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Structure and dynamics of oil/water interfaces in emulsions

Emulsions are an indispensable part of everyday life; they are used in a wide range of applications, including cosmetics, drug delivery, and food systems. Mixed interfaces in emulsions are common and are composed of proteins and low molecular weight emulsifiers like phospholipids.

The charge and nature of phospholipid head groups exert a significant influence on the interfacial structure and rheology of protein-stabilised emulsions, yet exert only a minor effect on their interfacial dynamics. A combination of lab based methods – such as drop tensiometry and interfacial rheology – and scattering methods – such as small angle neutron scattering (SANS) and neutron spin echo spectroscopy (NSE) – is employed in this presentation to facilitate the answering of research questions about structure and dynamics of complex interfacial systems containing proteins and two different phospholipids [1].

Phosphatidylcholine has been observed to be loosely bound to the interface in the presence of β -lactoglobulin molecules. In contrast, phosphatidylglycerol has been found to be partially bound to β -lactoglobulin molecules via hydrogen bonds or hydrophobic interactions.

The interfacial dynamics of the protein are inert for changes in interfacial structure, composition, and rheology, although structure and rheology have a strong influence on each other.

[1] T. Heiden-Hecht et al., Journal of Colloid and Interface Science 703 (2026) 139095

Session

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