



# DWS RheoLab

Contact-free rheology



## Systems

Gels  
Suspensions  
Polymers  
Emulsions  
Foams

## Applications

Gelation  
Texture analysis  
Aggregation  
Ageing  
Stability  
High-frequency rheology

## Industries

Food  
Cosmetics  
Specialty Chemicals  
Advanced Materials  
Academic Research

# DWS Rheolab

## Advanced optical microrheology

The DWS RheoLab is a powerful instrument that provides access to the sample's viscoelastic properties over an unmatched frequency range while requiring only small sample volumes. Since the measurements are contact-free and non-destructive, the use of a tightly sealed sample cell allows studies of stability or shelf-life over long periods for highly viscoelastic and fragile microstructures. Based on the powerful DWS Microrheology technique, the RheoLab is ideally suited for a wide range of viscoelastic samples, including polymers, microgels, protein solutions, emulsions, particle suspensions, dairy, and cosmetic products.



### What can it measure?

- Viscosity
- Elasticity
- Mean square displacement
- Particle size

### Your benefits

- 2 in 1 instrument:  
both a rheometer and a particle sizer
- Measure highly viscous samples
- Characterize fragile microstructures



#### Small volumes

As little as 150uL of sample required



#### Fast

Full characterization within 2-5 minutes



#### Contact-free

Without mechanical interaction



#### Sealed sample

Remeasure the stored cuvette anytime

## Software

### Powerful analytical tools

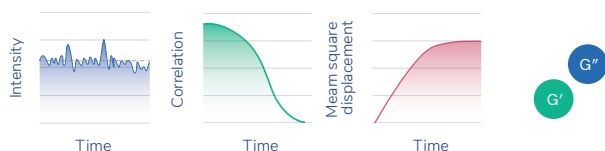
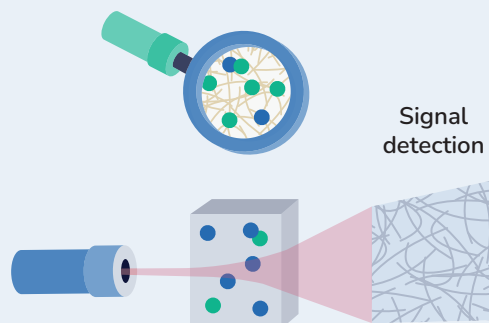
We designed the software of the DWS RheoLab for both DWS experts as well as beginners. Anything from one simple, yet reliable measurement, to a complex series of multiple measurements can be performed within just a few clicks. The powerful analytical tools allow highly customizable data display and export while saving all results in a well-organized and comprehensive database. Our software allows you to control the DWS RheoLab from any PC within the same network. You can work at your desk and remotely monitor the progress of your measurements!



# Technology

## Extract the viscoelastic properties without damaging the sample

Microrheology is a rheological method that uses the Brownian motion of tracer particles embedded in the sample. As the viscoelastic properties of the surrounding environment influence the particle's movement, microrheology can extract the viscoelastic properties without applying an external force. The RheoLab employs the DWS technology to extract the particle's motion. DWS has an unmatched sensitivity that goes far beyond particle tracking, DLS or camera-based microrheology and can also measure a much larger range of sample viscosity.

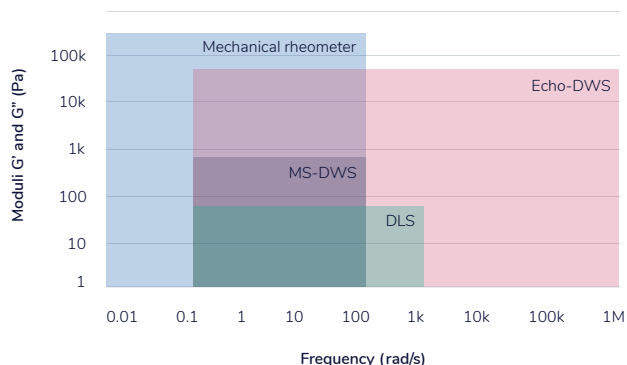
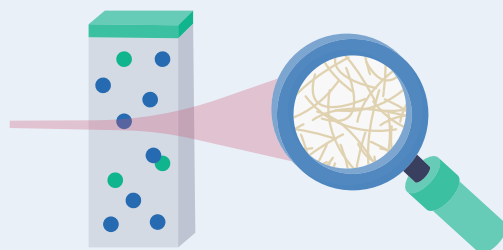


## Diffusing wave spectroscopy

DWS is an advanced light scattering technology used to measure the Brownian motion of tracer particles embedded in the sample. Similar to DLS, DWS analyzes the temporal intensity-fluctuations of light scattered by the particles. The statistics of these fluctuations are reflected in the measured correlation function from which the mean square displacement of the tracer particles can be calculated. DWS analyzes, in contrast to DLS, multiply scattered light. Each scattering event enhances the sensitivity, which makes DWS the most suitable technique for microrheology.

## Smart approach to study microstructure

Most soft materials show viscoelastic behavior, so their mechanical properties lie between that of a purely elastic solid and that of a viscous liquid. DWS microrheology can quantify both the viscous-like and the elastic-like properties of a material over a large range of time scales; which makes it a most valuable tool for understanding the microstructure and relaxation times of many soft materials.



## Extends limits of rheology

DWS RheoLab harnesses the patented Echo technique that allows rapid measurements of slowly relaxing samples equivalent to ordinary multi-speckle DWS (MS-DWS). The Echo-DWS technique also enables the measurement of high frequencies due to the fast detectors which give access to an unmatched frequency range, much larger than MS-DWS. Since Echo-DWS has a significantly higher tracer motion sensitivity than MS-DWS and DLS, it also allows the measurement of large moduli in samples such as firm gels and concentrated polymer solutions.

# Specifications

Technology	Diffusing Wave Spectroscopy with Echo Technology (EU Patent)
Scattering geometry	Transmission (backscattering optional)
Viscosity range	0.1 mPa · s to 1000 Pa · s *
Storage (G') & loss (G'') moduli	1 Pa to 50 kPa *
Frequency range	0.08 rad/s to 10 <sup>5</sup> rad/s (10 <sup>6</sup> rad/s with extended frequency upgrade)
Particle sizing** (radius)	0.1 to 1 µm * (accuracy of ±5% in the turbid range)
Cuvette sizes	1 x 10 mm, 2 x 10 mm, 5 x 10 mm, 10 x 10 mm
Sample volume	150 µL to 1.5 mL, depending on cuvette used
Temperature range	5 to 100 °C (optional: 5 to 160 °C) with stability better than ±0.02 °C***
Laser class	1
Laser	685 nm with 45 mW
Detection	Single mode fiber with 1 (optionally 2 with extended frequency upgrade) high performance APD(s), QE 65 %
Correlator	Two channel multiple tau, 12.5 ns to 15 h Two channel linear tau with selectable lag time
Software	Including microrheological analysis
Laboratory requirements	< 60 % relative humidity and T = 17 to 26 °C
Size	38 x 31 x 24 cm
Weight	Approx. 20 kg

\* The maximum range is sample dependent.

\*\* Requires backscattering mode.

\*\*\* A climate controlled room at or below 23 °C required to meet these specifications, for temperatures below the dew point a dry air source is required.



## Cuvettes

Seal your sample in the cuvette and characterize it over an extended period of time! You can choose between four different standard sizes of glass cuvettes (1 x 10 mm, 2 x 10 mm, 5 x 10 mm and 10 x 10 mm). Simply select the size that best suits your sample. If only small quantities of your sample are available, select the smallest cuvette and fill it with as little as 150 µL. Standard disposable plastic cuvettes can also be used if you want to avoid cuvette cleaning and/or need sterile conditions.

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