Teclis Scientific

Measuring instruments and Services for Interface Science

Scientific publications review 2022

More than 200 scientific papers, published in 2022, refer to TECLIS measuring instruments, TRACKER™ and FOAMSCAN™.

We genuinely thank all the research teams for their trust and congratulate them for their excellent work that makes the Interface Science shine.

Since day 1, TECLIS' ambition has been to work alongside with you, and to provide robust and reliable tools, made for scientific Research. We have started 2023 with the same spirit. Motivated by the ambition to offer new products in the coming months... but we'll talk about that later!

Today, we are particularly proud to highlight 3 papers, TECLIS' scientists, Yousra Timounay and Jean-Luc Bridot, have directly contributed to.

Sincerely yours, the TECLIS team

Interfacial Characterization of Ruthenium-Based Amphiphilic Photosensitizers.

Yousra Timounay, Andrea Pannwitz, David M. Klein, Anne-Laure Biance, Marlene E. Hoefnagel, Indraneel Sen, Alain Cagna, Marie Le Merrer, and Sylvestre Bonnet.
Langmuir 2022, 38, 9697−9707.
doi/10.1021/acs.langmuir.2c01391#

In the frame of the SoFia project (EU H2020 research and innovation program), Yousra Timounay worked on the characterization of the properties of air/water interfaces, soap films and liquid foams containing both the base surfactant and functional AP molecules. In particular, the interfacial activity of photocatalytic surfactants based on a ruthenium(II) tris-bipyridine core, functionalized with two alkyl tails was investigated (Fig1).

In this work, the **TRACKER™ drop tensiometer** was used to measure the interface activity and evaluate the Rosen parameters of RuCn(Cl)2 compounds, parameters which are typically used to quantitatively assess the performances of a surfactant:

- The CMC value is the concentration at which surface active molecules start forming micelles in polar solvents. In practice, micelle formation induces a break in the evolution of the equilibrium surface tension vs bulk concentration.
- The C_{20} value is the bulk concentration necessary to reduce the surface tension at the air–solvent interface by 20 mN/m. [2] This parameter can be interpreted as the true efficiency of a molecule as a surfactant, as it characterizes its ability to adsorb at the interface.
- The γ_{min} parameter is the minimum value of surface tension reached in the surface tension measurement. [1] It can be interpreted as the effectiveness of a surfactant, as it characterizes here its ability to reduce the surface tension, regardless of its concentration.

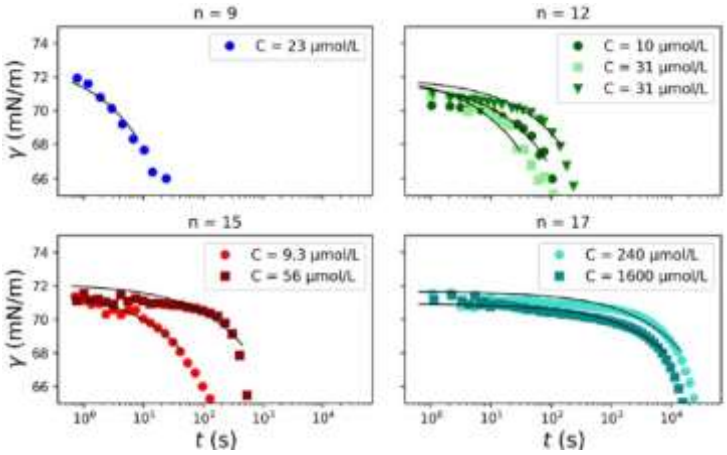

Fig1: Surface tension γ as a function of time t for RuC*n*(Cl)2 samples obtained at various chain lengths and concentrations

References

[1] Rosen, M. J. The Relationship of Structure to Properties in Surfactants. IV. Effectiveness in Surface or Interfacial Tension Reduction. J. Colloid Interface Sci. 1976, 56 (2), 320–327.

[2] Rosen, M. J. Relationship of Structure to Properties in Surfactants: II. Efficiency in Surface or Interfacial Tension Reduction. J. Am. Oil Chem. Soc. 1974, 51 (10), 461–465.

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Probing foams from the nanometer to the millimeter scale by coupling small-angle neutron scattering, imaging, and electrical conductivity measurements

Julien Lamolinairie, Benjamin Dollet, Jean-Luc Bridot, Pierre Bauduin, Olivier Diat and Leonardo Chiappisi.
Soft Matter, 2022, 18, 8733.
doi.org/10.1039/D2SM01252A

In this work, a new device has been developed that enables the simultaneous time-resolved investigation of foams by small-angle neutron scattering (SANS), electrical conductivity, and bubbles imaging.

The setup allows to probe the structural time evolution of liquid foams from nanometer up to centimeter scale in a single experiment. Structural features such as the liquid fraction (Fig.2), bubble size distribution, specific surface area of the Plateau borders and inter-bubble films, and thin film thickness can be deduced simultaneously. This new device is composed of a measuring glass tube made of Quartz compatible with the **FOAMSCAN™ foam analyzer** and can be used both in a laboratory and on a neutron diffractometer dedicated to small-angle scattering technique.

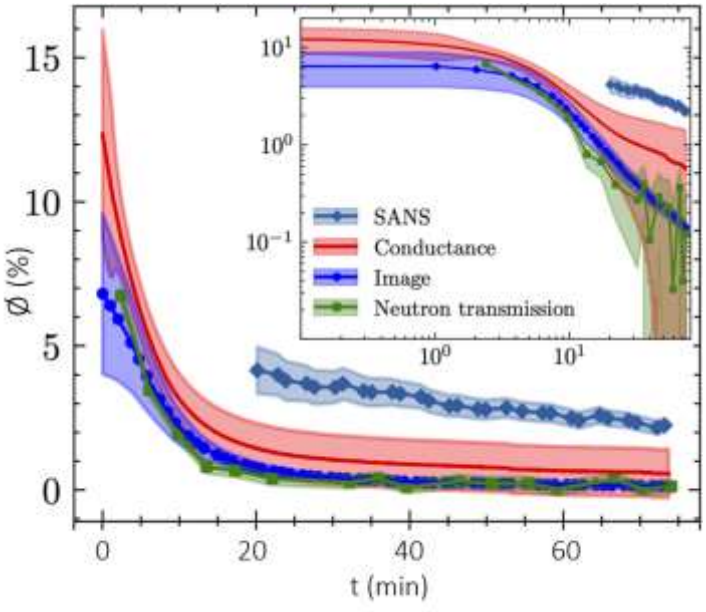

Fig. 2 Determination of the liquid fraction Ø at the height of prism 2 from mean conductance measurements on the electrode above and below the prism (red curve), from collected photo-images on the prism 2 (blue curve), from the transmission of the neutron beam (green curve), and from SANS analysis (light blue curve).

The setup is available at the Institut Laue-Langevin, world's flagship center for neutron science, and can be used upon positive evaluation of an experiment proposal. If you are interested in using this setup to characterize your foam, please send an email at contact@teclis-scientific.com, we will connect you to Leonardo Chiappisi at ILL.

Role of Asphaltene Origin in Its Adsorption at Oil–Water Interfaces

Jean-Luc Bridot, Dominique Langevin and Oliver C. Mullins.
Energy & Fuels 2022.
doi.org/10.1021/acs.energyfuels.2c00966

In this work, the **TRACKER™ drop tensiometer** was used to study the interfacial properties of oil–water interfaces in the presence of asphaltenes from different sources, crude oil, bitumen, and coal. The study includes dynamic interfacial tension and interfacial compression rheology measurements (Fig.3). The ability of the TRACKER™ to perform precise large amplitude oscillations was particularly relevant to study large molecules such as asphaltene proteins.

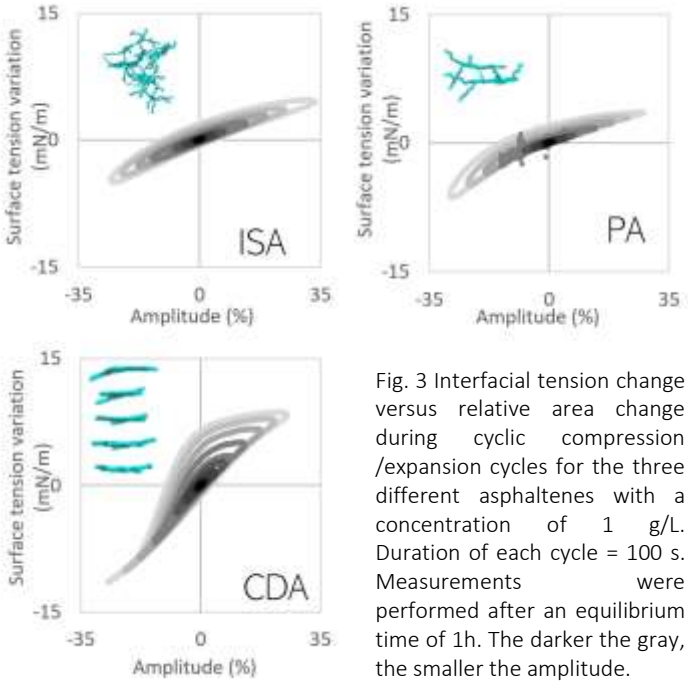

Fig. 3 Interfacial tension change versus relative area change during cyclic compression /expansion cycles for the three different asphaltenes with a concentration of 1 g/L. Duration of each cycle = 100 s. Measurements were performed after an equilibrium time of 1h. The darker the gray, the smaller the amplitude.

TECLIS Instruments, 22 chemin des prés secs – 69380 Civrieux d'Azergues, France +33 474 701 851