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PHOSPHOLIPID/SURFACTANT BICELLAR PHASE STUDIED BY SAXS, FTIR AND DS

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Discoidal (bicellar) phase represents intermediate morphology between lamellar and micellar phases. The bicelles are nanodiscs composed of mixture of phospholipids with short and long hydrophobic chains or mixture of phospholipid and surfactants. This phase exhibit the unique properties – very useful in the structural studies of membrane proteins or as a model of biomembranes [1].

Water suspensions of 1,2-dimyrilstoyl-sn-glycero-3-phosphocholine (DMPC) and 1,2-dipalmitoyl-sn-glycero-3-phosphocholine (DPPC) with different concentrations of the dimeric surfactant GEM-IK1 have been investigated by Small Angle X-ray Scattering (SAXS), Dielectric Spectroscopy in radiofrequency range (DS) and Fourier Transform Infrared Spectroscopy (FTIR).

The SAXS results exhibit that even at very low concentration of the surfactant the transition from lamellar phase to the bicellar phase is realized. The size of bicelles depends on the surfactant concentration.

Dielectric spectroscopy in frequency range from 10^6 Hz to 10^9 Hz was used to study a polar part of phospholipids. The observed small step in the dependence of dielectric constant vs. temperature is connected with a transition from gel to liquid crystalline phase, in accordance with temperature dependencies of the stretching bands of phosphate and carbonyl groups detected by FTIR. Two characteristic bands from IR spectra, corresponding to symmetric and antisymmetric vibrations of methyl groups, were used do detect changes in the non-polar part of phospholipids bilayer.

Our results show, that the temperatures of the observed main- and pre–transitions` decrease with an increase of the surfactant concentration.

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