



**INDIAN INSTITUTE OF TECHNOLOGY BOMBAY**  
**MATERIALS MANAGEMENT DIVISION**  
**Powai, Mumbai 400076.**

**Technical Specifications for “Ultrafast Ti:Sapphire Amplifier”**  
**RFx No. 6100000690 (Reference No. 1000015707)**

**Note 1:** All components are necessary. Some suggestions for the suitable option are provided based on previous experience.

**Note 2:** In the technical bid, point by point list should be furnished to demonstrate requirements have been met.

**Other important terms:**

1. The system should come with a warranty of one year. During warranty, at least 3 maintenance/breakdown service should be provided.
2. **It is mandatory to quote price on DDP basis in the bidding engine. Bidders have to select FCA/ FOB as the system won't allow bidders to select DDP in online bidding engine. The authorization letter should be furnished along with the quotation.**
3. The compliance statement should be enclosed with the quotation.
4. Indian agent should furnish a letter of authorization from the manufacturer along with the quotation. Also, the manufacturer should have ISO9001 or similar certifications.
5. Indian agent should have trained service personnel to provide efficient after-sales service support. Names of those personnel along with their training certificates, should be furnished along with the quotation.
6. At least five similar system must have been installed by Indian agent or the parent company.
7. The installation should be done free of cost for all equipment. Training to operate the instrument must be given to our research scholars at free of charge.
8. Trained Service engineers in India or directly from OEM should be available to resolve technical problems within a week.
9. The vendor should take total responsibility for installing the amplifier with spectrometer and demonstrating the performance.
10. All power supplies should be of Indian type 230+/-10% Volts, 50 Hz, with Indian standard plugs.
11. In technical bid, technical specifications described below should be substantiated with data measurement of stability, beam profile, beam pointing stability etc. The inability to do so will lead to disqualification from the tender process.

The three amplifier components and their specifications are as mentioned below:

**(a) SEED LASER :**

- I. Seed laser should be automated mode locked single box Titanium Sapphire Laser Oscillator with integrated CW pump laser. Part of the oscillator beam should be used to seed the amplifier and at least 150mW should be available simultaneously to be used for any independent experiments.
- II. Central wavelength : ~800 nm
- III. Power : > or equal to 450 mW at the highest bandwidth
- IV. Bandwidth : > or equal 60 nm (fixed or tunable)
- V. Pulse duration : 20 to 35 fs
- VI. System should have the capability of generating < 20 fs pulses using external compressor. Quotation of external compressor is optional.
- VII. Pulse repetition rate : ~80 MHz
- VIII. Power stability : < +/-0.5% over 2 hours
- IX. RMS Noise (%) : <0.05 (Measured from 10 Hz to 10 MHz)
- X. Beam diameter : 1.5 to 2.5 mm
- XI. Beam M2 : <1.1 to 1.3
- XII. Polarization : Linear, horizontal
- XIII. Beam divergence : <1.0 mrad
- XIV. Humidity control : system must allow for low humidity conditions within the oscillator portion of the cavity, providing smooth, no dropout mode locked performance throughout specified tuning range.
- XV. System should be supplied with all necessary pump laser, power supplies, water chiller, and other necessary accessories.

**(b) Regenerative Amplifier unit:**

- I. Regenerative amplifier unit should be fully compatible with the above seed laser unit.
- II. Pulse energy : > or equal to 5mJ
- III. Pulse duration : <20-35 fs
- IV. Central wavelength : ~800 nm
- V. Pulse repetition rate : 1-5 kHz
- VI. Power stability : <0.5% rms over 24 hours
- VII. Pre-pulse contrast ratio : >1000:1
- VIII. Post pulse contrast ratio : >100:1
- IX. Mode quality : TEM<sub>00</sub>
- X. Beam M<sup>2</sup> : <1.25
- XI. Polarization : Linear , Horizontal
- XII. Beam Pointing stability : <10 urad rms
- XIII. Beam Diameter (1/e<sup>2</sup>) : 9-12mm

**(c) Required Q-switched DPSS Pump Laser for Amplifier**

- I. Q-switched pump laser must be based on diode-pumped technology to ensure long-term shot-to-shot pulse energy stability, and long lifetime.
- II. Q-switched pump laser must not operate at more than 80% of current and satisfy the requirement of 5 mJ of pulse energy from regenerative amplifier unit at this value.
- III. Q-switched pump laser should be fully integrated within the amplifier enclosure and should be on the same thermally stabilized platform to provide a thermally stable system i.e., to minimize sensitivity to changing environmental conditions such as air flow, humidity and temperature, and to minimize the beam walking.
- IV. System should have a provision of using the 100% power output of the Q-switched pump laser for independent experiments whenever required. Suitable provision should be provided using flipper mirror.
- V. Wavelength : 527nm
- VI. Pulse Repetition Rate : 1kHz
- VII. Pulse Energy : > or equal to 30mJ @ 1kHz (must also satisfy specification c-II)
- VIII. Pulse Energy Stability : < 0.5% rms
- IX. Polarization : Horizontal

**One additional component is desired with the following specifications:**

- I. Power meter to measure the pulse energy should be included in the quote. Power meter must have a large digital display with data logging facility, USB interface with windows compatible software, spectral coverage from 190 to 11000 nm, and measurable power range of 100 micro watts to 50 watts.

**Essential features:**

- The pump laser, the seed laser and the regenerative amplifier should be in a one-box set up, and all three of the above should be sourced from a single factory/principal/manufacturing company.
- The Stretcher/compressor assembly should be “O-ring” sealed for enhanced stability and reliability to prevent contamination and for better grating lifetime
- Amplifier system should be fully tested in Accelerated Stress Screening chamber (including oscillator, pump, regen and stretcher/compressor) for optimum reliability and robustness. Results of the same must be provided with quotation.
- The complete system should be supplied with all necessary power supplies, closed-loop water chiller, filters, remote control, two laptop computers with control software, and other necessary accessories. No further accessories (other than the optical table, UPS and power outlets) should be required for safe and reliable operation.

During installation of the product, the following specifications should be demonstrated onsite (at IITB Mechanical Engineering Department, Mumbai, India) for the equipment at a minimum:

- (1) output powers of the oscillator and the amplifier
- (2) the simultaneous power output of  $\sim 150$  mW from the oscillator (i.e., simultaneously with the amplifier being switched ON)
- (3) option of pump laser as a stand-alone option when the amplifier is NOT used
- (4) pulse width of the amplifier
- (5) bandwidths of the amplifier and the oscillator
- (6) pump power output
- (7) wavelength of oscillator, pump and amplifier

All necessary equipments/devices required to perform the demonstration on-site should be either included in the tender offer or brought by the technical installation engineer/personnel during installation.