Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Growth and Morphology of Solid-like Domains in Binary Giant Lipid Vesicles PAUL BEALES, University of Edinburgh, VERNITA GORDON, ZHIJUN ZHAO, STEFAN EGELHAAF, WILSON POON, University of Edinburgh — Giant lipid vesicles are important, optically-resolvable, model systems for studying physical phenomena in biomembranes and have important applications as technological containers in the engineering of novel soft materials. Giant vesicles containing two different lipid components are well-mixed in the fluid phase; as the temperature is lowered phase separation occurs between fluid and solid-like phases. We observe this phase separation using confocal fluorescence microscopy. The varied domain morphologies have previously been assumed to result from interplay between line tension and the elastic properties of the bilayer. However, we find that the domain morphology can be understood from the structure of the solid-like phase: the molecular scale lipid organization determines the mesoscopic domain shape analogous to how unit cell symmetries determine the shape of three-dimensional crystals. We also show that the domains grow by a non-equilibrium mechanism that is well-know to occur in alloys. Slow diffusion in the solid-like phase results in a compositional gradient within these domains.

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Date submitted: 30 Nov 2005 Electronic form version 1.4