UC Irvine
UC Irvine Previously Published Works

Title

Tethered lipid bilayer membranes assembly on gold: Fabrication and properties characterization

Permalink

https://escholarship.org/uc/item/8zj5z29g

Authors

Wang, Xi
Shindel, Matthew M
Wang, Szu-Wen
et al.

Publication Date

2012

Copyright Information

This work is made available under the terms of a Creative Commons Attribution License, available at https://creativecommons.org/licenses/by/4.0/

Peer reviewed

eScholarship.org Powered by the California Digital Library
University of California

Abstracts of Papers of the American Chemical Society

Tethered lipid bilayer membranes assembly on gold: Fabrication and properties characterization

Xi Wang, Matthew Shindel, Szu-wen Wang, Regina Ragan

PRESENTED AT 243rd National Meeting (2012) – American Chemistry Society
Mar 26-29, 2012

Abstract

Tethered lipid bilayer membranes (tLBMs) on conductive surfaces are attractive for biosensing protein-membrane interactions and drug discovery. Since lipid vesicle fusion does not spontaneously occur on bare gold, a facile method is proved successfully for tLBMs formation using 1-palmitoyl-2-oleoyl-sn-glycero-3-phosphocholine (POPC) vesicles functionalized with 1,2-distearoyl-sn-glycero-3-phosphoethanolamine-N-poly(ethylene glycol)-2000-N-[3-(2-pyridyldithio)propionate] (DSPE-PEG-PDP) containing a disulfide group for Au-thiolate bond formation. AFM force spectroscopy with pico-Newton force accuracy is utilized to investigate functionalized POPC vesicles rupture kinetics as a function of DSPE-PEG-PDP concentration and the minimum external force for tLBMs formation on gold. The minimum external force to initiate tLBMs of 2.5mol%DSPE-PEG-PDP/97.5mol%POPC formation is 1.1nN, while that for 10mol%DSPE-PEG-PDP/90mol%POPC is 0.5nN. In contrast, POPC vesicles without DSPE-PEG-PDP kept intact on plasma-cleaned gold after >2.5nN forces were exerted. Thus, Au-thiolate bonding between DSPE-PEG-PDP and gold increases vesicle-substrate interactions and is crucial for promoting tLBMs formation. TLBMs fluidity was characterized as a function of DSPE-PEG-PDP concentration by fluorescence microscopy.