APPLICATION FIELDS


Cosmetic


Food


Pharmaceutical


Paint & Ink


Polymers...

...

MICRO-RHEOLOGY : A NEW WAY OF INVESTIGATIONS OF SOFT MATERIALS

"Microrheology looks at the thermal motion of small particles embedded in a material in order to extract its bulk rheological properties. This experimental technique opens the investigation of material properties that are difficult to access or inaccessible by conventional rheology such as the viscoelastic response to fragile materials. It is a non intrusive technique and thus particularly well suited to study fragile materials such as weak gels (emulsions, yaourt, cosmetics). No macroscopic stress is applied on the sample which avoids its destruction or its modification. This technique increases our microscopic understanding of these complicated materials. Microrheology directly probes the microstructure of the material. The analysis of the mean square displacement is related to the meshsize of a semi dilute solution of polymer, or to the meshsize of a gel. From these data, structural data may be extracted. This technique detects microscopic changes of the structure and is thus very relevant to study the syneresis of a gel, of an emulsion and thus to predict its stability."

Annie Colin
Rheologist Professor
University of Bordeaux I
Institut Universitaire de France

SPECIFICATIONS

Measurement cell
20 ml glass cell

Measurement head:
Emission: NIR light source 650 nm
Detection: Backscattering (MS-DWS)

Temperature
from RT + 5°C to 60°C
accuracy: ± 0.1°C

Communication
USB

Dimensions
60x40x30 (cm)

Weight
36 kg

Photo de couverture © CNRS Photothèque - Billes de silices prises dans un polymère

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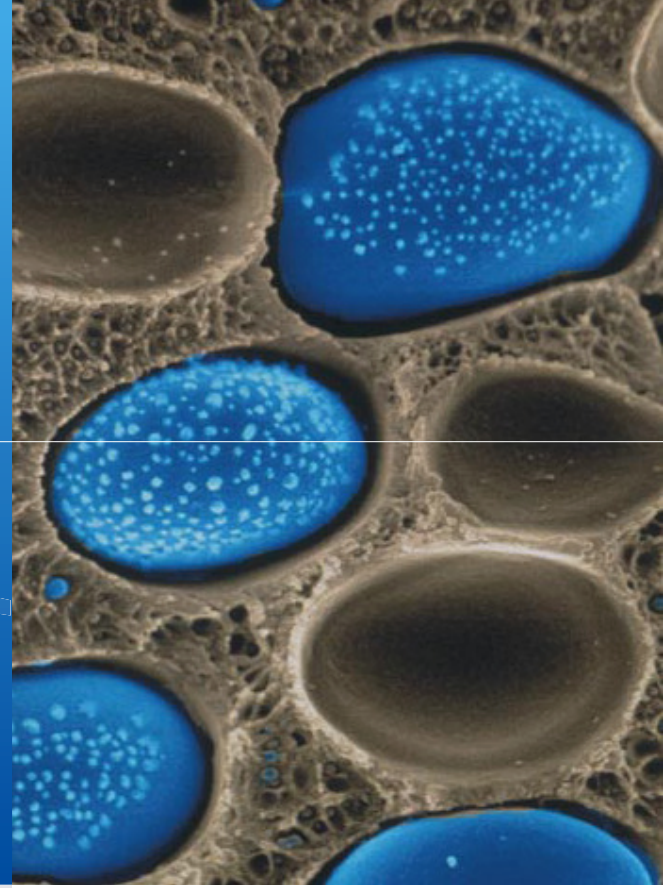
RHEOLASER® LAB

MICRO-RHEOLOGY FOR SOFT MATERIALS



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Smart scientific analysis™

A NEW RHEOLOGY SCALE

TO ACCESS TO THE MICRO STRUCTURE OF SOFT MATERIALS

Micro-Rheology μR

Rheolaser Lab is the first ready-to-use instrument to perform micro-rheology experiments.

Micro-rheology is a new domain of Rheology, which characterises the structure of the material at the micron scale.

Visco-elastic properties of soft materials like emulsions, gels, polymers etc... are analysed by measuring the displacement of the particles into the material due to thermal energy (Brownian motion).

THE FIRST READY TO USE
MICRO-RHEOLOGY
ANALYSER

BENEFITS OF PASSIVE MICRO RHEOLOGY

MEASUREMENT AT REST

Measurement is always in the linear visco-elastic regime as no external stress is applied. It allows analysis of fragile materials (weak gels, creams...) without sample modification nor destruction.

EASY SAMPLE HANDLING

Measurement is performed in a glass cell:

- No sample macroscopic deformation nor destruction
- No evaporation and drying
- No geometry configuration
- Disposable measurement cell

MICRO-STRUCTURE ANALYSIS

Micron sized particles probe the micro structure of the material to access to:

- Mechanical properties: Viscous modulus and elastic modulus
- Structural properties: Relaxation time, mesh size

THE OPTICAL MICRO-RHEOMETER:

Rheolaser Lab is constituted of 6 measurement positions and a measurement head .
The optical detection system uses Multi-speckle Diffusing Wave Spectroscopy (MS-DWS). It consists in measuring interfering backscattering waves resulting from laser light multi-scattered by the particles. This accurate technique enables to detect small particle displacement. Particle mean square displacement data enables to access to the micro-rheology parameters.

Features:

- Measurement in a 20 ml disposable glass cell
- 6 measurement positions
- From Room Temperature to 60°C
- Easy data processing

MULTI DATA ANALYSIS

The software has been designed for both experts and non experts in rheology.

The data available are:

- Decorrelation curve: Quantification of particle speed
- Particle Mean Square Displacement : Quantification of particle displacement
- Elasticity and viscosity factors
- Viscous modulus G''μR versus frequencies
- Elastic modulus G'μR versus frequencies
- Relaxation time, Macroscopic viscosity, Gp'μR (Generalized Maxwell model)

MULTI APPLICATIONS ANALYSER

The easy sample handling and data processing enable to perform different types of experiments.

EVALUATION

- Visco-elastic fluids can be characterised by plotting the viscous and elastic moduli at a chosen frequency (1 Hz for instance) or versus frequencies (up to 5 decades)
- Analysis of the Micro-structure: Mesh size, Relaxation time

EVOLUTION

Kinetic experiments can be performed with the same sample versus time as it is a non destructive method.

RECOVERY & THIXOTROPY

After shearing, automatic plot of:

- G'μR ,G''μR versus time at a one or several frequencies.
- Relaxation time TR μR versus time

STABILITY

At low frequency the position of the storage modulus G'μR versus the loss modulus G''μR enables to predict the stability of the material.