

Structural changes of DPPC bilayers induced by gemini surfactants

Wojciech Kida, Maciej Kozak

Uniwersytet im. Adama Mickiewicza, Wydział Fizyki, Zakład Fizyki Makromolekularnej (UAM), Umultowska 85, Poznań 61-614, Poland

e-mail: wk57@wp.pl

Dipalmitoylphosphatidylcholine (DPPC) is a phospholipid and also one of a major component of cell membranes. One of the major substances that can strongly interact with phospholipids and induce structural change of phospholipid phases are dicationic (gemini) surfactants. Gemini surfactants are the family of surfactant molecules possessing more than one hydrophobic tail and at least two hydrophilic head groups [1-2].

The research presented was conducted in order to evaluate the influence of bisimidazolium derivatives (quaternary salts at various concentrations) on the structure and phase stability of dipalmitoylphosphatidylcholine in aqueous solutions.

The SAXS measurements has been performed at Beam Line 911-4 at MAX-lab in Lund, (Sweden). Data were recorded in the temperature range 10-45 °C using synchrotron radiation ($\lambda=0.091$ nm) and the Mar 165 CCD detector. The scattering vector range was $0.05 < s < 4 \text{ nm}^{-1}$. All sets of SAXS data have been processed (normalized to the intensity of the incident beam, corrected for detector response and buffer scattering was subtracted) using computer programs BLI7-11 [3] and PRIMUS [4].

The studied surfactant caused destabilization of the lamellar phase typical for DPPC and finally, for the highest surfactant concentration, formation of the unilamellar vesicles – bicellar phase (the observed scattering patterns of DPPC/surfactant systems are very similar to the SAXS patterns reported for the bicellar DPPC/DHPC systems). The temperature range of the main phase transition of DPPC was shifted towards lower temperature with increasing surfactant concentration.

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References

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