

## **[CERI]**

### **Dr. APJ Abdul Kalam Centre for Extension, Research and Innovation (CERI), Gujarat University.**

#### **1. Next Generation Sequencer**

1. The System should be a simple bench top instrument to support various applications like: Gene expression profiling, Genomic sequencing (de novo/ re-sequencing) for bacteria, viruses and other small pathogens, Targeted Sequencing (Variant validation), Deep sequencing (virus, Broad sequencing e.g. exons) and more advance applications like CHiP seq, mi RNA and small RNA profiling and sequencing.
2. System should be user friendly with simple chemistry using DNA polymerase and natural nucleotides. Semiconductor based 'non- optical', cost effective systems with higher throughput and sensitivity will be preferred.
3. System should have an scalability regarding the read length varying from 100 base pair, 200 base pair and 400 base pairs and throughput varying from 10MB, 100 MB to 2GB with a high raw data accuracy depending on the application and running cost. It should also have an option of barcodes for 96 sample multiplexing.
4. System should have a short sequencing run time of ~ 2hrs with very low running cost.
5. System should have automation for ready to load sequencing template preparation from genetic library including In-line Clonal Amplification and minimum hands on time.
6. System vendor should individually quote for all necessary reagents and instruments for complete workflow starting from the raw genetic material till final data analysis.
7. The system produce simple and clear report for every sequencing run in HTML and PDF versions for easy viewing and data distribution
8. All necessary server support should be a part of the system with necessary data analysis tools. Server should be able to store up to 6000 runs; data generated should be in FASTQ format. Advance data analysis software should be included.
9. A separate branded PC for advanced data analysis & UPS to support the system should be quoted along with the system.
10. Purchase of the Instrument must include:
  - System installation & operator training performed by a vendor service engineer.
  - Local service engineer.

- Regional technical support/application training
- On-site, in Lab customer training.
- Technical phone support.

## **2. Fully automated capillary, fluorescence-based DNA Sequencer.**

- Number of capillaries: 8 Capillaries operating in parallel to meet throughput. Employ capillary arrays that use bare silica capillaries with a useful life that exceeds 160 runs.
- Excitation source: Long-life, Single line 505 nm solid state laser utilizing a standard power supply and without heat removal ducting
- Dye detection: Cooled CCD detection technology and spectrograph for color separation. System must be able to detect and analyze up to 6 unique dyes simultaneously for DNA fragment analysis
- Capillary illumination: Simultaneous dual-side illumination detection system to maximize signal sensitivity and uniformity that in turn reduces the requirements placed on the user for sample preparation and cleanup.
- Tracking of consumable: Radio-Frequency identification technology to track key consumables data.
- Heating/cooling: Active temperature cooling/heating that can maintain temperatures from 18°C to 70°C.
- Throughput (samples/day) is determined by the total number of samples that can be run in 20 hours (allows time for sample preparation, instrument maintenance, and warm-up).
- Electrophoresis Voltage: Up to 20 kV.
- Suitable Computer/Laptop Should be supplied with instrument
- Software: The vendor must supply software that are optimized for the instrument in the area of *de novo*, Re-sequencing, Long Read Sequencing, and comparative sequencing
- Real time analysis: System software should allow real-time assessment of quality evaluation providing immediate access to base-called or size called data to make decision about the quality of data as it is generated.
- Consumables: Required consumables for Installation and Training should be supplied along with system.

- Applications-specific kits and sequencing reagents required to perform the sequencing by synthesis (SBS) should be manufactured and available from the same supplier.
- Free of cost system installation and operator training performed by a vendor service engineer.
- Along with Installation, The Vendor should have a good service and application support back up along with instruments to provide an effective application related troubleshooting and support .The vendor should provide Application Training on the operation of the instrument, chemistry options and software.
- Vendor should have at least 10 installations (includes all the available models) in India.
- Suitable UPS and Printer should be supplied with System.

### **3. Real Time PCR Specification**

1. A dedicated multicolor Real Time PCR system (excitation and emission) with latest generation Peltier-based 96-well plate/tube in-built PCR to support:

- Gene-Expression analysis,
- Pathogen Quantitation,
- SNP Genotyping,
- Plus/Minus Assays that utilize internal positive control,
- Dissociation Curve Analysis,
- Multiplexing and complete End-Point Assays.

2. Bright White LED Light Source for excitation.

3. Machine should have 6 coupled filters for Optical Detection

4. Multiplexing must be upto 6 targets

5. Machine must have 2D barcode reading facility(Optional)

6. Peltier base Heating and Cooling Method

7. Temperature/Method optimization : Veriflex 6 Temperature zone

8. Optical System: Optiflex

9. Imaging System : CMSO

10. Dynamic Range : 10 Log

11. Temperature uniformity : 0.4 °C
12. Temperature Accuracy : 0.25°C
13. System should have Block ramp rate : 6.5 C or more
14. Run Time should be less than 30 Mins
15. Number of Copies : 1 copy
16. System Should perform HRM..
17. Sensitivity : Detect differences as small as 1.5-fold in target quantities in singleplex reaction
18. Total reaction volume range 10 uL to 100 uL for 96 well plate.
19. System should come with IQ,OQ.
20. Application software like dedicated primer and probe design software as well as relative quantitation analysis software to analyze multiple 96-well-plates of data simultaneously must be included as standard supply in the quoted price.
21. Computer: A business line computer (either notebook or tower) with latest computer specifications should be provided with the system.
22. The amplification traces viewed on the LCD screen in real time while a run is in progress with touch screen facility.
23. The supplier should be able to supply all the reagents and consumables for the operation of the system
24. Along with Installation, Extensive Training must be provided.
25. Warranty for 1 Years which should include cost of labour and Spares.

#### **4. SPECIFICATION 96 WELL PCR**

1. The system should be a 96 well Thermal Cycler with 6 separate peltier blocks to provide independent temperature zones to run – six different assays with varying annealing temperatures at the same time.
2. Veriflex Blocks on the Veriti Thermal Cycler provide a better than gradient approach to PCR optimization. With six separate Peltier Blocks, one can precisely set and control the temperature in each block.
3. Veriflex blocks maintain their thermal characteristics between optimizing and isothermal conditions, eliminating the need for optimization steps.
4. Incubate samples at six different temperatures simultaneously.

5. Each block to accommodate 16 wells and having the ability to set up PCR with a specific temperature differential of up to 5 degree centigrade between blocks.
6. Run up to 6 separate temperatures in the same plate with user defined time to determine the optimal annealing temperatures.
7. On board T<sub>m</sub> calculator facility to approximate the optimal annealing temperature.
8. The system should provide for Standard and fast run modes in a single instrument with the ability to use 0.2ml / 0.1ml PCR tubes or micro-well plates.
9. The system should support PCR volumes ranging from 10 to 80 µl
10. Mouse or stylus free navigation capability with VGA colour touch screen allowing for easy intuitive graphical user interface programming.
11. Choice of saving the methods up to 800 to the instrument or unlimited to a USB memory stick.
12. Programmable heat lid cover from 50 degree to 105 degree centigrade for efficient PCR optimization.
13. Scalability: capability to interlink up to 11 PCR systems via single Ethernet hub.
14. Security: The system should have the ability to store methods on a memory stick.
15. Portability: The system should have a USB port to transfer methods from one machine to another.
16. The system should allow easy product updates via USB port.
17. The machine should be duly certified / authorized for PCR process and the vendor should produce the certificate for the same.
18. All necessary optimized reagents and plastic ware for standard and fast thermal cycling should be made available by the vendor.
19. Ramp Rate : 3.90°C/sec Max
20. Sample Ramp Rate :3.35°C/sec
21. Enabled to Run Fast Chemistry : Yes
22. Temperature Accuracy : ±0.25°C (35–99.9°C)
23. Temperature Range : 4.0°C to 99.9°C
24. Temperature Uniformity : <0.5°C (20 sec after reaching 95°C)
25. PCR Volume Range : 10–80 µL

26. Instrument Memory : 800 protocols on board, unlimited with use of USB memory stick
27. Display Interface : 16.51 cm (6.5 in) VGA 32k color with touch screen
28. Tm Calculator : Menu-driven through touch screen

## **5. SPECIFICATION OF AUTOMATIC NUCLEIC ACID EXTRACTION UNIT**

- Vivid VFD display , transparent working chamber for easy observing the work conditions,
- Unit with touch Panel and compatible with Animal and Plant samples.
- Automatic nucleic acid purification device using magnetic bead separation technology,
- Characteristics, is to study the clinical genetic testing and molecular biology laboratory science right-hand assistant.
- Ingenious Structure & Various Functions : integrated with tablet PC , UV Lamp and Temperature control Systems, The Unit is with easier operation, Safer experiment , full lysing, complete wltion and better result.
- Fully automatic and high capability with automatic nucleic acid purification , the unit will process more than 30 samples at a time.
- Processing Volumes require 20ul to 1000ul
- Retention of Magnetic Particles  $\geq 98 \%$
- Uniformity of Purification Cv  $<3\%$
- Heating temperature Control range lysing and elution  $12^{\circ}\text{C}$
- Mixing Multi Mode, Multi Speed and Adustable
- Disinfection method UV Lamp
- Kits with magnetic beads
- Compatible with Window tablet , PC/Laptop with Window 7/\* operating systems
- Socket for USB, RS232 Adptor, Blue Tooth and WIFI
- Programing is set, edit or delet programs and set purification programs freely.
- Operating tempreature 10 to  $40^{\circ}\text{C}$
- Operating Humidity range 10 % to 90 %
- Certificate : ISO, CE

## **6. SPECIFICATIONS FOR NANO DROP**

### **General**

Detection Method Absorbance

Read method Endpoint, kinetic, spectral scanning, well area scanning  
It should be able to run spectral scans of 2  $\mu\text{L}$  samples, or samples contained in a microplate, standard cuvette or miniature quartz Cuvette

Microplate types Should be capable of reading 6-, 12-, 24-, 48-, 96- and 384-well plates.

Low Volume Plate The low volume plate should be capable of measuring up to sixteen 2 µl samples for rapid nucleic acid or protein quantification. It should be also capable of measuring two miniature cuvette and atleast one standard cuvette.. The plate should be re-usable and have low maintenance. The fused silicon slides should be easily removable and replaceable.

**Absorbance**

Light Source Xenon Flash Lamp, Lamp life 1 billion flashes

Wavelength range 200 nm - 999 nm, selectable in 1 nm increments through tunable grating monochromators.

Bandpass 5 nm

Dynamic range 0 to 4.0 OD

Resolution 0.0001

Monochromator wavelength accuracy ±2 nm

Monochromator wavelength repeatability ±0.2 nm

OD accuracy 0.0 to 2.0 OD: ±1% ±0.010 OD  
2.0 to 2.5 OD: ±3% ±0.010 OD

OD linearity 0.0 to 2.0 OD: ±1% ±0.010 OD  
2.0 to 2.5 OD: ±3% ±0.010 OD

OD repeatability 0.0 to 2.0 OD: ±1% ±0.005 OD  
2.0 to 2.5 OD: ±3% ±0.005 OD

Reading speed

96-well Normal:	49 seconds	384-well Normal:	169 seconds
96-well Rapid:	38 seconds	384-well Rapid:	131 seconds
96-well Sweep:	15 seconds	384-well Sweep:	31 seconds

Software Single integrated windows based software for Reader control and data analysis with at least 5 user license should be supplied with the instrument. The software should be able to analyze the data and perform all the calculations.

**Power Supply**

Power 100 – 240 VAC, 50-60 Hz, Consumption < 40W

**Regulatory**

Regulatory Instrument should be CE and NRTL Safety Agency marked.

## **7. Specifications of Water Purification System**

The system should include a comprehensive and optimized sequence of water purification and monitoring technologies in a single unit, allowing both pure Water(Type II) using **EDI Technology** and ultrapure water (Type I) to be produced directly from tap.

A digitally controlled Water Softener kit with a capacity of 200 L/ Hr should be provided along with the system to ensure the consistent good feed water quality to the water purification system and reduce the consumable cost.

It should provide purified water through a remote Point-of-Delivery unit with a built-in high precision resistivity sensor with cell constant of 0.01 cm<sup>-1</sup> to measure the quality of ultrapure water just prior to the dispensing and should offer volumetric dispensing and calibration. The dispenser should be 360 degree-rotatable and detachable from its support for effortless and instant dispensing with maximum flexibility. The system must be quoted with 2<sup>nd</sup> remote dispenser under optional.

The quality of ultrapure water produced should be suitable for critical applications such as HPLC, ICP, GC, AAS, ICP-MS, mammalian cell culture, PCR, and molecular biology etc.

A Prefiltration kit comprising of Polypropylene Depth Filter, 10 inches, 10 µm, Polypropylene Depth Filter, 10 inches, 1 µm , & Activated Carbon Cartridge, 10 inches, should be supplied to protect the system from gross impurities.

The high quality RO module should remove 95-99% of ions and at least 99% of all dissolved organics, bacterial and particles from the water

### **Product water Flow rate & Quality (TYPE II):**

EDI product water should meet or exceeds Type II water quality as defined by ASTM, CAP, CLSI and ISO 3696 / BS 3997 and should also comply with the Purified Water requirements from the European and U.S. Pharmacopoeia.

EDI water (Type II ) 10 L -15L/hr or more

EDI water resistivity ( @ 25° C ): > 5 MΩ·cm (typically 10 - 15 MΩ·cm)

The system should have 185nm/254nm Dual wavelength UV lamp to eliminate bacterial and residue organics.

The system should come with a 30-40liter conical bottomed PE tank with a liquid level sensor and a tank vent filter with CO<sub>2</sub> scavenger to prevent pure water from contamination by the surrounding air.



**It should have** Flexible choices of final filters to remove specific contaminants for multiple applications.

It should have Large LCD screens on both the water system and the POU dispenser.

**Product water Flow rate & Quality (TYPE I):**

Ultrapure water (Type I ) Flow rate : 1.5 L/min

Ultrapure water resistivity ( @ 25° C ) : 18.2 MΩ·cm

TOC < 5 ppb

Particles in ultrapure water: ( > 0.2 μm) < 1/ml ( with a 0.2 μm final filter or terminal ultrafiltration cartridge )

Microorganisms: < 1 cfu/ml ( with a 0.2 μm final filter or terminal BioPak ultrafiltration cartridge )

Pyrogens (endotoxins): < 0.001 Eu/ml ( with a terminal BioPak cartridge )

The BiopPak Should produce : RNase-free water (< 0.01 ng / mL) and DNase-free water (< 4 pg / μL) .

**8. Specification for Biosafety Cabinet**

BSC Class II Type A2

Size : L X D X H : 3 ft X 2ft X 2 ft

Cabinet Provides the Product, Person and Environmental protection

Class II Biohazard Safety cabinet should provide personnel, product & environment protection. Class II Cabinets differ in proportion as 70% air is re-circulated within the cabinet through high efficiency particulate air (HEPA) filtration.

Velocity of airflow to the work zone creates an class 100 environment for product protection, where the remaining exhaust air is discharged out through (HEPA).

Air barrier at the work opening & the contaminated air plenum under positive pressure.

An air barrier between the operator & the work zone maintained by a flow of room air through a full width grille in the work opening.

The barrier air mixes with the laminar flow air in a sump underneath the work surface & is exhausted to the outside environment through a HEPA filter.

Main body - Constructed in Mild Steel with epoxy powder coated

Work Surface –Seamless ,Scratch-free, high quality 18 gauge stainless steel, grade 304

Working tray - Autoclavable & Removable stainless steel work surface for easy cleaning.

Air Flow : 70% recirculation through HEPA filter & 30% exhaust through HEPA filter

Filter Type – HN 14HEPA filter with integral metal guards & frame gaskets. Supply of HEPA filter 99.997% at 0.3 micron.

Ergonomic Tilt- Exceptionally comfortable 10 deg ergonomic design improves comfort, prevents user fatigue & promotes safe working techniques.

Front Control Panel -Provided to avoid exposure of UV Light & Lamp outside, making eyes more comfortable.

Front Sash Door - Manual sliding sash door made up of Imported poly carbonate sheet or toughened glass with sloping front for better access of samples

Front sash door height can be easily adjusted as per required by end-user.

The transparent sash door maximizes light & visibility inside the cabinet, providing a bright & open working environment.

Air Velocity - 100 ft/min  $\pm$  10

Air Volume - Up to 500 CFM

LCD Display – Digital Microprocessor Control System for Operating Fluorescent, Uv Light & Blower.

Continuously display true value of differential pressure of HEPA filter for inflow as well as down flow velocity.

Conveniently located display on outside of the Biosafety Cabinet for easy use & also easy to reach from a seated working position

Sleep Mode Operation – Automatically blower speed reduced up to 30%,this will help to save energy as well as help to maintain sterile work area during Biosafety Cabinet is not in operation

Intelligence Alarm System – Safety purpose Audio & Visual alarm for air fluctuation and for life of the HEPA filter and UV light

Ultra violet tube light - Germicidal i.e. 254 nm

Ultra violet life meter- Continuously display UV Hour on display

UV Light programming - Available with timer & UV Hour meter to avoid operator risk

Interlocking UV - The closing/opening of front door is integrated with the UV ON/OFF. The UV will automatically switch “OFF” when the sash door is opened & switch “ON” when door is closed to avoid accidental exposure of UV light to the operator.

Electrical Socket - Internal socket inside the chamber,5/15 Amp

Illumination of Work surface- Fluorescent tube light (intensity > 600 lux) provides excellent illumination for work surface & reduces operator fatigue. Fluorescent tube light in set behind front control panel.

Working Noise level - Low/ should be < 65 dB

Electronic / Electrical panel- From clean chamber to give better contamination free results.

Electrical Safety - Electrical components used are standard for better electrical safety for the operator

Heat Emission - Heat Emission at 25°C.Ambient BTU/hr (kW)

Power supply - 230 V  $\pm$  15%, 50 Hz  $\pm$  3%

Weight – Cabinet Net weight approximately 200 kg

Arm Rest Bar - To avoid contamination from outside to inside contamination & for easy working with comfort.Secure & comfortable armrests enhance your comfort during extended work sessions

Drainage Port- Provide beneath work surface to facilitate easy & better cleaning of the interior & handling of spillage inside the chamber

Blower-Motor Assembly - Dynamically & statistically balanced aluminum centrifugal impeller driven by single phase, 2800 RPM motor

Double inlet blower fitted in such a way to reduces vibration & noise.

Blower is positioned in such a way that, to create an even filter loading, it helps to prolong the life of HEPA filters.

Provide uniform airflow by adjusting working voltage of fan

Performance Certificates -

ISO 9001 : 2008

CE Marked : CE Certificate

GMP Certificate

EN ISO 14971:2012 Applicable Standards

IQ,OQ & PQ. Calibration & Traceability certificates

Factory tested DOP certificate

Applicable Standards - EN ISO 14971:2012,EN ISO 13485 : 2012 , EN 980:2008 , EN 1041 : 2008 , EN 61010-1:2010, EN 61326-1:2013, EN 12469:2000

## **9. Specifications for the UV visible spectrophotometer:**

1. The UV must be True Double Beam UV – VIS Spectrometer with a Wavelength Range 190-1100nm
2. It should have Czerny – Turner mounting for its monochromator and Must be Variable spectral bandwidth i.e. 0.5, 1, 2, & 5 nm (User Selectable)
3. The offered model should be use as a standalone system connected to printer or complete control through PC using offered UV-WIN Software.
4. High Intensity Tungsten and Deuterium lamp with automatic changeover

5. High Sensitivity matched pair silicon photodiode Detector with all pharmacopoeia requirements.
6. The system offers standard Photometric Modes: Transmitted
  - a. Absorbance
  - b. Energy
  - c. Concentration
7. Offered model should be with automatic 8 - Cell changer used for multi - sample measurements, which offers very high sample throughput.
8. Optics of the system should exceeds stray light Jet performs using Potassium Chloride Solution, resolution check performance using Toluene & Hexane, specified by European Pharmacopoeia { $\leq 0.02\%$  T }
9. System offers Built-in Photometric measurement, spectrum scan, quantitative measurement Kinetic [Enzymatic] studies.
10. The system should offers as a standard feature of DNA/Protein analysis to set the samples of Life Science Biotechnology/Microbiology and provide DNA/Protein Concentration
11. When system should configured with PC & software, you get 3D Spectrum analysis software as a standard feature.
12. System should perform Derivative spectrum up to 4<sup>th</sup> derivative.
13. Optical specifications should be like photometric Range (-3 ~3 abs), Wavelength Accuracy ( $\pm 0.3$ nm), Baseline flatness (0.0015A), Baseline stability (0.0004 A/h), photometric Accuracy (0.002A) & Photometric reproducibility (0.001A)  
Noise level: 0.00005 Abs RMS value@500nm.

#### **10. SPECIFICATIONS AAS/GTA/FLAME/VGA/Mercury with Accessories.**

Atomic Absorption Spectrophotometer (GTA/FLAME/VGA/Mercury) Unit for Flame (Air-acetylene and nitrous oxide-acetylene) Graphite tube atomizer (GTA)/Chiller/Water circulating unit/ Auto samplers for GTA and Flame.

<b>Wave length range</b>	185-915nm wavelength Sensitivity greater than >0.9 abs for 5 ppm aqueous copper standard
<b>Sensitivity</b>	solution with air-acetylene flame
<b>Optics</b>	Double beam dual blazed/holographic Monochromator
<b>Focal Length</b>	300mm focal length
<b>Resolution</b>	1800lines/mm
<b>Width</b>	Automatic bandwidth of 0.1 to 2.0nm.
<b>Flame Atomizer</b>	All titanium or equivalent burner with impact bead.
<b>Movement</b>	Automatic movement into the sample compartment
<b>Affect from Acids/Organic solvent</b>	Unaffected from attacks by acid solutions or organic solvent.
<b>Flame Alignment in liquid beam</b>	Fully automatic, optimized with motorized burner mount for vertical burner adjustment

<b>Nebulizer</b>	High precision able to provide manually adjustable uptake rates material of the nebulizer and related Venturi should be inert to acid solutions and organic solvents,
<b>Flame Control</b>	Computer controlled ignition
<b>Gas Control</b>	Computer controlled with oxidant and fuel gases monitoring to monitor constant fuel/oxidant ratio ignition
<b>Safety Function</b>	Interlocking system to prevent ignition Burner type as well as its presence in position, air selector, flame sensor, liquid trap level, gas supply pressures and air supply anywhere in the network of gas tubings in the system
<b>Essential Interlock Monitors</b>	
<b>Automatic Lamp Selection Function</b>	Computer controlled Hollow cathode lamp selection and alignment, Atleast 8 lamp holder with built-in power supplies for hollow cathode lamps.
<b>Read Out / Display</b>	Display facility for absorbance as well as concentration, Display of errors or error codes, absorbance range atleast upto 2.0 Abs
<b>Accessories/Spares with the Flame AA System Vapour generation assembly</b>	Should be continuous flow based hydride and mercury vapour generator with option of using with a programmable auto sampler
<b>Precision</b>	Precision of better than or atleast 1% at ppb levels of mercury vapour ,arsenic etc with autosampler
<b>System accessories</b>	Complete with necessary reagent bottles, connectors etc.

### **11. SPECIFICATIONS FOR THE FTIR with ATR**

- THE SYSTEM SHOULD HAVE WAVENUMBER RANGE:8000-350cm<sup>-1</sup>.
- WITH ZNSE OPTICS (INTERFEROMETER,MIRRORS) HAVING WAVENUMBER RANGE FROM 5500CM<sup>-1</sup> TO 550CM<sup>-1</sup>.
- FTIR SYSTEM HAVING SIGNAL TO NOISE RATIO OF 31000:1 OR BETTER,PEAK-PEAK,1 MINUTE FOR A RANGE OF ATLEAST 100CM<sup>-1</sup> SHOULD BE QUOTED.
- STANDARD RESOLUTION SHOULD BE 0.9 CM<sup>-1</sup> OR BETTER& WAVELENGTH PRECISION/0.01CM<sup>-1</sup> OR BETTER.
- OPTICS AND INTERFEROMETERS WITH GOOD STABILITY FOR OPERATION UNDER NORMAL CONDITION / HUMID CONDITION.
- INTERFEROMETER KBR BEAMSPLITTER AND PREFERABLE ZNSE FOR BETTER PERFORMANCE,6 OR MORE YEARS WARRANTY SHOULD BE GIVEN.
- SOURCE INTENSITY SHOULD BE CONSISTENT THROUGHOUT ITS LIFE AND LASER SHOULD BE SOLID STATE OR BETTER. SOURCE AND LASER WARRANTY SHOULD BE 4 YEARS OR MORE.

- THE SYSTEM MUST HAVE A SOFTWARE CONTROLLED DESICCANT STATUS INDICATOR TO ALLOW THE USER TO ACCURATELY MONITOR THE STATUS OF THE DESICCATED AREA.
- INSTRUMENT SHOULD BE CONTROLLED WITH COMPUTER BASED SOFTWARE COMPATIBLE WITH WINDOW XP OR WINDOWS7/WINDOW8.
- DESICCANTS KIT(FOR AT LEAST 3 YEARS OF OPERATION)OTHER STANDARD UTILITIES WHICH WILL MAKE INSTRUMENT OPERATIONAL MUST BE QUOTED.
- PURE DIAMOND CRYSTAL ATR SHOULD BE INCLUDED FOR THE ROUTINE SAMPLE ANALYSIS pH1-14.
- OPTIONAL ITEMS:
- LIQUID CELL &HYDRAULIC PRESS WITH DIE SET,MORTAR&PESTLE,KBr POWDER.

## **12.SPECIFICATION OF ULTRA SONICATOR**

- 700 watts sonicator
- Touch screen
- 72 hrs timer
- Pulse mode : 1sec to 24 hrs
- Digital Amplitude control from 1-100%
- Elapsed Time indicator
- Overload protection
- RoHS Compliant
- Frequency 20Khz
- ½” replaceable tip probe , volume :20-250ml
- Auto Tuning
- 10 programs can be set in memory
- 6 programs can be run in sequence
- Sound Enclosure
- Temperature Couple
- Systems should be compatible with all Nanotechnology application.

### **13. Specifications NanoSight**

#### General/ Hardware

1. The system must have temperature control using Peltier elements, giving control over the range of 5 degrees below ambient temperature to 55°C.
2. A diode laser beam is directed through a prism in order to concentrate the light intensity for the most efficient scattering in the focal plane and minimize background noise within the sample cell (US patent # 7399600). This patented optical configuration also dramatically reduces noise and therefore provides an improved lower limit of detection compared to other optical techniques for visualizing light scattering.
3. System must be configurable with a syringe pump for sample fluidics. Through utilization of sample flow during measurement, better statistics can be achieved through the analysis of more particles. Instrument must not move instrument measurement position to improve statistics as this will introduce both sample variation as well as instrument location variation.
4. System must utilize a x20 objective with a Numerical Aperture (NA) 0.4. This combination of magnification and NA provides optimal light collection allowing the detection of nanoparticles as small as 10nm. The flow-through chamber uses a volume as small as 100 µl, depending on model, accommodating aqueous fluids used to suspend particles for measurements. A metal sample chamber is available for organic solvents.
5. Sample cells are available incorporating lasers including 405, 488, 532, and 642nm wavelengths. Sample cells must be user interchangeable, with all lasers capable of being fitted to the same instrument.
6. Fluorescence filters wheel allowing the positioning of 5 different fluorescent filter in path of optical train. Allows measurement of the size and concentration of fluorescent particles. Long pass or band pass filters should be available to cover the range of excitation wavelengths.
7. Lasers must be triggered by camera such that photo-bleaching is reduced when operating in fluorescence mode.
8. Particle visualization and tracking does not require knowledge of solvent or particle refractive index
9. Particles tracked using NTA software (Nanoparticle Tracking Analysis)

#### Size/ Concentration Measurements

10. The detection range is 10nm-2000nm when using the high-sensitivity sCMOS camera, material dependent.
11. Measureable total sample concentration range is  $10^6 - 10^{10}$  particles/ml. Optimum concentration range is  $10^7 - 10^9$  particles/ml. This allows measurement of even extremely low particle concentration suspensions.
12. Concentration range for particle sizing  $10^6 - 10^9$  particles per ml.

13. Peak-to-peak resolution enabling the resolution of a population including 100, 200, 300, 400nm polystyrene beads in same sample.

#### Software

14. Software must operate through a scripting Standard Operating Procedure, where camera levels, syringe pumps, user settings can be controlled through the scripting function.
15. The sample analysis software must show the particles being tracked such that erroneous measurements can be rapidly identified by the user, including indication of successful tracking or analysis conditions.
  1. Vibration detection and removal to isolate the measurement from external influences which may influence the measurement
  2. Sample flow is automatically measured and accounted for in particle tracking calculations. Corrects for flow induced by pump, thermal effects or possible air bubbles.
16. Absolute technique that does not require calibration.
17. Concentration calibration which accounts for the fact that different particles may scatter light from different scattering volumes. Calibration must account for changes in particle refractive index, particle size and user defined camera setting/detection thresholds and modify concentration calculation accordingly.
18. Auto focus.
19. Auto camera level which selects appropriate camera settings for sample type.
20. Simultaneously measure particle size and particle scattering intensity allows polydisperse and heterogeneous particle mixtures to be resolved
21. Camera pixel calibration used to measure particle movement must not exceed 200nm per pixel. Pixel calibration in excess of 200nm per pixel will reduce tracking accuracy and reduce spatial resolution.
22. Ability to gate and exclude particle based on size or concentration allowing measurement of discrete sub-populations.
23. All particle size, concentration, scatter intensity and diffusion data can be output in a variety of formats including PDF, CSV spreadsheets, and video files.



#### **14. Flowcytometer Analyser**

1. Bench top flowcytometer with solid state 488 nm laser and solid state 640 nm laser. Also it should have provision for future up gradation with solid state 405 nm violet laser.
2. The system should have the capability of 6 fluorescence & 2 scatter (8 parameters) measurement upgradable to 8 fluorescence & 2 scatter (10 parameters) measurements
3. The system should have less than or equal to 100 MESF for FITC & 50 MESF for PE
4. The system should accommodate wide range of input devices in the manual loading position including 5, 15 & 50 ml conical tubes & 0.5ml / 1.5ml microcentrifuge tubes
5. The instrument should have laser auto alignment feature to ensure consistent performance.
6. The system should offer minimum 30000 events per second or higher.
7. The system software should be capable of establishing baseline settings of system performance and be able to adjust for instrument variability thereby automating instrument setup leading to consistent & reliable results.
8. The system should be able to do single fluorochrome addition and inter-beam compensation.
9. The system should also allow analysis of data parallel to sample acquisition.
10. The system should have features for automated identification and matching of the optical configuration.
11. The system should also offer automatic start up & shut down procedures.
12. The system should have fixed optical assembly of laser upon the cuvette flow cell to ensure fixed alignment.
13. The system should offer low, medium & high flow rates. Should also have provision for high sensitive mode, required for applications where there is need to look at dim stained populations.
14. Should come with compatible work station and necessary software for data acquisition and analysis.
15. The system should provide upgradability option of built in sample loader platform which can accommodate minimum 30/40 tubes & option of 96 / 384 well plates
16. Company should have full fledged flowcytometry training center in India providing regular training courses on research applications.

### **15. Specifications for Nano-Particle Size and Zeta Potential Analyzer**

<b>No.</b>	<b>Feature</b>	<b>Description</b>
1.	Principle	Dynamic light scattering
2.	Particle size measurement range	0.3 nm to 5000 nm
3.	Zeta potential range	+/- 500 mV
4.	Zeta potential analysis in size range	3.8 nm to 100 microns
5.	Max sample conductivity	200 mS/cm
6.	Light source	Laser diode, 632.8 nm, 4 mW as per ISO 13321 document
7.	Detector	Avalanche Photo Diode (APD)
8.	Optics	The optics must be fully pre-aligned with no user adjustment required.
9.	Measurement temperature range	0°C - 90°C +/- 0.1°C
10.	Scattering angle	90 degree
11.	Sample cell	1) Disposable size cuvetts 2) Glass size cuvet 3) Disposable zeta cuvetts
12.	Auto-correlator	4000 channels. Min. sample time 25ns, max. delay time 8000s.
13.	Power supply	230 Volts. 50 Hz
14.	Software feature	Over plots of up to 20 size distributions must be possible.
15.	Software feature	The user must have the ability to measure the sample with manually defined parameters, or by defining a 'Standard Operating Procedure (SOP).
16.	Software feature	System should give Z-average value and poly-disperse (PDI) value