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Hybrid Lipid as Biological Surfactants ROBERT BREWSTER, Weizmann Institute of Science, PHIL PINCUS, University of California- Santa Barbra, SAM SAFRAN, Weizmann Institute of Science — Systems capable of forming finite-sized, equilibrium domains are of biological interest in the context of membrane rafts where it has been observed that certain cellular functions are mediated by small (nanometric to tens of nanometers) domains with specific lipid composition that differs from the average composition of the membrane. These small domains are composed mainly of lipids with completely saturated hydrocarbon tails that show good orientational order in the membrane. The surrounding phase consists mostly of lipids with at least one unsaturated bond in the hydrocarbon tails which forces a "kink" in the chain and inhibits ordering. In vitro, this phase separation can be replicated; however, the finite domains coarsen into macroscopic domains with time. We have extended a model for the interactions of lipids in the membrane, akin to that developed in the group of Schick (Elliott et al., PRL 2006 and Garbes Putzel and Schick, Biophys. J. 2008), which depends entirely on the local ordering of hydrocarbon tails. We generalize this model to an additional species and identify a biologically relevant component, a lipid with one fully saturated hydrocarbon chain and one chain with at least one unsaturated bond, that may serve as a line-active component, capable of reducing the line tension between domains to zero, thus stabilizing finite sized domains in equilibrium.

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