

Figure S1. The area density of lipid heads (σ^h) versus α for both leaflets at $\phi_l = 0.03$ and 0.09. The area density of lipid tails (σ^t) versus α for both leaflets at $\phi_l = 0.03$ and 0.09 is shown in the inset. The empty symbols denote the outer leaflet and the filled symbols represent the inner leaflet. Solid lines represent the expression of $\sigma_0 / (1 + \alpha)$.

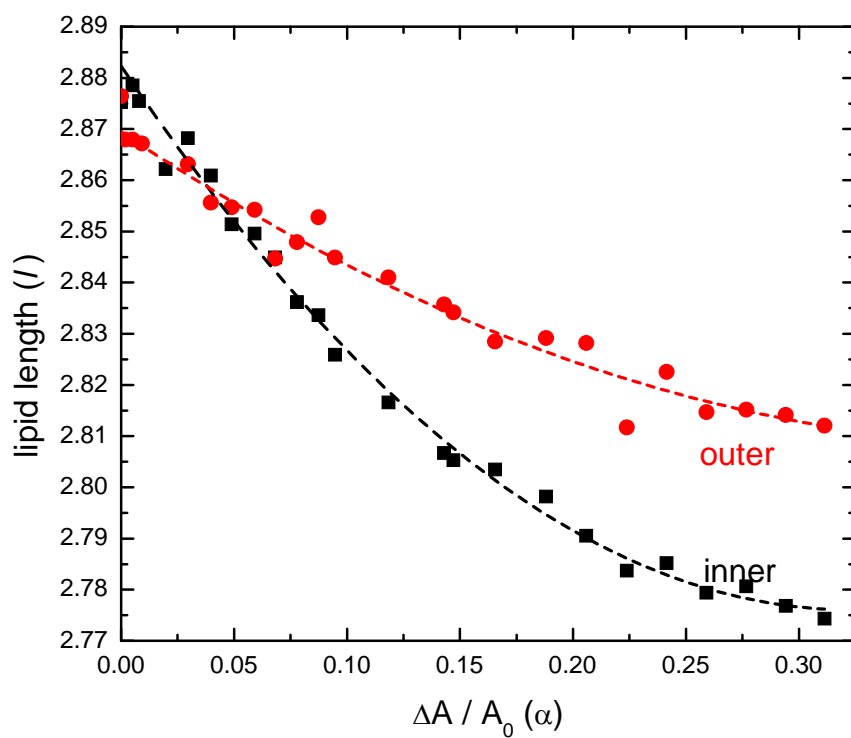


Figure S2. (a) The variation of the lipid lengths (l) of the inner and outer leaflets are plotted versus α with $\phi_l = 0.09$. (b) The lipid volumes (v) of the inner and outer leaflets and the mean lipid volume of the membrane are shown in the inset.

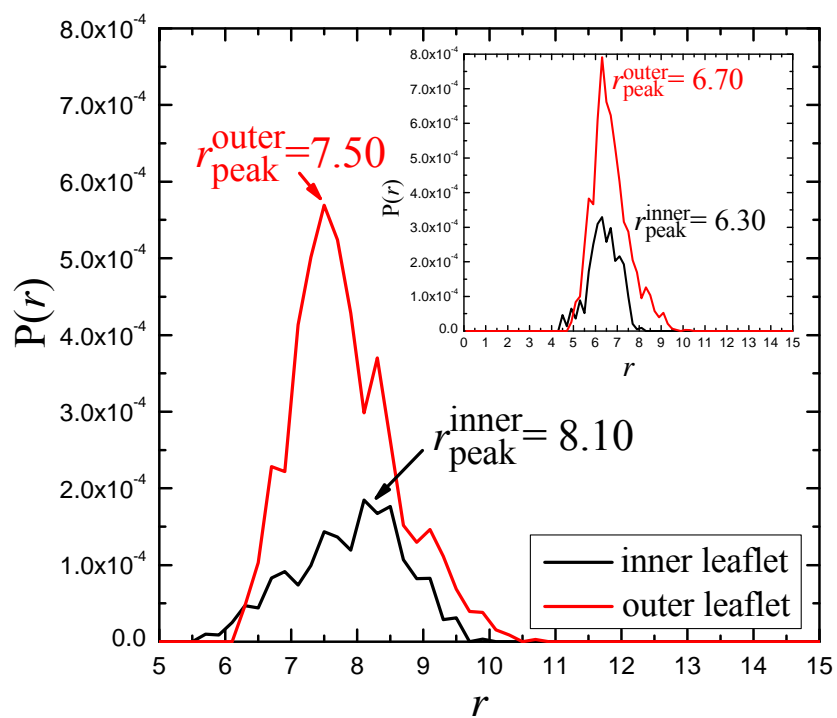


Figure S3. The radial distributions of the terminal beads of lipid tails for vesicle at $\alpha = 0.1$ and with volume fraction $\phi_l = 0.015$. The radial distributions of the terminal beads of lipid tails for vesicle at $\alpha = 0.0$ are shown in the inset.