# ISR Flip
## The Interfacial Shear Rheometer to expand your view


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Quantum Design

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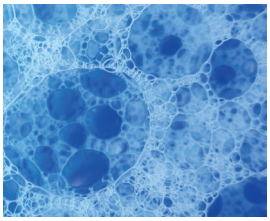
# ISR Flip
# Smart measurement molutions for you

KSV NIMA is the market-leader within smart measurement solutions for the creation and characterization of thin films with controlled packing density. Interfacial Shear Rheometry is a useful method when defining interfacial viscoelasticity and stability, a technique utilized in industries such as pharmaceuticals, cosmetics and food.



## Applications

The relationship between stress and deformation defines the rheological properties of a material. Most thin films encountered in vivo and in industrial applications are viscoelastic, where this behavior is intermediate between purely viscous and purely elastic.

The rheological properties are extremely important for defining product stability. Applications can be found in many industries. For example proteins, polymers, pigments, fluoroalkanes and other emulsifiers are strong stabilizers in dispersions and are used in the pharmaceutical, cosmetic and food industries.

### Research possibilities

- Prediction of emulsion, froth and foam stability
- Determination of thin film structure
- Examination of phase transitions
- Real-time monitoring of surface reactions
- Continuous monitoring of molecule adsorption into interfaces

## How it works

The measurement is performed with the help of a magnetized probe that is positioned at the air-liquid or liquid-liquid interface. The probe is oscillated using permanent magnets and the movement of the probe is recorded with a high-resolution camera. From the probe movement, the viscoelastic properties of the film can be calculated.

## What you can study

**Applications controlled by interfacial rheology, including:**

- Biological systems such as pulmonary lung surfactant and meibum. Their functionality is largely based on their flow on interphases under stress.
- Emulsions and foams whose stability is vital for their functionality. Viscoelasticity of the liquid-liquid interface can predict the stability of a colloidal system. Micelle/droplet fusion and fission are largely dependent on the interface viscoelasticity.
- Food products, cosmetics, biophysics, pharmaceuticals, oil and gas, application areas where molecules at interfaces have a significant impact on the system performance.

**Langmuir monolayer structural studies, including:**

- Phase changes, as the viscoelasticity of the layer is strongly affected by the microstructure of the monolayer.
- Surface reactions such as crosslinking in real-time, as changes in molecular size and shape have typically a strong response in their rheological properties.
- Aggregation and adsorption, as they typically change the viscoelasticity of the film.
- Determination of optimal coating parameters prior to deposition, as the Langmuir-Blodgett coating is based on the flow of the molecules to the solid substrate.

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# Smart measurement solutions for you

Expand your understanding of interfacial layers with ISR Flip from KSV NIMA. This next-generation interfacial shear rheometer enables highly sensitive measurements of interfacial viscoelasticity. Both at air-liquid and liquid-liquid interfaces.

Invest in a versatile tool to analyze foam and emulsion stability, and characterize proteins and surfactants. Combining ISR Flip with our KSV NIMA Langmuir Trough system gives you a unique possibility to control the monolayer packing density and surface pressure while measuring.

Flip the camera to suit your specific research conditions.

### Combine with the High compression trough

ISR Flip can be combined with KSV NIMA High compression trough. This allows measurements to be done at controlled packing density. The trough is divided into two compartments which enables air-liquid and liquid-liquid measurements to be done with the same trough. Additionally, having the camera below allows for liquid-liquid measurements with an opaque upper phase.

### Combine with the Low volume trough

When working with valuable compounds and subphases, ISR Flip can be used with the low volume measurement cell which requires less than 5 ml of subphase to be used. Injection ports allow easy injection of materials in the subphase while monitoring interfacial properties at the same time. With low volume cell, the camera is positioned on top to allow visualization of the probe.

## 3 reasons to invest

### Highly sensitive measurements

The lightweight magnetized probes enable highly sensitive measurement with minimum interaction between the instrument and the probe.

### Full control of the probe

The magnetic trap keeps the probe positioned even through a long experiment or during procedures such as monolayer spreading. The strength of the trap can be precisely controlled by moving the trap closer or further away from the probe. This also enables wide moduli and frequency range for a single probe.

### Expand your measurement possibilities

ISR Flip supports two camera positions to suit more purposes. Combining the instrument with a Langmuir trough allows the control of the monolayer packing density. The same trough can be used for both air-liquid and liquid- liquid measurements.

## What our collaborators say

"We realized that the use of a mobile magnetic trap to drive the probe was a game changer of this technique in terms of both accuracy and user's experience. We enjoyed being part of this collaboration to provide the scientific and industrial community with this advance."

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# ISR Flip Interfacial Shear Rheometer Specifications

| Measurement | | |
|---|---|---|
| Frequency range (Hz) | 0.01 - 10 | |
| Dynamic moduli range (N/m) | $2x10^{-8}$ - 1 | |
| Dynamic moduli resolution (N/m) | $1x10^{-8}$ | |
| Strain range (%) | 0.04 - 20[a] | |
| **Instrument** | | |
| Camera | USB 3.0 digital camera with zoom | |
| Camera resolution | 1980 x 1200 | |
| Field of view (Φ, mm) | 4.7 mm x 2.93 mm / 0.73 mm x 0.45 mm | |
| Instrument dimensions (LxWxH, mm) | 400 x 280 x 600 | |
| Weight (kg) | 21 | |
| **Langmuir Troughs** | **ISR Flip High Compression** | **ISR Flip Low Volume** |
| Surface area ($cm^2$) | 588 | 13.2 |
| Trough top inner dimensions, lower phase (LxWxH, mm) | 784 x 75 x 10 | 120 x 11 x 6.5 |
| Trough top inner dimensions, upper phase, (LxWxH, mm) | 784 x 95 x 7 | 120 x 19 x 6 |
| Lower subphase volume (ml) | 588 | 4.7 |
| Upper subphase volume (ml) | 521 | 13.9 |
| Maximum compression ratio | 7.8 | N.A. |
| Barrier speed (mm/min) | 0.1 - 270 | 0.1 - 270 |
| Balance measuring range (mN/m) | 0 - 300 | 0 - 150[b] |
| Maximum balance load (g) | 1 | 1 |
| Balance resolution (µN/m) | 0.03 | 0.04[b] |
| Instrument dimensions (L x W x H, mm) | 908 x 280 x 600 | 400 x 280 x 770 |
| Computer requirements | 2.4 GHz processor, 8 GB RAM, 512 GB hard disk drive (20 GB free), 1920 x 1080 screen resolution, 1 USB 3.0 Port, Windows 10 operating system | |

[a] The strain range is dependent on the channel width. For low volume the range is 0.08 - 40
[b] Pt-rod has to be used with the low volume cell

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