

Dynamic Light Scattering Instruments

Litesizer DLS Series



Litesizer DLS: The Power to Explore

Best-in-class particle sizing

Our instrument features automatic angle selection to ensure precise results every time, while our multi-angle particle sizing (MAPS) technology provides high-resolution particle sizing – even for multimodal samples. With continuous transmittance monitoring, the system detects sedimentation and agglomeration in real-time, giving you instant insights that measurements are reliable and of high quality.

Market-leading zeta potential determination

Unique to Litesizer DLS, the patented cmPALS technology and the Omega Cuvette enhance zeta potential measurement, ensuring stability and accuracy by minimizing electrical gradient interference.

FIND OUT MORE



[www.anton-paar.com/
apb-litesizer](http://www.anton-paar.com/apb-litesizer)

Even more benefits

- ✓ Additional selection of measurement modes: including particle concentration, refractive index, molecular mass, and transmittance
- ✓ Capable fluorescence and polarization filters: applicable at all angles
- ✓ Ultra-low sample volumes for particle sizing, down to 1.5 μL
- ✓ Kalliope, the benchmark in software operation: No training required, results in three clicks

The Future of Zeta Potential Analysis

cmPALS innovation

cmPALS is a significant advance on existing PALS technology because it allows the modulator to make large movements. This means you can use shorter measurements and apply lower electric fields, reducing the effects of electrode fouling and deterioration.

cmPALS technology, featured in Litesizer DLS 701 and 501, addresses these challenges with a groundbreaking, patented (European Patent 2 735 870) approach: It enhances sensitivity and stability, enabling precise zeta potential measurements even for delicate samples.

How it works

Zeta potential is determined by measuring the electrophoretic mobility of particles in an electric field. A laser beam passes through the sample, scattering off moving particles. The speed of this motion indicates the zeta potential's magnitude, while the direction reveals its sign. cmPALS refines this process, providing superior accuracy and repeatability.

Omega cuvettes

The specially designed cuvettes, with the unique Omega-shaped capillary ensure there are almost no gradients of the applied electric field at the measuring position. This delivers the highest possible repeatability because fluctuations of the results depending on the measurement position within the capillary are negligible.

Next-level zeta potential analysis

With cmPALS, Litesizer DLS 701 and 501 set a new benchmark in zeta potential measurement, efficiently delivering precise results. From formulation optimization to quality control, cmPALS ensures unparalleled performance for a wide range of applications.

Key benefits of cmPALS and Omega cuvettes

- ✓ Improved sensitivity: Detect even subtle changes in particle behavior
- ✓ Enhanced stability: Achieve consistent, reproducible results
- ✓ Faster measurements: Results in minutes without sacrificing accuracy
- ✓ Reduced sample damage: Safeguard sensitive samples during analysis



Measuring Modes



Particle size measurement by DLS

Particles suspended in a liquid are constantly undergoing random motion, and the size of the particles directly affects their speed. Smaller particles move faster than larger ones. In dynamic light scattering (DLS), light passes through the sample, and the scattered light is detected and recorded at a certain angle. The time dependence of the scattered intensity reveals how fast the particles are moving. From this information, it's possible to calculate the average size of the particles as well as the size distribution.

Litesizer DLS particle analyzers give you accurate and precise size measurements. You can easily measure the effect of time, pH, temperature, and concentration on the particle size. With integrated measurement algorithms, you obtain the highest peak resolution when choosing the most suitable single-angle DLS or multi-angle dynamic light scattering (MAPS) measurement mode (DLS 701).

Zeta potential measured by ELS

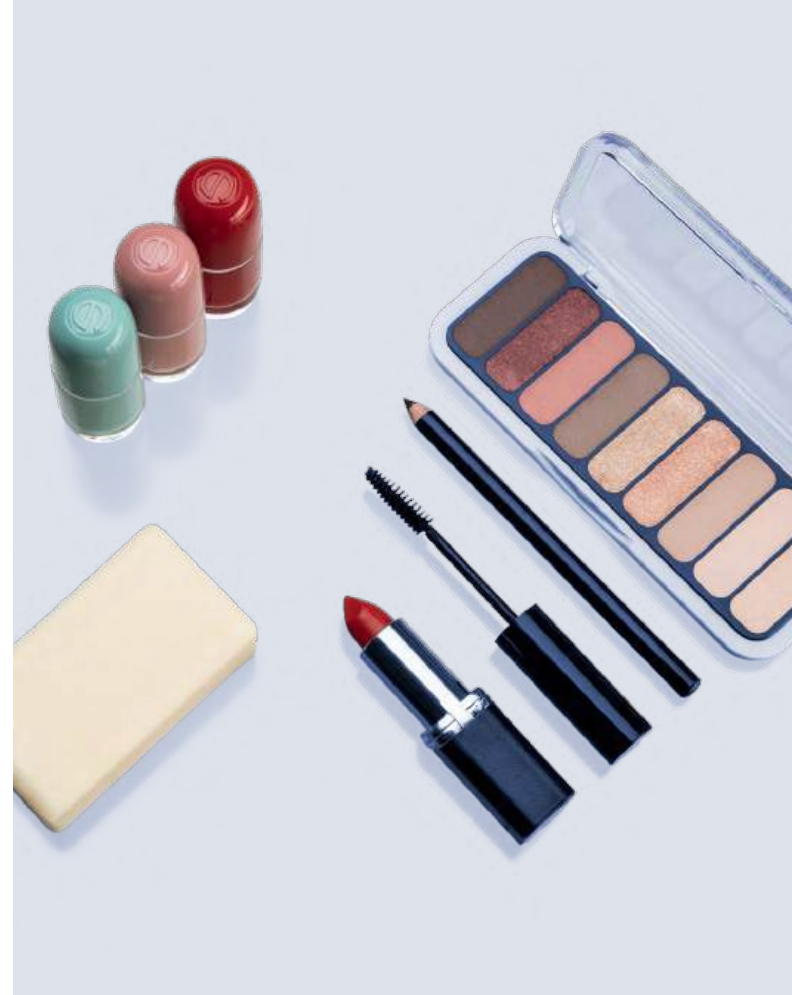
In electrophoretic light scattering (ELS), the speed of the particles is measured in the presence of an electric field. The faster the particles move, the higher the zeta potential of the particles. In general, a greater-magnitude zeta potential means that the particles will repel each other more strongly, giving a more stable suspension.

PARTICLE SIZE SPECIFICATIONS	
Particle analyzers	- Litesizer DLS 701 - Litesizer DLS 501 - Litesizer DLS 101
Measuring range	0.3 nm to 12 µm*
Sensitivity	0.1 mg/mL (lysozyme) lower than 0.00001 % (0.1 ppm, Latex 100 nm)
Max. sample concentration	50 % w/v (sample-dependent)
Accuracy	Better than ±2 % on NIST traceable standards
Repeatability	Better than ±2 % on NIST traceable standards
Min. sample volume	12 µL (Litesizer DLS 101) 1.5 µL (Litesizer DLS 701 and 501)
Measurement angles	175° (Litesizer DLS 101) 15°, 90°, 175° (Litesizer DLS 701 and 501)
Multi-angle particle sizing (MAPS)	Litesizer DLS 701

* Under laboratory conditions for Litesizer DLS 701 and 501. Litesizer DLS 101 0.3 nm to 10 µm.

ZETA POTENTIAL SPECIFICATIONS	
Particle analyzer	- Litesizer DLS 701 - Litesizer DLS 501
Measuring range	> ±1,000 mV
Size range	1.3 nm to 100 µm
Sensitivity	0.1 mg/mL (lysozyme)
Repeatability	±3 %
Max. sample concentration	70 % w/v (sample-dependent)
Sample volume	50 µL*
Max. sample conductivity	200 mS/cm
Measurement angle	15°
pH range	2 to 12

*Sample viscosity dependent



Particle analyzers	- Litesizer DLS 701 - Litesizer DLS 501 - Litesizer DLS 101
Measuring time	10 s
Min. sample volume	15 µL (Litesizer DLS 101) 1.5 µL (Litesizer DLS 701 and 501)

Cuvettes

Litesizer DLS analyzers are compatible with a number of different cuvette types for measuring size, particle concentration, zeta potential, molecular mass and transmittance of particles dispersed in liquids and the refractive index of the liquid. The table below lists all the available cuvettes and their major measurement applications.

Disposable cuvette	Glass cuvette	Quartz cuvette	Quartz low-volume cuvette	Uvette® low-volume cuvette	C-vette	Omega cuvette	Univette
↓	↓	↓	↓	↓	↓	↓	↓
							
APPLICATION (MEASURING PARAMETER)							
- Particle size, MAPS - Transmittance - Particle concentration	- Particle size, MAPS - Molecular mass - Transmittance - Particle concentration	- Particle size, MAPS - Molecular mass - Transmittance - Refractive index - Particle concentration	- Particle size, MAPS - Molecular mass - Transmittance - Particle concentration	- Particle size - Transmittance	- Particle size - Transmittance	- Zeta potential - Particle size - Transmittance	- Zeta potential - Particle size - Transmittance - Particle concentration
DETAILS							
- For aqueous solvents - Ideal sample volume: 1 mL (not less than 0.85 mL)	- For aqueous and organic solvents - Ideal sample volume: 1 mL (not less than 0.85 mL)	- For aqueous and organic solvents - Ideal sample volume: 1 mL (not less than 0.85 mL)	- For aqueous and organic solvents - Maximum volume: 45 µL - Minimum sample volume: 12 µL (when inserting a supporting plate into the module)	- For aqueous solutions and organic solvents - Minimum sample volume: 50 µL - Maximum sample volume: 2 mL	- For aqueous solutions only - Minimum sample volume: 1.5 µL	- Disposable cell - For aqueous solutions only - Minimum sample volume: 650 µL	- For aqueous solutions and organic solvents* - Minimum sample volume: 50 µL - Chemical resistance - Reusable - For highly concentrated samples
Cuvette compatibility with Litesizer DLS 701							
✓	✓	✓	✓	✓	✓	✓	✓
Cuvette compatibility with Litesizer DLS 501							
✓	✓	✓	✓	✓	✓	✓	✓
Cuvette compatibility with Litesizer DLS 101							
✓	✓	✓	✓	✓	×	×	✓
Legend: ✓ Compatible × Not compatible							

*Refer to the supplier material data sheet for the list of compatible solvents.

The scientist is using the 'Omega cuvette zeta potential' software. The interface shows the following data:

Parameter	Value
Acquisition time	4.410
Acquisition date	6/27/2024
Acquisition time	200.0
Acquisition time	53.3
Mean zeta potential	-19.3 mV
Standard deviation	0.2 mV
Point isoelectric mobility	-1.5038 $\mu\text{m}^2/\text{Vs}$
Conductivity	0.647 mS/cm
Discharge peak	-17.8 mV
Protonated ions	100
Also can obtain	Reached

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Conductivity	0.647 mS/cm
Discharge time	-17.8 mV
Proportion ratio	100
Auto run status	Reached

Kalliope is compatible with Anton Paar particle-sizing instruments. From laser diffraction and dynamic image analysis, to DLS and ELS, it's all performable with the same software. Forward planning delivers continuous updates and improvements. New functions and features are frequently added as per user requirements

Accessories

For automation, the Litesizer DLS series can be equipped with a dosing system and a flow module.



Flow Module FM11:

FM11 enables the automatic size and zeta potential measurements of dispersed samples under varying pH conditions. It can be installed on Litesizer DLS 701 and Litesizer DLS 501 instead of the general batch module BM11, which accommodates cuvettes for single measurements. The flow module can also be used for single measurements in standard cuvettes, so it's a versatile solution for a wide variety of applications.



Optical filters:

The Litesizer DLS 701 and 501 can be equipped with fluorescence, horizontal or vertical polarization filters in any of the three measurement angles. This allows for maximum flexibility and covers not only single angle DLS measurements, but also multi-angle particle sizing and concentration measurements.

Dosing system:

The Dosing System is an optional accessory for Litesizer DLS 701 and 501 that automates the adjustment of the sample's pH and enables the determination of the isoelectric point directly in the measurement cuvette. Fast and accurate characterization of zeta potential and particle size changes in response to pH are now possible, and the tedious process of adjusting the pH manually between every measurement can now be avoided. Automating this process not only saves time and effort but, most importantly, also reduces human error.

Litesizer DLS Series



Product compliance	Laser class 1, EN 60825-1:2014 and CDRH, LVD, EMC, RoHS
Light source	Semiconductor laser / 40 mW, 658 nm
Detector	Avalanche photodiode (APD)
Temp. control range	0 °C to 120 °C
Operating temp.	10 °C to 35 °C
Humidity	35 % to 80 % non-condensing
Dimensions (WxDxH)	450 mm x 505 mm x 135 mm
Weight	Approx. 18 kg (40 lbs)
Power consumption	50 W

Trademarks Kalliope (EU: 012709391), (UK: UK00912709391) Litesizer (EU: 011695491), (UK: UK00911695491)

Background Knowledge and Support

Your guide to particle size and zeta potential determination

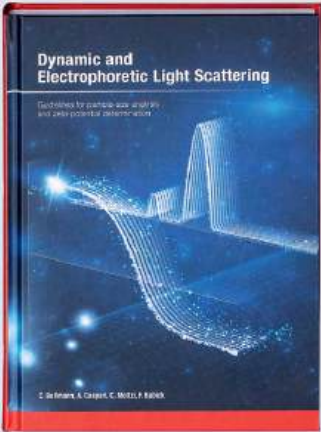
Your guide to dynamic and electrophoretic light scattering introduces particle size and zeta potential analysis theory. It includes useful information for properly preparing suspensions and emulsions, choosing measurements, and interpreting results.

Access our knowledge collection

Learn more about Litesizer DLS in application reports and on the Anton Paar wiki. Join our live webinars or listen to recordings.

Contact our experts

Anton Paar has more than 30 subsidiaries and numerous partners worldwide. An expert is always close by and happy to help, in your language, free of charge. Call us for advice on sample preparation and measurement or to discuss specific particle characterization challenges.



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