Grazing incidence diffraction from hybrid systems at the Air/Water interface

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Polydiacetylene (PDA) Langmuir films were formed at the air/solution interface by surface compression followed by UV photopolymerization. PDA films exhibiting acidic (carboxylate) groups or films formed from diacetylene lipids derivatized into having cytosine headgroups are studied for their interactions at hybrid interfaces.

The acid terminated film structures of the monomer, "blue" and "red" phases were solved by grazing incidence x-ray diffraction.[1] The structural information elucidated the structural details and shifts between the phases. In particular we observed the symmetry breaking from hexagonal into 2-D oblique structure. Two identical, but mirror symmetrical structures were formed by irradiation with circular polarized (CPL) UV light for polymerization.

PDA films are very effective templates for directed nucleation of inorganic materials due to their semi-rigid conjugated backbone, and the dense and ordered display of charged groups which are quasi-commensurate with the inorganic structures.[2,3]

Langmuir films displaying cytosine headgroups were formed by 3:1 surface dilution (PDC75%) with diacetylene lipid with alcohol headgroup in order to relieve steric surface crowding.[4] Surface compressed PDC75% films were polymerized with *left* or *right* CPL and their structure was solved by GIXD. Evidently the structures if the *left* and *right* films are indistinguishable by diffraction. However, we observed that only the left CPL polymerized is undergoing constructive base-pairing and stacking, while the right CPL polymerized is not.[5] This enatioselective binding at Langmuir films is unique and may be related to the intriguing question of chiral selection during the early period of "Origin of Life". We show that non-chiral compounds, as a result of irradiation with circular polarized light, can organize in chiral surface structures, capable of amplification biopolymers binding of particular handedness

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