Supporting Information

Concentration-driven growth of model protocell membranes

Itay Budin, Anik Debnath, and Jack W. Szostak

Howard Hughes Medical Institute, Department of Molecular Biology and Center for Computational and Integrative Biology, Massachusetts General Hospital, 185 Cambridge St., Boston, MA 02114, USA

This file includes Figures S1-S5.

Supporting Figures

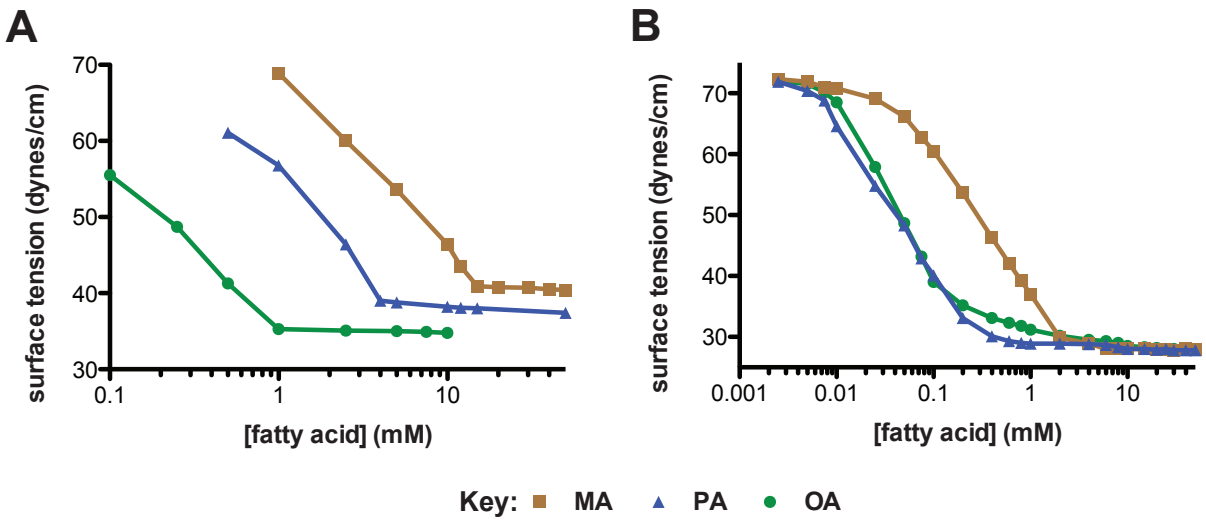

Figure S1: Surface tension of fatty acid solutions at pH 10.5 (A) and 8.5 (B). Surface tension measurements were taken by the Noüy ring method. MA, myristoleate (C14:1); PA, palmitoleate (C16:1), OA, oleate (C18:1).

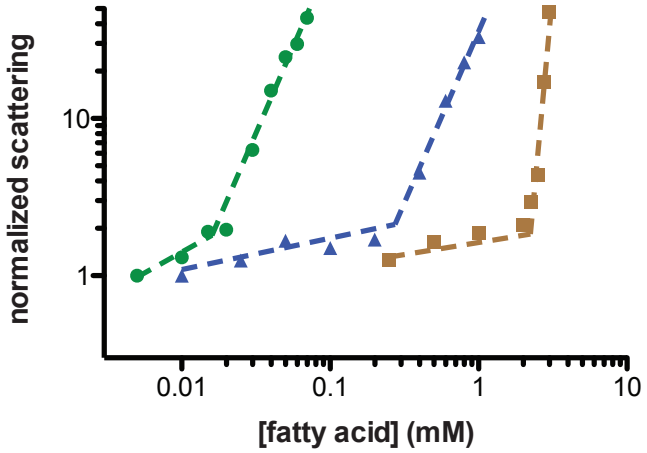

Figure S2: Critical aggregation concentrations for fatty acid vesicles as measured by light scattering of serial dilutions at pH 8.5. Abrupt increases in the slope of the plots indicates the presence of vesicles, which are much larger than monomers and micelles in solution and thus scatter light. Derived cacs are 0.02 mM for oleate (C18:1, green), 0.25 mM for palmitoleate (C16:1, blue), and 2 mM for myristoleate (C14:1, brown).

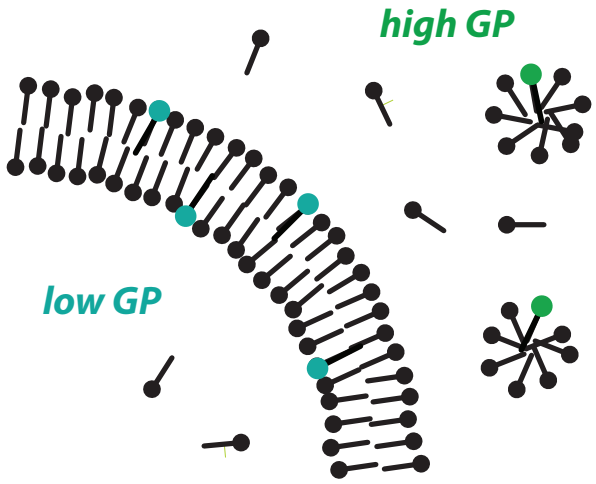

Figure S3: Laurdan as a probe for fatty acid aggregate composition. The high curvature of small micelles results in a higher GP for Laurdan probe molecules compared to planar bilayers.

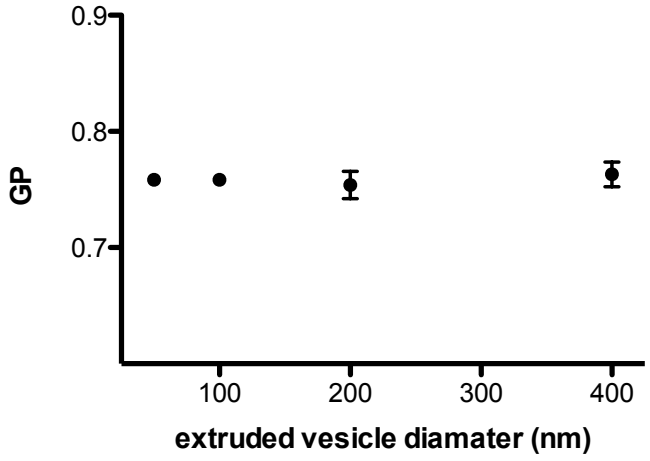

Figure S4: Dependence of Laurdan GP on the extruded vesicle size. 10 mM oleate at pH 8.5 was extruded using filters with pore sizes of the given diameter. GP is independent of extruded diameter and thus is independent of vesicle size over this range.

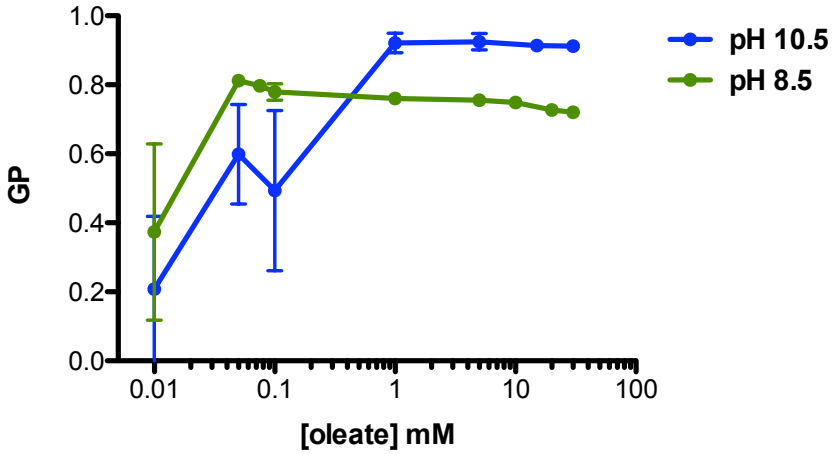

Figure S5: Concentration dependence of Laurdan GP in oleate solutions during the monomer-aggregate transition. Solutions below the critical concentrations (1 mM at pH 10.5, 20 μM at pH 8.5) are characterized by noisy Laurdan emission with low GP, likely reflecting the insolubility of the dye in the absence of hydrophobic aggregates. Upon aggregation, Laurdan partitions into the aggregates and samples their composition.