



INDIAN INSTITUTE OF TECHNOLOGY BOMBAY

MATERIALS MANAGEMENT DIVISION

Powai, Mumbai - 400076

PR No. 1000034041

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**Technical Specifications for Dynamic Light Scattering System (DLS)**  
**Instrument – Particle Size and Zeta Potential Analyzer**

The instrument should be able to measure, particle size, zeta potential, molecular mass, A2, transmittance, and refractive index of colloidal suspensions, emulsions, and dispersions in aqueous as well as non-aqueous medium and should have the following specifications.

**A. General specifications**

1. **Laser source:** 630nm – 660 nm; He-Ne/Solid state laser with a power of 4mW or better
2. **Measurement angles:** Should have at least two angles with a Back angle: 165 degrees or greater, Forward angle: 10-15 degrees or equivalent to technology
3. **Detector:** High-resolution photodiode
4. **Optics:** Should be able to automatically adjust its measurement distance from center to edge of the cuvette depending upon the concentration & scattering properties of the sample to achieve a better signal-to-noise ratio & reduce multiple scattering. It should have at least 5 such measurement positions.
5. **Laser attenuation:** Automatic, transmission 100% to 0.01% or better.
6. **Temperature Range:** 0°C - 120°C. Stability & Accuracy within +/-0.2°C or better.
7. The analyzer shall allow the measurement of fluorescent samples without impairing overall system sensitivity. Also, should include polarization filters for DDLS (Depolarized Dynamic Light Scattering) measurements.
8. The instrument shall be able to capture & separate steady state as well as transient scattering data to detect aggregates and foreign large particles in the sample.
9. Laser Warmup time: Less than 10 minutes

**B. Particle Size Analysis**

1. **Measurement Principle:** Dynamic Light Scattering
2. **Size range:** 0.3nm – 10microns or better
3. **Minimum sample volume:** 12 microliters or better



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4. **Minimum sample concentration:** 0.1 mg/mL or better
5. **Maximum sample concentration:** 40% w/v or better
6. System shall be suitable for water, ethanol, aqueous, and organic solvents.

### C. Zeta potential measurements

1. **Measurement technique:** Phase analysis light scattering or equivalent Preferably with Fast field reversal & slow field reversal techniques in each runs to improved resolution, insensitivity to cell alignment, and reduced sensitivity to cell wall contamination.
2. Constant current Zeta mode should be available for zeta potential measurement of highly saline samples without cell burnout.
3. Should be able of measuring samples suspended in organic solvents.
4. Unit shall have the Capability to isolate charged samples from electrodes to prevent electrode fouling and polarization.
5. **Size range suitable for measurement (diameter):** 4nm – 100 $\mu$ m
6. **Zeta potential range:** +/- 500mV or better
7. **Mobility range:** +/- 20  $\mu$ .cm/V.s
8. **Minimum sample volume:** 20  $\mu$ L or better
9. **Minimum sample concentration:** 1 mg/mL or better
10. **Maximum sample concentration:** 40% w/v or better
11. **Maximum sample conductivity:** 20 mS/cm or better

### D. Molecular mass measurement

1. **Molecular weight range:** 980 Da – 20 MDa
2. **Measurement principle:** Static Light Scattering using Debye Plot.

### E. Transmittance

1. **Measuring time:** 5-10 Sec
2. **Accuracy:** Better than +/- 1 %

### F. Refractive Index

1. **Measuring range:** 1.28 - 1.50
2. **Accuracy:** Better than +/- 0.5 %



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**G. Sample cells/cuvettes:**

1. **Disposable Cells for Size measurements:** 100 Units
2. **Reusable Glass/Quartz Cuvettes for Size measurements:** 1 Unit
3. **Capillary type Zeta potential cuvettes:** 20 Units
4. **A solvent resistant reusable cell for the measurement of zeta potential of samples in aqueous and non-aqueous dispersants:** 1Unit
5. **Low Volume Cuvette Quartz:** 1 Pcs.

**H. Software**

1. Intuitive & easy to use, preferably Windows based presentation of input parameters, results & analysis on a single page.
2. Software should provide data quality feedback of any size data quality issues, with clear advice on how to improve results.
3. **PC:** Suitable branded PC with the following minimum configuration should be supplied:i7 processor, 6 GB Ram, 500 GB Hard Disk, Latest version of Windows OS.
4. **UPS:**2KVA Suitable UPS should be provided

**I. Warranty - 3 years of warranty**

1. The supplier should clearly specify the after-sales/service/application support capabilities.
2. The warranty of the system should be 3 years from the date of installation and should cover the cost of spares and labor.
3. During the Warranty period, the supplier is required to visit the consignee's site at least once a year commencing from the date of installation for preventive maintenance of Equipment/Stores.