

Advanced solutions for nanoparticle characterization

Z_{av} Size and aspect ratio

ζ Charge and zeta potential

In situ / In line measurements

Process monitoring

Δt Kinetic

M_r Molecular weight



GMP
PHOTONICS & MICROTECHNOLOGY

CORDOUAN

Enlight the nanoworld

Technologies

About us

CORDOUAN Technologies is a French SME based in Bordeaux. Our company is specialized in the design, manufacturing and commercialization of innovative & advanced solutions for the nanoparticle and colloidal media characterization. After many years of progress and innovation, many recognized academic research laboratories and famous industrial company, French and international, have trusted us and are now using our instruments in very wide range of applications, such as microbiology, life science, bio-pharma, cosmetics, nano-medicine, petroleum, energy production, transformation and storage, functionalized inks & printing, nano polymers, environment, etc.

Innovation is at the heart of our development process. We propose to our customers advanced and innovative solutions to match their needs, including the customization of the instruments to match the application. We'll be proud to help you to make great developments and advanced science.

2007

VASCO

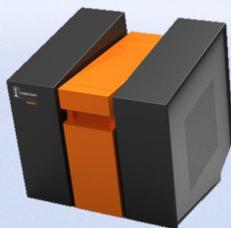
DLS for concentrated and absorbing samples



2013

WALLIS

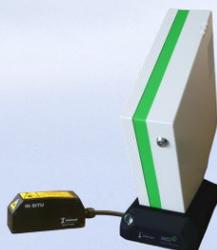
High-resolution *zeta potential*



2017

VASCO KIN

In situ contactless *DLS*



2019

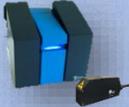
AMERIGO PLUS

3 in 1
DLS & Zeta
potential



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ELMO	

		 VASCO	 WALLIS	 VASCO KIN	 AMERIGO	 AMERIGO PLUS
Type of measurements	Size	Y	N	Y	Y	Y
	Zeta	N	Y	N	Y	Y
	SLS/M _w	N	NA	Y	Y	Y
	MADLS	N	NA	Y ⁽¹⁾	N	Y ⁽²⁾
Configurations	In situ	N	NA	Y	N	Y
	In line	N	NA	Y ⁽³⁾	N	Y ⁽³⁾
	Temp. Control	Y	Y	Y ⁽⁴⁾	Y	Y
	High conc.	Y	NA	Y ⁽⁵⁾	N	Y ⁽⁵⁾
	Remote control	N	N	Y ⁽⁶⁾	N	Y ⁽⁶⁾

(1): Goniometer head option : continuous detection between 30° and 160°

(2) AMERIGO Plus: 4 angles are available 17°, 90°, 170° and 130° with milli-fluidic head

(3) External milli-fluidic head option

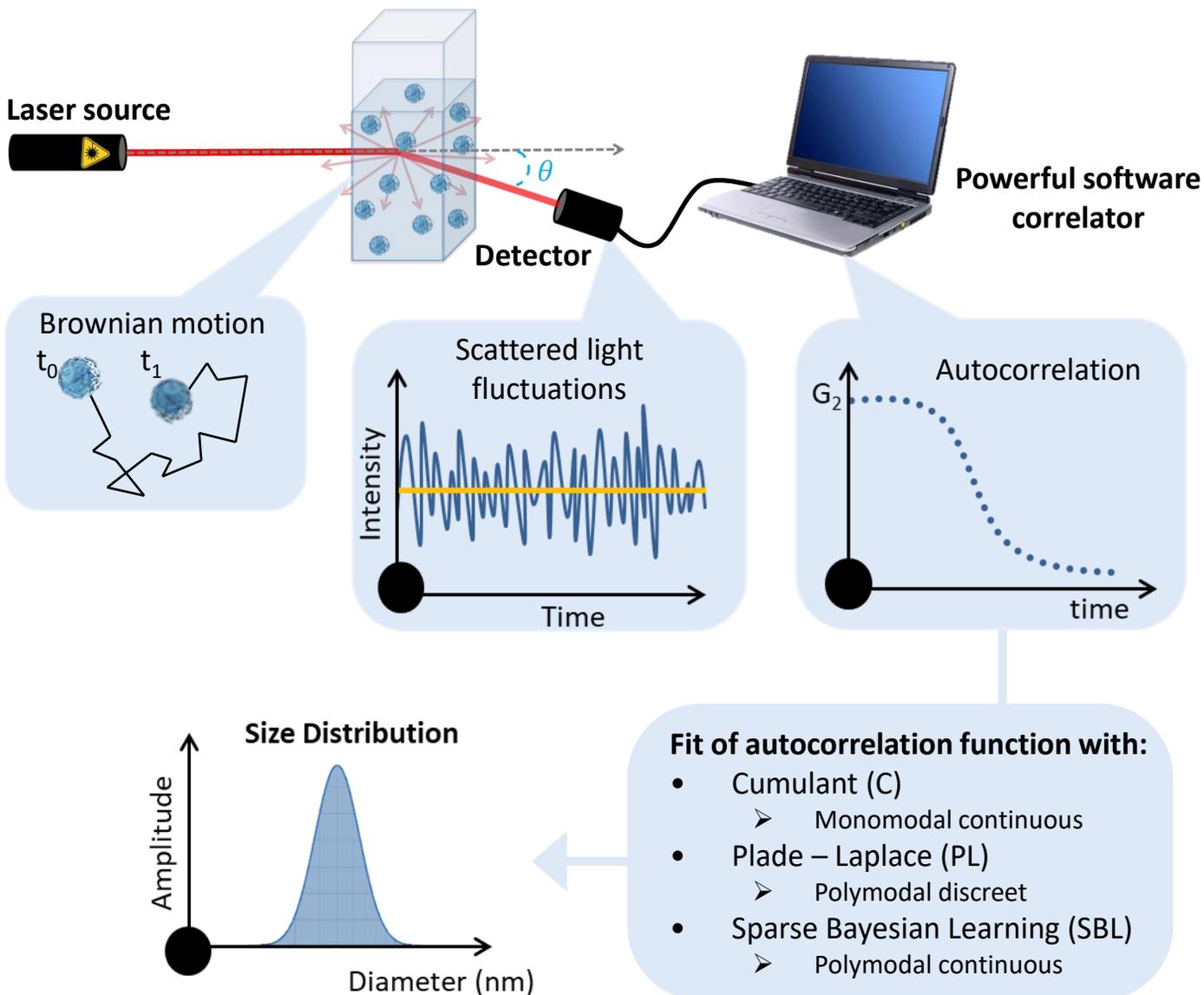
(4) External thermalized head option

(5) External DTC head option

(6) NanoKin software is provided with a DLL and SDK compatible with Python environment

Nanoparticle size measurements using Dynamic Light Scattering

Dynamic Light Scattering (DLS) uses Brownian motion of tiny objects (nanoparticles, macromolecules or their assemblies) in a solvent in order to measure their size distribution. **Launching a laser into these objects** and looking at the scattering light in a specific direction allows analyzing their size distribution.



VASCO



- ✓ Absorbing suspensions
- ✓ Opaque samples
- ✓ Concentrations from 0,0001%* to 40%*
- ✓ Minimal volume of 50 μ L
- ✓ No cuvettes needed
- ✓ Solvent-proof sample cell
- ✓ Polymodal and complex sample analysis Using NanoQ software

*Sample dependent



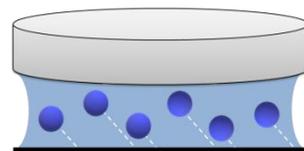
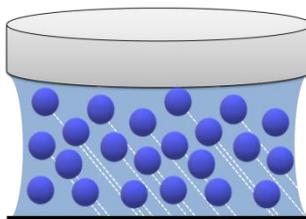
Dual Thickness Controller (DTC)

Technology transfer from the French Institute of Petroleum



Multiple scattering

Measurements within thin layer



Position UP

Position DOWN

for diluted suspensions

for concentrated suspensions

Suitable for size determination within:

- Nanoparticle suspensions
- Polymer and protein solutions
- Petroleum
- Ink and pigment dispersions
- Cosmetics
- Dispersions used in batteries and energy storage elements



VASCO Kin

In situ, contactless measurements in any container

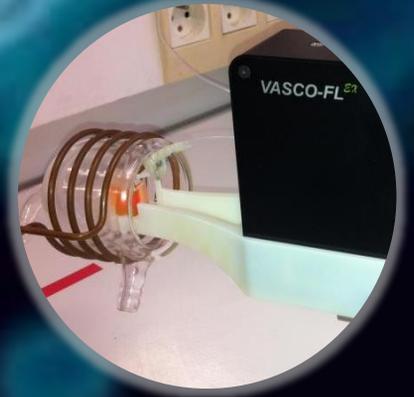
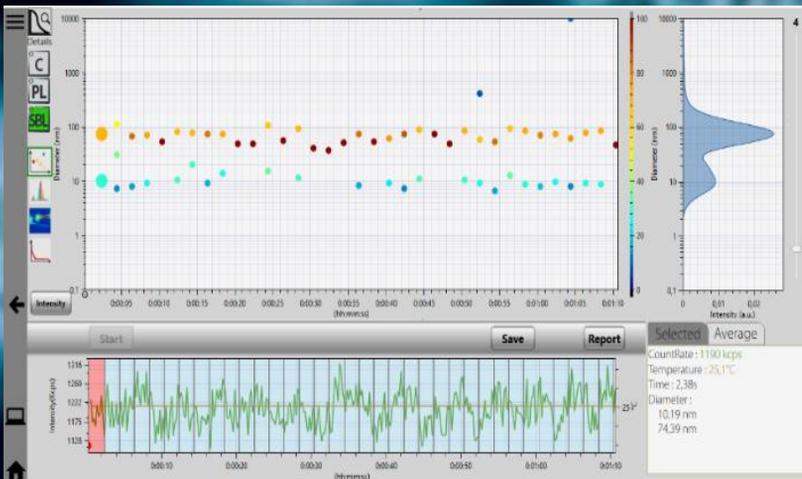
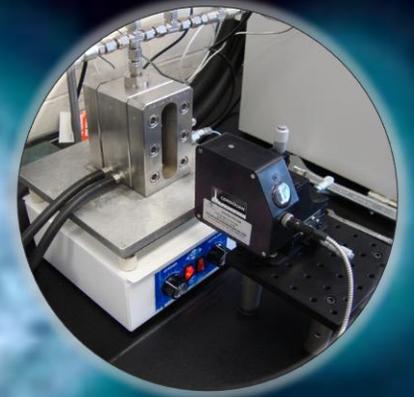
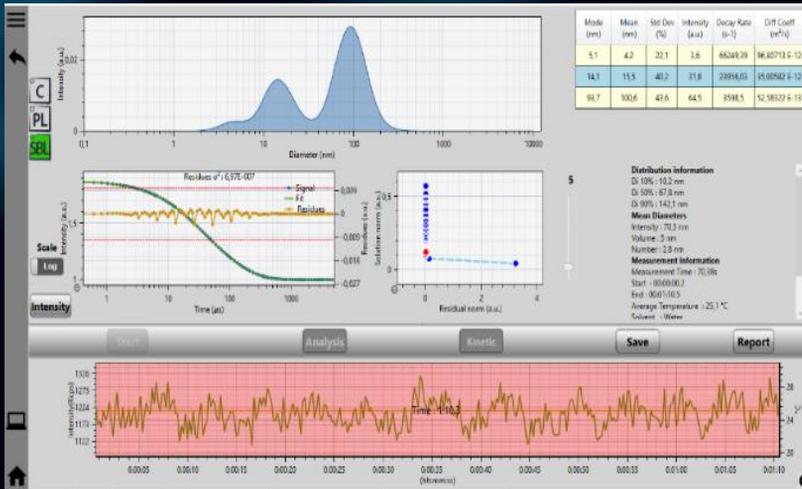
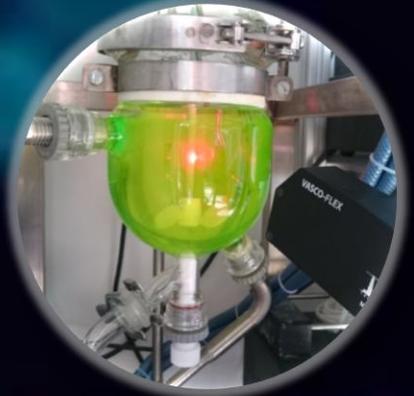
- ✓ Real-time correlation thanks to powerful software correlator
- ✓ Compact and ergonomic
- ✓ Suitable for coupling with other instruments



Contactless measurements allow you:

- Minimize contact with toxic samples
- Measure at extremely high temperatures or pressures
- Measure under application of external fields

Unique data analysis functionalities



External heads

Can be connected via optical fiber output

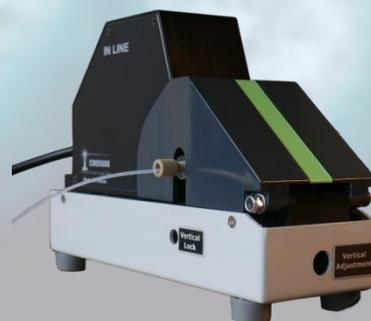
***In situ* remote head**

- Contactless in situ measurements
- Harsh environment, high pressure or temperature
- Toxic samples
- Industrial process control
- Monitoring of NP growth/kinetic of the process
- Non-invasive measurements



Milli-fluidic In Line remote head

- In-line measurements
- Size distribution of your formulation at the outlet of your microfluidic chip
- Real-time control of your formulation at various flow rates
- Interchangeable glass milli-fluidic channels



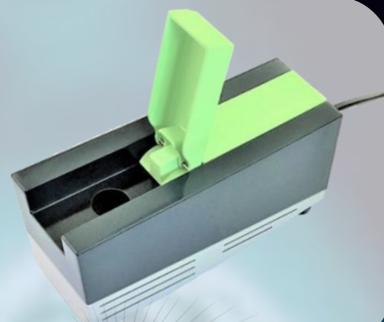
Dual Thickness Controller (DTC) remote head

- Highly concentrated and opaque samples
- Measurements in limited space environments
- No consumables
- No artifacts
- Extended concentration range



Thermalized remote head

- Batch measurements
- Temperature regulated cell
- Measurements in limited space environments
- No risks of cross- contamination
- Compatible with organic solvents

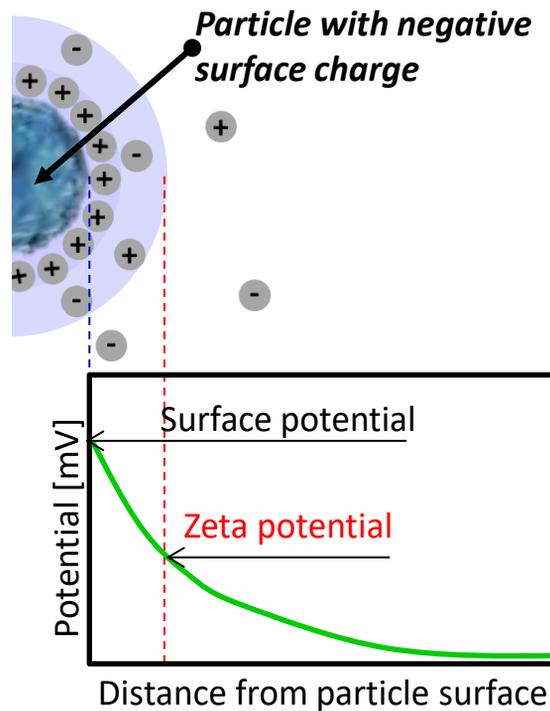


Zeta potential measurements for colloidal stability analysis

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 immersed in a solvent. Thus, it is linked to particle-particle interaction and formulation stability in a very complex way described by physical models like the Electrical Double Layer (EDL).

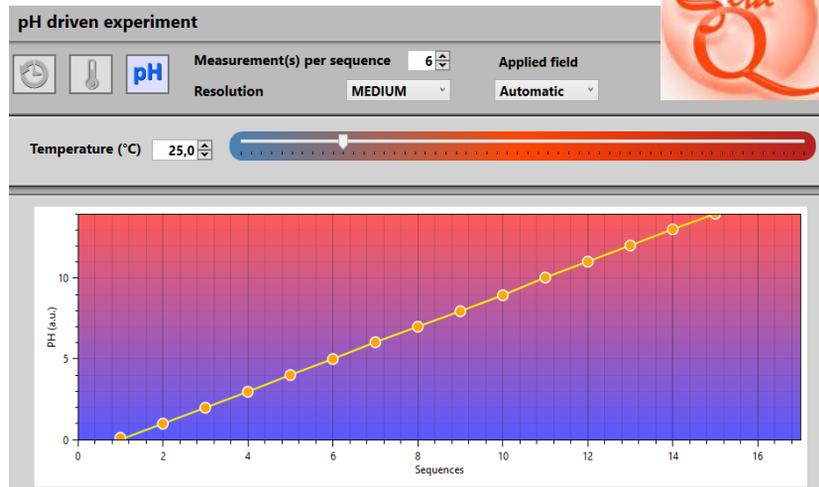
An electric field (E) application on charged particles provokes their motion together with strongly attached to them ions. This motion is determined as the **electrophoretic mobility (μ_e)** and **zeta potential is proportional to it.**

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

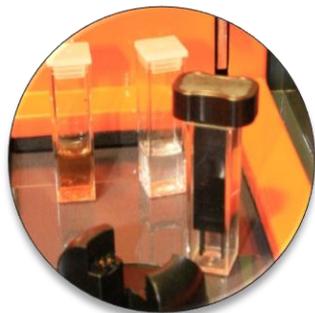


With WALLIS ζ you will get:

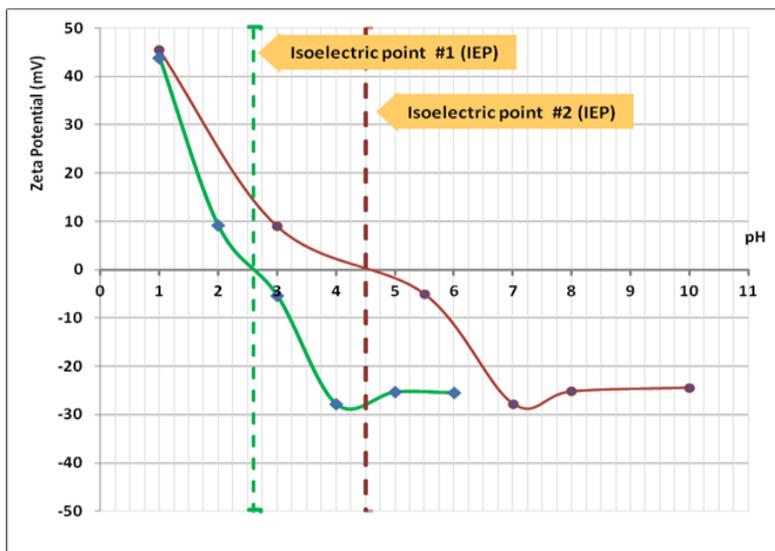
- 10 times better resolution thanks to **high-speed digital acquisition**
 - Accurate and repeatable zeta potential analysis with **resolution < 0.5 mV**
- User-friendly **ZetaQ software**:
 - Standard operating procedure and programmable experiments (Time, T°, pH)
 - Data comparison, isoelectric point location and kinetic
 - Database of your experiments



WALLIS ζ zeta potential analyzer



- Designed for standard cuvettes **dip-cell vitreous carbon electrodes** :
 - No electro-osmosis effect during your measurements
 - Easy to fill and clean
 - Long life and high chemical resistance
 - Compatible with organic solvents & high-pH suspensions
 - Reduced maintenance & consumables



Colloidal stability and isoelectric point (IEP) determination with 0,1 mV* resolution in the range of ± 500 mV

WALLIS can be used for:

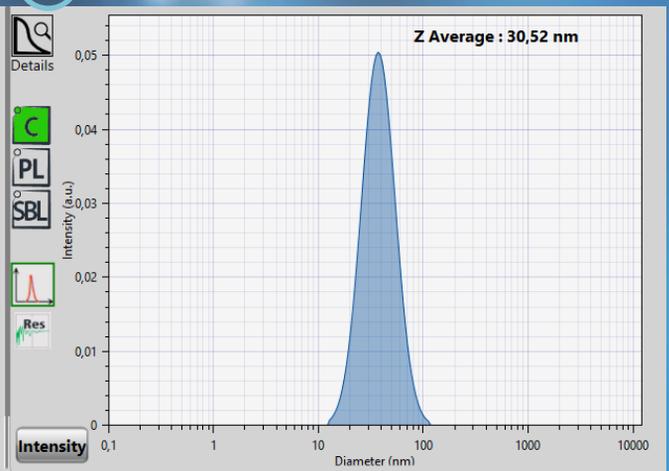
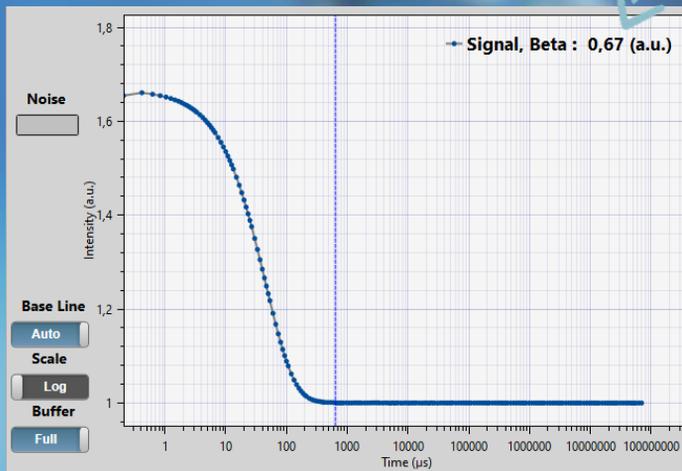
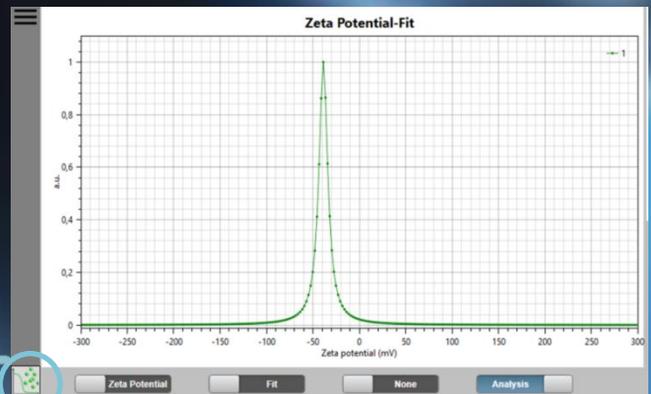
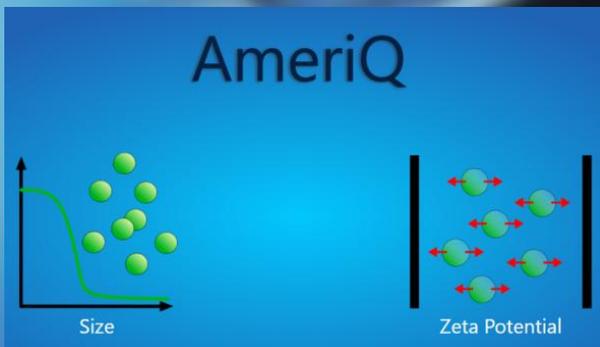
- ❑ Formulation & functionalization studies
- ❑ Drug delivery optimization
- ❑ Quality control in manufacturing process
- ❑ Fundamental study of electrophoretic physics
- ❑ Cosmetic and industrial emulsion stability study
- ❑ Ink pigment dispersion and aggregation characterization

And more....

AMERIGO

3 in 1 instrument

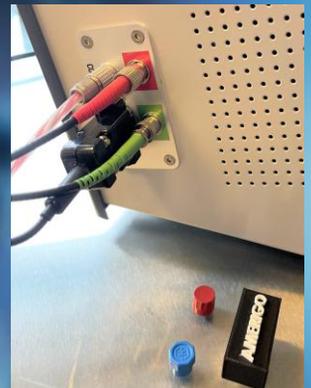
- Measurements of particle size and zeta potential in same cuvette (170°, 17°, 90°) *
- Powerful software correlator:
 - Real-time correlation
 - Kinetic
 - Data post-analysis and comparison
- AmeriQ software allow you switch between size or Zeta potential measurements thanks to one single click



→ **AMERIGO Plus:** Optical fiber output: compatible with external remote heads***:

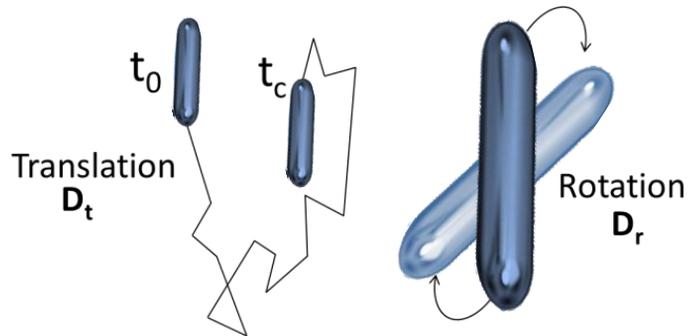
- In situ remote head (included)
- Milli-fluidic remote head**
- DTC remote head**

* for AMERIGO Plus model 3 angles, For AMERIGO 2 angles
 ** Optionally can be added for DLS measurements
 *** For more details check page 6

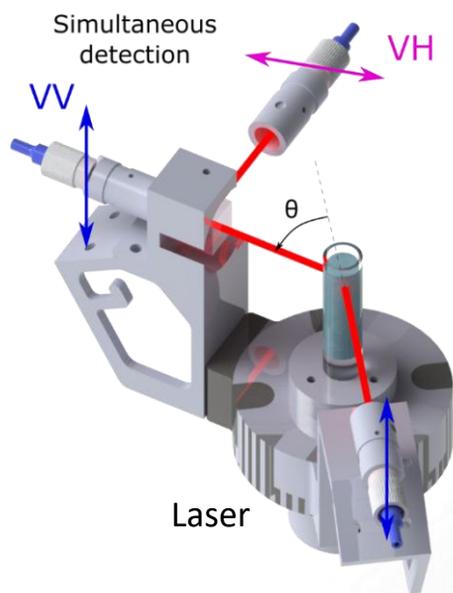


Depolarized Dynamic Light Scattering for anisotropic particle characterization

The Brownian motion of **anisotropic particle** is affected not only **by their size**, but also **by their shape**. Thus, their random motion mathematically can be described by a translation diffusion coefficient (D_t) and a rotational diffusion coefficient (D_r) respectively.

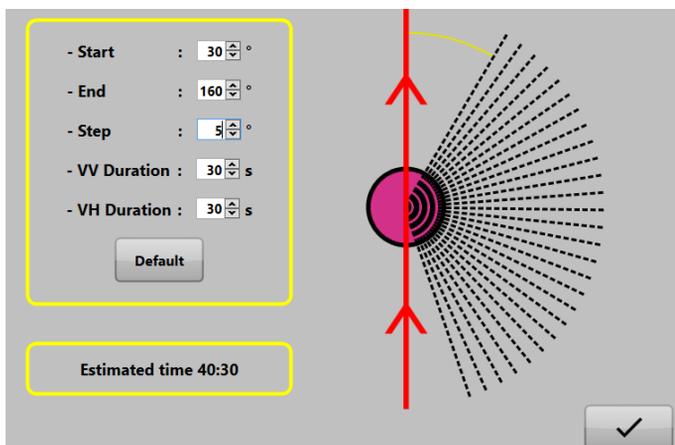


Using depolarized light and a judiciously improved DLS setup, it becomes possible to measure D_t and D_r to calculate the **size and aspect ratio of the anisotropic particles**.



Using the **polarization filter in combination with Goniometer head**, focuses polarized incident laser beam inside spherical cuvette with sample to be analyzed. Then it collects at **different angles (θ)** using a compact motorized goniometer with two distinct detection channels set with polarizers, allowing to **measure vertically polarized (v-v) and horizontally depolarized (v-h) scattered light separately**.

In the case of anisotropic particles, one can show that v-v and v-h detection channels leads to two different Auto-Correlation Functions (ACF) and to two different diffusion coefficients, which give information about the **length, the width and the aspect ratio of particles**.



Continues measurements at angles between 30° and 160°

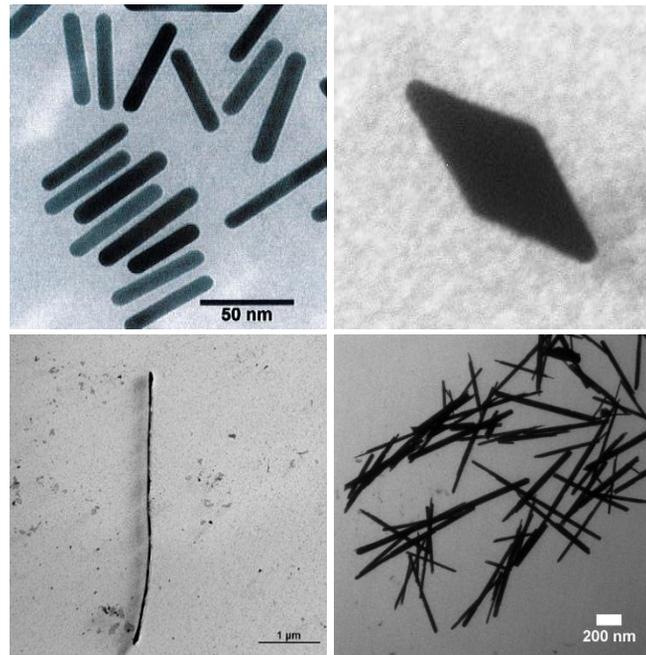
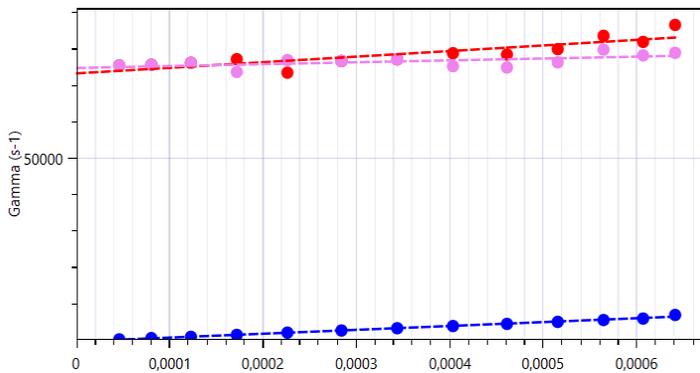
Goniometer

Multiangular DLS & D-DLS

- Time-resolved DLS**
 - ✓ Particle size distribution
 - ✓ Kinetic
- Time-resolved D-DLS**
 - ✓ Detection of the particle shape anisotropy
 - ✓ Determination of particle length, width and aspect ratio
- Continuous multi-angle SLS**
 - ✓ Molecular weight
 - ✓ Radius of gyration
 - ✓ Bare diameter



Analysis of complex samples using Vasco KIN instrument



In combination with polarization filter, DDLS is developed to be used for analysis of non-spherical particles :

- Efficient solar cell materials
- New optical materials
- Nanocrystals for structural improvement
- Magnetic NPs for imaging

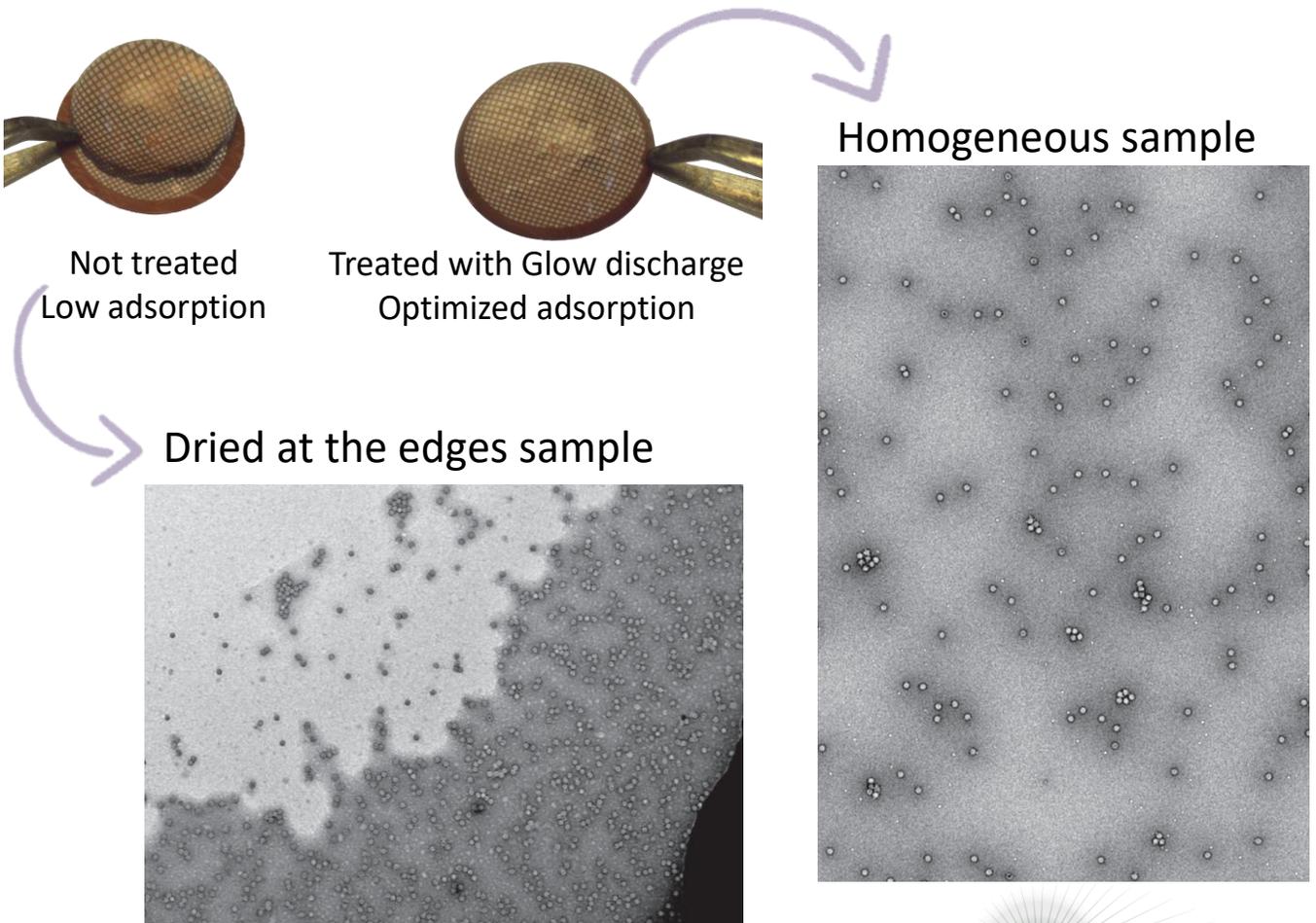
ELMO

Glow Discharge system for TEM/SEM grids preparation



System based on J. Dubochet's method, implemented by J.C. Homo. It was developed together with the IGBMC and ICS laboratories.

A treatment with a specific gas atmosphere will modify the surface properties of TEM support films or grids in order to optimize the adsorption of the solutions to spread.



Ideal for preparation of the homogeneously distributed sample on the electron microscopy grids

CORDOUAN Technologies proposes to you:

Custom-designed set-ups and instruments:

- Various wavelength of incident light are available on the request
- Customization of the instruments depending on your needs: the scattered angle(s), temperature controlled range, additional scattered angles etc.)
- Help with the coupling of our instrument with other devices (reactors, separators, robots, x-ray scattering or neutron scattering devices)
- Customized design for installation at specific environments (glow boxes, synchrotron facilities)

On-site demonstration

You are planning to buy a device for NP characterization and you want a demo? Test our characterization solutions on your samples, in your lab! Our solutions are easily transportable and can be installed in a few minutes. Call us to make an appointment and we will be pleased to come and make a demo on your site with one of our experts.

Our application laboratory offers the following services :

- Studies & feasibility tests (free of charge) on representative samples in order to help you define the best characterization solution for you.
- Custom-made measurements of your samples (i.e. on quotation) with implementation of protocols & a complete report of measures, including analyze and interpretation of the results.
- Advice & support for the implementation of measurement protocols and for an optimum use of CORDOUAN's products.



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