

Yuwathida Jantippana 2010: Chirality Control on Lipid Nanotubule Morphology Investigated by Circular Dichroism. Master of Science (Physics), Major Field: Physics, Department of Physics. Thesis Advisor: Miss.Nattaporn Chattham, Ph.D. 73 pages.

Self-assembled cylindrical tubules of chiral 1,2-bis(tricosano-10,12-diyne)-sn-glycero-3-phosphocholine (DC_{8,9}PC) formed under controlled cooling process. A mixture of DC_{8,9}PC in ethanol : water [75:25 (v:v)], was heated to 60 °C to dissolve the lipid, and then was allowed to cool to room temperature with controlled cooling rate. Ribbons of lipid bilayers self assembled into tight helical structure forming hollow cylindrical nanotubules during the cooling process.

Images from Atomic Force Microscopy (AFM) revealed strong dependence of helical pitches on cooling rates. The helical pitches increase with decreasing cooling rate. We report experimental measurement on absorption of two orthogonal circularly polarized light by chiral lipid nanotubules of different helical pitches. The optical experiment is carried out with 532 nm, 633 nm and 810 nm lasers. The preference of absorption of one handedness of circularly polarized light is revealed through circular dichroism study along with an evidence of absorption strength increasing with the length of lipid tubule helical pitches. Thus, other than molecular chirality, chirality of lipid tubules can be enhanced through controlled cooling process during the lipid tubule formation.

Student's signature

Thesis Advisor's signature