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The influence of membrane stress on phase separation and domain shape in phospholipid vesicles DONG CHEN, Physics Department of University of Massachusetts Amherst, MARIA SANTORE, Polymer Sci. & Eng. Department of University of Massachusetts Amherst — Phase separation of mixed phospholipid bilayers is of interest due to the potential role of phospholipid rafts in cell adhesion and signaling. Studies of membrane dynamics and the phase diagram itself typically neglect the role of tension, though it is expected that imposition of moderate membrane tensions might mildly shift the phase separation temperature, as anticipated by Clausius Clapeyron. We show here, using a simple binary system (DOPC/DPPC), a more dramatic effect: The tension imposed on giant unilamellar phospholipid vesicles can alter the phase and the domain shape, completely changing the composition of the liquid and solid phases, their proportions, and the transition temperature. The example in this talk demonstrates how striped or patchy hexagonal phases can develop, depending on thermal history and tension. Different incorporation of tracers into the ordered phases suggests fundamental differences in their structure at the molecular level. Rapid quenching and low tensions favor hexagonal patches while increased tension and slower quenching favors a striped phase. For this reason it is believed that the patches contain corrugations such that the structure of the ordered phase is metastable.

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