Influence of Drainage on the Lifetime and Reproducibility of Free-Standing Lipid Bilayer

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Free-standing lipid bilayers are one of the most used model systems to mimic biological cell membranes. Many experimental setups, like microfluidic chips, have been dedicated to produce such type of suspended lipid bilayers [1]. To achieve high yield and reproducible bilayer formation, most setups require the presence of an oil to stabilize the bilayer. We consider the case of a bilayer obtained by bringing into contact two lipid monolayers separated by a nanometric oil film, followed by zipping of these two monolayers to form the bilayer upon absorption of the oil film [2]. In this article, we discuss the importance of the drainage step on the stability and the lifetime of the formed lipid bilayer. We also investigated that by controlling the pressure of the chambers in the microfluidic chip, we can bend the bilayer and make a curvature. Furthermore, with the curvature of the bilayer, the surface tension of the lipid monolayer can be calculated using Young Laplace pressure equation.

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