Dynamic Light Scattering (DLS) with Zeta Potential (ZP)

Dynamic light scattering (DLS), also known as photon correlation spectroscopy (PCS), is a very powerful tool for studying the diffusion behavior of macromolecules in solution. The diffusion coefficient, and hence the hydrodynamic radii calculated from it, depends on the size and shape of macromolecules.

The sample is illuminated by a laser beam and the fluctuations of the scattered light are detected at a known scattering angle θ by a fast photon detector. Simple DLS instruments that measure at a fixed angle can determine the mean particle size in a limited size range.

Dynamic light scattering (DLS) is based on the Brownian motion of dispersed particles. When particles are dispersed in a liquid they move randomly in all directions. The principle of Brownian motion is that particles are constantly colliding with solvent molecules.

Dynamic light scattering (DLS) is a technique in physics that can be used to determine the size distribution profile of small particles in suspension or polymers in solution.

DLS may be used to study the homogeneity of proteins, nucleic acids, and complexes of protein-protein or protein-nucleic acid preparations, as well as to study protein-small molecule interactions.

Specific Features of the Dynamic light scattering (DLS)

- Particle size, zeta potential, molecular weight, and second virial coefficient all in one instrument.
- Wide range of particle sizes and concentrations.
- Particle size measurements at both 90° and 173° angle.
- Multiple particle size measurement modes for working with small particles and weak scatterers.
- Small volume cells for both particle size and zeta potential.
- Extremely low sample volume makes it possible to measure precious or rare samples.
- Modern signal processing electronics efficiently convert optical signals to mobility and zeta potential information. There is no need to manually calculate particle velocity or match speeds.

Technical specifications

Particle size

Measurement range	Particle diameter: 0.3 nm - 8.0 μm
Measurement Accuracy	Particle size: ISO 13321/22412 compliant. NIST traceable polystyrene latex particle standard: 100 nm measurement accuracy = +/- 2%
Measurement time	Approx. 2 minutes in general for particle size analysis
Sampling cell	Cuvette cell
Sampling volume	12 μL ~ 4 mL*

Zeta Potential

Measurement range	-200 – +200mV
Measurement time	Approx. 2 minutes in general
Sampling cell	Dedicated disposable cell or dip cell
Sampling volume	~100 μL for disposable cell

Applications

- Typical applications of DLS are measuring the size and size distribution of particles emulsions and molecules dispersed or dissolved in a liquid. e.g.: Proteins/complexes/DNA, Polymer Latexes, micelles, carbohydrates, nanoparticles, colloidal dispersions, emulsions, ions, Polymer Latexes, Pharmaceutical Preparations, Oil/Water and Water/Oil Emulsions, Paints and Pigments, Inks and Toners, Cosmetic Formulations, etc.

Sample requirement

Samples need to meet all these criteria:

- Clear, without any visible precipitation or solid impurities
- No air bubbles
- Minimum sample requirement: 5-8 mL (Less concentrated).
- Samples should be dispersed in a suitable dispersing medium.

Details of Dynamic light scattering (DLS) with zeta potential (ZP)

Brand	HORIBA
Model	SZ-100-Z
Sponsored Agency:	DST- PURSE program (Phase -2)