WALLIS

High resolution zeta potential analyzer

When knowing particle charge counts !

IDEAL FOR

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

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CORDOUAN Technologies

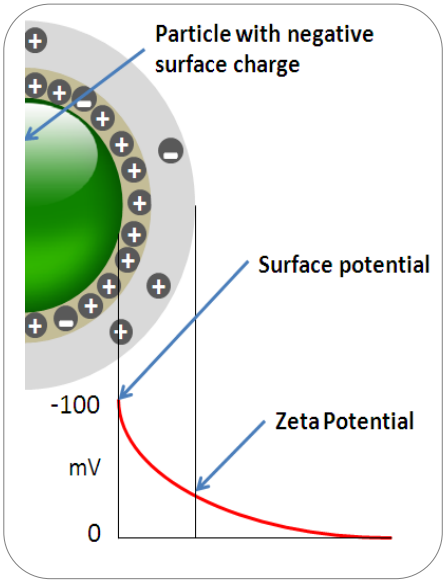
The Wallis

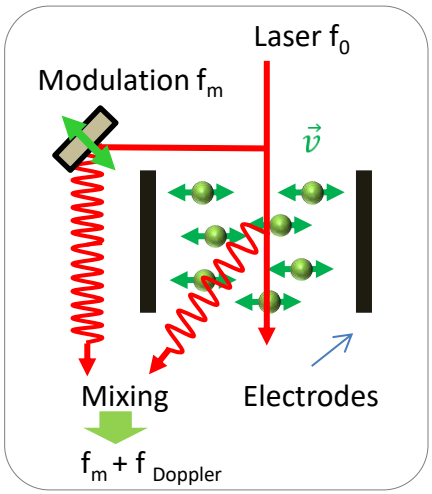
- Zeta potential : +/-500mV
- Particle size : 1nm ~ 100µm
- Resolution : 0,1mV (in water)

Wallis an instrument dedicated to Zeta potential

WALLIS$^{\zeta}$ 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).





Measurement principle

WALLIS$^{\zeta}$ works on a modern and innovative evolution of the well known and robust technique called **Laser Doppler Electrophoresis (LDE).**

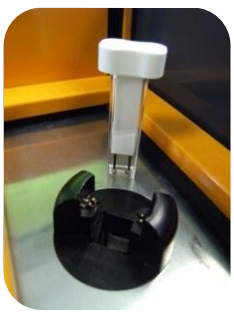
Basically, an alternative electrical field/voltage is applied between two electrodes immersed deeply in the colloidal suspension; Because of the electrostatic force, the charged particles located in between the electrodes undergo a translation motion (**electrophoresis**) which speed (v) is directly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

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

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

Measurement Cell design : simple, robust, artifact free



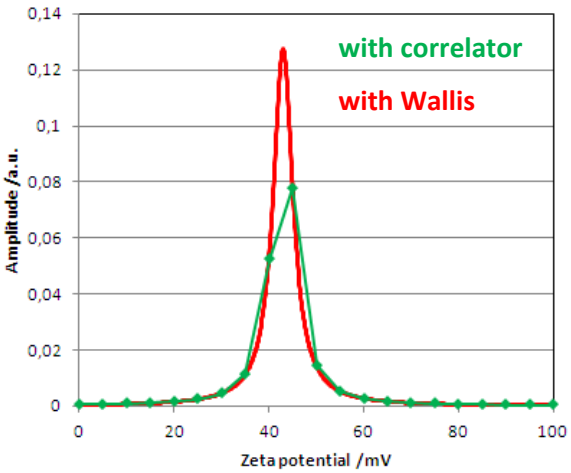
Simple : The dip cell design allows simple and easy **sample preparation** and prevents bubble formation. It is compliant with standard cuvette and available in different materials: polystyrene, glass or quartz fully **compatible with organic solvent.**

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$^{\zeta}$ **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 ζ 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

Specifications & main characteristics

SPECIFICATIONS	
Zeta potential range	-500 mV to 500 mV
Mobility range	10-10 to 10-7 m2/V.s
Particle size (for zeta measurement)	1 nm up to 100 µm
Sample concentration	0.0001% to 10% (w/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} m²/V.s or Zeta = 0,1 mV (in water)
Detector	Avalanche Photodiode – APD
HARDWARE	
Computer interface	USB 2.0 – Windows 2007 or newer
Weight	16 kg
Dimensions	33 x 33 x 38 cm^3 (LxWxH)
Power supply	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

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