



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

Reference No. 2021-22/87 PR No. 1000022686 (Rfx No. 6100000977)

Detailed Technical Specifications for Dynamic Light Scattering Analysis Setup:

Computer controlled System should be quoted to be used for Dynamic Light Scattering characterization of suspensions. It should report Hydrodynamic Size, Number and intensity size distributions, polydispersity, electrophoretic mobility and particle count concentration of the particles in suspension.

- 1. Dynamic Light Scattering:** To measure Particle size, Zeta potential, Molecular Weight and A2 of particles in colloidal suspensions, emulsions & dispersions in aqueous as well as non-aqueous medium through measurement of the intensity fluctuations caused by Brownian motion of the particles. It should be operable in a temperature range from 0°C to 90°C and have following specifications.

S. No.	Specifications	Description
1.	Size Range	It should report intensity distribution and mean of size in the range of 0.4 nm-10 µm or better.
2.	Measurement Principles	It should use measurement of intensity fluctuations caused by Brownian motion of the nanoparticles to estimate the particle size and other parameters.
3.	LASER Source	At least 1 light source should be quoted. It should be He-Ne gas/Solid state / Diode laser of following wavelengths and power. 1. Red Laser (630nm – 660 nm) 2. Laser Power – Minimum 10 mW
4.	Detector	Following detectors should be quoted 1. High resolution and high sensitivity Avalanche photodiode to capture intensity fluctuations; PMT detector is not acceptable.
5.	Measurement Angle	Should have at least THREE fixed measurement angles 1. Standard: 90 degrees 2. Back Scatter Angle: 170 degrees or greater 3. Forward Angle: 10-15 degrees
6.	DLS	1. Minimum sample volume: 12 microliters. 2. Minimum sample concentration (protein): 0.1 mg/mL (lysozyme) 3. Concentration range for sizing - 0.1 ppm to 50 mg/mL, depending on refractive index and concentration 4. Maximum sample concentration: 40% w/v 5. Optical Arrangement: Optics Should be able to automatically adjust its measurement distance from centre to edge of the cuvette depending upon the concentration & scattering properties of the sample to achieve better signal

		<p>to noise ratio & reduce multiple scattering. It should have at least 5 such measurement positions. Automatic Laser attenuation to adjust transmission in the range of 100% to 0.01% or better.</p> <ol style="list-style-type: none"> 6. Temperature Control Range: 0°C – 90°C (or better). +/- 0.3°C (or better) 7. Fully Automated increasing or decreasing temperatures by 0.1°C intervals for size & zeta potential measurements. 8. Analyzer shall allow measurement of fluorescent samples without impairing overall system sensitivity using Fluorescence filter. The instrument should be equipped with polarization filters for DDLs (Depolarized Dynamic Light Scattering) measurements. 9. Instrument should be able to capture steady state as well as transient scattering data to detect aggregates and foreign large particles in the sample & report them through software.
7.	ELS	<ol style="list-style-type: none"> 1. Measurement technique: Phase analysis light scattering or Electrophoretic Light Scattering (ELS) 2. Preferably with Fast field reversal & slow field reversal techniques in each run to improve resolution, insensitivity to cell alignment, and reduced sensitivity to cell wall contamination. 3. Constant current Zeta mode should be available for zeta potential measurement of highly saline samples without cell burnout. 4. Should be able to measure samples suspended in organic solvents. 5. Unit shall have capability to isolate charged samples from electrodes to prevent electrode fouling and polarization. 6. Sensitivity: 10 mg/mL (lysozyme / protein) 7. Size range suitable for measurement (diameter): 5nm – 100µm or better 8. Zeta potential range: +/- 500mV 9. Mobility range +/- 10^{-11} to 10^{-7} m²/V.s 10. Minimum sample volume: 350 µL 11. Minimum sample concentration: 1 mg/mL 12. Maximum sample concentration: 40% w/v or better 13. Maximum sample conductivity: 200 mS/cm or better
8.	Molecular Weight range	<ol style="list-style-type: none"> 1. From 1000 Da to 20x10⁶ Da or better 2. Hydrodynamic and Debye Plot 3. 2nd Viral coefficient calculation for non-spherical particles
9.	Consumables	<p>Cuvettes: -</p> <ol style="list-style-type: none"> 1. Disposable cuvettes for size: 300 Units 2. Reusable Glass/Quartz Cuvette for size: 10 Units 3. Zeta capillary cuvette: 30 Units 4. Reusable Solvent resistant Zeta Cuvette: 3 Unit
10.	Standard Samples	<p>System should be provided with certified standard reference material for validation of size and zeta measurement at the time of installation.</p>

11.	Software & Data	<ol style="list-style-type: none"> 1. Required software should be quoted to acquire, process, and analyse the raw data. 2. Processed data should be reported in CSV, PDF, video file and Jpg format (Dot Plot & 3D Plot). 3. Should indicate cleanliness of cuvettes and sample cells with alarms and error messages. 4. In-built database for parameter input, refractive index, particle absorption and viscosity. 5. Overlay plots of up to 30 measurements for direct comparison. 6. Post processing capability for changes in measurement parameters. 7. Integrated time and temperature series study capability.
12.	Computer	Separate Suitable computer(s) should be provided to run the software to acquire data.
13.	UPS	3KVA Suitable UPS should be provided.
14.	Warranty	5 years of warranty should be provided.
15.	Installation and service supports	<ol style="list-style-type: none"> 1. Supplier should clearly specify the after sales/service/application support capabilities. 2. Warranty of the system should be 5 years from the date of installation and should cover cost of spares and labor. 3. Should provide a comprehensive plan for on-site training, conducting workshops, software upgrade during warranty period. 4. Trained engineer & application support within India should be available for onsite training & support. 5. Supplier should provide SOP documents and free of cost training in first 3 months after installation to multiple users PLUS one onsite training session to multiple users every six months for the entire period of Warranty. 6. During the Warranty period, the supplier is required to visit at consignee's site at 2 times in the year commencing from the date of the installation for preventive maintenance of the Equipment/Stores. 7. The Supplier along with its Indian Agent and the CMC provider shall ensure continued supply of the spare parts for the machines and Equipment supplied by them to the purchaser for 7 years from the date when the company stops manufacturing of the unit. Company should ensure that spare parts will be available till 7 years from the date when the company stops manufacturing of the unit. 8. During the Warranty period, the supplier is required to visit consignee's site at least twice a year commencing from the date of installation for preventive maintenance of Equipment/Stores. 9. Should attend all breakdown calls within 24 hours of the receipt of information from the institute through fax/e-mail/mobile/sms, etc. 10. The equipment will be diagnosed with a problem within 72 hours of receiving the complaint and repaired within 4 weeks, failing which the warranty period will be extended by the number of days the instrument is non-functional post

		<p>4 weeks.</p> <p>11. Provide a detailed list of users and current installations of the system with similar set-up in India with contact details.</p>
--	--	--