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# Torque Induced on Lipid Microtubules with Optical Tweezers

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Chiral Phospholipids are found self-assembled into cylindrical tubules of 500 nm in diameter by helical winding of bilayer stripes under cooling in ethanol and water solution. Theoretical prediction and experimental evidence reported so far confirmed the modulated tilt direction in a helical striped pattern of the tubules. This molecular orientation morphology results in optically birefringent tubules. We investigate an individual lipid microtubule under a single optical trap of 532 nm linearly polarized laser. Spontaneous rotation of a lipid tubule induced by radiation torque was observed with only one sense of rotation caused by chirality of a lipid tubule. Rotation discontinued once the high refractive index axis of a lipid tubule aligned with a polarization axis of the laser. We further explored a lipid tubule under circularly polarized optical trap. It was found that a lipid tubule was continuously rotated confirming the tubule birefringent property. We modified the shape of optical trap by cylindrical lens obtaining an elliptical profile optical trap. A lipid tubule can be aligned along the elongated length of optical trap. We reported an investigation of competition between polarized light torque on a birefringent lipid tubule versus torque from intensity gradient of an elongated optical trap

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