

Abstract Submitted
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Near-Field structural studies of lipid bilayers MERRELL JOHNSON, RICARDO DECCA, IUPUI Physics Dept. — We use a Near-field Scanning Optical Microscope (NSOM) in conjunction with a Photo Elastic Modulator (PEM) to conduct birefringence ($n_e - n_o$) measurements with a spatial resolution of $\sim 80\text{nm}$. With our current setup we are able to distinguish changes in retardance $\alpha = \frac{2\pi(n_e - n_o)}{\lambda}$ on the order of 5×10^{-3} radians. Simultaneously while gathering information about α we extract information about the samples optical orientation θ , reference to the system's axis, with an accuracy of 3.64×10^{-3} radians. We use our system on 1,2-dipalmitoylphosphatidylcholine (DPPC) bilayers, which at room temperature are in the gel state, (i.e.: their acyl chains have a ~ 32 degree azimuthal tilt with respect to the membranes normal). Modeling the membrane as a uniaxial crystal we are able determine the position of the acyl chains by measuring the birefringence and optical orientation. By controlling the temperature of our sample we hope to better study the structural changes that occur during phase transitions from gel to liquid states. The investigation of other lipid mixtures and the transformations they undergo during different phases will also be discussed.

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