

4.5 Syntheses of Novel Langmuir-Blodgett Molecules with Nonlinear Optical Chromophores

(Th. Dietrich and L. Eng)

Several chromophores with relatively high non-linear optical (NLO) susceptibilities β_{zz} have been modified to render the molecules amphiphilic. This is a prerequisite for the formation of Langmuir layers on a water subphase. Provided a long enough hydrocarbon chain, any hydrophilic head-group can be altered to float on the water surface. Therefore, we attached long alkyl-chains to NLO chromophores of the MNBA and ONBA type. This chemical modification is known not to affect the physico-chemical properties of the head-groups, i.e. the molecules should keep their ability to highly respond at a wavelength of 532 nm.

In all three examples (ONBA, MNBAP, MNBAO) we succeeded in preparing good floating Langmuir films. While the phase diagrams of both MNBAP and MNBAO showed a pronounced liquid-like behaviour at ~ 30 mN/m, the solid phase was not achieved though compression could be continued up to 60 mN/m. For ONBA, direct transition from the gaseous into the solid phase was observed where the net projected surface area for an individual head-group measures 17 \AA^2 , only. Furthermore, deposition onto solid substrates was possible in all cases.

However, when measuring the optical properties of these transferred LB films, we observed the molecules to arrange pair-wise, thereby cancelling any optical contrast. These molecules thus prefer a centrosymmetric arrangement. Further investigations (especially NLO measurements) will be performed.