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Probing interleaflet coupling in phase separated lipid bilayers under high shear MATTHEW BLOSSER, Univ of Washington, AURELIA HONERKAMP-SMITH, Univ of Cambridge, SARAH KELLER, Univ of Washington — Lipid membranes composed of at least three lipid types can phase separate into micron-scale, coexisting liquid phases. Domains in each leaflet are never observed to move out of registration, which indicates a strong interleaflet coupling. Our group has found that this strong coupling persists in asymmetric membranes, where lipid ratios are different in each leaflet [1]. For membranes that lack transmembrane proteins or gel phases, the origin of this strong coupling is not intuitive [2]. Previously, we have found that domain registration persists in supported bilayers to shear rates of 6 seconds^{-1}. Here, we use microfluidic techniques to apply higher shear to supported bilayers with the goal of overcoming coupling by moving the membrane's upper leaflet with respect to the lower leaflet. We use a flow cell design by Jönsson which was previously shown to move bilayers across a substrate [3]. In this system, the leaflet proximal to the substrate flows much slower than the leaflet proximal to the solution, leading to a macroscopic spatial shift between initially apposed regions. This technique of subjecting supported bilayers to high shear allows us to probe interactions between leaflets in the monolayer.

[1] Collins MD, Keller SL (2008) *PNAS,* 105(1):124–128
[2] Devaux PF , Morris R (2004) *Traffic,* 5:241–246
[3] Jönsson P, Beech JP, Tegenfeldt JO, Höök F (2009) *JACS*, 131(14):5294-5297

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