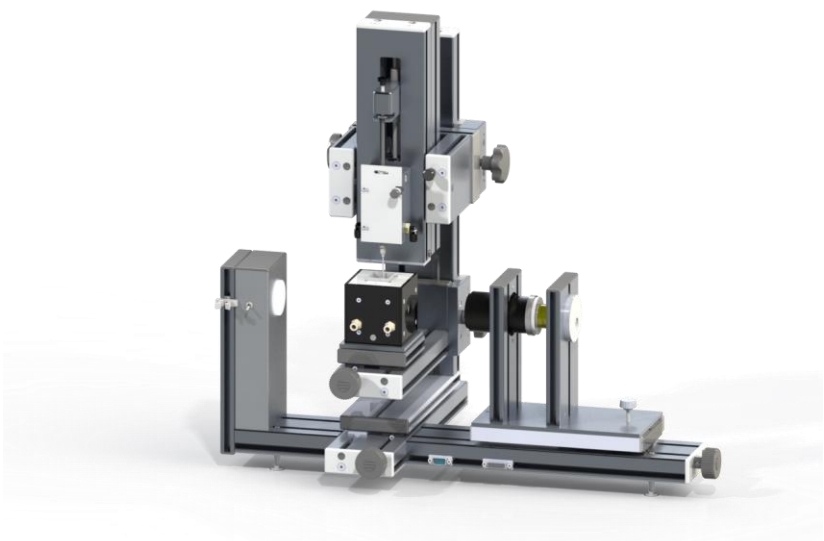
TRACKER™
Piezoelectric cell



TRACKER™ *PIEZOELECTRIC CELL*

For higher frequency bubble oscillations

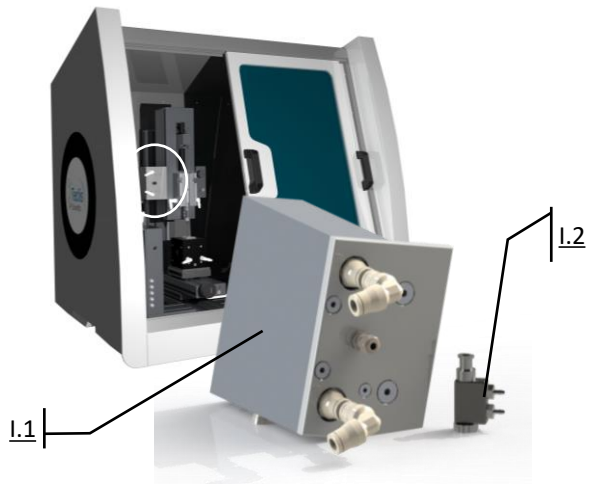
Foams and bubbly liquids are dispersed media used in many industrial applications (food, cosmetics, oil and gas, etc.). At the macro-scale, their properties such as the stability, the transport properties and the mechanical behavior strongly depend on their composition and the properties of the fluid-fluid interfaces composing them [1,2, 3].

Interfacial rheology allows a better understanding of the properties of surfactants, proteins, polymers or micro–nano sized particles at the interface. Moreover, it enables the **study of adsorption-desorption** phenomena as well as interactions that can take place at the interface. That can reveal crucial information on interfacial dynamics and the contribution of the structure to formulation properties.

The TRACKER™ can measure the dilatational rheology at frequencies from 0.01 to 2 Hz, as a standard. However, higher frequencies maybe required. For weak surfactants, specially, it is necessary to work at high frequencies, as the required compression/dilatation stress applied to the bubble should be fast enough to create a deviation of the surface layer from equilibrium, before this equilibrium is reestablished by desorption/adsorption at the interface.

The TRACKER™ **piezoelectric cell** option is just suitable for such need. The piezoelectric ceramic piece generates regular vibrations that lead to high frequency oscillations. It makes possible to oscillate gas bubble from 0.01 Hz to 10 Hz.

The piezoelectric cell has been designed for gas/liquid systems. It is not recommended for liquid/liquid systems.



Piezoelectric cell to make high frequency oscillation	I.1	Piezoelectric cell
	I.2	Connection box

Technical specifications	
Compatibility	TRKS, TRKH, TRKCMC
Frequency range	0 – 10 Hz
System	For Liquid / gas systems only

References
[1] Langevin, D. (2000). Influence of interfacial rheology on foam and emulsion properties. Advances in colloid and interface science, 88(1-2), 209-222.
[2] Lucassen-Reynders, E. H. (1993). Interfacial viscoelasticity in emulsions and foams. Food Structure, 12(1), 1.
[3] Hemar, Y., Hocquart, R., & Lequeux, F. (1995). Effect of interfacial rheology on foams viscoelasticity, an effective medium approach. Journal de Physique II, 5(10), 1567-1576.

TRACKER™ *PIEZOELECTRIC CELL*

For higher frequency bubble oscillations

The **piezoelectric cell** is a module which is connected to the syringe. This option makes it possible to **oscillate gas bubble at higher frequencies.**

- Oscillating frequency: from 0.01 Hz to 10 Hz with Piezoelectric module (Fig1)
- Bubble volume variation: from +/- 0.1 µl to +/- 4 µl with Piezoelectric module
- Volume variation Speed min : 0.01 µl/s
- Volume variation Speed max : 40 µl/s
- Time: bubble area remains constant during oscillations

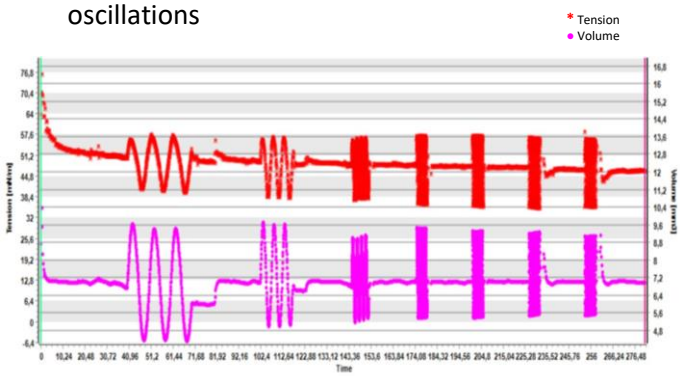


Fig1: Volume regulation with frequency sweep from 0.1 Hz to 10 Hz

From the basic single-frequency oscillation to complex scenarios including several oscillation steps, all measurement parameters can be set or changed independently, even during measurement.

The TRACKER™ Batch function can also be used to write a scenario with an unlimited number of steps or actions to be carried out on the bubble during the measurement, controlling:

- Area/volume regulation
- Oscillating frequency
- Oscillation amplitude
- Periods
- Time

During oscillation, no data are displayed, since the maximum number of images (60 per second) is being captured for subsequent analysis.
After oscillation sequence is finished, the results are calculated and displayed (Fig2).

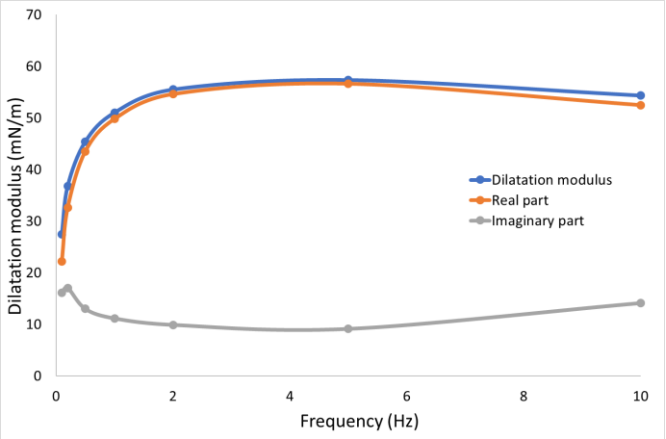


Fig2: Results of dilatation modulus obtained