Nanostructured surfaces

Ternary Langmuir and Langmuir-Blodgett monolayers of lipids and lauryl gallate

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Domain formation in model membranes has been intensively studied since the hypothesis of lipid rafts was put forward [1]. Rafts are defined as nanoscale regions of biological membranes that take part in important cellular processes and signalling pathways. Model membranes, such as lipid Langmuir monolayers at the air-water interface and solid supported Langmuir-Blodgett monolayers, offer the possibility of understanding how phase separation and domain formation can be regulated by the lipid components [2].

A surface thermodynamic analysis was applied to the experimentally measured surface pressure – area per molecule (π-A) isotherms of mixed Langmuir monolayer films formed by lipids and lauryl gallate to quantitatively describe the phase miscibility of these physiologically important ternary mixtures at the air-water interface. Then by means of the Langmuir-Blodgett technique the investigated films were transferred onto the hydrophilic mica plates at the surface pressure of 35 mN/m. Wettability of the model membranes was investigated via contact angle measurements of three liquids. The contact angles allowed evaluation of the total surface free energy and its components for mixed systems based on the theoretical approach proposed by van Oss et al. (LWAB) and Chibowski (CAH) [3].

Properties of the ternary monolayers strongly depend on the monolayer composition, phase behaviour and ordering of molecules. The presented results can be helpful to design the film surfaces with targeted properties which would potentially have practical applications.

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3. *Jurak M., Chibowski E.* Surface free energy and topography of mixed lipid layers on mica // Colloids Surf. B.-2010.-**75.**-P. 165-174.