

Shippable and Indefinitely Storable Biomimetic Membrane Platform

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Although artificially reconstituted lipid bilayers have been used for over four decades for basic scientific research, to host engineered pore proteins for sensing applications, and to measure drug/ion channel interactions, their application is limited by a number of factors including fragility, short lifetime, and manual formation at the time and place of use. We have developed a new approach in which the self-assembly of lipid bilayers formed using the Mueller-Rudin method (Mueller et al. Nature, 1962) can be reversibly halted through freezing. (Jeon et al. Lab Chip 8, 1742 (2008)) When frozen before bilayer self-assembly is complete, the bilayer precursor is sufficiently robust to withstand shipping and indefinite storage. After thawing, the process of self-assembly resumes and results in a lipid bilayer membrane indistinguishable from one formed conventionally. In this way, we eliminate the need for the bilayer solution to be prepared at the time and place of use by a skilled operator. Instead, the bilayer precursor may simply be thawed prior to use. We will present our work with this platform and discuss our efforts to create membrane arrays with this technology and their application to high throughput screening of ion channels.