

Liquid domains in Lipid Membranes

We study giant lipid vesicles as a model of cell membranes. Much of our past work has focused on finding the minimum number of lipid types required to create liquid domains in a vesicle. We find that liquid domains appear on the surface of vesicles containing at minimum a high melting temperature lipid, a low melting temperature lipid, and cholesterol. These three components separate into two phases. This presents an interesting question of which components are in which phases, and in what amounts. I will review our work using fluorescence microscopy and NMR to determine the lipid composition of the liquid domains vs. the background, and to map phase diagrams and to quantify tie-lines. Our work in the past year has focused on two new projects. We study how domains in one leaflet of the membrane are induced in an opposite, initially uniform leaflet, or if the uniform leaflet suppresses domain formation in the first leaflet. We also study how composition fluctuations in the membrane vary with temperature near a miscibility critical point, and find a fit with the prediction of the 2D Ising model.