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Protein crystals on phase-separating model membranes SULIANA MANLEY, MARGARET HORTON, SZYMON LESZCZYNSKI, ALICE GAST, Massachusetts Institute of Technology — We study the interplay between the crystallization of proteins tethered to membranes and separation within the membranes of giant unilamellar vesicles (GUVs) composed of DOPC, sphingomyelin (SM), and cholesterol. These model membranes phase separate into coexisting liquid domains below a miscibility transition temperature. This phase separation captures some aspects of the formation of lipid rafts in cell membranes and demonstrates the influence of membrane composition on raft formation. Real cell membranes have a much more complicated structure. There are additional physical constraints present in cell membranes, such as their attachment to the cytoskeleton and the presence of membrane bound proteins. The self-association of membrane proteins can influence the membrane phase behavior. We begin to investigate these effects on model tethered protein- loaded membranes by incorporating a small amount of biotin-X- DPPE into our GUVs. The biotinylated lipid partitions into a cholesterol-poor phase; thus, streptavidin binds preferentially to one of the membrane phases. As streptavidin assembles to form crystalline domains, it restricts the membrane mobility. We examine the effect of this protein association on lipid phase separation, as well as the effect of the lipid phase separation on the crystallization of the tethered proteins.

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