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Preparation of Highly Effectively Fusible Liposomes Reconstituted with Phage Portal Proteins for Nanopore Sensing Technology

A new, cost-effective method eliminates the need for expensive detergents to create stable, long-lasting proteoliposomes that efficiently enhance nanopore sensing technology and drug delivery.

The biological nanopore sensing technology is a technique that has been experimentally proven to sequence DNA and identify and quantify the targets of molecules with different sizes by means of a nanosized protein pore formed in a planar bilayer membrane at the single-molecule level. However, a huge challenge to this technique is how to realize efficient insertion of a variety of either the channel proteins from cell membrane or phage portal proteins into the bilayer membranes, which represents an extremely technical and tedious task. Especially for the proteins with high hydrophobicity, the proteoliposomes reconstituted with the proteins are always required. Unfortunately, the fusion of the proteoliposomes into the bilayers is often sporadic, unpredictable, and highly variable. Traditional methods, such as the use of high-cost biologically compatible detergents, can partially solve the issues, while they are not appropriate for mass production of the proteoliposomes. Moreover, improvements of the methods are also needed to extend the shelf life of the proteoliposomes for commercial purpose.

Researchers at Purdue University have developed a new method for the preparation of fusible proteoliposomes containing portal proteins from bacteriophages. To address the aforementioned issues with the proteoliposomes, this method eliminates the need for the high-cost detergents, making the proteins less hydrophobic and saving the time needed for detergent removal. The prepared proteoliposomes are more efficiently and rapidly inserted into the bilayers for nanopore sensing, maintaining an extended shelf life. This method has the potential for use as a practical and universal method for reconstituting the proteoliposomes with other hydrophobic channel proteins from cell membranes. It could be commercialized for different biomedical applications and enhance

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nanotechnology, biophysics, microbiology, and pharmaceutical research & development.

Advantages:

-Increased the protein stability in the proteoliposomes

-Adjustable and highly efficient fusion of channel proteins into bilayer membranes

-Better liposome longevity, easing storage and transport

-Universal, simple, and practical

Potential Applications:

-Biomedical applications such as nanopore sensing technology and liposome assisted drug-delivery systems

-Enhance research areas that use proteoliposomes

TRL: 2

Intellectual Property:

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