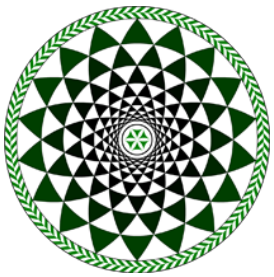

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Change in the phase transition behaviors of phospholipid bilayer by incorporated stilbenes

The phase transition from the ordered gel phase (L_{&beta}') to the disordered liquid-crystalline (L_{&alpha}) phase of a phospholipid bilayer is important for the biomembrane functions. Although incorporated additives such as cholesterol are known to affect the transition behavior, detailed mechanisms have not been clarified. In the present study, the effect of cis/trans isomerization is investigated using stilbene [1] to understand the effect of the steric structure of additives.
Differential scanning calorimetry revealed that the L_{&beta}' - L_{&alpha} phase transition temperature of DPPC decreases by larger extent with cis-stilbene than trans-stilbene. In both L_{&beta}' and L_{&alpha} phases, the bilayer thicknesses and the in-plane molecular packing do not change by the addition of cis- or trans-stilbene from that in pure system. On the other hand, Fourier transform infrared spectroscopy indicates that the perturbation of alkyl chains of the lipids by cis-stilbene is larger than that by trans-stilbene at lower temperature. This suggests that the effect of additives on the order of alkyl chains dominates the change in the L_{&beta}' - L_{&alpha} phase transition.
The effect of the transition on the photoisomerization of stilbene was also examined using the ultraviolet-visible spectroscopy. Exposure of 313 nm of UV light in the L_{&beta}' phase scarcely leads to the photoisomerization of trans-stilbene, while that in the L_{&alpha} phase photogenerates 25-50 % of cis-stilbenes. That is, photoisomerization of trans-stilbene depends on the phase of the lipid bilayer.
These findings demonstrate the cross-relationship between a phase transition of a lipid bilayer and a photoisomerization of an incorporated molecule. In the presentation, we will also discuss the effect of stilbenes on the transition between the L_{&alpha} and the H_{II} phases.

References
[1] <u>K. Nakazawa</u>, M. Hishida, S. Nagatomo, Y. Yamamura and K. Saito, Chem. Lett. 43, 1352 (2014).

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