

# WALLIS<sup>z</sup>

## ZETA POTENTIAL MEASUREMENTS

### *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



Enlight the Nanoworld

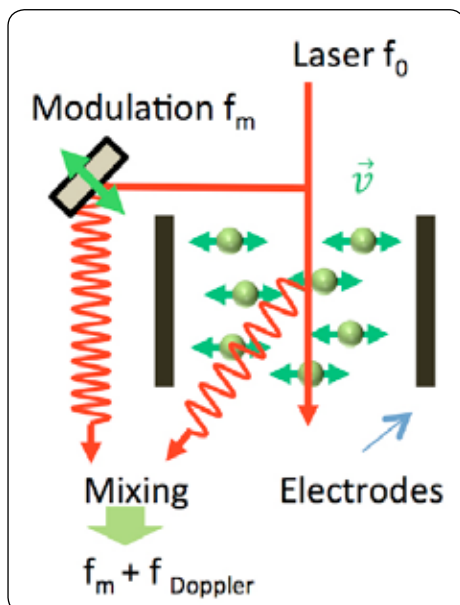
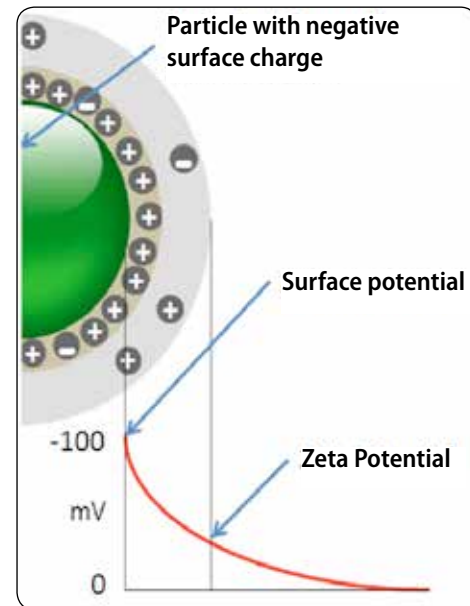


- Zeta potential : +/-200mV
- Particle size : 1nm - 100μm
- Resolution : 0,1mV (in water)

## Wallis an instrument dedicated to Zeta potential

**WALLIS<sup>ζ</sup>** 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 unequalled 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 property 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](http://www.cordouan-tech.com)

## Measurement principle

**WALLIS<sup>ζ</sup>** 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  $\mu_e$  called the **electrophoretic mobility**.

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

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

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

## 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**.

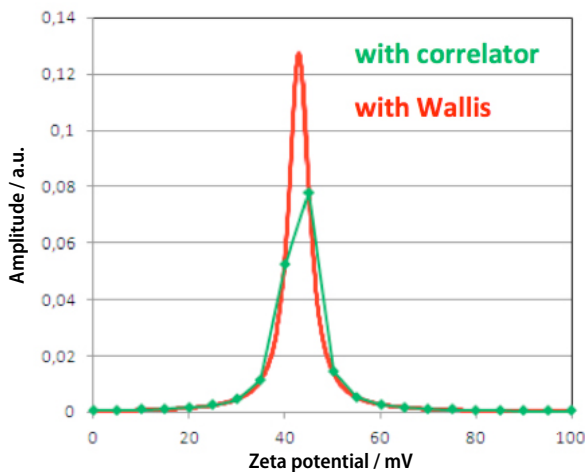
**Robust :** The **innovative vitreous carbon electrode** provides **long life, oxidation free** electrodes that can be easily cleaned by standard process like ultrasonic bath or acid-base washing.

**Artifact free :** **WALLIS<sup>ζ</sup> 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<sup>ζ</sup> technology led to its best

## Think « out of the box » for high resolution measurement



**WALLIS<sup>ζ</sup>** performance 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<sup>ζ</sup>** a unique Zeta potential analyzer with an unequalled resolution:

- » Electrophoretic mobility up to  $10^{-10} \text{m}^2/\text{V.s}$  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 $\pm 5$	Rapid coagulation or flocculation
from $\pm 10$ to $\pm 30$	Incipient instability
from $\pm 30$ to $\pm 40$	Moderate stability
from $\pm 40$ to $\pm 60$	Good stability
more than $\pm 61$	Excellent stability

## Zeta potential analyzer

### Specifications

Zeta potential range	-500 mV to 500 mV
Mobility range	$10^{-10}$ to $10^{-7}$ m <sup>2</sup> /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

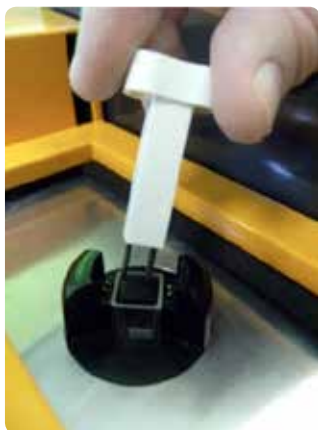
Measurement technology	Laser Doppler Electrophoresis (LDE)
Laser source	Highly reliable 20 mW diode @635 nm coupled to automated optical attenuation system. Other wavelengths available upon request
Measurement angle	Single angle for zeta potential at 17°
Data processing algorithm	Fast Fourier Transform
Resolution	Mobility = $10^{-10}$ m <sup>2</sup> /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**

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