

# THE FTIR AND SAXS STUDIES OF INFLUENCE OF A MORPHOLINE DERIVATIVES ON THE DMPC-BASED BIOLOGICAL MEMBRANE SYSTEMS

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Keywords: infrared spectroscopy, small angle X-ray scattering, phospholipids, DMPC, cationic surfactants

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Biological membranes are selectively permeable lipid bilayers found in all cells. Besides making the cell walls, the inner system of membranes divides the cell into a number of compartments, which permits simultaneous occurrence of many metabolic reactions requiring different conditions. The main structural elements of the cell membranes are phospholipids, including phosphocholine derivatives [1-3]. The study was undertaken to establish the effect of a cationic surfactant (alkyl derivative of morpholine) on the stability of the model system of biological membrane based on DMPC (1,2-dimyristoyl-sn-glycero-3-phosphocholine).

The method applied was the Fourier transform infrared spectroscopy (FTIR) and small angle X-ray scattering. Measurements were performed on an FTIR-Raman IFS-66 (Bruker) spectrometer equipped with a cell with KRS-5 windows for investigation of solutions in temperatures 10-70°C and in the range 4500 cm<sup>-1</sup> – 600 cm<sup>-1</sup>. The frequencies characterising the symmetric and antisymmetric stretching vibrations of the CH<sub>2</sub> groups in the carbon chains of fatty acid residues were analysed. Depending on surfactant concentration, the temperature range of the main phase transition in DMPC was shifted towards lower temperatures.

The series of SAXS measurements were performed at DESY (Hamburg, Germany; Beam Line X33). Measurements were performed in temperatures 4 - 60 °C for the scattering vectors: 0.05 < *s* < 5.0 nm<sup>-1</sup> (*s* = 4πsinθ/λ). The SAXS results confirmed the changes of DMPC main phase transition observed by FTIR. Also the effect of the surfactant on the growth of the model aquatic organism *Scenedesmus communis* was analysed.

**Acknowledgements:** The project have been financially supported by the Rectors of the A. Mickiewicz University and University of Economics, Poznan, within the interdisciplinary grant AE-UAM Nr 512 00 068. The data collection was supported by European Community - EMBL Hamburg Outstation, contract number: RII3-CT-2004-506008.

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