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Diffusion in Tethered Bilayer Lipid Membranes as observed by Z-Scan FCS S. SHENOY, R. MOLDOVAN, S. RAUHALA, M. LOESCHE, Carnegie Mellon University — Tethered bilayer lipid membranes (tBLMs, [1]) are resilient biomimetic systems stabilized by the proximity of an inorganic interface. Synthetic lipids with a hydrophilic oligomer covalently coupled to the substrate serve as membrane anchors while forming a nm-thick aqueous reservoir. This property can be exploited to investigate protein-membrane interactions at the molecular length scale. The anchor is chemisorbed into a self-assembled monolayer, either as a pure compound (densely tethered) or laterally diluted (sparsely tethered) by β -mercaptoethanol (βME), a small spacer. Phospholipids are then precipitated to complete the bilayer structure. Diffusion measurements were performed using both one-photon and two-photon fluorescence correlation spectroscopy using the Z-Scan approach[2]. While the aqueous reservoir decouples the bilayer from the substrate, we expect the presence of tethers in the inner leaflet to inhibit the free diffusion of lipids. Indeed, we see a drop in the apparent diffusion coefficient by a factor of 2 when comparing a densely tethered membrane to a sparsely-tethered membrane. Importantly, the diffusion coefficients in tBLMs compare favorably with those observed in giant unilamellar vesicles, indicating that tBLM dynamics are similar to those of free bilayers. [1] McGillivray et al., Biointerphases 2007(2): 21-33 [2] Benda et al., Langmuir 2003(19): 4120-4126

S. Shenoy

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