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Robust and Tunable Polymer Cushioned Lipid Membranes

Tuesday, 16 July 2024 09:00 (45 minutes)

This talk will present some comparisons of neutron and X-ray reflectivity of supported lipid membranes as platforms to investigate various membrane properties. I will emphasize some recent work on a robust polymer cushioned membrane system that recapitulates many salient features of the plasma membrane including control over the fluidity of the membrane and thickness/density of the underlying, pH responsive polymer network. The system is readily fabricated from commercially available materials with commonly available laboratory equipment. High quality, high coverage lipid membranes were constructed using Langmuir-Blodgett and vesicle fusion deposition methods. The underlying polymer network or membrane cushion is a covalently grafted PAA cushion with nominal thickness controlled by spin coating conditions. The pH-sensitive structure of the PAA network and coupling to the membrane can be used to control the hydrated thickness of the film and membrane diffusivity. At low pH, when the PAA is collapsed, diffusivity is strikingly lower than at high pH when the PAA is swollen. Under physiological conditions, the diffusion rates of lipid membranes on the PAA network were indistinguishable from those on bare glass supports. Importantly, the PAA cushioned membrane structure is stable during cycling through acidic, neutral, and alkaline conditions.

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Thin films and interfaces in soft matter and materials science

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