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The effect of protein on phase separation in giant unilamellar lipid vesicles.[1] J.B. HUTCHISON, R.M. WEIS, A.D. DINSMORE, University of Massachusetts Amherst — We explore the coarsening and out of plane curvature (budding) of domains in lipid bilayer vesicles composed of DOPC (unsaturated), PSM (saturated), and cholesterol. Green fluorescent protein (GFP) was added to the membrane in controlled amounts by binding to the Ni-chelating lipid, Ni-DOGS. Vesicles with diameters between 10 and 50 microns were prepared via a standard electroformation procedure. As a sample is lowered through temperature Tmix, a previously homogeneous vesicle phase separates into two fluid phases with distinct compositions. Phase-separated domains have a line tension (energy/length) at the boundary with the major phase which competes with bending energy and lateral tension to determine the overall configuration of the vesicle. Domain budding and coarsening were observed and recorded using both bright field and fluorescence microscopy during temperature scans and with varying concentrations of GFP. The addition of a model protein into our system allows for a broader understanding of the effect of protein, which are ubiquitous in cell membranes, on phase separation, budding, and coarsening.

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