

Abstract Submitted
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Dynamics of Encapsulation and Budding in Lipid Membranes

KURT SMITH, Department of Chemical Engineering, University of Pittsburgh — The behavior of lipid membranes is important in cell biology, as well as in the development of synthetic vesicles for drug delivery and other applications. The fundamental role of the membrane is to control the passage of matter into and out of a cell or vesicle. We have examined two related processes - the encapsulation of a particle by an adhesive membrane (as in endocytosis) and the budding and vesiculation of a phase separated membrane domain. These processes require changes in membrane topology (i.e. pinch-off) which involve molecular-scale rearrangements. Thus they cannot be fully understood through a macroscopic free energy formulation. Using dissipative particle dynamics, we examine the pathway through which pinch-off occurs, and find that it depends upon the nucleation of a pore at the membrane neck. We use simulations to predict the range of conditions under which pinch-off is possible.

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