

論文 / 著書情報  
Article / Book Information

題目(和文)	シャペロン機能カチオン性高分子による脂質膜のDNA駆動形態制御
Title(English)	DNA-commanded Morphological Control of Lipid Membranes Chaperoned by Cationic Copolymers
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種別(和文)	要約
Type(English)	Outline

# Thesis Outline

## Abstract

### Chapter 1 General Introduction

- Phospholipid basics
- Lipid nanotechnology
- Convertible lipid nanosheets
  - Membrane disruptive peptide E5
  - Molecular chaperones and cationic copolymer chaperone Polyallylamine-*graft*-Dextran (PAA-g-Dex)
  - 2D-3D convertible lipid nanosheets formed with E5 peptide and PAA-g-Dex
  - Polyanions can potentially dissociate E5/ PAA-g-Dex complex to convert nanosheets into vesicles.
- Purpose of this research
  - DNA, as a polyanion, can be utilized to control lipid membrane structures.
- Main content of this dissertation

### Chapter 2 DNA-driven sheet-to-vesicle conversion of lipid membranes

- DNA can effectively dissociate E5/PAA-g-Dex complex.
- A novel dual anchoring strategy using palmitated E5 (E5-pal) and stearylated PAA-g-Dex (PAA-g-Dex-SA) can form more stable lipid nanosheets.
- DNA can drive sheet-to-vesicle conversion of lipid nanosheets formed with non-anchoring or dual anchoring system.
- Altering DNA nanostructures are possible to adjust the control effects on lipid membrane.

### **Chapter 3 Smart convertible lipid nanosheets using sequence-responsive chaperone**

- Novel cationic copolymers based on PAA-g-Dex(-SA) that can recognize specific DNA sequences were developed.
- The switch-OFF of copolymer and sheet-to-vesicle conversion of nanosheets were realized with high specificity at nano-scale concentration.
- The switch-ON of copolymer was achieved and led to further membrane fragmentation.

### **Chapter 4 Conclusive remarks and future perspectives**