

MINIMUM TECHNICAL SPECIFICATIONS

NOTE: - Technical & Financial should be submitted in separate covers.

HRMS-ESI Mass Spectrometer with Quadrupole Time of Flight (Q-TOF) Analyzer

A state of art hybrid (ESI-Q-TOF) MS system having ESI and APCI sources and capable of MS and MS/MS operation to analyze the following types of compounds.

- Organic, Inorganic compounds and Natural products – for exact mass measurement (HRMS analysis) + MS/MS analysis for fragment pattern recognition.
- Proteins/peptides Identification.

IONIZATION

- 1) For small molecule analysis the HRMS should include ESI & APCI dual source and capable to handle Flow rate from 10ul/min to 2ml/min
- 2) A combination/Dual/Multimode source to perform ESI and APCI in single LC/MS run.
- 3) Atmospheric pressure solid probe source for direct analysis of solid/semisolid and volatile samples without any laser source.
- 4) The instrument must include as standard dual-spray to facilitate automated exact mass measurements.
- 5) Integral programmable syringe pump

ANALYZER

- a) The TOF Mass range should be 20- 20,000 m/z or better for intact protein analysis.
- b) The Quadrupole mass range 20-4000 m/z.
- c) Mass accuracy better than 2ppm for MS as well as in MS/MS mode.
- d) Should have a separate specially design collision cell decoupled from the main analyzer(s) to do CID fragmentation(MS/MS) under controlled energy and gas environments and it has function to acquire the MS and MS/MS spectra simultaneously with low and higher collision energy levels without preselect ion.
- e) Resolution better than 10000 FWHM for the **complete mass range**.
- f) Should be capable of acquisitions 20 spectra/sec or better in both MS as well as MS/MS mode.
- g) The instrument must be capable of achieving 4 orders of linear dynamic range.

SENSITIVITY

System should have a low pg level sensitivity for the test standard. The sensitivity should be specified in terms of S/N mentioning all the

chromatographic conditions (the concentration of the test standard, solvent etc).

VACUUM SYSTEM

The instrument must incorporate a differentially pumped, automated vacuum system. There must be three air-cooled turbo molecular pumps oil free pumps. One for each of the source, Quadrupole and orthogonal-Tof regions of the instrument

COMPUTER SOFTWARE

The ESI MS should be supplied with

1. Integrated software to control both MS and LC. Software should be able to control the mass spectrometer, acquire, store, process and reproduce the data.
2. The software should be capable of automatic calibration, accurate mass measurements, elemental composition, MS/MS experiments and quantification.
3. The software should also control the associated liquid chromatography system, PDA detector and auto sampler.
5. The software required should be preinstalled and preconfigured in the computer.

ULTRA sensitive & fast HPLC for Small Molecule analysis

The Binary Gradient high pressure HPLC system with following specification.

Operating Flow Rate Range: 0.010 to 2.000 ml/min, in 0.001 ml increments

Maximum Operating Pressure: 15000 psi or more

Flow Precision: 0.075% RSD, 11 Gradient Curve, Active integral and programmable plunger seal wash,

HPLC Auto Sampler: capacity of 90 vials also should accommodate 384 and 96 well plate. Flow through needle injection, Sample Temperature Control: 4 to 40 °C Sample Carryover: < 0.005%

Column Oven Temperature: 50 C above ambient to 90⁰ C, 0.1⁰ C increments

PDA detector with Deuterium Lamp only, wave length range: 190-800nm.

Accessories

All the required accessories such as arrangement for gas supply (Nitrogen/Helium/Argon or any other) either through gas generator or gas cylinder, regulators, compressor, essential for the operation of the instrument

should be supplied along with the instrument. One low noise 5 liter capacity ultrasonic cleaner with heating and timer control should be provided.

Spares (optional)

Required spares (Capillaries, heaters, O-rings, seals, probe tips, auto sampler vials of different sizes, syringes of different sizes, air tight syringes for syringe pump, consumable kit for ESI and APCI, reference samples, vacuum gauges, deuterium and visible lamp(s) covering entire wavelength range, check valve (inlet and outlet), plunger, pump seals, rotor seals, seal replacement kit, etc.) for five years trouble free operation should be supplied.

COMPUTER HARDWARE

A standard make PC with all necessary hardware and legal operating software required to operate all the specified equipments. Minimum configuration for PC: CPU (Intel Core i7 processor), RAM (DDR3 min. 4 GB (2 x 2 GB)), HDD (min. 500 GB), video card with 512 MB memory, DVD writer with double layer writing capability, floppy drive, heavy duty laser printer (50 ppm or better), minimum 21 inch TFT color monitor. All the necessary software should be provided in the CD with legal licenses.

UPS

Appropriate online UPS for the MS, HPLC, auto sampler, and other accessories and data system with one hour backup with SMF batteries with all safety features should be supplied. A separate UPS for the gas generator/compressor should be supplied.

Manual:

Hard copy of instruction, operation and service manuals, Full circuit diagrams should be provided.

Warranty:

Extended full warranty for 5 years from the date of complete installation. In case of trouble, expert service must be provided within 48 h.

Training

Training for two persons (one for operation and one for maintenance) at manufacturer factory must be provided free of cost at least for a week.

- (i) User Interface: Keyboard, Mouse, Control Panel with multifunction for the control and adjustment of frequently used FE-SEM parameters like focussing, magnification, astigmatism correction etc. Manual Joystick control for stage axes movement.
- (j) Standard sample for verifying FE-SEM resolution
- (k) Special built in anti-vibration mechanism for chamber, column etc.
- (l) Complete System control with software and latest branded high speed Intel Core 2 Quad processor PC (4 GB or more RAM and HDD of 500 GB, CD writer, USB ports etc.). Complete software for Instrument Control and data analysis.
- (m) Automatic or manual control of large number of system functions like EHT, chamber pressure control, imaging recording, scanning conditions, auto emitter run up, auto brightness auto stigmator etc.
- (n) Display: 2x 19" high end TFT Monitors for FESEM
- (o) Standard data zone
 - (i) Cross Hairs overlay
 - (ii) Multiple point to point and line width measurement
 - (iii) Graticule overlay
 - (iv) Spot mode beam positioning etc.
- (p) Vacuum: Fail-safe suitable vacuum system having Ion pump, Turbo Pump & Rotary Pump
- (q) Penning gauge for vacuum measurement.

2. Energy Dispersive Spectroscopy (EDS) System:

The EDS system should be latest, state of art, analytical accessory designed to work with High Resolution Field Emission Scanning Electron Microscope meant for Nano-scale imaging and analysis with the following or additional features. It should be possible to simultaneously image nanometer sized regions and analyze it by EDS:

- a) High resolution EDS Elemental Analysis, line analysis and mapping
- b) Elemental detection and quantification upto Beryllium (Z=4) or lighter elements
- c) Liquid Nitrogen Free Large Area (30 mm² or more) Silicon Drift Detectors(SDD) (Peltier Cooled)

- d) Detector Resolution: 127 eV or better at Mn K_a
- e) Ability to detect and quantify elements from Be (Z=4) to Americium (Z=95).
- f) Standard samples for energy calibration and composition standardization should be supplied.
- g) The EDS system should be capable of accurately quantifying compounds containing light elements like Boron Nitride (BN), and boro carbonitride (BCN) etc. and mixture of light elements and heavy elements.
- h) EDS analysis software should have latest database for K, L, M and N x-ray lines database with the ability to deconvolute the spectra or other equivalent techniques to verify the peak fitting.
- i) Quantification of elements should be possible at low voltages in the range of 1 to 5 kV besides quantification of elements at higher voltages.
- j) Interface between EDS and FE-SEM and all necessary softwares.

3. Cathodoluminescence(CL) Imaging and Spectroscopy Analysis

Complete unit in the wavelength range of 185 to 850 nm in monochromatic and panchromatic mode. The CL system should be upgradable to parallel and FAR-IR detection capabilities.

- 4. Branded latest high speed PC with necessary softwares for FE-SEM, EDS and CL and accessories. High resolution Laserjet printer.
- 5. Chiller.
- 6. Compressor.
- 7. Carbon Coating Unit with carbon rods
- 8. Sputter Coating Units with Gold and Palladium/PlatinumTargets.
- 9. Warranty Period at least 3 years covering all spare parts and services etc.
- 10.The supplier to provide all detailed information about instrument site reparation at least 3 months before the date of delivery of instrument.
- 11.Training on site by the Company Engineers on FE-SEM, EDS, CL and all accessories.
- 12. Manuals in English should be supplied free of cost along with the system: The user instruction manual, operation/instruction manual, trouble shooting manual, CDROM tutorials for FESEM, EDS and CL systems. Detailed circuit and fault diagnostic software, detailed circuit diagram of the equipment (FESEM, EDS and CL) maintenance and service manuals. Supplier shall provide detailed application notes of FESEM, EDS and CL systems in hard and soft copies free of cost.
- 13. Electrical Supply: 240 V AC Single Phase 50 Hz

14. Branded High Performance Online UPS (15 kVA) for two hour or more backup of complete operation of FE-SEM, CL and EDS and other accessories.

15. Support kit for instrument operation and specimen preparation and loading:

Specimen handling tools, stage tools, specimen preparation materials: graphite and silver paint, conducting adhesives, stubs, multiple stub holder, sample holder for cross-section view.

16. Spares and Consumables

The supplier should also submit quote/prices for Schottky element filament and other essential spares and ensure their uninterrupted supply for a period of at least 10 years after the installation of FE-SEM and all attachments.

17. Optional Accessories:

(i) STEM attachment with software

(ii) Fish Eye mode

(iii) EBSD set up with software

(iv) WDX set up with software

(v) Cryo attachment for cooling samples upto liquid nitrogen

(vi) High Temperature (upto 1000 °C) attachment.

(vii) Peltier Cool Stage

(viii) Cryo stage

(ix) Vacuum Dessicator for dehydrating biological samples

(x) Plasma based Chamber Cleaner and Cold Trap.

(xi) Auto Rotary Pump Switch Off

CONFOCAL MICROSCOPE

1. Fully Motorized Inverted Fluorescence Research Microscope with Bright Field and DIC
2. Confocal grade Plan Apochromatic objectives: 4X, 10X, 20X, 40X, 60X/ 63X water, 60X/ 63X oil
3. 12 V/ 100 W Halogen lamp illumination for transmitted light.
4. Fluorescence illumination by 120 W /130 W Hg/metal halide lamp for minimum 2000 Hrs life.
5. X-Y stage with all types of sample holders (slides, different sized petri dishes, microplates etc.).
6. Motorized Z drive with preferably 15nm Z step resolution
7. The system with focus-drift management.
8. Anti vibration Table.
9. Highest possible resolution cooled CCD camera.
10. System should be compatible for FRET and FRAP.

Scan head :

1. Preferably solid state lasers, High sensitivity detectors (4 in number)
2. High sensitivity fluorescence detectors capable of spectral detections and conventional imaging.
3. Efficient spectral dispersion technology for enhanced spectral signal acquisitions.
4. Flexibility of system to adapt to UV, Visible and IR Lasers.
5. Standard Scanner with at least 4fps @ 512 x 512.
6. Minimum Resolution: 4K x 4K and Higher.
7. Scan Field: minimum 18 mm

Laser Module with controller

Multiple Lasers : Ranging from 405nm – 690nm

Computer work station:

High performance computer with minimum 3 GB RAM expandable up to 12 GB.

Graphics: High end resolution graphic card with GDDR 5.0 memory

Gigabit Ethernet, Windows latest version, USB 2.0, Firewire 2x19" or above

System control and imaging software (continuously upgradeable version)with essential applications

Optional:

- 1) 100 X oil Apochromatic objective
- 2) Compatible microscope components and scanner for extended live cell experiments with incubation chamber having CO₂, temperature and humidity control.

FLOW CYTOMETER

1. A Bench Top Flow Cytometer up to 3 laser configuration with 10 fluorescent parameters – 5+3+2 configuration). Operated at 230V, 50Hz is required with following specifications:
2. Up to 10 fluorescent parameters analysis along with forward & side scatter (with 3 laser set up) simultaneously.
3. Should be equipped with a Solid State 488 nm Laser (20mW or more) & Solid State Red laser 638 nm (25mW or more) & Violet solid state diode laser with a provision to put the third laser in stand by mode to conserve laser life.
4. The equipment should have flexibility of forward scatter light collection at multiple angles to allow analysis of small sized particles, large particles & submicron particles with greater sensitivity
5. PMT range 200 to 900nm or better to enable use of fluorochromes emitting in far red.
6. The equipment should have digital signal processing with dynamic range of at least 20 bit data acquisition or more in order to get the clear resolution of populations without data smoothing.
7. Optical filters should be easily changeable by user
8. Must have Compensation capability between all fluorescence channels manually and through auto compensation
9. Should have minimum automated 30 tubes or more Multi Carousel Loader with provision of individual tube vortexing before sample acquisition, also have biohazard contained wash station for thorough rinsing of sample probe
10. Must have a inbuilt temperature control mechanism to regulate internal temperature of flow Cytometer to a custom setting specific to the laboratory ambient temperature
11. System should be capable of analysing cytokines, markers etc in the suspension and supernatants using the beads based assays. Suitable software with complete compatibility should be there with the system.
12. Suitable online UPS for the 1 hr backup for uninterrupted running of the full equipment during power failure.
13. Company should provide the start up kit including 100 lit sheath fluid, 5000 sample tubes, calibration beads
14. System should be equipped with Data management system: State of the art (branded only) with following or better specifications:
15. **Computer Hardware**
Intel Core i4 processor (3Ghz) or higher with 4MB Cache; 4GB DDR3 RAM or higher; 500GB or higher SATA Hard disc; 16X DVD RW Drive; 22LCD/TFT Monitor; Genuine windows 7; 512 MB or higher Graphic memory, Printer color laser-1, 8USB ports.
16. Warranty for the machine should be for five years.
17. Operation manual should be provided for smooth functioning of the instrument
18. Complete details of the service and application support should be given

19. Company should provide free training at the training centre for atleast two persons in addition to onsite training for the machine and various applications for analysis

Important note:

Manual:

Operation manual should be provided for smooth functioning of the instrument

Hard copy of instruction, operation and service manuals, Full circuit diagrams should be provided.

Warranty:

Extended full warranty for 5 years from the date of complete installation. In case of trouble, expert service must be provided within 48 h.

Training

Company should provide free training at the training centre for atleast two persons in addition to onsite training for the machine and various applications for analysis

Spares and Consumables

The supplier should also submit quote/prices for spares and ensure their uninterrupted supply for a period of atleast 10 years after the installation of Machine and all attachments.

Terms & Conditions:

- FOR Guru Nanak Dev University, Amritsar (Pb.)
- Payment against delivery and installation