ESRF	X-ray reflectivity studies of interaction of the antimicrobial frog peptide, PGLa, with phospholipid monolayers, DSPG and DSPC	**Experiment number**: SC-691
Beamline: ID10B	**Date of experiment**: 19 April 2000 to: 25 April 2000	**Date of report**: 22/02/2002
Shifts: 15	**Local contact(s)**: Oleg KONOVALOV	*Received at ESRF:*

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Report:

Surface pressure-area (π-A)-isotherms measured previously in laboratory and Grazing incidence diffraction (GID) data [report on proposal SC-517] indicated that frog peptide PGLa interacts differently with monolayers of DPPG and DPPC formed at the air/water interface. These result suggest that the peptides do not mix at a molecular level with DPPC but with DPPG. So, the aim of this experiment was to understand, using X reflectivity techinque, the structural changes taking place in monolayers of DPPG and DPPC at presence of PGLa and localization of petide in a membrane. An understanding of how these peptides distinguish between e.g. bacterial (mimicked by DPPG monolayer) and eucaryotic (mimicked by DPPC monolayer) cell membranes and perturb the barrier function of cell membranes of the first would allow to design novel peptide antibiotics which can selectively kill bacteria.

X-ray reflectivity measurement was performed for pure gas/water surface, monolayers of DSPC and DSPG lipids without and with presence of PGLa peptide as well as for monolayer of pure petide. To understand an effect of surface pressure (π) on interaction between phospholipids and peptides molecules, measurements was done for all type of monolayers at set of π = 15, 20, 25, 30, 35 and 40 mN/m. The wavelength λ=1.55 Å was used for measurements and a range of scattering vectors (0 - 0.6 A^{-1}) was explored.

Electron density profiles reconstracted from measured reflectivity curves (Fugure) shows that:

1) peptide forms a layer near air/water interface with sharp interface at the air and diffused interface with water. That would correspond compact location of hydrophobic part of peptide moleciles near interface with air and progressive vanishment of density of hydrophilic part.

2) thichness of pure phospholipid monolayers increase with increase of surface pressure due to decrease of tilt of aliphatic chance of molecules.

3) DSPC molecules do not mixt on the molecular level with PGLa molecules and coexist at the water surface in different phases.

4) DSPC molecules mixt with PGLa molecules on the molecular level and forms homogeneous layer with out possibility to distinguish characteristique part of individual molecules.

Studies performed during proposals SC-691, SC-517 result in paper: "**Konovalov O., Myagkov I., Struth B., Lohner K. "Lipid discrimination in phospholipid monolayers by the antimicrobial frog skin peptide, PGLa. A Synchrotron X-ray grazing incidence and reflectivity study." (submitted to European Biophysics Journal)**"

X-ray Reflectivity

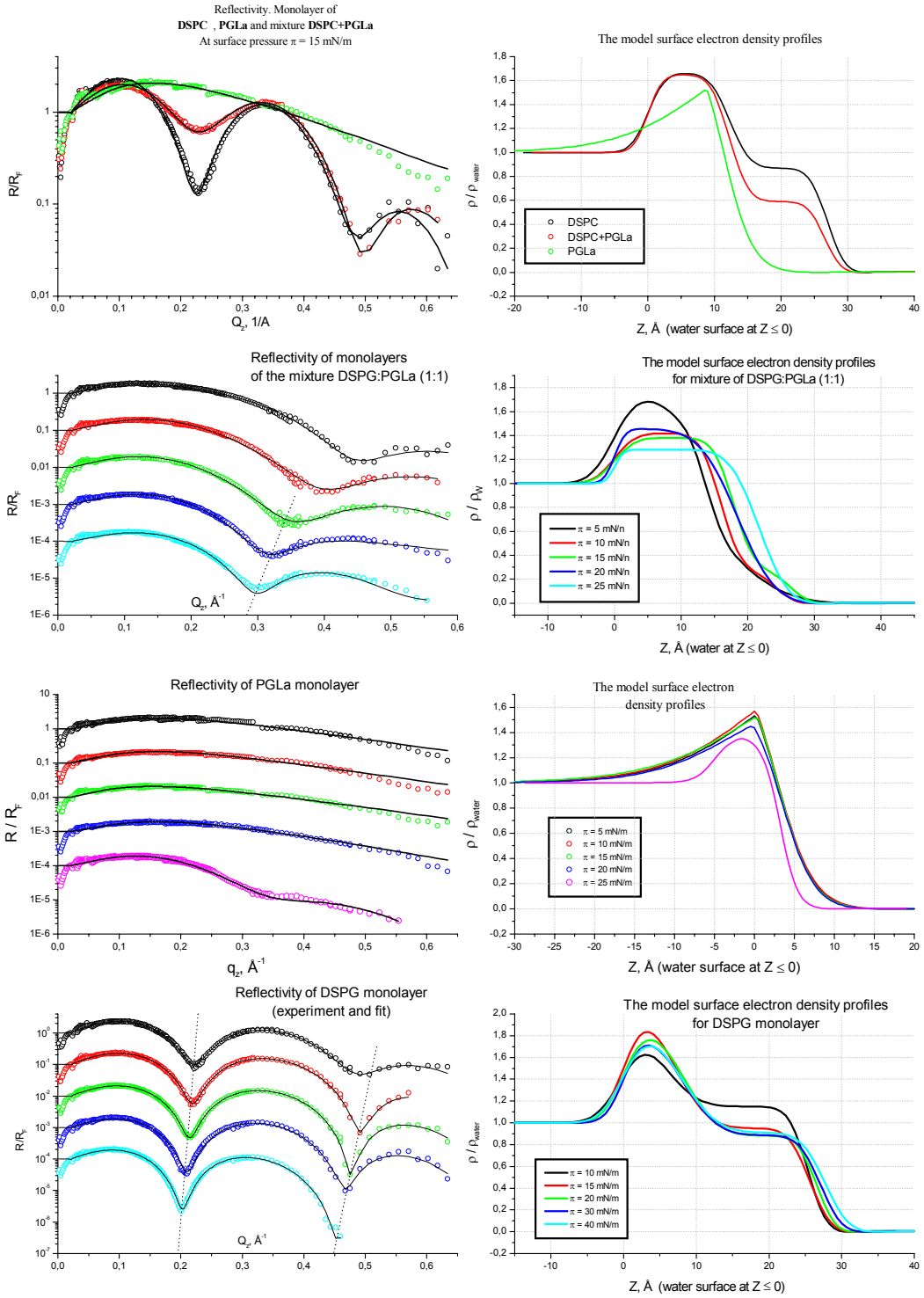

Figure. Summary of Reflectivity measurements and reconstructed electron density profiles.