

# Structure and Forces in Self-Supported Foam Films

Gunther Andersson, Christiaan Ridings  
Flinders University  
Flinders Centre for NanoScale Science and Technology  
School of Chemical and Physical Sciences

Self-supported foam films are usually in a liquid state. In foam films two surfaces come in close proximity. The stability of foam films is remarkable due to the enormous surface area formed while usually formation of large surface areas is avoided in nature if possible. In order to keep the foam film metastable, i.e. having lifetimes of a few hours or more, surfactants are added to the solution forming the foam film. In some cases the presence of inorganic salts seems to be helpful to keep the foam film stable. Electrostatic and van-der-Waals forces are used to describe the thickness and structure of foam film. [1] However, little is known about the internal structure of foam films: what is the coverage of the surface with surfactant and solute, what is the orientation of the molecules at the surface, and where are the charges located. Such information is required to give reasoning for the models used to describe foam films. By measuring directly concentration depth profiles at the surface of foam films, the above listed quantities describing the structure of foam films can be determined. [2] The technique used to measure the concentration depth profiles is neutral impact collision ion scattering spectroscopy (NICISS).

In this presentation the techniques for measuring concentration depth profiles of foam films will be shown and results of foam films stabilised by ionic and non-ionic surfactants discussed. We will show examples of foam films stabilised by the ionic surfactants hexadecyltrimethylammonium bromide ( $C_{16}TAB$ ) and the non-ionic surfactant dodecyldimethyl phosphineoxide ( $C_{12}DMPO$ ). In the latter case also ion specific effects have been investigated by adding various sodium halide salts over a range of concentrations. The anions show differences in their propensity to adsorb at the surface.

[1] C. Stubenrauch and R. v. Klitzing, J. Phys.: Condens. Matter 15, R1197 (2003).

[2] C. Ridings and G. G. Andersson, Rev. Sci. Instrum. 81, 113907 (2010).