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# Interpreting simultaneous small-angle neutron scattering and reflection from surfactant stabilised air-water foams

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Air-in-water foams stabilised by surfactants and polymers have been the subject of much recent debate due to their ubiquitous occurrence, desirable or otherwise. When examining such hierarchically structured and dynamic materials using neutron techniques, the complex patterns observed are often discussed in terms of a superposition of on- and off-specular scattering and reflectivity arising from the air/water interfaces and any (self-assembled) structures within the sample. Here, we present such data from foams stabilised by surfactant multi-layers comprising sodium lauryl ether sulfate/sodium dodecylsulfate blends in the presence of multi-valent salts ( $\text{AlCl}_3$ ,  $\text{CaCl}_2$ ). Concurrently, we demonstrate how the absolute intensities, the incoherent backgrounds and the transmissions can be used to determine the thickness of the liquid films within the beam, and thence, the liquid volume fraction in the foam. Together with literature data, and with additional contrast variation data, we re-interpret our previously published data and highlight some correlations between surface structure / composition and foam stability.

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