Budding of domains in mixed bilayer membranes

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We propose a model that accounts for budding behavior (Figure) of domains in lipid bilayers, where each of the bilayer leaflets has a coupling between its local curvature and local lipid composition. The compositional asymmetry between the two monolayers leads to an overall spontaneous curvature.

The membrane free-energy contains three contributions: bending energy, line tension, and a Landau free-energy for a lateral phase separation. Within a mean-field treatment, we obtain various phase diagrams which contain fully-budded, dimpled and flat states. In particular, for some range of membrane parameters, the phase diagrams exhibit a tricritical behavior as well as three-phase coexistence region.

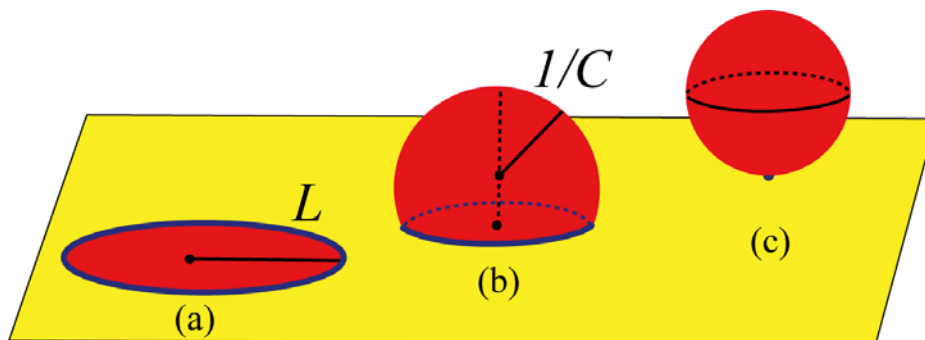The global phase diagrams can be divided into three types and are analyzed in terms of the curvature-composition coupling parameter and domain size.

Figure : Budding process [1]

[1] J. Wolff, S. Komura, D.Andelman, *Budding of domains in mixed bilayer membranes* PRE, **91**, 012708 (2015)