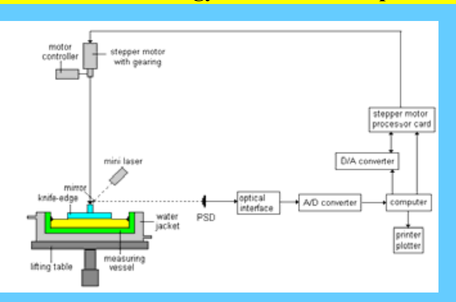
Interfacial Shear Rheology of GIBBS- and LANGMUIR- Layers

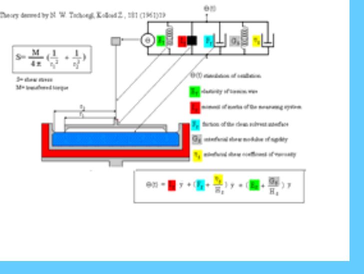
Motivation

The adsorption and interfacial rheological properties of proteins are of particular interest in many technological applications, such as foam and emulsion formation and stabilisation. Interfacial rheological parameters are useful tools to understand the structure formation in adsorption layers at liquid interfaces. Amphiphilic bio-polymers, such as proteins, adsorb spontaneously at interfaces. The formation of a protein adsorption layer at the air/water or oil/water interface involves adsorption followed by conformational changes. Combined studies of the adsorption and rheological behaviour of protein adsorption layers are also useful to elucidate the intermolecular interaction. During the adsorption process at an interface, protein molecules tend to unfold. The extent of unfolding of proteins depends on the surface concentration.

A torsion pendulum rheometer is used to measure the **interfacial shear rheological** properties. This method can be applied to the water/air and water/oil interfaces. To interpret the complex properties of the adsorption layer of ß-lactoglobulin and ß-casein additional data from measurements of **dynamic interfacial tension** obtained by the pendent drop technique (ADSA) and adsorption layer thickness obtained from **ellipsometry** are used.

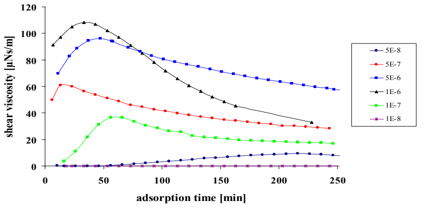
Interfacial Shear Rheology of Gibbs Adsorption Layers



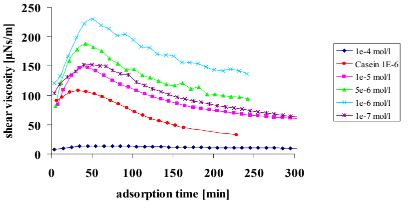


Competitive adsorption studies between β-casein and the non-ionic surfactant decyl dimethyl phosphine oxide

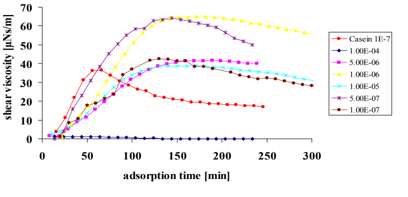
pure β-Casein



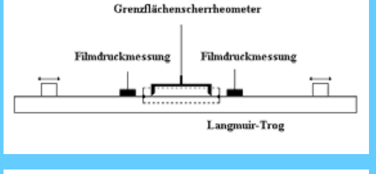
β-Casein/DDMPO mixtures ($c_{\beta\text{-Casein}}$ = 1*10^{-6} mol/l)

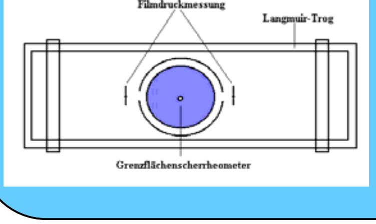


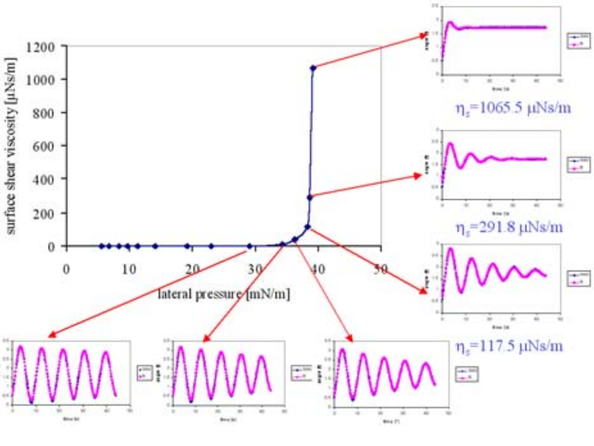
β-Casein/DDMPO mixtures ($c_{\beta\text{-Casein}}$ = 1*10^{-7} mol/l)



Interfacial Shear Rheology of Langmuir Monolayers







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