Chemical Engineering

Surface Science and Engineering Research Group Biointerfacial Engineering Laboratory

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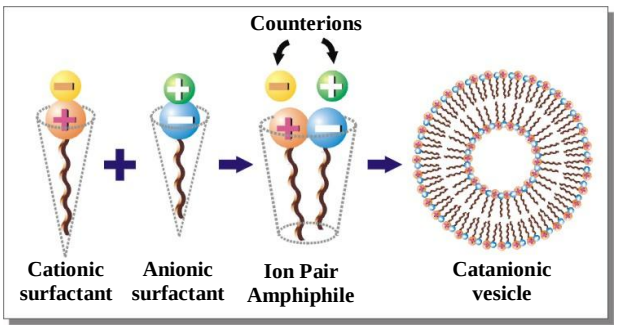
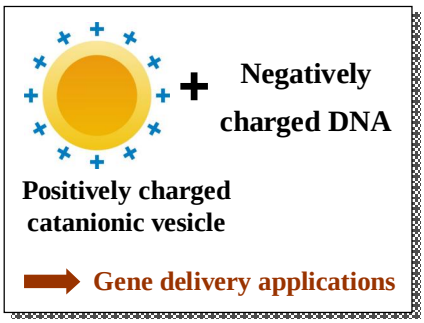
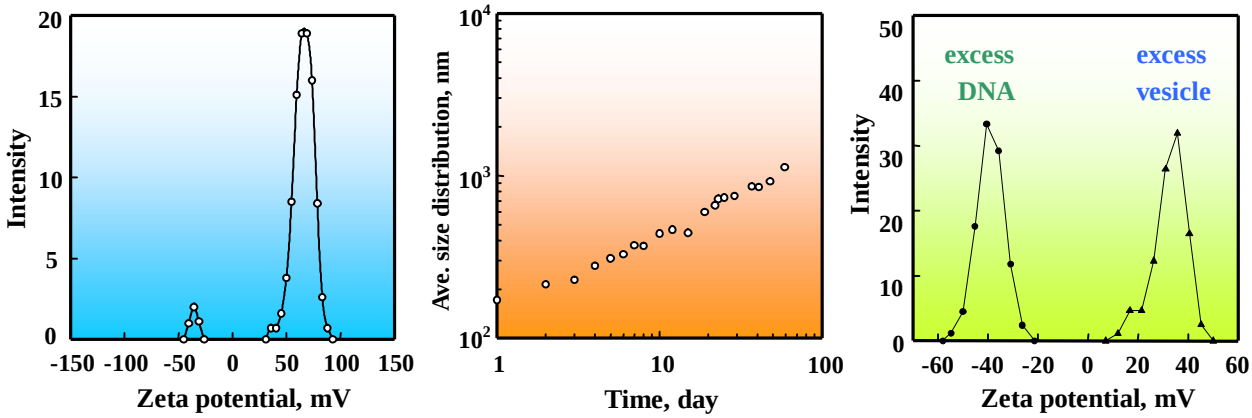
Research Interests:

Preparations and applications of charged drug delivery carriers

Catanionic vesicles with reasonable stability and specific charge characteristics are prepared from ion pair amphiphiles with a proper process, in order to be used as drug delivery carriers. Moreover, the possibility of using the catanionic vesicles with positive charges in the gene delivery applications is under investigation.







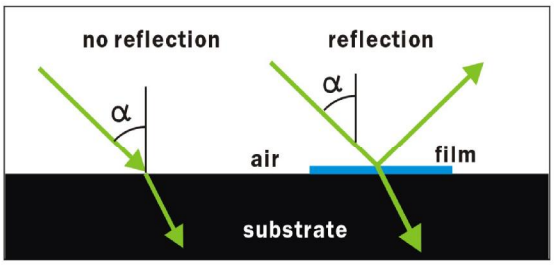
zeta potential and size stability of catanionic vesicles

zeta potentials of vesicle/DNA mixtures

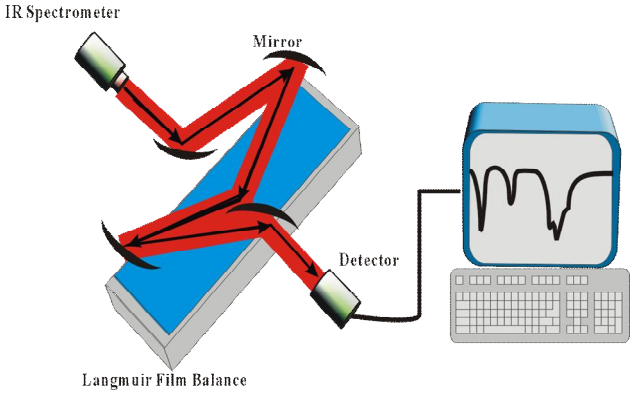
Investigation of mixed lipid/protein layer behavior at air/liquid interfaces

Brewster angle microscopy (BAM) and infrared reflection-absorption spectroscopy (IRRAS) techniques are developed to study the morphology and composition of mixed lipid/protein layers at air/liquid interfaces *in-situ*, in order to understand the inhibitory mechanism of plasma proteins on the surface activity of lipids in the lung surfactant systems.

Principle – with p-polarized light



α : Brewster angle



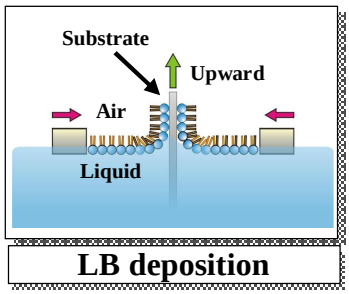
Brewster angle microscopy

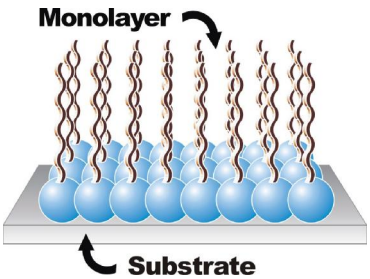
infrared reflection-absorption spectroscopy

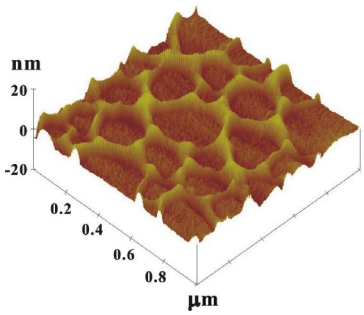
Fabrications and applications of ultra-thin films

Langmuir-Blodgett (LB) deposition technique

This technique is developed to transfer a monolayer at the air/liquid interface onto a solid substrate, in order to fabricate extremely organized monolayer or multilayer thin films with a layer-by-layer approach.







AFM image of a LB film

Self-assembled monolayer (SAM) fabrication technique

This technique is developed to fabricate a monolayer onto a solid substrate by specific chemical reactions between the monolayer-forming material and the substrate, in order to modify the wettability or other surface properties of the substrate with an ultra-thin film.