage with imaging station**

**Technical specifications for Temperature Control Stage**

Linkam THMS350EV-4 Temperature Control Stage with Vacuum Chamber with 4 Electrical Connectors without Controller and with Imaging Station

1.11083 THMS350EV-4 Temperature Control Stage with Vacuum Chamber with 4 BNC Screw fit fittings. Temp.

Range: Ambient to +350C (-196 C to +350 C with LNP96), can be evacuated 10e-3mBar

Sample Area : 22mm diameter, Temp. Stability : < 0.1°C

XY Sample Manipulation : Up to 15mm in both directions

Heating / Cooling Rates : 0.01°C to 30°C / min

**2. Imaging Station**

Ergonomic sample imaging platform for thermal applications, incorporating swinging arm technology for easy

sample handling and exchange during a programme of experiments. Comprising:-

Imaging station unit

Long working distance condenser lens assembly to enable Kohler illumination

Facility to insert an adapter carrying a corresponding phase ring

Integrated LED lighting system including variable power supply and standard field diaphragm

Polariser and Analyzer

One 10x objective lens (non phase)

Stage Clamps

**15) File no: 0481/20**

**PP Plates**

Technical specification

PCL-10-100-96: « Prestwick Chemical Library ® » Ver.20

1520 compounds packaged in nineteen 96-well Greiner BioOne PP plates ref 651201.

Each well contains 100 µL at a precise 10mM concentration in DMSO

including a well annotated database

Re-supply is guaranteed for each hit at 10mg

**16) File no: 0390/20**

**Fluorescent stereomicroscope**

Technical specification

Binocular Stereo microscope with parallel optics (zooming type) and minimum zoom ratio of 7:1. Magnification range at least 8x (or lower) to at least 56x (or higher) using 10x eyepiece and 1x objective

1x Plan-Apochromat objective N.A 0.10 or better with WD not lesser than 80 mm or higher

10x eyepieces with diopter adjuster, F.N. 22 or better with rubber eye shields and interpapillary distance adjustment

One eyepiece should have an ocular scale/reticule

One micrometer for measurements

Ergonomically inclined Binocular head

Appropriate large microscope stand with fine and coarse focusing unit

Transmitted light stage with LED illumination with Bright field and Dark Field illumination

Black and white stage plate/s

Fluorescence Attachment with 130W light source with Fluorescence Filter GFP and RFP

All relevant adapters, cables and power supplies

3 year warranty on all parts

**17) File no: 0194/20**

## **Supercontinuum Light Source**

Technical specifications

**Spectral coverage:** 450-2400 nm or broader

**Spectral stability:** 600-1040 nm < 0.12 dB per hour; 1100-1500 nm < 0.14 dB per hour

**Total power:** > 110 mW (at least 28μW/nm in range 500-2200 nm, Average >50μW/nm), Power spectral density graph must be provided

**Total visible power:** > 20 mW

**Total power stability:** <± 1.0 % for 1 hour

**Repetition rate:** Variable 1 Hz to min. 20 kHz

**Output pulse width:** < 2ns

**Pulse-pulse jitter:** < 2μs (repetition rate dependent)

**Beam Quality:** Diffraction limited beam with true achromatic collimation

**Beam quality, TEM<sub>00</sub>:**  $M^2 \leq 1.1$

**Beam pointing stability:** <50 μrad

**Beam divergence (half angle):** <5mrad for full range 450-2400nm

**Beam diameter (collimated)** ~1mm at 530 nm

**Output:** True single mode fiber delivery with collimator

**Polarization:** Unpolarized

**Interlock:** Door interlock 2 pin LEMO must be supplied

**Trigger options:**

The laser must have capability to be triggered by external devices through

1. BNC connected Coax trigger
2. Terminal connector based industrial trigger providing high isolation voltage ~350 V

**Operating temperature:** 18 – 30 °C

**Cooling:** Laser must be air cooled

**Software:** Controlling software along with LabView etc codes for virtual instrument must be provided

## Isothermal Calorimeter

### Technical specification

| S. No. | Technical requirement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1      | <p><b>Temperature control</b></p> <p><b>a) Operating temperature range:</b> Should be able to operate in the range 2°C to 80°C with temperature stability ~ <math>\pm 0.00012^{\circ}\text{C}</math> at 25°C or better with thermostability <math>\pm 0.005^{\circ}\text{C}</math> or better.</p> <p><b>b) Temperature control system:</b> A peltier controlled system for rapid temperature equilibration should be provided.</p> <p><b>c) Equilibration time:</b> The system should have fast equilibrium time and should take <math>\leq 8</math> min (lesser will be preferred) to equilibrate from 25°C to 5°C.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 2      | <p><b>Specifications of sample cell</b></p> <p><b>a) Cell configuration:</b> Design of the cell should be non-capillary and enclosed in an adiabatic chamber, with perfect cell geometry to provide a larger surface area, for maximizing cell contact leading to faster equilibration, faster response time, and better sensitivity.</p> <p><b>b) Cell type:</b> Fixed cell with reaction volume of <math>\sim 200\ \mu\text{L}</math> (less is preferred) and a maximum sample loading volume not exceeding of 300 <math>\mu\text{L}</math> or less.</p> <p>The working volume and dead volume of the offered cell should be specified.</p> <p><b>c) Cell Material:</b> should be made with a material which is inert and should not react with non-metal and metal ions such as silver, gold, magnesium, calcium, zinc, mercury, manganese, carboxylates, phosphate ions, and with thiol compounds. Further, the material should not adsorb biomolecules such as oligomeric and aggregated proteins, large nucleic acids, and other organic compounds, etc.</p> <p>Cell material should also be highly resistance to extreme pH (2-12) conditions, organic solvents, resistant to acid, base, and detergent based cleaning materials.</p> |
| 3      | <p><b>Injection parameters</b></p> <p><b>a) Injection syringe capacity:</b> The injection syringe capacity should be <math>\leq 50\ \mu\text{L}</math> or less.</p> <p>The system should have bubble free sample loading that can take care of high viscous solutions.</p> <p><b>b) Mixing or stirring speed:</b> The system should have user definable mixing speed options (rotations per minutes, rpm) with maximum stirring speed up above 1500 rpm.</p> <p><b>c) Injection volume precision:</b> The injection volume should be precise (1% or lower @ <math>2.0\ \mu\text{L}</math>) for accurate and reproducible injections. Injection volumes per step of <math>0.1\ \mu\text{L}</math> (or less) should be possible.</p> <p><b>d) Equilibration option:</b> Fast equilibration and auto injection options should be available.</p>                                                                                                                                                                                                                                                                                                                                                                                                 |

|    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|----|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 4  | <p><b>Response time</b></p> <p><b>a) Response time:</b> The system should be capable to provide user selectable response times with a minimum response time <math>\sim \leq 8</math> seconds.</p> <p><b>b) User selectable Mode of operation for response times:</b> Multiple mode option for response times (high, medium and low gains) should be available to cover broader range of binding reactions, and allow fast re-equilibration between injections.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 5. | <p><b>Sensitivity</b></p> <p><b>a) Detectable heat range:</b> The instrument should have a minimum detectable heat of <math>\sim 0.1 \mu\text{J}</math> or less.</p> <p><b>b) Sensitivity:</b> Base line noise level measured (RMS average) should be LESS THAN <math>1 \text{ nJ/s}</math>.</p> <p><b>c) Binding constants detectable range:</b> Should be able to detect interactions with binding constants in the range of sub- millimolar (<math>10^2 \text{ M}^{-1}</math>) to nano-molar range (<math>10^9 \text{ M}^{-1}</math>) [for normal binding] and <math>10^2</math> to <math>10^{12} \text{ M}^{-1}</math> [for competitive binding].</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 6  | <p><b>Computer and software accessories</b></p> <p><b>a) Computer:</b> a. Computer and monitor equipped with necessary software for operation, data collection and analysis, viewing and data transfer (USB, hard disk drives and ethernet ports) and printer should be provided. b. Analysis software: should provide copies of offline analysis software and should not require a separate software supporting license.</p> <p><b>b) Software:</b> Software should be provided, which is capable of running the instrument, injector control, sample loading the injector, providing user-selectable binding models, and data merging like: single site, two site, sequential site, competitive site, and enzyme kinetics. Non-linear least square analysis of the data should include calculations to correct for the excluded concentrations of the macromolecules and ligands during each injection.</p> <p>It should be easy to export and use data in other formats. In addition to this, the software should have significant property to generate high resolution images, which are ready to publish data which describes stoichiometry, Thermodynamic properties of Gibb's free energy, enthalpy and entropy.</p> <p><b>c) Updates:</b> Future software updates necessary for operation and analysis, compatible to the model provided, should be available free of cost and periodically updated.</p> |
| 7  | <p><b>Necessary Accessories:</b></p> <p>All necessary accessories should be supplied with the instrument, including user manuals. Bottle kits, Bottling tubing-external, Filling port adapter with needle, extra tubing sets, drip tube, syringe, wash module, drip tube, cleaning device and O-rings should be provided.</p> <p>Accessories for sample degassing should be provided or options based on the system configurations for avoiding air bubbles during operation should be specified.</p> <p>Also, <b>five</b> additional injection syringes must be provided.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 8  | <p><b>Service and Maintenance:</b></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   | <p>(a) Trained technicians should install the instrument and ensure that it is operating correctly and within specifications. User training at site should also be provided.</p> <p>(b) There should be at least one service engineer and one application scientist based in India trained on the same quoted instrument.</p> <p>(c) They should provide user manual, warranty for <b><u>minimum of five years</u></b>, and also long term regular service of the instrument. There should be periodic visits (at least one per year) from both service engineer and application scientist for periodic training of new users and software/application updates, in addition to visits due to break down or specific requests.</p> <p>(d) User training at site should be provided by the application scientist, including instructions for maintenance and optimal usage.</p> <p>(e) Price should include installation, operating instructions and training at site.</p> |
| 9 | <p><b>Miscellaneous:</b></p> <p>A user's list should be provided highlighting instalment of similar equipment in other research institutes in India in the recent past. A good record in supply and service to other research institutes will be considered as a positive point for a particular company.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

**Automated DNA/RNA oligonucleotide synthesizer**

## Technical Specifications

Complete and ready to use research grade automated DNA/RNA/LNA oligonucleotide synthesizer capable of synthesizing modified oligonucleotides. The system should be closed one, always under Argon protective atmosphere and be compatible for the synthesis of DNA, RNA, LNA and modified oligonucleotides based on phosphoramidite and related chemistries.

**Section A: Mandatory specifications that should be 100% complaint**

| Si. No. | Specification                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1       | The system should be a closed one, always under Argon protective atmosphere. Open systems are not acceptable for our applications. The system must be new and not refurbished.                                                                                                                                                                                                                                                                                                                                              |
| 2       | <p>(a) The system should be compatible for the synthesis of DNA, RNA, LNA and modified oligonucleotides based on phosphoramidite and related chemistries.</p> <p>(b) The instrument should allow synthesis of phosphorothioate backbone containing oligonucleotides.</p> <p>(c) Should have provision for the synthesis of oligonucleotides with wobble bases without manual amidites premixing. The premixing should be done by the instrument.</p>                                                                        |
| 3       | <p>(a) The system should have a minimum of 6 to 8 column for parallel synthesis with cycle time less than 4 min for each column.</p> <p>(b) Synthesis should be possible on all columns simultaneously and also independently using 9 to 12 different amidites including standard A/G/C/T/U and ports for LNA and modified amidites. At least 10 ports should be online.</p> <p>(c) System should be capable of starting new synthesis on any column position at any time when the synthesis is going on other columns.</p> |
| 4       | At least 2 ports should be dedicated to small volume vials for modified amidites. (Appropriate set of vials should be supplied).                                                                                                                                                                                                                                                                                                                                                                                            |
| 5       | <p>(a) The system should be suitable for different synthesis scales (50 nmole to 10 micromole) using standard columns and customized column materials.</p> <p>(b) The coupling efficiency should be very high for each cycle: more than 98% for standard A/G/C/T/U amidites and should allow synthesis of shorter (10 mer) and longer oligonucleotides (80 mer or more) with high efficiency.</p>                                                                                                                           |
| 6       | The instrument should have a reliable online trityl monitor system to check the coupling efficiency of each cycle (not simply verifying by using flow detector).                                                                                                                                                                                                                                                                                                                                                            |
| 7       | The system should be compatible with standard quality of amidites, reagents and columns supplied by different vendors worldwide. The amidite and reagent consumption should be low.                                                                                                                                                                                                                                                                                                                                         |
| 8       | All necessary authentic licensed software for the instrument and computer, connecting cables and plugs compatible to Indian electrical requirements must be provided.                                                                                                                                                                                                                                                                                                                                                       |
| 9       | Software should be user-friendly. Along with standard synthesis cycles, the software should have provision to customize reaction cycles based on user requirements including LNA and phosphorothioate backbone modification.                                                                                                                                                                                                                                                                                                |
| 10      | Start-up synthesis kit including bottles, reagent cap adapters/tubes for all bottle sizes (such as 450 mL, 4 L, 2.5 L, etc), o-rings, tubes and columns must be provided. The list should be mentioned in the quotation.                                                                                                                                                                                                                                                                                                    |
| 11      | In addition to start-up synthesis kit, the essential spare parts required for 3 years of hassle-free operations need to be provided with system. This should include bottle caps, O rings, tubings, valves, membranes, connectors, vials, electronic boards for the machine, etc.                                                                                                                                                                                                                                           |

|    |                                                                                                    |
|----|----------------------------------------------------------------------------------------------------|
| 12 | Footprint of the system should be compact with no moving parts and no exhaust cabinet requirement. |
|----|----------------------------------------------------------------------------------------------------|

**Section B: Other specifications and items that should be provided with the system (should be 90% or more compliant)**

| Si. No. | Specification                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1       | The system is preferred to be configured for the following bottle size for acetonitrile (2.5 L), DCM (2.5 L), TCA (2.5 L), activator, Cap_A, Cap_B, Oxidizer (450 ml), amidites (0.25 g, 0.5 g and 1.0 g). The amidite position should be compatible for small volume vials mentioned in point 7, Section A). For all these bottles appropriate adapters and tubings should be provided. In addition, connecting tubes and cap adapters for other bottle sizes for acetonitrile (4L and 1L), DCM (1L), TCA (1L) and reagents should be provided. Please mention the list in the quote. |
| 2       | Should provide gas regulator with appropriate tubes and adapters for connecting argon cylinder with the instrument. The regulator should be compatible with the Indian Argon cylinder.                                                                                                                                                                                                                                                                                                                                                                                                 |
| 3       | Spare parts should be available for at least 10 years from the date of supply.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 4       | Power supply: The instrument should be compatible with the below power supply (for India) specifications. Appropriate wires and plugs should be provided. 220V, 50/60 Hz, (Operating range 220-240V).                                                                                                                                                                                                                                                                                                                                                                                  |
| 5       | A branded PC with minimum i5 processor, 8GB RAM and 1TB hard drive with 19-inch monitor should be supplied. The PC should be compatible with the instrument software.                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 6       | Manual and Installation: Complete manual should be provided. Comprehensive onsite training should be provided for selected students and operators during installation of the instrument.                                                                                                                                                                                                                                                                                                                                                                                               |
| 7       | Availability of qualified and professionally trained service support in India need to be ensured. Service support should be assured for at least 10 years from the date of installation.                                                                                                                                                                                                                                                                                                                                                                                               |
| 8       | Warranty: Three-years comprehensive warranty must be provided. Also, minimum 1 maintenance service visit per year needs to be provided during the 3 year warranty period.                                                                                                                                                                                                                                                                                                                                                                                                              |
| 9       | A minimum of six references in India in academic and research institutes like IISERs, IITs, DST labs etc not in industries should be provided as research and academic requires different type of application and requirement.                                                                                                                                                                                                                                                                                                                                                         |

**\*Compliance to Section A and B will be used to evaluate the bid.**

**Additional requirements:**

1. All other pre-installation requirements (Argon cylinder, etc) that need to be arranged from the indenter side should be clearly mentioned in the quote.
2. After three-year warranty, additional two-year annual maintenance contract (without spare parts) can be offered by Indian representative in Indian rupees: quoted optionally and separately.

**Electrochemical Workstation with Spectroelectrochemical System**

## Technical specifications

| SI No | Specifications                                                                             | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-------|--------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1     | Requirement for                                                                            | <b>Electrochemical Workstation with Spectroelectrochemical System (SECS) -01 Nos</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 2     | Specifications                                                                             | <p>Compliance voltage: <math>\pm 12</math> V or better at <math>\pm 250</math> mA<br/> Maximum Output Current: <math>\pm 200</math> mA or better at <math>\pm 10</math> V<br/> Output Voltage Range: <math>\pm 10</math> V<br/> Current Ranges smallest current range: <math>\pm 50</math> pA to <math>\pm 250</math> mA or better<br/> Resolution of applied potential: 150 nV or better<br/> Accuracy of applied current: <math>\pm 0.2</math> % of the current range or better<br/> Measured current resolution: 30 fA or better<br/> Potentiostat rise/fall Time: <math>&lt;1\mu</math>s or better<br/> Bandwidth of electrometer: <math>&gt;7</math> MHz or better<br/> Interface: USB/Serial interface for connection with PC<br/> Input bias current: <math>&lt;20</math> pA or better<br/> Cyclic Voltammetry with Scan Rate: 10 <math>\mu</math>V/s to 5,000 V/s or better<br/> Differential Pulse Voltammetry and Normal Pulse Voltammetry with Pulse width: 0.001 to 10 sec.<br/> Should have the following techniques:<br/> a. Cyclic Voltammetry (CV)<br/> b. Linear Sweep Voltammetry (LSV)<br/> c. Chrono Amperometry (CA)<br/> d. Chrono Coulometry (CC)<br/> e. Differential Pulse Voltammetry (DPV)<br/> f. Normal Pulse Voltammetry (NPV)<br/> g. Square Wave Voltammetry (SWV)<br/> h. Bulk Electrolysis with Coulometry (BE)<br/> i. Open Circuit Potential – Time (OCPT)<br/> j. Full version of CV simulator<br/> k. IR Compensation<br/> l. External Potential Input<br/> m. Auxiliary Signal Measurement Channel</p> |
| 3     | <b>Cell for Cyclic Voltammetric studies and Spectroelectrochemical (SECS) Measurements</b> | <p>It should consist of the following:<br/> a. Four Glass cells and Cell stand for the operation of CV and two 0.2 mm Quartz cuvettes for SECS<br/> b. Minimum three Pt and three Glassy Carbon working electrodes for CV<br/> c. One Pt gauze electrode for SECS<br/> d. One Pt wire Counter electrode<br/> e. Two Ag/Ag<sup>+</sup> reference electrode (non-aqueous)<br/> f. One SCE Electrode<br/> g. Electrode polishing kit<br/> h. Cell stand for CV studies</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

|   |                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|---|-----------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 4 | <b>UV Vis Spectrophotometer for Insitu Spectro-electro-chemical Studies</b>                                           | UV-Vis Spectrophotometer for measurement of change in absorbance or transmittance. Cuvette holder for transmittance and absorbance measurements. It should have data analysis and control software to work on computer.<br>a. Wavelength Range: 200 nm to 1000 nm or better<br>b. Optical resolution of ~0.1-10.0 nm FWHM<br>c. Light Source: 210 nm to 2500 nm.<br>d. Accessories for in situ absorption and transmission studies                                                     |
| 5 | <b>Software suitable for measuring and analyzing data of electrochemical and Spectroelectrochemical measurements.</b> | <ul style="list-style-type: none"> <li>• Licensed copy of Software for Spectro-electrochemical data analysis</li> <li>• Windows based Software for measuring and analyzing data of electrochemical and Spectroelectrochemical measurements</li> <li>• Multiple user license along with the original installation software in a CD or USB flash drive should be provided</li> <li>• The software should support above mentioned measurements, simulation and fitting program</li> </ul> |
| 6 | <b>Installation &amp; Commissioning</b>                                                                               | Instrument should be installed, tested and commissioned by manufacturer, or representative at site with no additional cost.                                                                                                                                                                                                                                                                                                                                                            |
| 7 | <b>Cell assembly</b>                                                                                                  | Spectroelectrochemistry Cell should include Cell Top, Pt Gauze Electrode (Flag Type) & Pt Counter Electrode, 0.5 mm and 1 mm path quartz cuvette                                                                                                                                                                                                                                                                                                                                       |
| 8 | <b>Warranty</b>                                                                                                       | One Year Exclusive Warranty                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 9 | <b>Other Specifications /requirements</b>                                                                             | The complete system should operate at standard 230 V, 50 Hz power supply<br>Capable for extending absorption up to 2000 nm or better and upgradable to measure florescence with suitable hardware/software on a later date.<br>Whole set up should be adaptive to be connected to an existing desktop computer. (Specifications may be mentioned for the desktop)                                                                                                                      |

**Optional  
10**

**Computer**

I5 processor with 13 inches' windows 10 based laptop. The instrument should be connected through USB cable to the computer from which the instrument will be operated

**11**

**Warranty**

Indicate AMC Charges for 1 Year after warranty

## 21) File no: 0209/20

### Bench Top Mixer Mill

#### Technical specification

The mill should be compact versatile bench-top unit, which has been developed specially for **dry, wet and cryogenic grinding** of small amounts of sample. It can mix and homogenize **powders and suspensions in only a few seconds.**

The grinding jars of the mill perform radial oscillations in a horizontal position. The inertia of the grinding balls causes them to impact with high energy on the sample material at the rounded ends of the grinding jars and pulverizes it. Also, the movement of the grinding jars combined with the movement of the balls result in the intensive mixing of the sample.

#### **The mill should have the following features mention below:**

- reproducible, efficient grinding, mixing and homogenization in seconds
- powerful grinding by impact and friction, up to 30 Hz for up to 20 samples per run
- 3 different grinding modes (dry, wet or cryogenic)
- screw-top grinding jars for leak-proof grinding
- 9 SOPs can be stored
- wide range of accessories including various jar and ball sizes, adapter racks for single use vials and tubes, grinding tool materials, Cryo Kit
- Isolation of bacteria from tissue in 8 x 30 ml bottles or 20 x 5 ml vials for accurate diagnosis of infections.

#### • Technical specification of the Mill:

|                                  |                                                                             |
|----------------------------------|-----------------------------------------------------------------------------|
| Applications                     | size reduction, mixing, homogenization, cell disruption, cryogenic grinding |
| Feed material                    | hard, medium-hard, soft, brittle, elastic, fibrous                          |
| Size reduction principle         | impact, friction                                                            |
| Material feed size               | $\leq 8$ mm                                                                 |
| Final fineness                   | $\sim 5$ $\mu\text{m}$                                                      |
| Batch size / feed quantity       | Max. 2 x 20ml                                                               |
| No. of grinding stations         | 2                                                                           |
| Setting of vibrational frequency | digital, 3 - 30 Hz (180 - 1800 $\text{min}^{-1}$ )                          |
| Typical mean grinding time       | 30 s - 2 min                                                                |
| Dry grinding                     | yes                                                                         |
| Wet grinding                     | yes                                                                         |
| Cryogenic grinding               | yes                                                                         |
| Self-centering clamping device   | yes                                                                         |
| Type of grinding jars            | screw top design                                                            |
| Material of grinding tools       | stainless steel                                                             |

|                          |                        |
|--------------------------|------------------------|
| Grinding jar sizes       | 25 ml                  |
| Setting of grinding time | digital, 10 s - 99 min |
| Storable SOPs            | 9                      |
| Electrical supply data   | 100-240 V, 50/60 Hz    |
| Power connection         | 1-phase                |
| Protection code          | IP 30                  |
| Power consumption        | 150 W                  |
| W x H x D closed         | ~371 x 266 x 461 mm    |
| Net weight               | ~ 26 kg                |
| Standards                | CE                     |

Grinding Jars, Stainless Steel - 25 ml

Grinding balls, Stainless Steel - 15 mm Ø

Grinding balls, Stainless steel – 5 mm (200 pieces

**22) File no: 1154/20**

**Teflon Acid distillation unit**

Technical specification

A Teflon sub-boiling distillation unit having following specifications is required to purify selected inorganic acids (HF, HNO<sub>3</sub> and HCl).

These purified acids will be used for trace metal analyses of water and rock samples.

Sub-boiling distillation unit capable of purifying acids up to high purity (10 ppt) grade.

All wetted parts of the unit should be of high purity PFA type.

The unit should contain CE certified heating source and electric control units (230 VAC, 50/60 Hz).

Power to the heating mantle should have variable temperature controller.

Pure acid production rate at higher temperature should be about 40 mL/hr.

No water cooling should be required.

Should include a 1 L PFA bottle and also a bottle bracket

**23) File no: 1189/20**

**Fiske 210 Micro Sample Osmometer**

Technical specification

Alphanumeric Display

Result, user prompts and instrument Diagnostics are clearly displayed.

Automatic Calibration

No fine-tuning or user adjustments during calibration. The instrument's microprocessor automatically makes calibration adjustments at the push of a button.

Easy push-button operation Requires minimum operator training.

Smallest sample size

Only 20 microliters of sample needed.

Printer, RS232C and barcode scanner ports

A full range of data handling options are available. Unit connects easily to printer, computer, and scanner

Solid-state cooling

The 210 has no liquid cooling bath, no maintenance required.

**24) File no: 0624/20**

Haematology analyser for Veterinary samples: 01 Numbers

|                                                                                                                                                                                                                                                                                                                                                                                                      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Technical Specifications</b>                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Hematology analyser for Veterinary samples</b><br><br><b>Manufacturer by Mindray and model is BC-5000 Vet</b><br>Automatic 5-part differentiation of white blood cells and should offer 23 parameters;<br>Should support 5-part CBC+DIFF test on 16 species Dog, Cat, Horse, Monkey, Rat, Mouse, Rabbit, Pig, Guinea pigs, Cow, Llama, Goat, Sheep, Ferret and Camel +20 self-programmed animals. |
| Minimum sample required for CBC+DIFF test 20uL of blood<br>Throughput up to 60 samples per hour<br>At least 40000 sample results storage<br>At least 12 QC files storage, 100 results per file<br>Customized report formats on picture and microscopic exam results                                                                                                                                  |
| <b><u>Reagents:</u></b> A set of reagents, controls and calibrators should be supplied along with each set of instrument                                                                                                                                                                                                                                                                             |

**25) File no: 1153/20**

**Non-metallic hotplate**

Technical specifications

Acid digestions and trace metal analysis Separate control box connected with a PTFE coated lead.

A heated glass ceramic plate mounted in a block of pure PTFE creates a powerful hotplate

Concentrated acid resistant

Separate temperature controller allows for safe placement outside the fume hood

Large, square top plate accommodates one large vessel or several smaller ones

Top Plate Material Glass Ceramic

Body material - PTFE

Top Plate Length (cm) - 30 \* 30

Heated area (CM) - 20 \* 20

Hotplate dimensions, (w x d x h) - 32 \* 36 \* 6

Control unit dimensions (w x d x h) - 15 \* 16\* 6.5

Max Temperature (° C) - 400

Power - 230 V 50-60Hz

26) File no: 0625/20

**Biochemistry analyser**

Technical specification

Clinical chemistry analyser

| Technical requirement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Biochemistry analyser</b><br><br>Manufacturer by DiaSys Diagnostics and model is <b>Sys 200 OR</b><br>Manufacturer by Transasia Erba and model is <b>EM-200</b><br><br>Fully automated biochemistry analyser with through put of 200-240 photometry tests per hour.<br><i>Should have Multi-functional Sample and reagent disk with refrigerator,</i><br><i>Sample/reagent Pipetting System and In Built Laundry System,</i><br>Reagent Bottle Vol: 20mL, 70mL,100mL<br>Auto Rinse: Cuvettes, reagent probe, mixing rod and auto-rinsing |
| Number of sample cups provided with machine should be minimum 1500 numbers                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Laundry system should have 7 stops, 12 steps washing laundry system with 2 time recycling detergent and washing by warm water rinsing to ensure complete cleanliness.                                                                                                                                                                                                                                                                                                                                                                       |
| <b><u>Software intelligence:</u></b> Automatic checks for linearity limit over, reference limit over, substrate depletion, antigen surplus, no reaction balance point.<br><b><u>Calibration &amp; QC Function:</u></b> Linear and non-linear calibration, auto-calibration and manual Calibration. Real-time QC, daily QC, day-to-day QC with double-concentration method.<br><b><u>Operating Software:</u></b> Graphical operating software with simple interface & user friendly real time online Help System.                            |
| <b><u>Reagents:</u></b> A set of reagents (for ~12-15 parameters), controls and calibrators should be supplied along with each set of instrument                                                                                                                                                                                                                                                                                                                                                                                            |
| <b><u>Warranty:</u></b> Instruments should provided with 3 years of warranty period.                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

27) File no: 0487/20

## High Resolution Mass Spectrometer System with Ultra High-Performance Liquid Chromatography (LC-MS), Software and Accessories

Technical specification

| Sr. No. | Technical requirement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.      | <p><b><u>Pump</u></b></p> <ul style="list-style-type: none"> <li>• Binary gradient pump with high pressure mixing, equipped with in line degasser technology</li> <li>• Operating flow rate range to be 1 - 5000 <math>\mu\text{L}/\text{min}</math>, in 1-<math>\mu\text{L}</math> increments.</li> <li>• Operating pressure should be 18000 psi or better.</li> <li>• Flow rate accuracy <math>\pm 1\%</math></li> <li>• Flow rate precision: <math>&lt; 0.07\%</math> RSD</li> <li>• Composition accuracy: 0.5% or better</li> <li>• System delay volume <math>&lt; 200 \mu\text{L}</math>, independent of system backpressure (with standard mixer).</li> <li>• The chromatography system should be capable of being operated both as a HPLC &amp; UPLC by interchanging the column chemistries.</li> <li>• The HPLC/UHPLC system should have single point software based control with MS.</li> <li>• Gradient precision of 0.15% RSD or <math>\pm 0.4</math> min SD whichever is greater.</li> <li>• Gradient profile: step and linear gradient at multiple levels</li> <li>• Capability to run columns from 1 – 10 <math>\mu\text{m}</math> particle size range.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 2.      | <p><b><u>Autosampler</u></b></p> <ul style="list-style-type: none"> <li>• Injection volume: 0.1 to 20 <math>\mu\text{L}</math> (or better) in 0.1 <math>\mu\text{L}</math> increments.</li> <li>• Sample capacity of over 100 vials of 1.5/2 ml.</li> <li>• Sample carryover <math>&lt; 0.004\%</math></li> <li>• Sample cooling range from 4 – 40 <math>^{\circ}\text{C}</math></li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 3.      | <p><b><u>Mass Spectrometer</u></b></p> <ul style="list-style-type: none"> <li>• Technology required: Quadrupole Time of Flight (QTOF)</li> <li>• MS ionization source: Dual ionization source required: Electro-Spray Ionization (ESI) and Atmospheric Pressure Chemical Ionization (APCI) with orthogonal spraying for improved robustness equipped with self-cleaning heaters.</li> <li>• Flow rate range for source: 1 <math>\mu\text{L}/\text{min}</math> to 2000 <math>\mu\text{L}/\text{min}</math> or higher without flow splitting for better accuracy.</li> <li>• Expected Resolution: should be <math>&gt; 40,000</math> for QTOF @ <math>m/z</math> 1000</li> <li>• Mass accuracy: <math>&lt; 2</math> ppm and <math>&lt; 1</math> ppm against external and internal calibration respectively for 12 hours of LC-MS/MS.</li> <li>• Scan modes: Full scan MS, and MS/MS or product ion scan or precursor ion scan with full scan mode. Q1 scan mode also should be possible.</li> <li>• Quadrupole mass range: at least 50 – 2000 or better.</li> <li>• Linear dynamic range: <math>\geq 4</math> orders of magnitude.</li> <li>• Acquisition speed: High speed, with very high response time, and efficient fragmentation is expected. For MS and MS/MS acquisitions: <math>\geq 25</math> and <math>\geq 50</math> Hz for QTOF, @ at least 15,000 resolution @ 200 <math>m/z</math> is expected.</li> <li>• The system should have a TOF mass range of 50 – 10,000 <math>m/z</math> for better or QTOF in high-resolution mode.</li> <li>• Sensitivity: Full MS scan mode: 1 pg for known company MS standards, with S:N <math>&gt; 500:1</math> without compromising on speed or resolution. Automated calibration and tuning from a reference probe either intra or inter sample during batch sample analysis should be possible.</li> <li>• Desolvation temperature: <math>&gt; 500^{\circ}\text{C}</math> with complete temperature range should be controlled by instrument acquisition software. If vendor describes</li> </ul> |

|    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    | <p>desolvation temperature in some other way or is absent from their instrument specification, factory certificate for the same must be provided</p> <ul style="list-style-type: none"> <li>• Polarity switching: Positive and negative mode spectral acquisition should be possible in a single run</li> <li>• Vacuum interlock system: An in-built system that allows source and (if possible) even capillary cleaning and maintenance while maintaining system vacuum</li> <li>• As an optional accessory, an integrated infusion device controlled by instrument acquisition software.</li> <li>• Data acquisition should be possible in data-dependent and data-independent modes.</li> <li>• Applications: Capable of performing both qualitative and quantitative lipidomic, metabolomics and small molecule analysis with high sensitivity, accuracy, precision, and reproducibility.</li> <li>• LC &amp; MS: Have to be from the same vendor for seamless integration and better post-sales service.</li> <li>• Upgradability: Upgradeable to ion mobility for separation of isobaric and co-eluting analytes (if possible, but this option should be mentioned in the technical document).</li> </ul>                                                                                                                                                            |
| 4. | <p><b><u>Workstations and Software Specifications</u></b></p> <ul style="list-style-type: none"> <li>• Original and licensed universal perpetual software (including free upgrades for at least 5 years), computers and workstations and all interfacing hardware and software for instrument control, data acquisition and data processing must be supplied compatible to the LC-MS system should be quoted.</li> <li>• Software for discovery lipidomics applications as well as other related and relevant applications mentioned, that can perform both qualitative and quantitative analyses with statistical tests, should be provided and quoted. Software should have visual tools to help understand trends within datasets, and allow for the exclusion of outliers in the data for further analysis.</li> <li>• Separate high configuration workstation should be quoted for off-line data processing.</li> <li>• The system should be quoted along with 3 offline data processing computers and 1 data acquisition computer. Minimum computer specifications for each computer: 64 GB RAM, 10 TB hard disk, Most recent version of Windows compatible with acquisition and offline data processing software, mouse, English keyboard, and a 24 inches screen. All software (and potential upgrades) should be compatible with the operating system.</li> </ul> |
| 5. | <p><b><u>Accessories</u></b></p> <ul style="list-style-type: none"> <li>• Prerequisite for MS: IISER Pune will provide empty space with electricity and AC connections. It will be the vendor's responsibility to install the equipment and the accessories, as well as the infrastructure and essential facility to run the instrument. It may include but not restricted to platforms, plumbing, wiring, cylinders, piping, gas generators, computer hardware and software installations, extra electrical wiring, switches, and so on, to bring the instrument to PQ level.</li> <li>• Suitable nitrogen generator should be supplied by the vendor, and quoted. The generator must have a trouble-free compressor with appropriate capacity to deliver sufficient gas (purity &gt; 99.999%) required to run the system.</li> <li>• The vendor must also quote all the accessories for the smooth functioning of system.</li> <li>• The vendor must highlight the specification in their technical brochure sheet and mention compliance with proposed specifications.</li> <li>• Instrument operation and data analysis training at customer site to be included (at least two times per year).</li> </ul>                                                                                                                                                             |
| 6. | <p><b><u>Warranty</u></b></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

|  |                                                                                                                                                                                                               |
|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <ul style="list-style-type: none"><li>• Comprehensive Maintenance Contract (CMC) for at least 5 years (if not more) is expected for the entire system including all accessories and offline systems</li></ul> |
|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

**28) File no: 1536/20**

### **Electromagnet and Accessories**

Technical Specifications:

- (1) Pole face diameter: 200 mm
- (2) Field intensity: at least 13 kG at 25 mm and at least 6 kG at 100 mm ( at 200 mm Pole face dia)
- (3) Additional tapered pole face (approximately 50 -75 mm Dia) should be supplied
- (4) Two energizing coils wound on non-magnetic formers
- (5) Coil separation > 120 mm
- (6) Air Gap: Adjustable from 10 to at least 100 mm
- (7) Water cooled system
- (8) Geometry: H shaped
- (9) Pole face gap should be accessible from the top
- (10) A stable magnet mount holding the assembly
- (11) Minimum one-year onsite warranty for the magnet-assembly

Accessories: (Each item to be quoted separately)

- (1) Rotating Base with 360 degrees markings, Mounting screws and position locking mechanism
- (2) Compatible Bipolar Magnet Power Supply
  - (a) Stability better than 0.05% over 5 hours
  - (b) Built-in meters for voltage and current
  - (c) Protection against overload and short circuit
  - (d) Remote control/programming enabled
  - (e) Minimum one-year onsite warranty for the power supply
- (3) Suitable Gauss meter (with transverse Hall probe) to precisely measure the magnetic field

29) File no: 1542/20

## Laboratory Grade Vibration Isolation Optical Table

Technical specification

| S.N. | Specifications                                                                                                                                                 |
|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1    | Laboratory Grade Vibration Isolation Optical Table: -<br>- Optical table with non-magnetic stainless steel top.<br>- Pneumatically isolated, broadband damped. |
|      | <b><u>Optical Table Top Specifications:</u></b>                                                                                                                |
| 2    | Optical Table Top Width : 1200 mm                                                                                                                              |
| 3    | Optical Table Top Length : 3000 mm                                                                                                                             |
| 4    | Optical Table Top Thickness : $\geq 300$ mm                                                                                                                    |
| 5    | Height of Top Skin from Ground : 932 +/- 2 mm                                                                                                                  |
| 6    | Top Skin Thickness : $>4.5$ mm                                                                                                                                 |
| 7    | Top Skin Material : Non Magnetic Stainless Steel 316 Series                                                                                                    |
| 8    | Top Skin Flatness : +/- 0.15 mm Over Entire Working Surface                                                                                                    |
| 9    | Top Skin Finish : Surface should have non-glare surface finish                                                                                                 |
| 10   | Mounting Hole Type : M6                                                                                                                                        |
| 11   | Mounting Hole Pattern : 25 mm Grid (pitch between holes to be 25 mm)                                                                                           |
| 12   | Mounting Hole Depth : $>15$ mm                                                                                                                                 |
| 13   | Mounting Hole Sealing : $>20$ mm Long Polymer Cup/Steel Cup                                                                                                    |
| 14   | Mounting Hole Borders : $<15$ mm                                                                                                                               |
| 15   | Core Design : Steel Honeycomb Core Structure, $\geq 0.25$ mm Thick Steel Sheet                                                                                 |
| 16   | Core Shear Modulus : $> 270,000$ psi                                                                                                                           |
| 17   | Honey comb Core Cell Size : $<350$ mm <sup>2</sup>                                                                                                             |
| 18   | Sidewalls : Damped, Formed Steel Channel, Vinyl Covered                                                                                                        |
| 19   | Bottom plate : $> 4.5$ mm Thick 316 Series Non-Magnetic Stainless Steel                                                                                        |
|      | <b><u>Pneumatic Vibration Isolators Specifications:</u></b>                                                                                                    |
| 20   | Nature Of Damping : Broadband Damping                                                                                                                          |
| 21   | Optical Table Supports : Pneumatic Isolators                                                                                                                   |
| 22   | Number of Isolators : 4                                                                                                                                        |
| 23   | Pneumatic Isolator Height Adjustment : $> +/- 10$ mm                                                                                                           |
| 24   | Pneumatic Isolator Horizontal Natural Frequency : $\leq 5$ Hz                                                                                                  |
| 25   | Horizontal Isolation, 5 Hz : $\geq 85\%$                                                                                                                       |
| 26   | Horizontal Isolation, 10 Hz : $\geq 90\%$                                                                                                                      |
| 27   | Pneumatic Isolator Vertical Natural Frequency : $\leq 5$ Hz                                                                                                    |
| 28   | Vertical Isolation, 5 Hz : $\geq 85\%$                                                                                                                         |
| 29   | Vertical Isolation, 10 Hz : $\geq 90\%$                                                                                                                        |
| 30   | Load Capacity per Isolator : $> 450$ kg                                                                                                                        |
| 31   | Releveling Accuracy : $< +/- 0.3$ mm                                                                                                                           |
| 32   | Settling Time : $< 2$ Sec                                                                                                                                      |
|      | Portable, quiet air compressor should be provided with optical table.                                                                                          |
|      | Service and warranty : At least 3 years from the date of installation                                                                                          |

### **30) File no: 1537/20**

#### **Vector Network Analyser**

##### Technical Specifications

- 1) Frequency range: 1 MHz to 20 GHz
- 2) Frequency resolution: at least 1Hz
- 3) Frequency Accuracy:  $\pm 2$  ppm (Representative Calibration data to be provided)
- 4) IF Bandwidth: 10 Hz-300 KHz
- 5) Number of ports: 2-port
- 6) System Dynamic Range: approximately 100 dB
- 7) Trace noise (rms): 5-10 mdB (@ 100 Hz IFBW)
- 8) System Performance Parameters:
  - (a) Directivity: 1 MHz to 20 GHz,  $\geq 30$  dB
  - (b) Source Match: 1 MHz to 20 GHz,  $\geq 25$  dB
  - (c) Load Match: 1 MHz to 20 GHz,  $\geq 30$  dB
- 9) Sweep Speed:  $< 150 \mu\text{s}$  / data point
- 10) Sweep type: Linear, CW, Segment, Log
- 11) Max number of points:  $> 12,000$
- 12) Calibration: Short-Open-Load-Through (SOLT), Short-Short-Load-Through (SSLT), Short-Short-Short-Through (SSST), Short-Open-Load-Reciprocal (SOLR), Line-Reflect-Match (LRM)
- 13) Markers: 12 markers + 1 reference marker per trace
- 14) Marker statistics functions: Mean, max, min, standard deviation per trace or over a marker region
- 15) Limit Lines: Single or segmented. 2 limit lines per trace. 50 segments per trace.
- 16) Display Channels and Traces: Up to 16 channels with a maximum of 16 traces each. A separate memory for each trace can be used to store measurement data for later display or subtraction, addition, multiplication or division for later display or subtraction, addition, multiplication or division recalled.
- 17) Measurement Parameters:

Single ended: S-Parameters: S11, S21, S12, S22,

User-defined: a1, a2, b1, b2,
- 18) Graph/Display Format: Log Magnitude, Phase, Group Delay, Linear Magnitude, Real, Imaginary, SWR, Impedance, Smith Chart, Polar, kQ product and  $\eta_{\text{max}}$ .
- 19) Programming: SCIP, LabView, MATLAB, and Python34
- 20) Controller: PC-controlled. A compatible PC (atleast CORE I5, 4GB RAM, 1TB Disk, WINDOWS 10, with Display, Keyboard & Mouse) should be included in the quotation.
- 21) Display: PC Display
- 22) Mandatory Accessories: Calibration Kit & Phase Stable test port cables 2 No's
- 23) other optional accessories may be quoted separately.
- 24) Operating Temperature: 10 °C to 40 °C
- 25) Weight:  $< 3$  kg (approximate)

**31) File no: 1061/20**

**Automated Flash cum preparative HPLC chromatography system**

Technical specification

| S. No. | Technical requirement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1      | <p>1. System must be capable of flash chromatography with normal phase silica gel as well as reverse phase C-18 flash columns.</p> <p>2. System must be capable of preparative HPLC with reverse phase C-18 prep columns (5 micro and 10 micro particle size) as well as normal phase silica columns.</p> <p><b>Pump system</b></p> <p>3. Four-solvent-inlet with binary gradient with capability for linear, isocratic and gradient elution between two solvents or better.</p> <p>4. Flow rate range: 1–200 mL/min (for both flash and prep HPLC).</p> <p>5. Self-priming should be possible.</p> <p>6. Maximum pressure for flash chromatography operation should be up to 200 psi (14 bar).</p> <p>7. Maximum pressure for Prep HPLC chromatography operation should be up to 3500 psi (240 bar).</p> <p>-</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 2      | <p><b>Detector</b></p> <p>8. Integrated PDA variable wavelength UV detector with automatic collection of fractions at all available wavelengths from 200 to 400 nm or more.</p> <p>9. Baseline monitoring during equilibration of column in Prep mode should be possible.</p> <p>10. Flow cell should be compatible with a wide range of solvents and must be able to handle the high pressure of the system.</p> <p>11. The system should be upgradable to connect ELSD and Mass detectors in the future.</p> <p><b>Injection port, display/software, fraction collector</b></p> <p>12. Sample introduction for Flash operation: Solid and liquid load (manual). Standard sample loading cartridge should be provided.</p> <p>13. The flash column holder should be able to hold columns of different sizes.</p> <p>14. Sample introduction for preparative HPLC: variable volume liquid injection should be possible (up to 5 ml : 5 ml loop is preferred). Manual injection port is preferred.</p> <p>15. Automatic Injection valve for solid sample injection with automatic self cleaning at the end of the run for flash mode &amp; manual liquid injection by sample loop for prep mode should be available with the system. The injection of the sample into the column should be controlled by the software.</p> |

|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|---|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   | <p>16. Touch screen display is preferred with easy to handle software. The software should be user friendly and allow creation and execution of flash as well as prep HPLC methods for separating small molecules as well as biomolecules.</p> <p>17. Software should have option for real time method editing, method scale up option, and choosing column size with media for flash mode and fraction collector rack size identification for flash &amp; prep mode.</p> <p>18. Real-time and post run spectral display with peak purity by spectral ratio should be possible.</p> <p>19. The change over from Flash operation to preparative HPLC operation and vice versa should be possible using the software and should not be complicated.</p> <p>20. Solvent level sensors in all solvent inlet and waste bottles for physical solvent management should be available.</p> <p>21. Safety features like over pressure sensor, vapor sensor and grounded solvent path should be provided with system.</p> <p>22. Standard fraction collector racks should be provided with the system. Mention the size and collection volume. The system should be compatible with different rack size.</p> <p>23. For future integration: Automated multiple injection facility in prep mode by adding auto-injector &amp; auto-sampler modules should be possible.</p> <p>24. Standard columns and accessories required for the installation and functioning of the instrument should be provided.</p> |
| 4 | <p><b>Power supply:</b> The instrument should be compatible with the below power supply (for India) specifications. Appropriate wires and plugs should be provided. 220V, 50/60 Hz, (Operating range 210-240V).</p> <p><b>Manual and Installation:</b> Complete manual should be provided. Comprehensive onsite training should be provided for selected students and operators during installation of the instrument.</p> <p><b>Warranty:</b> Three years comprehensive warranty must be provided.</p> <p><b>Optional Items:</b> <u>The following optional items should be quoted separately. Prices for these items will not be considered for the comparison.</u></p> <ol style="list-style-type: none"> <li>1. Reusable column holders of various sizes for silica gel and other material.</li> <li>2. Quote all standard Flash columns (disposable silica columns) for normal phase separation.</li> <li>3. Quote all standard C-18 reverse phase columns (disposable) for reverse phase separation.</li> <li>4. Sample loading cartridges.</li> <li>5. Preparative Reverse phase HPLC column C-18 with 10 micron size; 250 x 21.2 mm with guard column.</li> </ol>                                                                                                                                                                                                                                                                                                                        |

|  |                                                                                                    |
|--|----------------------------------------------------------------------------------------------------|
|  | 6. Preparative Reverse phase HPLC column C-18 with 5 micron size; 250 x 21.2 mm with guard column. |
|--|----------------------------------------------------------------------------------------------------|

32) File no: 1544/20

## Dual beam system comprising of FIB-FE SEM (Focused ion beam + Field Emission Scanning Electron microscope)

### Technical Specifications

| Marks | Field Emission Scanning Electron Microscope                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 10    | Resolution<br>At least 0.9nm at 15kV and 1.8nm at1kV                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 5     | Magnification not less than x800000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 3     | Acceleration voltage: 350 V or less to 30kV or more (continuously variable).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 2     | Probe current- 20pA or less to 100nA or more (Continuously variable)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 5     | Electron Gun- Thermal Schottky Field-emitter. Source lifetime should be guaranteed for 12 months or longer.<br><br>Hybrid final Lens (Combo of electrostatic & electro-magnetic to avoid split of Ga ion during simultaneous imaging & milling. Also, to get correction free data in EBSD)                                                                                                                                                                                                                                                                                                      |
| 5     | <b>Detectors</b><br>Should have a dedicated in lens / in column detector for Secondary electron imaging.<br><br>Should have secondary electron detector (Everhart-Thornley).<br>Dual Camera (IR-CCD) chamber mounted                                                                                                                                                                                                                                                                                                                                                                            |
| 2     | Chamber design should allow changing the specimens quickly.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 2     | 5 or more axis Eucentric motorized stage with suitable standard stubs (including multi stubs) for specimen fixing. Should allow independent movements in x, y, z directions with rotation (360° continuous) and tilt capabilities.<br><br>Stage movement range - X,Y =100mm, Z=10 mm or more, R=360°, T= at least 0° to 60° or higher.<br><br>Stage movement should be controlled through mouse or joystick<br>Maximum specimen size should be mentioned by vendor<br>Maximum specimen height should be mentioned by vendor<br>Specimen exchange must be through airlock or load lock mechanism |
| 2     | Lens system- Suitable system to adjust spot size. State of art stigmator coil, scanning coil and beam blanking                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 2     | Computer- Latest state of art computer with USB ports and Ethernet ports for data transfer and net connectivity with latest Windows operating system and at least 24" TFD monitor with latest laser printer                                                                                                                                                                                                                                                                                                                                                                                     |
| 2     | User Interface - Keyboard, Mouse, Control Panel with multifunction for the control and adjustment of frequently used SEM parameters, Manual Joystick control for stage axis.                                                                                                                                                                                                                                                                                                                                                                                                                    |
|       | <b>Software for FESEM</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

|    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2  | Total system control and user-friendly Graphical user interface including fail safe protection and Auto functions. Latest state of art Image processing with auto image brightness & contrast, auto beam setting, auto axial alignment, autofocus, auto stigmatism, raster rotation, auto data recording, fast mode, spot mode, dynamic focus, line scan, line profile, built in image filing and image post processing functions (binary, grey measurements, grain size, grain geometry etc), pseudo color, histogram, multiple viewing screens, scan rotation, tilt compensation, dual magnification, gamma and LUT manipulation, data display, stereoimaging, navigation etc |
| 1  | Image recording Image achieve, image export to various formats (Tiff, GIF, JPG, BMP etc.) including digital video recording (AVI).                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 2  | Required anti-vibration tables need to be supplied.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 2  | Vacuum- Fully automated pneumatic valve control with ion getter pumps, turbo molecular pump and air compressor.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|    | <b>Focused Ion Beam</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 10 | Ion source and column: Suitable column with Ga liquid metal ion source with provision for beam and aperture alignment, adjustable stigmator, variable scan speed and blanker for blanking.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 5  | Resolution: $\leq 3$ nm or better FIB column for imaging                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 2  | Beam current: 1 pA – 100 nA (Continuously variable)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 2  | Source lifetime: Should be $\geq 1000$ hours.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 3  | Magnification: From $\leq 600$ X to $\geq 500,000$ X (Continuously variable)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 3  | Accelerating Voltage: $\leq 500$ V to 30 kV, continuously variable.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 2  | Stitching accuracy- better than 1 micrometer.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 3  | Stability of the beam for condition of maximum resolution should be better than 0.2% per hour, and it should be demonstrated on demand                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 5  | Gas Injection System (one deposition & one etching) <ul style="list-style-type: none"> <li>Platinum deposition</li> </ul> The minimum ion-beam deposition line-width obtainable should be 50 nm or better.<br>All accessories required to perform the desired operation to be supplied.                                                                                                                                                                                                                                                                                                                                                                                         |

|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|---|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   | <b>Control Software</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 5 | <p>Should have <b>Microsoft Windows</b> based operating system, network ready. The operating system, drivers and computer hardware should be supported for at least 5 years from the date of purchase. Any required upgrades during this time should be provided free of cost.</p> <p>Appropriate microscope control software for alignment, image capture and archival etc. (system should be capable of automatic gun-alignment).</p> <p>Should offer both automatic and manual control of features like focus, contrast, astigmatism correction etc.</p> <p>Specimen current and vacuum should be indicated in the user interface.</p> <p>Capability to save user settings and parameters for beam and scanning, patterns, detectors, user interface appearance should be available</p> |
|   | <b>Essential Accessories</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 5 | <p>Suitable UPS, Chiller, Compressor and any other required accessories to be supplied to run it as standalone system.</p> <p>Support and maintenance kit - Standard support and maintenance kit is to be provided.</p> <p>Calibration standards- Necessary multi element calibration standards</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| 3 | Additional support PC with at least 24" TFD monitor - total 3 in number. Latest state of art PC for data storage (at least 1TB), design and analysis.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|   | <b>Spares</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 5 | Three extra emitters along with recommended essential spares for 3 years of operation. The replacement should be carried out at site whenever required.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|   | <b>Optional Items:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|   | In-lens (On Axis – In Column detector) Back Scattered electron detector -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|   | Plasma Cleaner with provision of integrated software control                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|   | <p>In situ micromanipulator for transmission electron microscopy (TEM) lamella preparation under computer control.</p> <p>Specific holder for TEM lamella preparation to be provided, preferably thinning from both sides for uniform lamella thickness.</p> <p>Manipulation with a closed-loop system is completely independent of the microscope's stage positioning, enabling an extra degree of freedom for sample manipulation</p>                                                                                                                                                                                                                                                                                                                                                    |

|  |                                                                                          |
|--|------------------------------------------------------------------------------------------|
|  | Drift:< 50 nm / min<br>Step size:500 nm or smaller<br>Repeatability:<+/- 200nm or better |
|  |                                                                                          |
|  |                                                                                          |

### Other Requirements

- ☐ **Should provide warranty for 2 years and preventive maintenance along with breakdown maintenance for a period of 3 years (after 2 years warranty).**
- ☐ Installation and training at IISER Pune.
- ☐ Should include 10 working days technical training for one technical staff of IISER Pune at an applications center of the supplier.
- ☐ Must have done installation of dual beam FIB systems during the 5 years in the government academic institutions and R&D labs in India to be supported with installation reports obtained from the Institutions. The names and contact details of the Institutions where the instruments are supplied and installed should be given so that the Technical Committee can ascertain the veracity of the information provided and take that as an input to determine the vendor.
- ☐ The supplier should have a service center in India and a trained technician should be available in the country and available for at least 3 years.
- ☐ The following sample preparation and imaging demonstrations (if required in a video file) should be arranged by the vendor for evaluation by the technical expert committee appointed by IISER Pune. Benchmarking criteria mentioned in each case would be used for comparing the systems offered by vendors and bids may be rejected if any of the criteria mentioned below are not met. The demonstrations can be arranged by the vendors at any laboratory of their choice. The demonstrations should be done using the system model quoted by the vendor in this bidding process. The vendor should demonstrate the same after installation of the system at IISER Pune if they win the tender.

### **Demonstration-1**

Sample: One-side polished p-type silicon wafer of surface orientation of (100) and resistivity of

1-10 Ohm-cm provided by IISER Pune.

Mill a rectangular cuboid trench into the polished surface with a top area of 100 um X 25 um using ion beam of 65 nA current for 10 minutes. Images of the trench should be taken in such a way that the morphology of the sidewalls, and the morphology of the bottom of the

trench can be assessed. Images for assessing the trench depth with evaluated trench depth should be provided.

**Benchmarking criteria:**

- i. The trench depth demonstrated by any vendor should be larger than 80% of the largest demonstrated as part of this bidding process.
- ii. The trench sidewalls should be smooth and with negligible material deposit on surfaces.

**Demonstration-2**

Sample: Mesoporous silica (SBA-15) imaging to reveal the fine features on the surface of the sample. The sample should be imaged **with no coating** on it. Samples would be provided by IISER Pune.

**Benchmark criteria:**

- i. The clarity of images which reveal all surface features (including~ 8 nm pore) of the mesoporous silica.
- ii. Damage created on the sample by the imaging process should be minimal.

33) File no: 1193/20

### Multiplex Suspension Array System

Technical specifications

| Sr. No. | Technical requirement                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2.      | <p><b><u>General requirements</u></b></p> <ul style="list-style-type: none"><li>• A multiplex suspension array system for simultaneous analysis and quantitation of up to 100 biomolecules (protein or nucleic acid) in a single sample such as cell culture medium, serum, plasma, saliva etc.</li><li>• System should be 96-well microplate based open system with multiplexing capabilities for different applications.</li><li>• Instrument should support different protocol for Human, Mouse and Rat assays for different components like serum, plasma, CSF etc.</li><li>• Blank beads along with amine coupling kit must be available with the vendor and should be able to supply as and when required for developing in-house assays.</li><li>• MCV Plate /Automated Maintenance Plate for hands free startup, shut down, maintenance procedures, validation and calibration of the instrument should be supplied along with the instrument.</li><li>• An on-board reagent reservoir should allow users to run maintenance, calibration and validation protocols unattended.</li><li>• System should be supplied with suitable plate shaker, suitable handled magnetic washer, and compatible PC.</li></ul> |
| 3.      | <p><b><u>Hardware (Optics)</u></b></p> <p>The optics should include Reporter laser: 532 nm, &gt;10 mW Frequency doubled diode and classification laser: 635 nm, 10 mW Diode</p> <p><b>Reporter channel detection:</b> Photomultiplier tube with 14 bits resolution, detection bandwidth of 565 – 585 nm</p> <p><b>Classification detectors and doublet discriminator channel detection:</b> Avalanche photodiodes with temperature compensation, A/D resolution 12 bits</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 4.      | <p><b><u>Hardware (Fluidics)</u></b></p> <ul style="list-style-type: none"><li>• <b>Sheath flow rate:</b> 90 <math>\mu\text{L} \pm 5 \mu\text{L}/\text{second}</math></li><li>• <b>Cuvette:</b> 200 micron square flow channel</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 5.      | <p><b><u>System Maintenance and Operational Software</u></b></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <ul style="list-style-type: none"> <li>• Automated setup, run, and shutdown functions, Simple and flexible multiplex template formatting, Automated system monitoring and error flags</li> <li>• Data analysis features include: Automated generation of multiple standard curves, Multiplex 4- and 5-parameter curve-fitting analyses, automated calculation of concentration and coefficient of variation, Ratio calculation of sample data, Standard exportable data file format.</li> <li>• Instrument control software with integrated data analysis package. No export to third party software necessary for data reduction.</li> <li>• Data reduction package including automatic and simultaneous calculation of unknown sample concentrations, standard deviation and coefficient of variation percentage for duplicate samples, and recovery values for standard curves (assessment of “goodness of fit”).</li> <li>• Integrated data regression analysis including seamless implementation of StatLIA “weighted” 5 PL (parameter logistic) curve-fitting algorithms (exclusively licensed from Brendan Scientific).</li> <li>• Full menu of additional regression methods including 4PL, cubic spline, linear, and point-to-point curve fitting.</li> <li>• Real-time data acquisition permitting display of multiplex data as it is generated, including bead map, single parameter histogram, bead flow rate, and median fluorescence intensity values for all analytes in each well.</li> <li>• Raw data is collected and displayed well by well rather than at the conclusion of the read, allowing for data recovery should an unexpected event occurs.</li> <li>• Rerun/Recovery mode allows for complete rerun of all or a portion of samples.</li> <li>• System monitoring of instrument functionality with error flags and available pause function enabling user intervention and troubleshooting in case of problems with low bead count, aggregated beads, classification efficiency, region selection, or platform temperature.</li> <li>• Automation of commonly used functions such as start-up, calibration, washing, and shutdown.</li> <li>• “One-click” data export to Excel providing tab-delimited version of generated data.</li> <li>• Calibration, Validation and Instrument Operations Logs automatically generated, providing documentation of system maintenance, performance and operation, enabling enhanced troubleshooting.</li> </ul> |
|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

|    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|----|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|    | <ul style="list-style-type: none"> <li>• Calibration is available at optional “high PMT” setting for maximum system sensitivity.</li> <li>• Validation Report feature for generating hard copy quality control and IQ/OQ (installation qualification/operational qualification) documentation.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 6. | <p><b><u>Installation and Operational Qualification (IQ/OQ) Certification</u></b></p> <ul style="list-style-type: none"> <li>• The Calibration/Validation kits should allow discrimination between assay and instrumentation problems and work in conjunction with the System Workstation and Software.</li> <li>• The validation kit should include three separate sets of beads to evaluate optical alignment, reporter channel performance, bead classification efficiency, and integrity of fluidics.</li> <li>• The Validation Kit should provide a formal IQ/OQ (installation qualification/operational qualification) of the System Workstation through the evaluation of critical system parameters. In addition, the validation kit should aid in troubleshooting whether or not the system hardware is the source of assay problems.</li> <li>• The kit should check optical alignment, fluidics carryover, accuracy, slope, linearity, sensitivity and dynamic range of the reporter laser, as well as classification efficiency and doublet discrimination.</li> <li>• The beads in the Validation Kit should evaluate the following components of the Array reader: (1) Optical alignment, (2) Reporter channel performance; (3) Classify efficiency (4) Fluidics integrity; (5) Reading precision</li> </ul> |
| 7. | <p><b><u>Warranty</u></b></p> <ul style="list-style-type: none"> <li>• Comprehensive Maintenance Contract (CMC) for at least 5 years (if not more) is expected for the entire system including all accessories and offline systems</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

**34) File no: 0306/20**

**Low Temperature Powder X-Ray Diffractometer**

Technical specifications

| S.N. | Specifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.   | <p>Powder X-ray Diffractometer:</p> <p>Floor mounted X-ray diffractometer with following application capabilities-</p> <ul style="list-style-type: none"><li>- Powder X-ray diffraction measurements in Bragg Brentano reflection geometry with automatic sample changer</li><li>- Thin film analysis in different modes - GIXRD, in-plane GIXRD and XRR</li><li>- Low temperature sample stage for powder X-ray diffraction study at 12K or lower</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                  |
| 2.   | <p>X-ray generator:</p> <p>Output power 3 kW or more, Voltage 50 kV or higher, Current 60mA or higher and Output stability: <math>\pm 0.005\%</math> or better for 10% variation of mains.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 3.   | <p>X-ray Source:</p> <p>X-ray Tube with Cu target, 2kW or more power and Ceramic Insulated body. The offered X-Ray tube should have a line focus window for Bragg Brentano(BB) measurement geometry and a point focus window for in-plane GIXRD and other applications. The changeover from line focus to point focus should be user friendly. Line focus beam should not be attenuated to shape it as point beam. It should not be required to detach water cooling &amp; high voltage cables during changeover.</p>                                                                                                                                                                                                                                                                                                                                         |
| 4.   | <p>Goniometer:</p> <p>Theta-theta geometry with minimum step size of 0.0001 deg; range <math>-30</math> to <math>160</math> deg. (<math>2\theta</math>) or better and radius 250 mm or better.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 5.   | <p>Optics:</p> <p>Fully automated motorized &amp; computer control Primary/Secondary slits/optics for BB geometry.</p> <p>For IP-GID Measurements – A parallel beam X-ray lens (polycapillary type) should be offered on incident beam side. This lens should be able to work with Cu, Co, Fe and Cr radiations. Spot size to be typically <math>\sim 5</math> mm. Lower spot sizes should be user selectable using manual/automated aperture slits. In case of manual slits different sizes aperture slits to be included. The changeover of optics should be easy and user friendly.</p> <ul style="list-style-type: none"><li>- Suitable equatorial soller collimator for GID &amp; IP-GID measurement to be included.</li><li>- Suitable knife-edge collimator and automatic absorber for X-ray reflectivity (XRR) measurements to be included.</li></ul> |
| 6.   | <p>Detector:</p> <p>Direct detecting semiconductor silicon strip type or pixel type detector capable of working in 0D and 1D modes. The detector should be capable to remove</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

|     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|     | sample fluorescence, energy resolution of the detector $dE/E$ should be $\leq 700$ eV or lower. If required, necessary optics or secondary monochromator for removal of sample fluorescence should be quoted.                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 7.  | <p>Ambient Sample Stage:</p> <p>Automatic sample changer stage with minimum 8 or more sample positions.</p> <ul style="list-style-type: none"> <li>- Necessary sample holders should be quoted in numbers at least twice the sample positions of automatic changer.</li> <li>- Continuous spinning of samples during measurement should be possible.</li> <li>- 2 nos. Low or Zero background sample holder for small sample quantity compatible with automatic sample changer</li> <li>- Necessary NIST traceable standard sample for instrument check</li> </ul>                                                                                      |
| 8.  | <p>Non-ambient Sample Stage:</p> <p>A compact helium cryostat with 2-stage closed cycle cooler to cool powder samples down to 12K or lower Including vacuum system (turbo molecular pump and backing pump) with accessories and necessary sample holders (minimum 4 nos.).</p> <ul style="list-style-type: none"> <li>- Temperature stability 0.1K or better.</li> <li>- Cool down time to 12K should be 60 minutes or better.</li> <li>- Warm-up time from 12K to room temperature should be 40 minutes or better.</li> <li>- X-ray window material having low mass absorption coefficient for Cu radiation (Be or Carbon Fibre or better).</li> </ul> |
| 9.  | <p>In-plane GID Sample Stage:</p> <p>For IP-GID measurement a necessary Eulerian Cradle with motorized Chi, Phi &amp; Z movement should be quoted with minimum below specifications or better.</p> <ul style="list-style-type: none"> <li>- Phi range -----0 to 360 deg.</li> <li>- Chi range ----- minus 3 to +90 deg.</li> <li>- Z range ----- 0 to 2 mm.</li> </ul>                                                                                                                                                                                                                                                                                  |
| 10. | <p>Display/ Computer/workstation:</p> <p>Should be high end computer with &gt; 8 GB RAM and &gt; 1TB HDD and <math>\geq</math> Intel i5 processor to handle large volumes of data and 21 inch or larger TFT screen.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 11. | <p>Software:</p> <p>Necessary Software for data analysis, peak search with search-match, peak characterization, including crystallite size estimate, elaborate pattern treatment such as data smoothening, background subtraction, k-alpha-2 stripping, peak comparison from pattern overlays etc. Necessary software modules for GID, IP-GID and XRR data interpretation should be included.</p>                                                                                                                                                                                                                                                       |
| 12. | <p>Relevant up-to-date ICDD-PDF2 file. License should be in the name of IISER Pune.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

|     |                                                                                                                                                                                                                                                                                                                                                     |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 13. | <p>Chiller:</p> <p>The X-ray diffractometer system should overall be water cooled. A single chiller with sufficient cooling capacity to support both X-ray diffractometer system and non-ambient stage with its accessories to be included in the quotation. Outdoor version would be preferred.</p>                                                |
| 14. | <p>Branded UPS of 30 kVA with minimum 30 mins backup should be quoted.</p> <p>- 415V/50Hz, 3-phase input and 3-phase output</p>                                                                                                                                                                                                                     |
| 15. | <p>Warranty:</p> <p>Comprehensive warranty for XRD system (including X-ray tube, detector and all the accessories), Low temperature attachment and all its accessories, water chiller and UPS for 3 years with on-site installation.</p> <p>Warranty will cover shipping charges to-and-fro factory for any spare/consumable parts requirement.</p> |
| 16. | <p>Installation and user training:</p> <p>The system should be installed at IISER Pune and necessary training to scientific staffs/faculty members on Operation, Maintenance, Calibration of the offered system and X-ray diffraction studies will have to be provided for minimum 5 working days after the installation of the system.</p>         |

**35) File no: 1157/20**

**Research Grade Steady State Fluorescence Spectrometer**

Technical Specification

1. Light Source and Optics

- Light Source: Vertically mounted Ozone-free 150 W Xenon CW lamp or better with suitable power supply should be provided.
- Optics: The system should be mirror based system for focusing at all wavelengths and precise imaging for micro samples.

2. Spectrometer, Wavelength Range, Wavelength Accuracy, and Bandpass:

- Excitation Spectrometer: Single Czerny Turner spectrometer with 1200 gr/mm grating blazed between 300-330 nm or better
- Excitation Wavelength Range: 200-950 nm should be optimized in the UV
- Emission Spectrometer: Single Czerny Turner spectrometer with 1200 gr/mm grating blazed between 500-550 nm or better
- Emission Wavelength Range: 200-950 nm should be optimized in the Visible.
- Bandpass: At least from 0-30 nm should be continuously adjustable from computer.
- Wavelength Accuracy: Minimum  $\pm 0.5$  nm

3. Scan speed, Signal to Noise Ratio, and Detectors

- Scan speed: Minimum 4800 nm/min or better
- Signal to Noise Ratio: Minimum 16,000:1 (RMS Method), 6000:1 (FSD Method) using water Raman signal at excitation at 350 nm, emission at 397nm, Bandpass 5 nm and 1 sec integration time. Vendors have to mention both FSD and RMS values.
- Reference Detector: Photodiode detector should be provided for stability
- Emission Detector: Photomultiplier tube detector should cover the wavelength range from 250-850 nm and should operating in photon counting electronics mode.

4. Sample Compartment, Cuvette, Variable Temperature Data Recording, and Instrument Upgradability

- Sample Compartment: The sample compartment should have a single cuvette liquid sample holder.
- Cuvette: Minimum of one 4 mL, 1 cm x 1 cm quartz cuvette without lid option should be provided.
- Solid Sample Holder should be provided for thin films, powders, pellets, paper, fibers, or microscopic slides measurements.
- Variable Temperature Data Recording: Peltier for varying temperature from -15 to

100 deg C or better should be provided. It should have stirring feature with magnetic stirrer bar.

- Instrument Upgradability: The spectrometer system should be field upgradable to NIR detector and TCSPC accessory for doing time resolved measurements

#### 5. Control and Analysis Software, Computer, and Warranty

- Powerful Microsoft Windows based software for data collection and system control. On start-up, the system automatically calibrates and presents itself for new experiments.

- Following PC should be supplied

HP Z2-G4 Workstation

Intel 8th Gen Core i7 8700 Processor,

64 GB DDR4 2666 MHz Memory,

512 GB SATA SSD for OS

4 TB SATA Enter. Class HDD with 7200 RPM,

Nvidia Quadro P1000 Graphics card with 4 GB,

USB Keyboard + Mouse,

Windows 10 Professional 64 Bit,

HP P244- 23.8" TFT Monitor,

Tower Form Factor with 500W Power Supply &

Apple Mac Book Air

13-inch MacBook Air: 1.1GHz quad-core 10th-generation

Intel Core i5 processor, 512GB, 8GB - Space Grey

- Warranty: three year from the date of installation.

### **36) File no: 0307/20**

## **EPR Spectrometer**

### Technical specifications

---

#### **1. Magnet**

- 9.5" double yoke magnet, (mention air gap)
- Max magnetic field strength with 12KW Power supply
- 14.5 kG weight <2000 kg, water cooled version
- 3 Ohm Impedance
- Solid state power supply with 12 kW output power
- Resolution 3 mG at 4 KHz

---

#### **2. Microwave Bridge**

- Solid state microwave source
- X Band Frequency range: 9.2 to 9.9 GHz
- Maximum source output : 200mW

---

#### **3. EPR-X band generator**

- Should be compatible for room, liquid nitrogen and liquid helium temperatures

---

#### **4. Frequency Tuning**

- AFC lock range: 4 MHz
- Tune bandwidth: 8 Mhz
- AFC stability:  $10^{-8}$

---

#### **5. Microwave Power Setting**

- Attenuation : 63 dB max

---

#### **6. Signal Amplifier**

- Low noise preamplifier, 20Hz to 600kHz
- Two 50 Ohm signal outputs

---

#### **7. Resonator Tuning and Matching**

- With "auto tuning" and "auto matching"

---

#### **8. Microwave frequency counter**

- 1kHz resolution

---

#### **9. Q-factor Display**

- The system should evaluate the probe head (resonator) and display the loaded Q-Factor.
- All parameters of the bridge to be software controlled

---

#### **10. Magnetic Field Control**

- Operating range: 100G to +18kG
-

- 
- Field accuracy typically better than 800 mG

---

#### **11. Signal Channel**

- Frequency range: 10kHz to 100kHz, settable in 80Hz to 1kHz steps
- Source: synthesizer
- Harmonic: first and second
- Modulation phase: 0/90 with simultaneous detection
- ADC integrating type time constant settable: 1ms to 5sec
- High linearity Modulation amp module 500 Hz to 120 kHz

---

#### **12. High sensitivity probe head**

- Standard resonator for high sensitivity CW-EPR
- 10 mm sample access
- 10-20 G at 100kHz maximum modulation amplitude automatic iris control with optical window for light (laser) access compatible for high and low temp work unloaded  $Q > 15000$
- Sensitivity weak pitch 1500:1 or better
- Absolute no. of detectable spins:  $2 \times 10^{+9}$  spins/G (mention the line width)

#### **13. Temperature control systems**

- Nitrogen VT unit: Console plug-in digital temperature control unit for variable temperature using liquid/gaseous nitrogen (100-400K)
- Mention air gap
- Optical access : Optical grid window at X-band
- Dewar for X band resonator
- Cavity for room and nitrogen temperature
- Storage Dewar 25-30 lit. (~100 – 500 K) with thermocouple/heater assembly
- Dewar should have Dewar insert holder; transfer dewar; nitrogen evaporator, glass version digital control unit

---

#### **14. Helium VT unit**

Suitable for variable temperature experiments with liquid Helium (3.8K to 300K)  
Mention the necessary requirements

---

#### **15. Chiller**

- Chiller system (local chiller quoted in INR preferred) for 12 kW (for magnet, microwave bridge etc)

---

#### **16. Personal Computer**

- Pentium Color display 21.5" flat screen monitor
  - Operating System installation package, Windows /Linux
  - LaserJet color Printer or equivalent
-

---

### **17. EPR Software package**

- Acquisition Program under Microsoft Windows XP for field sweeps, time sweeps, 2D power sweeps, 2D goniometer sweeps, 2D temperature sweeps.
- Full software control of all external devices via System Ethernet Network, Spectra Manipulation and Analysis Program, featuring baseline correction (up to 9th order), single and double integration, differentiation, smoothing, add and subtract of spectra, peak picking, cursor read-out for position, amplitude and distance, line, dot and cross display, file handling and printing.
- Spectra Simulation Program for liquids and powders with isotropic, axial and rhombic symmetry.
- A simulation suite to perform EPR simulation with the following possibilities full matrix diagonalization for liquids, powders and single crystals including g-tensors, hyperfine interaction, D and E parameters (eg. XSophe and SimFonia, Xenon Linux EPR program)

---

### **18. Accessories**

Calibration set up (strong pitch, weak pitch)

Single line reference marker for quantitative EPR with g factor =1.98

Aqueous solution cell and cell holder

Accessory for recording spectrum in organic solvents

Tissue cell

Finger Dewar

Programmable One-axis Goniometer for resonator and low temperature equipment

15 sample tubes 4 mm i.d/ 5 mm o.d CFQ quality

15 sample tubes 3 mm i.d / 4 mm o.d CFQ quality

10 sample tubes 2 mm id / 3 mm od CFQ quality

100 sample tubes 1 mm i.d/ 1.6 mm o.d Quartz one end beaded

---

### **Optional**

---

#### **19. The spectrometer should be capable to employ Q-band frequency**

Operating frequency: 34 GHz

Microwave power: 50 mW

Signal bandwidth: 30 Hz–400 kHz

Power attenuation range: 50 dB in 1 dB steps

Frequency counter: Integrated

AFC Stability:  $10^{-6}$

Resonator: For VT from 4 K to 300K (Liquid/Gaseous Nitrogen or Helium)

Optical access: 12 mm optical window at Q band

Modulation frequencies: 4 kHz to 100 kHz, full range of signal channel

---

---

Sensitivity: Absolute  $1 \times 10^9$  spins/G

O2 in air 200 : 1

---

## **UPS**

**20. A branded UPS for two-hour backup. (local UPS quoted in INR preferred)**

---

### **Terms and Conditions**

---

**21.** Bidder can quote both in INR & DOLLAR. Taxes, duties, etc to be clearly mentioned. It is mandatory to quote all the components listed and partial quotation will not be accepted. Also quotation should provide individual price for all the components quoted.

---

**22.** Complete installation and commission of the instrument to be done by the bidder. The quotations should be submitted with clear Scope of Work.

---

**23.** Bidders should be Reputed OEMS or Authorized Partners. If Bidder is the Authorized Partner/SI; they should submit valid Manufacturer Authorization Letter in their quotation for this specific bid.

---

**24.** Details of the Power requirements for the proposed systems should be submitted. Power socket details should be provided. Space requirement in terms of minimum square feet required to host the instruments including the chillers etc should be mentioned.

---

**25.** The load bearing capacity required for flooring needs to be detailed

---

**26.** A detailed compliance sheet has to be submitted in accordance with the above specifications. Any deviations has to be highlighted and details to be mentioned.

---

**27.** The quotation should also consist of all the necessary datasheets and brochures

---

**28.** Any deviations from the above points the bidder will be disqualified and their bids will not be considered.

---

**29.** The quotation in foreign currency should be on CIF/CIP, Mumbai, India.

---

**30.** The bid must include all details of technical specifications of the equipment along with commercial terms and conditions. The bill of materials, printed technical brochure and any other document which will help in the evaluation of bids.

---

### **31. Time**

- Validity of offer for three months
  - Delivery Time to be mentioned
- 

### **32. Warranty**

- One year starting from the date of installation and acceptance by the buyer
  - All hardware and software should be quoted with 5 years warranty (24 X 7 with six hrs telephonic response)
- 

### **33. Installation and Training**

- The costs for the installation (travel expenses, labor costs etc.) and detailed training for 30 days should be included
- 

### **34. Documentation:**

---

- 
- All necessary documentation (technical as well as for system operation) should be an integral part of the system. This information should be in the English language and is provided either digitally or on paper
- 

### **Eligibility Criteria for Bidders**

- 
- 35.** The bid must include all details of technical specifications of the equipment along with commercial terms and conditions. The bill of materials, printed technical brochure and any other document which will help in the evaluation of bids.
- 
- 36.** The bidder must have experience of executing similar orders earlier in India. The bidder must enclose documentary evidence of supplying and integrating minimum of two orders of their own or of an OEM.
- 
- 37.** An undertaking from the OEM is required stating that they would facilitate the bidder on a regular basis with technology/product updates and extend support for the warranty as well.
- 

### **Support**

- 
- 38.** The vendor should provide complete turnkey solution.
- 
- 39.** The vendor shall be responsible for round-the-clock operation and comprehensive maintenance for five years from date of start of operation and shall provide an undertaking for the same at the time of submitting the tender.
- 
- 40.** All equipment / components should carry an onsite replacement warranty of three years.
- 
- 41.** The installation should be done by certified and trained engineers followed by comprehensive user training.
-

### **37) File no: 1446/20**

#### **Closed cycle refrigerator**

##### Technical specifications

Variable Temperature Closed Cycle Refrigerator (CCR) with Electrical Feedthrough & Optical Port, suitable for electrical & magneto-transport measurements.

- Temperature Range :  $\leq 10\text{ K}$  to  $\geq 325\text{ K}$ .
- Cooling power at least 2 watts at 20K (50Hz) second stage.
- Preferred cool-down time (RT to 10K) not more than 120 minutes.
- Temperature stability should be  $\pm 50\text{mK}$  or better
- Sample in vacuum.
- Electrical feedthrough for heater and temperature sensors.
- Heater installed on the coldhead.
- Silicon diode temperature sensor installed on refrigerator cold finger and cernox temperature sensor installed on the sample holder. Both sensors should be calibrated from 10K to 325K.
- At least 10-pin electrical feedthrough for doing electrical measurement. Twisted pairs of (preferably Ph-Br) wires from the 10-pin feedthrough to the sample area. Matching feedthrough should be provided for doing electrical measurements.
- OFHC or gold plated copper sample holder for optical and electrical measurements. Electrical measurement sample holder should be installed as default.
- Optical Narrow Gap Vacuum shroud approximately 50 to 60 mm , atleast 2 window ports, Blanks should be included with the vacuum shroud.
- Vacuum Valve with NW-25 flange for evacuation
- Coldhead should run for at least 12,000 hrs without maintenance.
- Mounting plate and stand for the CCR.
- Water cooled compressor.
- Compressor should be fully charged with high-purity helium gas.
- Maintenance Intervals (Adsorber Exchange) for the compressor not less than 30,000 hours.
- Approximately 10 feet interconnecting hoses and control cable.
- Power requirements ~230VAC, 50 Hz, 1 phase .

- Cryogenic Temperature controller with required connecting cables. Power input- single phase 220-230V, 50Hz. Dual Channel Sensor Input, Dual Heater control loops, USB / GPIB option.
- Desktop computer with i7 processor 8 GB ram or more, hard disk 1 TB, Windows OS, Graphics card.
- Onsite installation and demonstration (the system should be complete and able to operate as standalone system without requiring any item from the customer side) without any added charge.

#### **Accessories (to be quoted separately)**

Upgrade option for atleast 5K Base temperature.  
Sample Holder for

- Turbomolecular pumping system backed with dry (Oil Free) Pump.). Base pressure better than  $3 \times 10^{-7}$  Torr. Full-Range Gauge (atmosphere to  $10^{-8}$  Torr) with digital display and controller. Flexible SS pumping line (at least 3 ft) with vacuum isolation valve. Suitable flange for connecting the turbo pump to the CCR's vacuum port. Power requirements ~230VAC, 50 Hz, 1 phase.

**Warranty:** All equipment and parts (other than the temperature controller, which should have at least 3 years warranty) should have at least one year warranty from the date of installation.