Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Compositional Heterogeneity in Ternary Models for the Cell Membrane ROBIN SMITH, Department of Physics, Cornell University, FREDERICK HEBERLE, JING WU, GERALD FEIGENSON, Field of Biophysics, Cornell University — Ternary models for the cell membrane comprised of cholesterol (Chol) plus high and low melting temperature lipids exhibit rich phase behavior as a function of temperature and composition. Of particular interest is a region of coexisting disordered and ordered fluid phases that is thought to indicate how lipids organize to promote protein function in the cell membrane. We have used fluorescence resonance energy transfer to investigate the ternary mixtures DOPC(1,2-dioleoyl-sn-glycero-3-phosphocholine)/bSM (porcine brainsphingomyelin)/Chol and POPC (1-palmitoyl-2-oleoyl-sn-glycero-3-phosphocholine)/bSM/Chol at high compositional resolution. We confirmed liquid coexistence for DOPC/bSM/Chol at 15 and 25C that melts by 35C, but in contrast to previous studies we detected no fluid-phase compositional heterogeneity for POPC/bSM/Chol from 5-35C. If domains exist, they must be smaller than the approximately 5 nm sensitivity provided by the fluorescent lipid analogs employed. We propose electron spin resonance and x-ray scattering for measuring whether liquid-phase compositional heterogeneity occurs for POPC/bSM/Chol. Understanding POPC/bSM/Chol phase behavior will provide a framework for investigating peptide/lipid interactions in a biologically relevant lipid mixture.

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Date submitted: 17 Nov 2009 Electronic form version 1.4