WALLIS ζ

GMP
GENERAL MICROTECHNOLOGY & PHOTONICS

High resolution Zeta Potential Analyzer

When knowing particle charge counts !

IDEAL FOR

Liposomes and bio-colloids
Nanoparticle aggregation
Emulsions dispersion
Formulation stability
Pigments and inks
Pharmaceuticals
Petrochemicals
Polymers
… and more

CORDOUAN Technologies
Enlight the Nanoworld

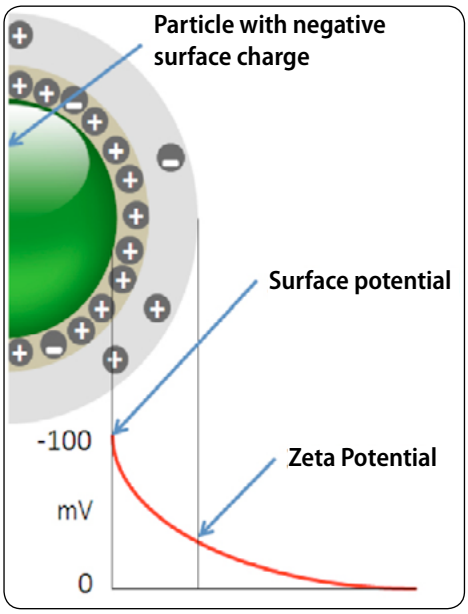
The WALLIS ζ

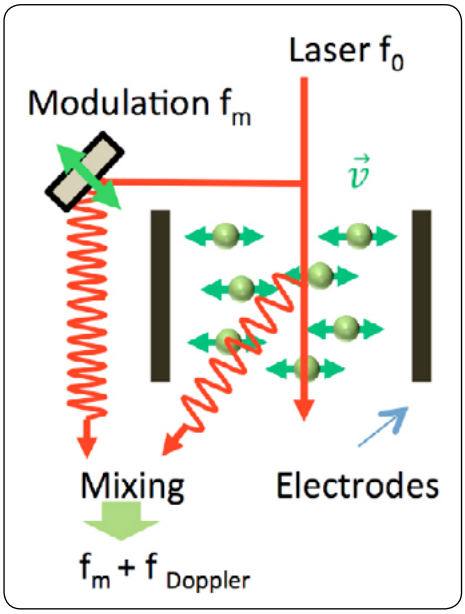
- Zeta potential : +/-200mV
- Particle size : 1nm - 100µm
- Resolution : 0,1mV (in water)

Wallis an instrument dedicated to Zeta potential

WALLIS ζ is an innovative **zeta potential analyzer** dedicated to the characterization of **nanoparticle suspensions**. It is based on a revisited and modern version of the **Laser Doppler Electrophoresis (LDE) technique** offering a unique and unequaled measurement resolution. It is complementary to the Cordouan's ***VASCO*** particle size analyzer to study colloidal solution stability and properties.

Zeta potential (ζ) is a fundamental properties of colloidal suspensions. Basically ζ is intimately related to the **number of electrical charges** attached to the surface of the particles when immersed in a solvent. It is thus **linked to particle-particle interaction and formulation stability** in a very complex way described by physical models like the Electrical Double Layer (EDL).





Download technical notes
www.cordouan-tech.com

$$\mu_e = C^{st}(Scat) \times f_{Doppler}$$
$$\zeta = C^{st}(Solvent) \times \mu_e$$

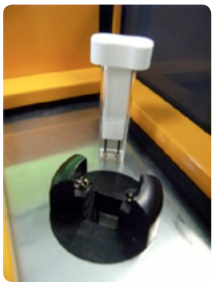
Measurement principle

WALLIS ζ works on a modern and innovative evolution of the well known and robust technique called **Laser Doppler Electrophoresis (LDE)**.

Basically, an alternative electrical field/voltage is applied between two electrodes immersed deeply in the colloidal suspension; Because of the electrostatic force, the charged particles located in between the electrodes undergo a translation motion (**electrophoresis**) which speed (v) is directly proportional to the applied electrical field by a factor μ_e called the **electrophoretic mobility**.

This parameter μ_e is determined in a very accurate manner by measuring the corresponding Doppler frequency shift $f_{Doppler}$ using a high sensitivity optical heterodyne interferometer scheme.

Measurement Cell design : simple, robust, artifact free



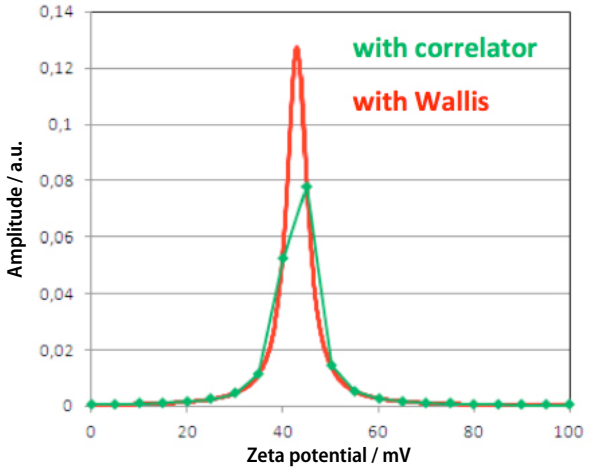
Simple : The dip cell design allows simple and easy **sample preparation** and prevents bubble formation. It is compliant with standard cuvette and available in different materials: polystyrene, glass or quartz fully **compatible with organic solvent**.

Robust : The **innovative vitreous carbon electrode** provides **long life, oxidation free** electrodes that can be easily cleaned by standard process like ultrasonic bath or acid-base washing.

Artifact free : ***WALLIS*** ζ **optimized dip cell electrodes design** prevents from artifact like electro-osmosis effects by suppressing solvent induced displacement along the wall of the cuvette; No software correction is needed to the measured signal

WALLIS$^{\zeta}$ technology led to its best

Think « out of the box » for high resolution measurement



***WALLIS*$^{\zeta}$** performances comes from an original design, a subtle combination of advanced optoelectronic technologies and high speed data acquisition systems, getting rid of the limiting correlation approach. This makes ***WALLIS*$^{\zeta}$** a unique Zeta potential analyzer with an unequaled resolution:

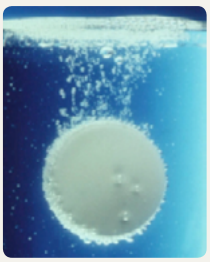
- Electrophoretic mobility up to $10^{-10} m^2/V.s$ resolution
- Zeta potential up to 0,1 mV resolution (in water)

10 times higher resolution !

Key benefits

- ✓ No electro-osmosis ⟶ Artifact free measurements
- ✓ Improved LDE technology (LDE) ⟶ Efficient, reliable and simple
- ✓ Enhanced resolution ⟶ 10 times better than usual correlation technology
- ✓ High-resolution measurement ⟶ Accurate and repeatable zeta potential analysis
- ✓ Easy to use and intuitive graphical user interface (GUI) software ⟶ Turn key operation
- ✓ New material for long life electrodes ⟶ Reduced maintenance and consumable; cost effective
- ✓ Designed for standard disposable and quartz cuvette ⟶ Easy to fill; compatible with organic solvents and high-pH suspensions

High performances for advanced applications


Pharmaceutical


Cosmetics


Chemistry


Advanced colloid


Polymer

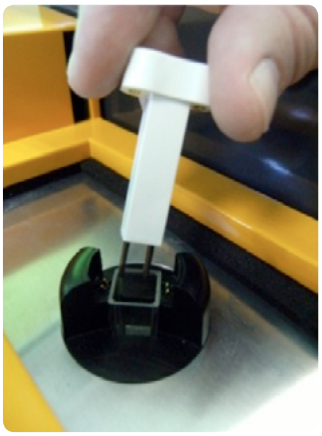
- Functionalization study
- Drug delivery optimization
- Quality control in manufacturing process
- Fundamental study of electrophoretic physics
- Cosmetic and industrial emulsion stability study
- Nanoparticle formulation and synthesis optimization
- Advanced colloidal stability analysis and optimization
- Ink pigment dispersion and aggregation characterization

And more...

Zeta potential [mV]	Stability behavior of the colloid
from 0 to ±5	Rapid coagulation or flocculation
from ±10 to ±30	Incipient instability
from ±30 to ±40	Moderate stability
from ±40 to ±60	Good stability
more than ±61	Excellent stability

WALLIS ζ

Specifications	
Zeta potential range	-500 mV to 500 mV
Mobility range	10^{-10} to 10^{-7} $m^2/V.s$
Particle size (For zeta measurement)	1 nm up to 100 µm
Sample concentration	0.0001% to 10% w/% (solvent dependent)
Temperature control range inside the cell	10°C to 70°C +/-0,1°C (depending on cuvette cell material)
Cell options	Cuvette cell with optical quality windows compatible with organic solvents
Sample volume	Typically 750 µL (Hellma cell – 10 mm light path)
Maximum sample conductivity	300 mS/cm
Sample Type	Aqueous & organic solvents – pH: 1-14 (depending on cuvette cell material)
Signal processing	
Measurement technology	Laser Doppler Electrophoresis (LDE)
Laser source	Highly reliable 20 mW diode @635 nm coupled to automated optical attenuation system. Other wavelengths available upon request
Measurement angle	Single angle for zeta potential at 17°
Data processing algorithm	Fast Fourier Transform
Resolution	Mobility = 10^{-10} $m^2/V.s$ or Zeta = 0,1 mV (in water)
Detector	Avalanche Photodiode – APD
General	
Computer interface	USB 2.0 – Windows XP, Seven
Dimensions	33 cm x 33 cm x 38 cm (HWD)
Weight	16 kg
Power	100-115/220-240 VAC, 50/60 Hz, 100 W max
System Compliance	
CE certification	CE marked product - Class I laser product, EN 60825-1:2001, CDRH
ISO norm	ISO 13099-2 : 2012 – Colloidal system – methods for zeta-potential determination Part 2 : Optical methods



Simple, easy and high-resolution zeta potential analyzer

www.gmp.ch

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