

X-Ray Reflectometry (XRR)

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Many lipids are insoluble in water and can be spread on a water surface to form an insoluble layer at the air-water interface. In these, so called Langmuir films all molecules are arranged in a one molecule thick layer. Typical layer thicknesses are in the order of a few nanometers. Thus, very sensitive probes are needed in order to characterise the phase-dependent structure of such Langmuir films. Here, the x-ray reflectivity technique has been proven to be a method, providing high resolution electron density profiles of interfaces. In an x-ray reflectivity experiment the specularly reflected intensity of an x-ray beam is monitored as a function of the wave vector transfer perpendicular to the samples surface $q_z = (4\pi/\lambda) \sin(\alpha)$, where λ is the wavelength of the radiation and α the scattering angle. X-ray reflectivity measurements are mainly sensitive to the electron density contrast within a sample. However, due to the scattering geometry, reflectivity data contain only information on the lateral averaged profile of an interface.

In our module, the students will be taught in the preparation and investigation of lipid monolayers by XRR and surface-pressure isotherms. After a short instruction, the students will use XRR to investigate the structure of Langmuir films. The results obtained, will be analyzed and discussed in the group. The complete module composed of the surface-pressure isotherms, XRR measurements needs approx. 8 hours, except lunch break.