

**STUDIES OF PHASE TRANSITIONS IN SUPPORTED BILAYERS OF CATIONIC AND NEUTRAL LIPIDS BY SIMULTANEOUS IN SITU FLUORESCENCE SPECTROSCOPY AND ATOMIC FORCE MICROSCOPY**

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Supported planar bilayers, formed by the direct fusion of lipid vesicles to a solid substrate, have been shown to be ideal models of cell membranes. To a large extent, this is due to the relative ease of modulating their chemical composition and domain structures. We recently observed a putative phase transition during the initial stages of bilayer formation for the cationic lipid, dimyristoyltrimethylammoniumpropane (DMTAP), and the neutral lipid, dimyristoylphosphatidylcholine (DMPC). This transition, marked by ~ 1 nm variation in the height of the bilayer, was directly resolvable by in situ tapping mode atomic force microscopy (AFM), both in the height and phase imaging modes. We were able to resolve the kinetics of this structural transition and stabilize the two structural forms through manipulation of the temperature and ionic strength of the buffer solution. To confirm that this transition is due to a change in tilt and/ or packing of the lipid tails, in situ fluorescence spectroscopy was applied. The simultaneous acquisition of the fluorescence spectra and atomic force microscopy data provide an excellent correlative approach to monitoring and characterizing these transient structural rearrangements.