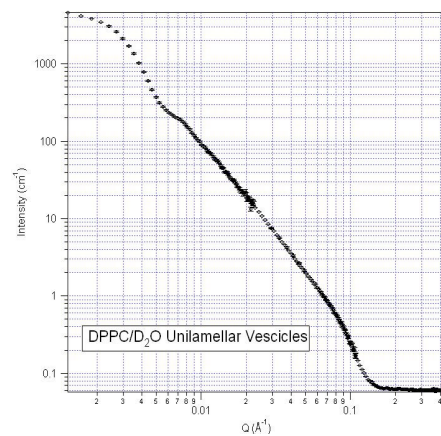
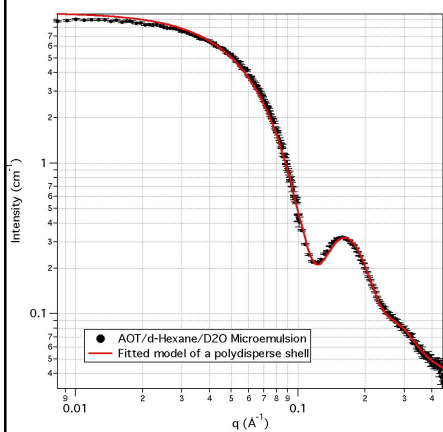


Data Analysis Exercise 2: Investigation of the Bending Modulus of a Lipid Bilayer in a Vesicle

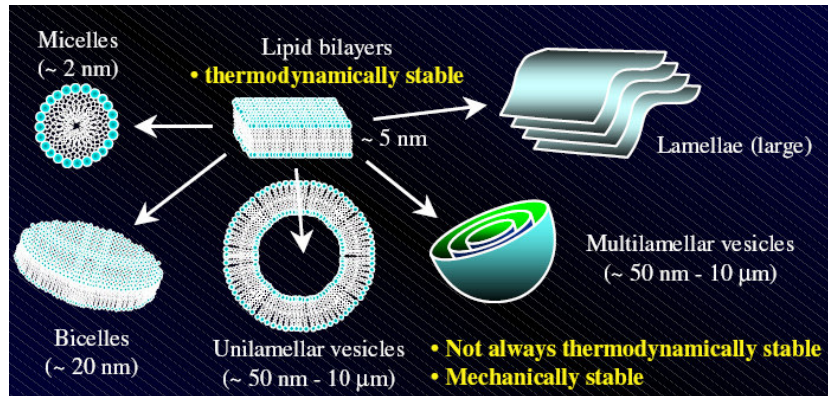
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Microemulsion and Vesicles

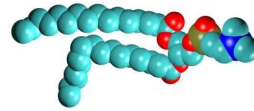


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Typologies of Lipid Bilayers

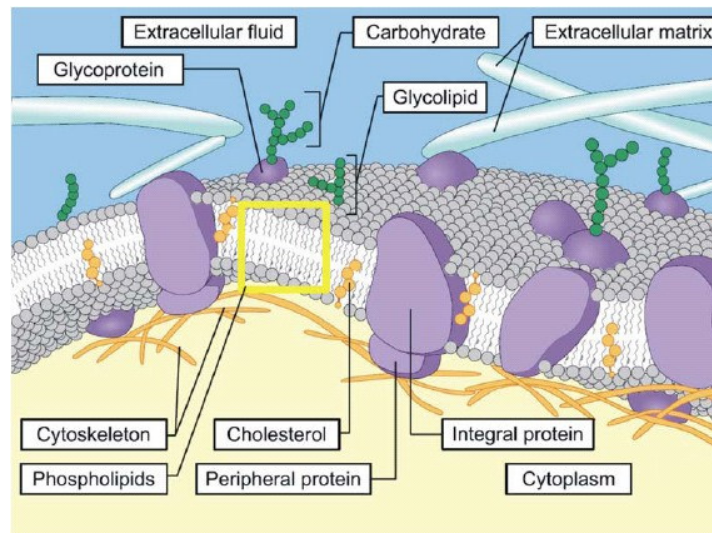


1,2-Dipalmitoyl-*sn*-Glycero-3-Phosphocholine
 DPPC



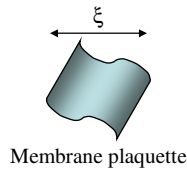
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Phospholipids in the Cell Membrane



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Zilman-Granek Theory



Dynamic Structure Factor

$$S(\bar{Q}, t) = \left\langle \sum_{i,j} \exp\{-i\bar{Q}[\bar{R}_i(t) - \bar{R}_j(0)]\} \right\rangle$$

$$\bar{R}_i(t) = \underbrace{\vec{r}_i(t)}_{\text{lateral}} + \underbrace{\vec{z}_i(t)}_{\text{perpendicular}}$$

$$z_i(t) = h(\vec{r}_i(t), t)$$

Helfrich bending Hamiltonian
for small deformations

$$H = \frac{1}{2} \kappa \int d^2r [\nabla^2 h(\vec{r})]^2$$

$$\frac{I(Q, t)}{I(Q, 0)} = \exp[-(\Gamma t)^{2/3}]$$

$$\Gamma = 0.025 \gamma_k \sqrt{\frac{k_B T}{\kappa}} \frac{k_B T}{\eta} Q^3$$

$$\frac{I(Q, t)}{I(Q, 0)} = \exp \left[- \left(0.025 \gamma_k \sqrt{\frac{k_B T}{\kappa}} \frac{k_B T}{3\eta} \right)^{2/3} Q^2 t^{2/3} \right]$$

A.G. Zilman, and R. Granek, *Phys. Rev. Lett.*, 77, 4788 (1996).
A.G. Zilman, and R. Granek, *Chem. Phys.*, 284, 195 (2002).

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