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Studying Structure at the Liquid/Liquid Interface by Neutron and X-ray Scattering.

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The investigation of structure at the liquid/liquid interface is of prime importance in a number of physico-chemical areas both fundamentally and practically. This presentation will focus on x-ray and neutron scattering approaches to studying structure and molecular conformation at planar oil/water interfaces. The oil/water interface is crucial to many industrial systems, for example emulsions (food, cosmetics, drug delivery and others), chemical extraction (both aqueous to organic and the subsequent back extraction).

After outlining technical aspects and alternative model systems I will discuss our current work on tailorable nanoemulsions (TNE) for drug delivery. The TNEs consist of an oil in water emulsion where the interface is stabilised by a rationally designed single alpha helix peptide (AM1). To the AM1 stabilised emulsion a related four-helix peptide (DAMP4) is added. The DAMP4 can be linked to a range of biologically functional elements including antibodies or protein resistant molecules. The arrangement of the AM1 and DAMP4 at the oil/water interface and competition between the two species are important questions, the answers to which help to guide the TNE design. Furthermore, the presentation, conformation and orientation of the antibody into the aqueous phase impacts upon the TNE design and ultimately activity.

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