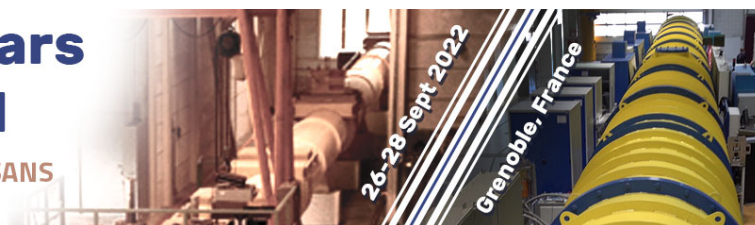


50 years of D11

A history of SANS
at the ILL



Contribution ID: 4

Type: poster contributions

Neutron scattering and reflectivity to study the stability of foams in a multi-scale experiment

Liquid foams are non-equilibrium multi-scale soft structures. Moreover, the foamability of a surfactant solution as well as the metastability of the foam are still difficult to predict. In order to better understand the physico-chemical factors that affect the aging of foams at different length scales, a new columnar device was developed. It enables the simultaneous data collection from a small-angle neutron scattering (SANS) diffractometer, from an optical camera and an electrical conductivity meter. In order to evaluate the potentiality of this device, a foam from a mixture of the nonionic alkylether BrijO10 surfactant and of the sodium dodecyl sulfate (SDS) anionic surfactant was generated in D₂O and analyzed as a function of time.

The volume of the foam, its liquid fraction and the radius of the foam bubbles as a function of time (obtained by image analysis and conductivity processing) are macroscopic information, necessary for foam lifetime characterization but not sufficient. SANS analysis is known to provide useful information at the nano-scale, on the structure of the inter-bubble film or the surfactant self-assemblies trapped within the foam. However, to extract this information over a large structural range and in order to be able to compare the various structural features (the specific surface area, the liquid fraction, the film thickness) determined from different techniques, we have for the first time performed a quantitative analysis - in absolute scale - of the scattering data.

The analysis of nano- and macroscopic information obtained simultaneously enabled us to better understand the correlation between the mechanisms of drainage, ripening and coalescence involved at the different scales in the aging of the foam.

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