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Department of Physics

Corrigendum-4

Tender Reference no: PHY/JKRA/007/2018
Name of the Item: Transient Absorption Spectrometer
Corrigendum details: Technical Specification revised

As informed earlier the technical specification for above mentioned tender has been updated. The vendors are requested to submit their bids considering the updated specifications into account.

All other terms and conditions remain the same.

Tender Inviting Authority:

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Complete Automated Transient Absorption Spectrometer with Integrated Wavelength Tuner

The Transient Absorption Spectrometer integrated with the Wavelength Tuner system should be designed to work with the existing 35fs Coherent femtosecond amplified laser Model Astrella to generate spectral and kinetic data required for the investigations of photo excitation events on the femtosecond and longer timescale. The system should offer automated switching (crystal, beam path, filters, detector and other necessary components) between UV-VIS and if required also to NIR range in future.

The system should include a complete transient spectrometer, with all optical and electronic parts, up to 8 ns delay line, controller and PC.

Specifications	
A	Tender Specifications of Transient Absorption Spectrometer
1.	Transient absorption apparatus should allow for spectral data acquisition in 320-800 nm spectral ranges.
2.	All crystal should be mounted together and automated switching between different spectral ranges should be available.
3.	The system should be automated (software controlled) to switch between different spectral ranges (UV-VIS & also NIR if procured in future) without any manual intervention or alignment.
4.	The system should be able to work with laser frequency inputs of 1 KHz.
5.	<p>Low Profile High Speed Delay Line with all necessary electronics having:</p> <ul style="list-style-type: none"> • Retroreflectors with chirp corrected dielectric mirrors to preserve the laser pulse parameters (Short pulse) as well as retain most of the power (~90%). • Fully automated and hands-off alignment of the delay line with Beam pointing drift of <10 μm throughout an 8 ns delay range • Max time window of 8ns or more • Step size of 3- 4 fs, • Bi-direction Repeatability: 14fs • Max. speed: 8-12 mm/s • Acceleration: 250-300 mm/s²
6.	Anisotropy measurements should be possible.
7.	Reflective and transmission measurements should be possible. (Attachments for this should be quoted separately as Accessories)
8.	The system should suitable optical shield for use with photodegradable systems

9.	Chopper phase synchronization with TTL from Laser Sync out. Optical chopper must accommodate pump beams of up to 9 mm in diameter without sacrificing the contrast of pump-on and pump-off measurements and the transient absorption signal amplitude.
10.	The spectral range for probe beam should be 320 to 800 nm
11.	<p>UV-Visible Detector:</p> <ul style="list-style-type: none"> • It should have a Fiber optics coupled multichannel spectrometer with CMOS based sensor, including software • Spectrometer should have Single optical element (Grating) without any moving parts for high efficiency. • Sensor Size: 1024 pixels • Spectral resolution of 4nm or better with 200 micron slit • Spectral range 200-1000nm. • Max Scanning rate 5000 spectra/s. • ADC resolution- 16 bit digitization
12.	A Liquid sample holder with magnetic stirring option should be included.
13.	<p>Data acquisition hardware and software for transient absorption. A labview based advanced software capable of performing following functions should be provided with the system.</p> <ul style="list-style-type: none"> • Computer controlled switching between UV, VIS and NIR modes • Supports computer controlled translating sample holder • Support pump beam shutter • Supports motorized filter wheel for automated pump intensity control • Preset optical delay sizes • Averaging time for each transient spectrum • Selection of Time window • Random delay line stepping
14.	For each pump-probe delay, all probe light spectra to be analyzed for stability over a specified (user controlled) wavelength range. The probe light spectra with the deviation over a certain threshold (user controlled) should be retaken to maintain the statistical weight of the averaged spectrum
15.	<p>Data analysis software for kinetic and spectral analysis should include the following</p> <ul style="list-style-type: none"> • Various display options for dynamic surface • Averaging of multiple surfaces • Facile "stitching" of surfaces having different temporal and

	<p>spectral ranges</p> <ul style="list-style-type: none"> • Quick navigation through transient spectra and kinetics • Simultaneous display of multiple spectra and kinetics • Selected spectra and kinetics can be quickly exported into CSV files • Quickly fit kinetics and export results into spreadsheet • Time zero adjustment • Temporal chirp correction • Quickly and easily normalize spectra and kinetics • Subtraction of scattered light & background • Anisotropy calculation • Perform SVD and Global Analysis • The software should save every individual kinetic scan, to prevent the data loss if experiment is aborted by any means. • Should be able to produce a 3-Dimensional Wavelength-Time-Absorbance data matrix and, which should be easily exportable into ASCII
16.	Necessary beam routing optics from wavelength tuner (OPA) & Laser to the spectrometer should be included.
17.	The System should be field-upgradable to 800-2400nm detection range and 500 microsecond time window with sub-ns resolution.
18.	Provide appropriate supporting documents wherever required, for example, spectral range, spectral resolution, measurement range, automatic alignment of delay stage and spectral range change, detector range and optical accessories.
19.	A suitable computer with preloaded windows based operating system and other softwares should be supplied with the equipment.
20.	Please provide the laboratory conditions (such as working temperature range, humidity level, power back up requirement and etc..) required for the installation and working of the equipment.
21.	Translation sample holder of 10mm x 10mm XY range to work with Solid/Thin film samples.
22.	<p>Must include essential accessories for optical coupling:</p> <ol style="list-style-type: none"> 1. Mirror Telescope, diameter 1.5”or higher: 3 Nos. 2. Beam Splitters, diameter 1.5” or more , 75% Reflection and 25% Transmission, AOI: 45 deg. 6 Nos. 3. Beam delivery with routing optics consisting of at least 12 number of optical mounts with optics with sufficient appropriate spectral bandwidth and high-damage threshold of the type UV enhanced silver coated mirrors and six irises.

B. Wavelength Tuner (WT) for Transient Absorption Spectrometer system item

A:

Type and compatibility

The wavelength tuner should be of the type – Optical Parametric Amplifier (OPA) – suitable to generate the required source wavelengths using the existing Ti:Sapphire femtosecond laser Astrella (model name) from Coherent Inc. (vendor). Coherent femtosecond amplified laser Model Astrella. (If further details are required, please contact the indenter).

Automation of Wavelength tuner (WT)

The WT-OPA should be fully computer controlled and designed to work with our existing 35fs OPA should be pumped easily with 5mJ @800nm@1kHz.

In addition to the above, the following technical specifications should be met by the Wavelength Tuner OPA:

- OPA system must integrate all components (harmonics)
- The OPA system must have single laptop computer control of all components with unified software control to allow operators to adjust system parameters and verify status of the optimization loops.
- Inbuilt accessories to extend the wavelength range to cover from 240nm to 2.6 micron.
- Fresh Pump beam should be used for Sum Frequency Generation.
- Repetition Rate: 1KHz
- Input Pump duration: ~35 fs
- Input pump Energy: ~5mJ
- Pulse width : (1 to 1.5) x pump for <50 fs pump duration
- Typical output energy when pump with ~5mJ
 - 1150nm – 2600nm : >1250uJ
 - 533nm – 1150nm : >300uJ
 - 475nm – 533nm : >450uJ
 - 290nm – 475nm : >75uJ
- Polarization: Idler (1600 – 2600 nm) – Horizontal; Signal (1160 – 1600 nm) – Vertical

Necessary Beam routing, telescopic optics & beam Splitter for pumping OPA should be included.

Important essential terms:

- Vendor should take total responsibility of installing the OPA with existing Astrella Amplifier laser and demonstrating the performance.
- Vendor should have Trained Multiple Service Personnel to provide efficient local service support. Names of such Service Personnel in India (with suitable certificates) for the quoted model should be furnished along with the quotation and must be readily available to resolve the technical problems

- System must have installation and on-site training included
- Compliance sheet of the quoted system against tender specification should be provided.
- The details of the manufacturer should be mentioned and the quoted OPA technical details should be mentioned in the manufacturer's website.
- The vendor should not quote for automated OPA in R&D stage or being built for first time. Such offers will not be considered. Vendor should have a minimum of 3-5 installations worldwide and atleast one or more installations of OPAs in India along with Coherent Astrella Amplifier. Please provide the list of end users with contact details
- Also the manufacturer should have ISO9001 or similar certifications.
- Authorization letter should be furnished along with the quotation.

Notes and Important terms:	
1.	Authorization letter from the Principals should be furnished by representatives along with the quotation.
2.	Compliance statement should be enclosed with the quotation.
3.	The installation of the complete system and in-house training costs should be included.
4.	The technical details of the quoted instrument must be available on the official website of the principal.
5.	Vendor should have a minimum of 5 installations worldwide and atleast one installation of similar spectrometer with integrated wavelength tuner combination in India along with femtosecond laser system equivalent to Coherent Astrella Amplifier. Please provide the list of end users with contact details.
6.	Trained Service engineers in India (with suitable certificates) for the quoted model must be readily available to resolve the technical problems.
7.	Vendor should take total responsibility of installing the complete system with existing amplified laser and demonstrating the performance.
8.	Site inspection of the existing femtosecond laser system in IIT-Madras is permitted upon request.
9.	Lead-time:

C. Optional items and accessories

1) Option #1:

Sample holder and manipulation for solid samples and Gels.

2) Option #2:

Honeycomb table-top with vibration isolation.

- A. Table of Dimension: 2400 x 1200 x 800 mm (L x B x H) or nearest
- Thickness of Table top required: 200mm or nearest – 1 set
 - Dynamic Deflection coefficient : 1.10×10^{-3}
 - Relative Motion: 0.5nm
 - Compliance : 37nm/N
 - Natural frequency : 110Hz- 214Hz
- B. Suitable Air compressor (1no) should be quoted along with the system

Working Surface should have the following specifications:

- Top Skin should have 4.0 mm thickness 430 series ferro magnetic SS plate, smooth sanded finish
- Side Walls should have 2.0mm thickness carbon steel plate with damped wood composite, vinyl covered finish
- Bottom Skin should be 4.5 mm thickness carbon steel plate epoxy painted finish
- Core: Plated steel Honeycomb (0.25mm foil, 3.2cm² cell size)
- Surface Flatness: +/- 0.1mm over 600mm square
- Mounting Holes: Metric – M6-1.0 holes on 25mm grid, 37.5mm borders
- Hole/Core Sealing: Easy clean cylindrical cup (25mm deep)
- Damping: Broadband Standard Damping
- Compliance curve should be provided
- Core Shear Modulus: 19339kgf/cm² (275,000 psi)

Pneumatic Support System should have the following or nearest specification:

- Integrated pneumatic support
- Load capacity : 500Kg
- Height : 600 mm
- Leveling : Auto Leveling by 3 Automatic Leveling valve
- Self-centering

- Maximum air pressure : 6bar
- Accuracy of Leveling Repeatability:
Standard leveling valve = $\pm 0.5\text{mm}$ (0.02 in.)
Precision leveling valve = $\pm 0.05\text{mm}$ (0.002 in.)
- Integrated supports should come with casters and leveling feet
- Effective damping by the two chamber system
- Pendulum piston for superior vibration isolation

Performance Specifications

- 1st Resonant Frequency - Vertical : ≤ 1.2 Hz, Horizontal : ≤ 1.5 Hz
- Roll off rate (or Isolation efficiency)
 - at 5 Hz, vertical : over 85 %, Horizontal : over 75 %
 - at 10 Hz vertical : over 95 %, Horizontal : over 85 %