

## Effect of polymer on uni-lamellar vesicle in lipid mixture system

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It has been well known that natural swelling of a dry phospholipid film usually produces large multi-lamellar vesicles (MLVs) [1]. These mimic biomembranes produced from synthetic phospholipid molecules have been extensively studied to understand the actual behavior of real biomembranes. Living cells and their organelle, however, exist as uni-lamellar vesicles (ULVs). Therefore, effective methods to create the ULVs have been studied so far [2].

For a phospholipid mixture system consisting of long- and short-chain lipids, ULVs were spontaneously formed at high temperature when lipid bilayers are charged by adding ions or charged lipids [3]. Since these ULVs are uniform in size and very easy to make, the ULV production method from bicelles appears promising to create ideal model cells. In this study, we investigated the effect of polyethylene glycol (PEG), as mimic-biomolecules, on ULV formation in a lipid mixture system.

To observe the ULV structure, we have performed SANS experiments on a typical lipid mixture system, dimyristoylphosphatidylcholine (DMPC) and dihexanoylphosphatidylcholine (DHPC) mixture, at SANS-U, JRR-3M, JAEA, Tokai, Japan [4]. The mixture of lipids in the molar ratio of [DMPC]:[DHPC] = 3.2:1 was dissolved in the PEG solution to be the same volume fraction of lipids (0.35 wt.% for PEG-less sample). The molecular weight of PEG was 4000 g/mol and the concentration of PEG solutions were 0, 16.6, 33.3, 50.0, 66.6, 83.3, and 100 mg/ml.

Figure 1 shows the obtained SANS profiles of vesicles at high temperature phase (50°C). As shown by previous study, homogeneous ULVs were observed in the profile of 0 mg/ml. With increasing PEG concentration, ULVs became polydisperse

in size, and a new Bragg peak due to MLVs appeared around  $q = 0.1 \text{ \AA}^{-1}$  above 50.0 mg/ml. From these results, we conclude that the addition of PEG stabilize MLV structure instead of ULV structure. This would be resulted from the entropic effect due to the addition of PEG.

### References

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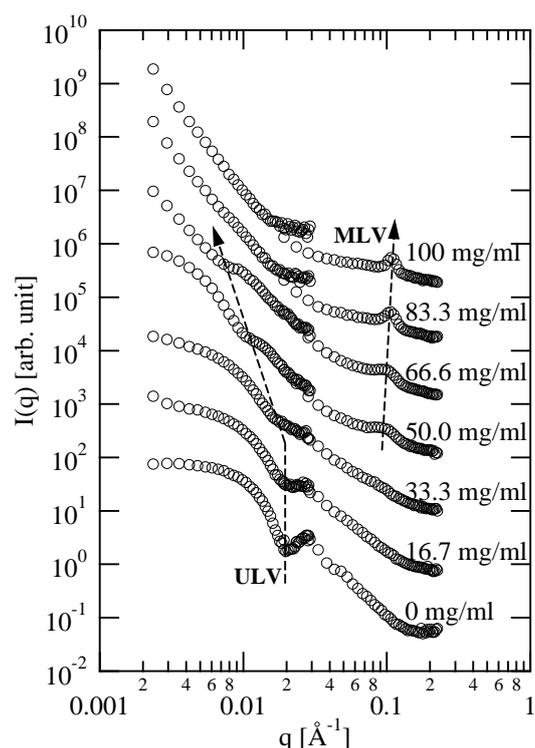


Fig. 1. SANS profiles of vesicles from bicelle with changing PEG concentration.