



*Customizable Family of Analyzers for Measuring
Particle Sizing, Zeta Potential, and Molecular Weight*

Rapid, Reliable, and Accurate Analysis

Characterizing proteins, nanoparticles, and polymers confronts the user with a difficult choice of instrumentation. Brookhaven Instruments makes that choice easier with the NanoBrook series of instruments. Choose from particle sizing including backscatter for proteins, Zeta Potential, or combinations including molecular weight determination of small polymers and proteins.

- » **Dynamic Light Scattering (DLS)**
Range: 0.3 nm to 15 μ m
Three measurement angles to choose from
- » **Speed and Efficiency**
Rapid and accurate nanoparticle size distributions
- » **Industry Compliant**
Multimodal & unimodal size distribution software
ISO 13321 and ISO 22412 compliant results
- » **Powerful and Cool**
High power 40 mW temperature-controlled semiconductor laser
Temperature control, -5 $^{\circ}$ C to 110 $^{\circ}$ C
- » **Phase Analysis Light Scattering (PALS)**
1,000 times more sensitive than other Zeta Potential techniques
- » **Fits into Existing Labs**
Compact bench top unit, USB connection
- » **Valuable and Versatile**
Molecular weight determination (relative and absolute through Debye plot)
- » **Upgradable to suit a variety of research needs**
New functionality can be added to existing systems
- » **Electrophoretic Light Scattering (ELS)**
Standard method for measuring Zeta Potential in aqueous solvents
- » **Disposable Cuvettes**
Minimize cross contamination
- » **Easy to Use**
Built-in automatic procedures and parameters (SOP)



At Brookhaven, we're experts in Particle Characterization

Customized Solutions

The NanoBrook is configurable to suit a variety of particle characterization needs, including different combinations of sizing capabilities, Zeta Potential measurement, and molecular weight analysis. Your capabilities are even further expanded with several companion instruments and accessories. The NanoBrook series is an open platform that has been used globally in many different situations including quality control, research and development, biopharmaceutical testing, and much more. No two applications are the same, and we are happy to make sure that you get the best instrument for your needs.

Our products are all manufactured at our facility in Holtsville, New York. Please discuss your needs with your sales engineer or distributor, and we'll be happy to work on a solution that works for your unique situation. Visit our website for more information.



Customizable and Built to Order

No two test applications are alike. We offer a range of NanoBrook configuration options so you get the functionality you need. **We're happy to configure our systems to your specific needs.**

NanoBrook Configuration	Technology			Detection Angle			Includes Correlator
	DLS	ELS	PALS	90°	173°	15°	
90Plus	✓			✓			✓
90Plus Zeta	✓	✓		✓		✓	✓
90Plus PALS	✓	✓	✓	✓		✓	✓
173/173Plus	✓			✓	✓		✓
ZetaPlus		✓				✓	
ZetaPALS		✓	✓			✓	
Omni	✓	✓	✓	✓	✓	✓	✓

* 173Plus only

Dynamic Light Scattering (DLS)

Dynamic Light Scattering (DLS) is extremely versatile and is used in particle, protein, and polymer sizing. This method can be used to characterize both monodisperse and heterogenous materials. DLS is sensitive to even small amounts of aggregated material and is often used to verify the stability of formulation nanomaterials. In addition to measuring hydrodynamic size and translational diffusion, DLS can also be used to estimate the relative molecular weight of many conventional polymer-solvent pairs using known Mark-Houwink parameters to relate effective size to molecular weight.

Measuring Zeta Potential with ELS

The most traditional implementation of Electrophoretic Light Scattering (ELS) is laser doppler electrophoresis, where the motion of charged particles is observed to change in the presence of an applied electric field. The magnitude of this doppler shift is related to the surface charge of the material. This can be used to characterize colloidal particles and other charged nanomaterials. NanoBrook models that utilize ELS measure electrophoretic velocity which is then used to determine the Zeta Potential of the sample.

Phase Analysis Light Scattering (PALS)

PALS is a specialized subclass of electrophoretic light scattering. Unlike ELS, PALS can be utilized for very low mobility, low surface charge samples. Since these samples display such a weak electrophoretic response, the PALS technology is required in order to accurately measure these small shifts. This typically includes samples with low Zeta Potential or mobilities suspended in oils, organic solvents, and high-conductivity fluids.

Particle Sizing with 90° scattering

Measurements of traditional colloids are typically made at 90° scattering angle due to the unbiased results measured. For nanoparticles and proteins, IgG and peptides, these < 50 nm samples can be measured using the backscattering angle (173°) for best signal to noise and reproducibility of measurements.

Backscattering with 173°

The NanoBrook series offers an optional backscatter detection angle for the characterization of proteins, antibodies, nanoparticles, macromolecular assemblies, and other small sized particles ranging from less than 1 nm to 10 µm.

Aggregate Detection with 15° DLS

Zeta Potential measurements are always performed using the 15° detection angle to minimize diffusion broadening, but this forward-scatter angle can also be used to detect the presence of even small quantities of aggregated materials due to its heightened sensitivity to large particles.

General Specifications	
Laser	Standard Laser 40 mW red diode laser, nominal 640 nm wavelength
Condensation Control	Purge facility using dry air or nitrogen
Temperature Control	-5 °C to 110 °C, active control. No external circulator required.
Power Requirements	100/115/220/240 VAC, 50/60 Hz, 150 Watts
Dimensions	23.3 x 42.7 x 48.1 cm (HWD)
Weight	15 kg
Environmental Characteristics	Temperature 10 °C to 75 °C Humidity 0% to 95%, non-condensing
CE Certificate	Class I laser product, EN 60825-1:2001, CDRH

Specifications for Particle Sizing at 90°	
Sample Type	Most nanoparticle, and colloidal-sized materials, in any non-absorbing liquid
Size Range	1 nm to 6 µm diameter*
Sample Cells	1 to 3 mL disposable plastic, 50 µl disposable, 40 µl quartz flow cell, 10 µl quartz minimum
Concentration Range	2 ppm to 50 mg/mL*
Signal Processing	Dynamic Light Scattering (DLS)
Correlator	Brookhaven's TurboCorr, multitaup, research grade with 510 hardware channels, covering the equivalent of 1010 linearly-spaced channels, 100% efficiency, real-time operation over the entire delay-time range
Precision	± 1% typically
Scattering Angle	90°
Data Presentation	Average & width, lognormal fit, and multimodal size distribution standard
Test Standards	Conforms to ISO13321 and ISO22412

Specifications for Particle Sizing at 173°	
Sample Type	Most globular proteins, nanoparticles, and small polymers in any non-absorbing liquid
Size Range	<0.3 nm to 10 µm diameter*
Sample Cells	50 µl disposable, 1 to 3 mL disposable plastic, glass, or quartz cells
Concentration Range	0.1 ppm to 50 mg/mL*

Specifications for Zeta Potential	
Sample Type	Most nanoparticle, polymer and colloidal-sized materials, suspended in any non-absorbing liquid, with relative permittivity > 20 and viscosity <5 cP ELS; relative permittivity > 1.5 and viscosity < 30 cP PALS
Size Range Suitable for Zeta Measurement	1 nm to 100 µm*
Mobility Range	10 ⁻⁹ to 10 ⁻⁷ m ² /V·s ELS; 10 ⁻¹¹ to 10 ⁻⁷ m ² /V·s PALS
Zeta Potential Range	-500 to 500 mV*
Sample Cells	180 µl, 600 µl, 1250 µl
Maximum Sample Conductivity	220 mS/cm*
Signal Processing	Sizing: Dynamic Light Scattering (DLS) Zeta Potential: Electrophoretic & true Phase Analysis Light Scattering (ELS & PALS)
Precision	± 3%*
Scattering Angle	15°
Data Presentation	Doppler Frequency Shift (ELS), Phase (PALS), electrophoretic mobility, zeta potential using Smoluchowski, Hückel, or Henry
Concentration Range	40% v/v*

* sample dependent

About Brookhaven Instruments

Our talented team of scientists and engineers are dedicated to delivering the most accurate, reliable, and easy-to-use particle characterization instruments on the market. Our modular instrument design allows us to fully customize every aspect of our products, ensuring that our customers receive precisely what they need to meet their research goals. We are continuously improving our products based on feedback from customers, building on our legacy of innovation in particle science.

We strive to act as partners with our customers to ensure they get the most benefit and maximum value from their Brookhaven equipment. We offer extensive post-sale support to educate and empower customers. Whether you have questions about a specific function or are trying to set up a new experiment, our experts will be there to help you every step of the way.



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