

Our E-Tender Notice No. IPR/TN/ET/F/19-20/19 dated 26th July, 2019 for Supply and Installation of Spectrometer with Detector (CCD) and its Accessories as per technical specifications mentioned in our tender documents – 1 System.

SECTION - C

TECHNICAL SPECIFICATIONS OF STORES AND DRAWINGS.

Technical Specifications for Supply and Installation of Spectrometer with Detector (CCD) and its Accessories

I Application

Spectrometer will be used to characterize RF driven argon plasma system. We are going collect the spectra using the spectrometer with the CCD and analyse the spectra to know impurities present in our system.

II Specification

Sr. No.	Technical Specification of Spectrometer	
	Parameters	Specification
1	Wavelength Range:	320-1050 nm
2	Focal length	≥300 mm
3	Aperture	~ f/4
4	Grating:	Grove density 1200 g/mm, Blaze Wavelength: ~ 500 nm Grove density 600 g/mm, Blaze Wavelength: ~ 500 nm
5	Grating Size	~ 68 mm x 68 mm
6	Grating arrangement	Externally controllable Turret for minimum 3 grating slots
7	Optical resolution:	Better than 0.2 nm @1200 grooves/mm with CCD (26 micron pixel) at 435 nm Better than 0.08 nm @1200 grooves/mm with PMT and 10 micron slit at 435 nm
8	Wavelength accuracy	+ 0.2 nm
9	Repeatability	+ 0.075 nm
10	Spectral dispersion	~2.3 nm/mm at 435 nm
11	Number of entrance ports	1
12	Number of exit ports	2
13	Exit port configuration	head on port - CCD side on- Slit (motorized)
14	Folding mirror for side on port	Required with external control
15	F number -matching optics	Suitable optics for coupling a fiber bundle (minimum 8 no's of 0.2 mm diameter fibers of 0.22 NA) arranged in a line.
16	Fiber coupler adapter	Adjustable fiber coupler adapter to position fiber bundle ferrule (minimum 8 no's of 0.2 mm diameter fiber of 0.22 NA) at the entrance slit. The image of fiber bundle should be within the active

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		area of the CCD detector quoted.
17	Interfaces:	USB
18	Operating Temperature:	10° to +50° C
19	Power supply	230V, 50Hz
20	Operational manual	Hard/Soft copy form provided with spectrometer

Detector specifications: A camera with required accessories to couple to the quoted spectrometer has to be included in the quotation. The camera and spectrometer has to be controlled by a single software.

Sr. No.	Parameters	Specification
1	CCD format	1024 x 256 or better
2	pixel size	26 x 26 μm
3	image area	~ 26 x 6 mm
4	Single pixel well depth	>200 k e ⁻
5	Read out noise	$\leq 6 \text{ e}^- @ 50\text{-}100 \text{ kHz}$
6	Dark current	$< 0.05 \text{ e}^- / \text{pixel/s}$
7	interface	USB 2.0 or USB 3.0
8	Shutter	Should be provided
9	Quantum efficiency	$\geq 20\% @ 400\text{nm}$ $\geq 50\% @ 750\text{nm}$ $\geq 10\% @ 1000\text{nm}$
10	software	Microsoft compatible software must provided
11	Feature of Software	Stich and glue Multi track binning Control of spectrometer camera

III Optional Accessories:

- 1) Fiber bundle with 8 optical fibers (0.22 NA and 4 meter length, core dia -0.2 mm or more) aligned in a straight line has to be quoted. The quoted fiber bundle must be compatible to couple to the spectrometer using the F number matching optics of the spectrometer.
- 2) Fiber bundle with 10 optical fibers (0.22 NA and 4 meter length, core dia -0.2 mm or more) aligned in a straight line has to be quoted. The quoted fiber bundle must be compatible to couple to the spectrometer using the F number matching optics of the spectrometer.

IV Pre-despatch tests

The vendor has to submit the following test reports to IPR once they complete the work of the spectrometer and other components. Based on this test report, IPR issue a despatch clearance to the company so that they can ship the consignment to IPR.

The report has to have the following tests

Our E-Tender Notice No. IPR/TN/ET/F/19-20/19 dated 26th July, 2019 for Supply and Installation of Spectrometer with Detector (CCD) and its Accessories as per technical specifications mentioned in our tender documents – 1 System.

1. Spectral resolution: The specified spectral resolution 0.2 nm should be demonstrated for 435 nm (Hg line) at the center and both edges of the CCD by appropriately selecting the central wavelength. The resolution at edges should not vary beyond 15 % of central resolution.
2. Image acquired on the CCD for the uniformly illuminated fiber bundle or uniformly illuminated entrance slit has to be provided. The accepted variation in intensity along the vertical direction is less than 20 %.
3. Full spectrum in the range of 350 to 1050 nm with a standard spectral calibration lamp of Hg or Hg-Ar to ensure the lines are recorded correctly on the spectrometer.

V Acceptance tests at IPR.

1. Service engineer from supplier should visit IPR to install & commission the spectrometer with the CCD at the IPR site. Service engineer should perform the acceptance tests in presence of IPR representative and generate the test report for acceptance of spectrometer with CCD
2. Spectral resolution: resolution of spectrometer with CCD will be tested for specified resolution 0.2 nm using Hg and Ar spectral lines.
3. Spectrum of Hg lamp will be acquired to test the wavelength accuracy ± 0.2 nm of the spectrometer.

VI Warranty

Minimum one year from the date of acceptance

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Compliance Sheet

Compliance Statement for Supply and Installation of Spectrometer with Detector (CCD) and its Accessories

Bidder must submit compliance statement dully filled with exact technical values of each specifications (Not with OK, CONFIRM, COMPLY, ACCEPTABLE) alongwith official seal and signature with their offer.

I. Specification

Sr. No.	Technical Specification of Spectrometer		Vendor Response
	Parameters	IPR Specification	
1	Wavelength Range:	320-1050 nm	
2	Focal length	≥300 mm	
3	Aperture	~ f/4	
4	Grating:	Grove density 1200 g/mm, Blaze Wavelength: ~ 500 nm Grove density 600 g/mm, Blaze Wavelength: ~ 500 nm	
5	Grating Size	~ 68 mm x 68 mm	
6	Grating arrangement	Externally controllable Turret for minimum 3 grating slots	
7	Optical resolution:	Better than 0.2 nm @1200 grooves/mm with CCD (26 micron pixel) at 435 nm Better than 0.08 nm @1200 grooves/mm with PMT and 10 micron slit at 435 nm	
8	Wavelength accuracy	+ 0.2 nm	
9	Repeatability	+ 0.075 nm	
10	Spectral dispersion	~2.3 nm/mm at 435 nm	
11	Number of entrance ports	1	
12	Number of exit ports	2	
13	Exit port configuration	head on port - CCD side on- Slit (motorized)	
14	Folding mirror for side on port	Required with external control	
15	F number -matching optics	Suitable optics for coupling a fiber bundle (minimum 8 no's of 0.2 mm diameter fibers of 0.22 NA) arranged in a line.	
16	Fiber coupler adapter	Adjustable fiber coupler adapter to position fiber bundle ferrule (minimum 8 no's of 0.2 mm diameter fiber of 0.22 NA) at the entrance slit. The image of fiber bundle should be within the active area of the CCD detector quoted.	
17	Interfaces:	USB	
18	Operating Temperature:	10° to +50° C	
19	Power supply	230V, 50Hz	
20	Operational manual	Hard/Soft copy form provided with spectrometer	

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Detector specifications: A camera with required accessories to couple to the quoted spectrometer has to be included in the quotation. The camera and spectrometer has to be controlled by a single software.

Sr. No.	Parameters	IPR Specification	Vendor Response
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2	pixel size	26 x 26 μ m	
3	image area	~ 26 x 6 mm	
4	Single pixel well depth	>200 k e ⁻	
5	Read out noise	< 6 e ⁻ @ 50-100 kHz	
6	Dark current	< 0.05 e ⁻ /pixel/s	
7	interface	USB 2.0 or USB 3.0	
8	Shutter	Should be provided	
9	Quantum efficiency	≥ 20% @400nm ≥50% @750nm ≥ 10% @1000nm	
10	software	Microsoft compatible software must provided	
11	Feature of Software	Stich and glue Multi track binning Control of spectrometer camera	

II Optional Accessories:

Sr. No.	Parameter	IPR Specification	Vendor response
1	Fiber bundle	Fiber bundle with 8 optical fibers (0.22 NA and 4 meter length, core dia -0.2 mm or more) aligned in a straight line has to be quoted. The quoted fiber bundle must be compatible to couple to the spectrometer using the F number matching optics of the spectrometer.	
2	Fiber bundle	Fiber bundle with 10 optical fibers (0.22 NA and 4 meter length, core dia -0.2 mm or more) aligned in a straight line has to be quoted. The quoted fiber bundle must be compatible to couple to the spectrometer using the F number matching optics of the spectrometer.	

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Sr. No.	Parameter	IPR Specification	Vendor Response
1	Spectral resolution	The specified spectral resolution 0.2 nm should be demonstrated for 435 nm (Hg line) at the center and both edges of the CCD by appropriately selecting the central wavelength. The resolution at edges should not vary beyond 15 % of central resolution.	
2	Image acquired by CCD	Image acquired on the CCD for the uniformly illuminated fiber bundle or uniformly illuminated entrance slit has to be provided. The accepted variation in intensity along the vertical direction is less than 20 %.	
3	Spectrum	Full spectrum in the range of 350 to 1050 nm with a standard spectral calibration lamp of Hg or Hg-Ar to ensure the lines are recorded correctly on the spectrometer	

IV Acceptance tests at IPR and warranty

Sr. No.	Parameter	IPR Specification	Vendor response
1	Installation	Service engineer from supplier should visit IPR to install & commission the spectrometer with the CCD at the IPR site. Service engineer should perform the acceptance tests in presence of IPR representative and generate the test report for acceptance of spectrometer with CCD	
2	Spectral resolution	Resolution of spectrometer with CCD will be tested for specified resolution 0.2 nm using Hg and Ar spectral lines	
3	Spectrum	Spectrum of Hg lamp will be acquired to test the wavelength accuracy + 0.2 nm of the spectrometer.	
4	Warranty	Minimum one year from the date of acceptance	

Authorised Signatory

Official Seal

Date :-