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Dynamic Heterogeneity in Lipid Structures CHRISTINA OTHON[1], Wesleyan Univ, NEDA DADASHVAND, Wesleyan University — We have characterized the temperature and pressure dependent scaling of dynamic heterogeneity in a homogenous liquid phase of a lipid monolayer using time-resolved fluorescence anisotropy (TRFA) microscopy. Rotational diffusion is far more sensitive to highly correlated motions than translational diffusion due to the enhanced influence of nearest neighbor interactions. Highly correlated motion results in regions of high-density, low mobility lipids, and low-density, high mobility lipids; and are observed as the bimodal distribution of rotational correlation times. For biological lipid membranes the presence of highly correlated motion will greatly influence the rates of protein sorting and self-assembly, as particles suspended in the fluid can become kinetically trapped. Rotational diffusion timescales ($\sim$ ns) are far shorter than the lifetime of dynamic clusters and lipid raft-like structures ($\sim$ 10 μs), and thus the distribution of rotational correlation times can provide critical insight into the presence of these structures. We have characterized rotational dynamic distributions for a variety of phosphocholine moieties, and found dynamics consistent with highly correlated motion. Using the proximity to the phase transition, and the scaling of the temperature dependence of the heterogeneity we apply theoretical models developed for other condensed matter systems help us define limits on the size and lifetime of dynamic clusters in lipid structures.

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