Hybridization of Lipids to Monolayer and Bilayer Membranes of Triblock Copolymers[1]

Heng-Kwong Tsao[a], Yu-Jane Sheng[b]

[a] *Department of Chemical and Materials Engineering, National Central University, Jhongli, Taiwan 320, R.O.C.*
[b]*Department of Chemical Engineering, National Taiwan University, Taipei, Taiwan 10617.*
yjsheng@ntu.edu.tw

ABA triblock copolymers can exhibit two shapes in the membrane: bridge- and loop-conformations, leading to monolayer, bilayer, and mixed structures (Figure 1). The monolayer (bridge-conformation) and bilayer membranes (loop-conformation) were investigated by dissipative particle dynamics, and their hybridization with lipids was studied as well. The influence of the fraction of loop-conformation on the structural, mechanical, and transport properties of the membrane was obtained. The bilayer membrane is thicker than the monolayer membrane, and it is easier to stretch and bend. Moreover, the lateral diffusion and permeability of the former are greater than those of the later. Lipids can co-assemble with ABA copolymers into a hybrid membrane (Figure 1). A homogenous distribution of lipids in the membrane is acquired at low lipid concentrations (ϕ_l), but a lipid-rich domain emerges as $\phi_l > \phi_l^c$. The critical lipid concentration associated with phase separation is higher in the monolayer membrane, indicating that lipids prefer to hybridize with bridge-conformation rather than loop-conformation. In addition to the energy incompatibility, it is found that the structural incompatibility itself can lead to phase separation in hybrid membranes.

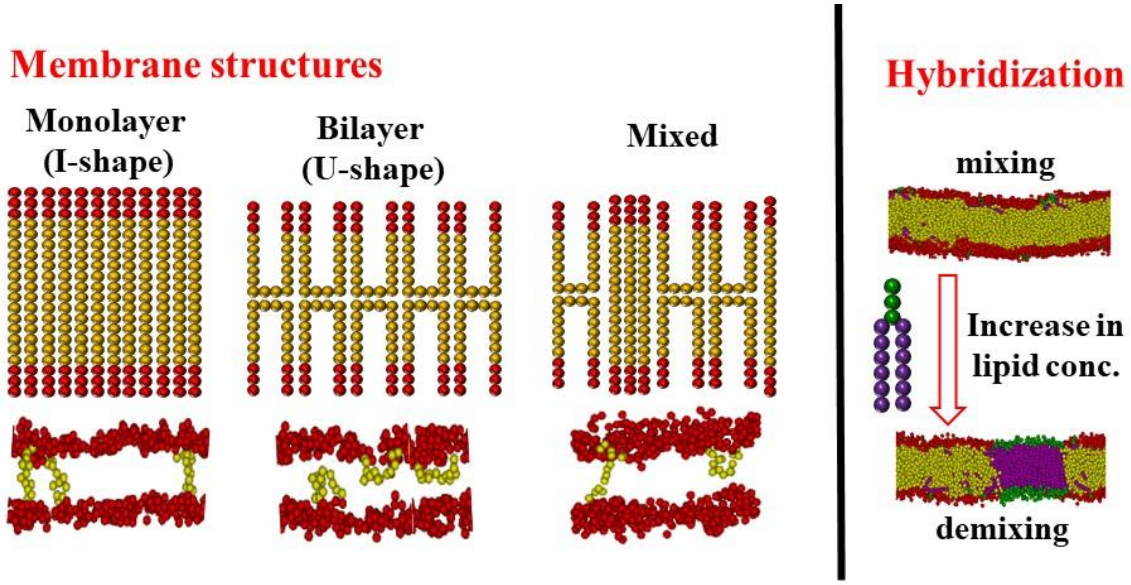

Figure 1: The schematic diagrams and snapshots of the monolayered, bilayered, and mixed membranes are shown. The snapshot of the hybrid lipid/ABA polymer membrane at different lipid concentration are demonstrated.

References

1. Yan-Ling Yang, Yu-Jane Sheng, Heng-Kwong Tsao "Hybridization of Lipids to Monolayer and Bilayer Membranes of Triblock Copolymers", *J. Colloid Interface Sci*. **544**, 53-60 (2019).