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Droplet Microfluidics for Artificial Lipid Bilayers SRIKOUNDINYA PUNNAMARAJU, ANDREW STECKL, Nanoelectronics Laboratory, University of Cincinnati — Droplet interface bilayer is a versatile approach that allows formation of artificial lipid bilayer membrane at the interface of two lipid monolayer coated aqueous droplets in a lipid filled oil medium. Versatility exists in the form of voltage control of DIB area, ability of forming networks of DIBs, volume control of droplets and lipid-oil, and ease of reformation. Significant effect of voltage on the area and capacitance of DIB as well as DIB networks are characterized using simultaneous optical and electrical recordings. Mechanisms behind voltage-induced effects on DIBs are investigated. Photo induced effect on the DIB membrane porosity is obtained by incorporating UVC-sensitive photo-polymerizable lipids in DIB. Photo-induced effects can be extended for in-vitro studies of triggered release of encapsulated contents across membranes. A droplet based low voltage digital microfluidic platform is developed to automate DIB formation, which could potentially be used for forming arrays of lipid bilayer membranes.

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