ESRF	**Experiment title:** Interaction of the antimicrobial peptide Cynthaurine with lipid monolayers studied by SXR and GIXD	**Experiment number**: SC-1187
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Report:

In recent studies on surface pressure area isotherms of lipid monolayers the interaction of Cynthaurin with such model systems was characterized showing that the peptide adsorbs to the lipid layer. The adsorption depends on the lipid species forming the monolayer that serves as model system for biological membranes. The results suggested that the peptide does interact preferentially with negatively charged PG monolayers. Therefore our study focused on the structural changes induced by the peptide adsorption from the subphase to lipid monolayers consisting of different lipid species. As lipid components we have used saturated phospholipids differing in their head group structure (DPPE, DPPG, DPPC) thereby mimicking different cell membrane compositions.

Initially all experiments were performed on PBS buffer at 20°C for the pure lipids. After injection of the peptide into the subphase followed by an adsorption period the monolayers were measured to allow a direct comparison of the monolayer structure before and after the peptide adsorption. To understand the effect of surface pressure on the structure, the measurements were done at 10, 20, 25, 30, and 40 mN/m. The x-ray wavelength used in the experiments was set to 1.55 Å and a momentum transfer between 0 and 0.6 $Å^{-1}$ was investigated.

In summar, the data recorded show that:

1.) The peptide adsorption to DPPG monolayers changes the structure of the layer in the pressure region up to ~35 mN/m. The minima of the reflectivity intensities are shifted towards lower Q values indicating increased layer thicknesses.
2.) At a high pressure of 40 mN/m, the comparison of the reflectivity data obtained for DPPG before and after adsorption was recorded, suggesting a squeeze - out of the peptide from the layer due to the pressure increase. These findings are supported by the isotherm measurements (see Fig. 1).
3.) For DPPE monolayers, the adsorption does not change the structure of the layer in the whole pressure region.

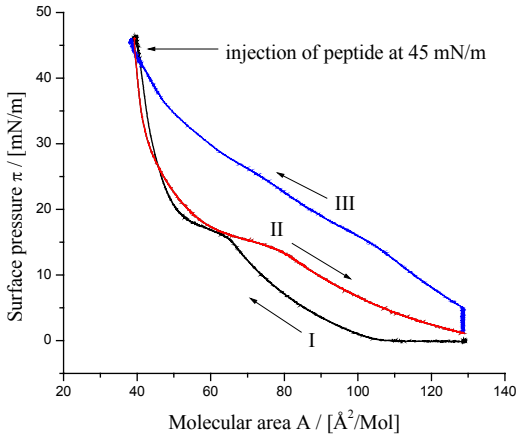

Fig. 1. Pressure area isotherm of DPPG on PBS. The first compression (I) is shown. At 45 mN/m the peptide was injected and the layer was expanded (II) to maximum molecular area. The second compression (III) was performed after an adsorption period of about 5 hours.

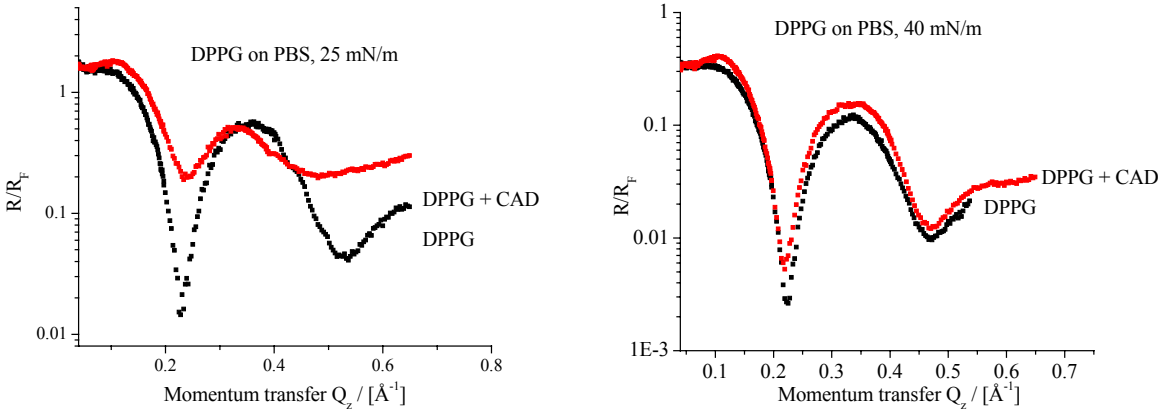

Fig. 2. Fresnel normalized reflectivity data obtained for DPPG on PBS and DPPG after peptide adsorption and recompression to 25 mN/m (*left*) and 40 mN/m (*right*).

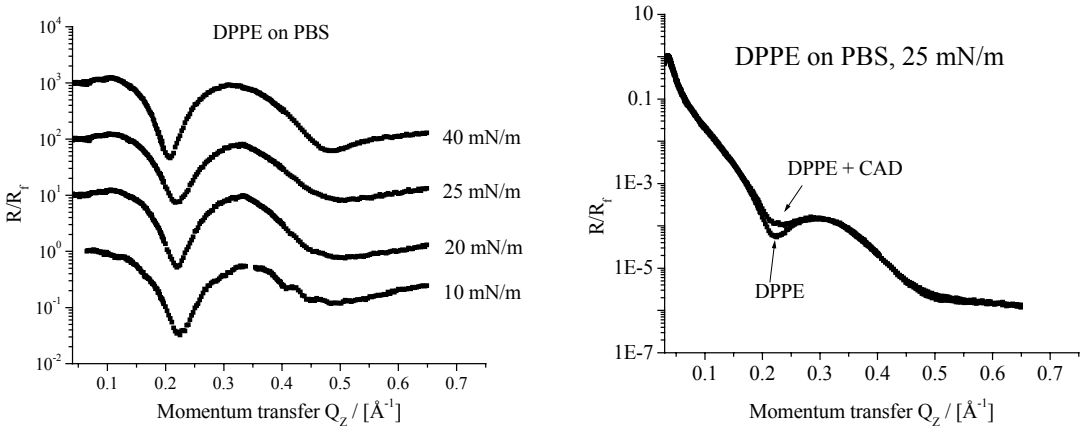

Fig. 3. Fresnel normalized reflectivity data obtained for DPPE on PBS at 20 °C and pressure values as indicated. A jump in the position of the first minimum between 25 and 40 mN/m indicates a phase transition from a phase with tilted chains towards an upright orientation (*left plot*). Comparison of the reflectivity observed for DPPE and DPPE after peptide adsorption and recompression to 25 mN/m (*right*).