Method For Indefinite Storage And Preservation Of Membrane Precursors  
Tech ID: 29954 / UC Case 2007-746-0

SUMMARY
UCLA researchers in the Department of Bioengineering have developed a novel strategy for the creation of biomimetic lipid bilayer membrane using a high freezing point lipid-containing solvent. Using this method, the membrane precursor is frozen/immobilized prior to the completion of the spontaneous process of bilayer self-assembly, and the process can be resumed later by simply thawing and allowing membrane formation to resume.

BACKGROUND
Artificially reconstituted freestanding planar lipid bilayers are important tools for ion channel electrophysiological studies due to the accessibility allowed to both sides of the membrane by ions and analytes. However, the technological utility of these membranes is limited by their characteristic fragility and short lifetime. As a result, long-term ion channel measurements become difficult to perform, and the duration of these experiments is limited by the stability of the membranes. In addition, membrane fabrication requires expertise and special equipment, and the membranes formed are extremely susceptible to mechanical and acoustic perturbation and cannot be transported.

Although solid-supported membranes have improved mechanical stability, they cannot be used for measuring trans-membrane ion transport because of the inaccessibility of one side of the membrane. Furthermore, since the solid support stabilizes the membrane quite well, sometimes defects in the membrane can occur without any effect on the rest of the membrane, which can severely complicate transport measurements.

Therefore, it is desirable to have mechanically stable and ready-to-use freestanding lipid bilayer that can be used routinely by untrained workers.

INNOVATION
Researchers at UCLA have developed a new method by which a membrane precursor may be created and preserved through freezing or other means of immobilization. By using high freezing point lipid-organic solvent mixtures, the process of lipid bilayer self-assembly can be reversibly arrested. When the temperature is lowered below the freezing point of the organic solvent, the membrane precursor is immobilized but not the surrounding water. In the solid form, the membrane precursor can be stored indefinitely and is mechanically stable to withstand commercial shipping. Upon thawing, spontaneous bilayer self-assembly resumes, resulting in a biologically functional membrane. The surrounding water can also be removed to allow large numbers of membranes to be packed in the form of arrays for compact storage, transport and high-throughput screening applications.

APPLICATIONS
- Preparation of freestanding planar lipid bilayer or biomimetic membrane for ion channel electrophysiological measurements, membrane protein incorporation experimentations, and drug discovery

ADVANTAGES
- Extended membrane precursor lifetime enables centralized manufacturing and subsequent shipment and distribution
- Ready-to-use by researchers and clinicians without prior training
- Adaptable to low cost, mass production of membranes to house membrane proteins for high-throughput screening of targets for drug discovery.

STATE OF DEVELOPMENT
The described method has been successfully tested in the lab.

PATENT STATUS

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RELATED MATERIALS

RELATED CASES
2007-746-0

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS
- Lipid Bilayer Formation Using Sessile Droplets