Abstract Submitted
for the TSF11 Meeting of
The American Physical Society

Detection of superlattice domain formation in ternary lipid mixtures using fluorescence spectroscopy BURCIN MUTLU, STEPHANIE LOPEZ, MARK VAUGHN, JUYANG HUANG, K. CHENG, Texas Tech University — Multicomponent lipid bilayers represent an important model system for studying the structures and functions of cell membranes. At present, the lateral organization of lipid components, particularly the formation of regular distribution, in lipid membranes containing charged lipid, e.g., phosphatidylserine, is not clear. Using a ternary phosphatidylcholine/phosphatidylserine/cholesterol lipid bilayer system, the presence of ordered domain formation was examined by measuring the fluorescence anisotropy of the embedded fluorescent probe, 22-(*N*-(7-nitrobenz-2-oxa-1,3-diazol-4-yl)amino)-23,24-bisnor-5-cholen-3β- ol (NBD-CHOL), with structure similar to that of a cholesterol, as a function of phospatidylserine composition. The plot of the anisotropy vs. phosphatidylserine revealed abrupt changes at certain critical compositions of phosphatidylserine. Some of these critical compositions agree favorably with those predicted by the headgroup superlattice model suggesting that the charged phosphatidylserine lipid molecules adopt a superlattice-like distribution in the lipid bilayer at some predicted compositions. The ordered distribution of charged lipids may play an important role in the regulation of the composition of the biological membranes.

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Date submitted: 13 Sep 2011 Electronic form version 1.4