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Manipulation of Biomolecules Using Artificial Cell Membrane

- Selective adsorption/transport of proteins to desired position -

NTT

Motivation

We aim at fabricating nanobio (biomimetic) functional devices. The development of these devices requires a technique for manipulating biomolecules on a solid substrate (biointerface) without interfering with their structure or biological functions. We produce an artificial cell membrane on a substrate that enables proteins to be adsorbed or transported to a desired position, and thus realize a novel molecular manipulation technique for use on biointerfaces.

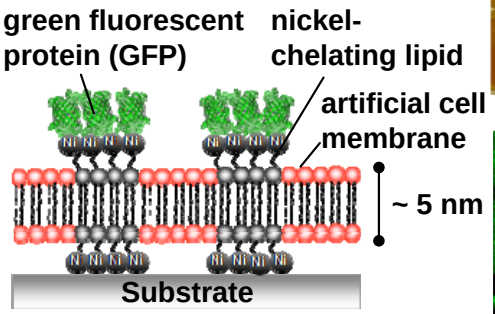
Originality

A nickel-chelating lipid is capable of specific binding with terminal modified proteins. We fabricate an artificial cell membrane that includes nickel-chelating lipids on a substrate, and succeed in the selective adsorption (patterning) of proteins at a specific position on the membrane. In addition, we demonstrate protein transport that is realized through self-spreading behavior of the membrane.

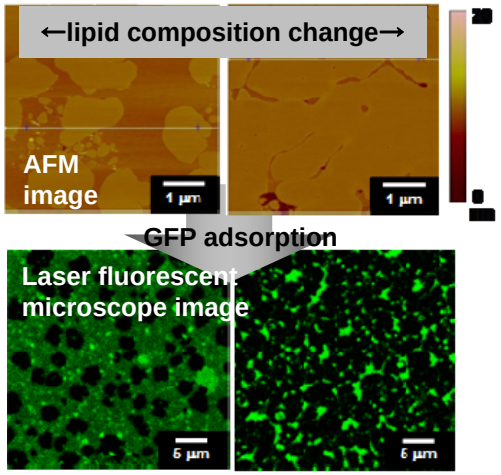
Impact

By using an artificial membrane biointerface, we can control the position, density and arrangement of biomolecules on a solid surface, leading to the development of various nanobio devices such as highly sensitive biochips. The biointerface can also utilize a model of a cell membrane to analyze a number of unknown biomolecular interactions.

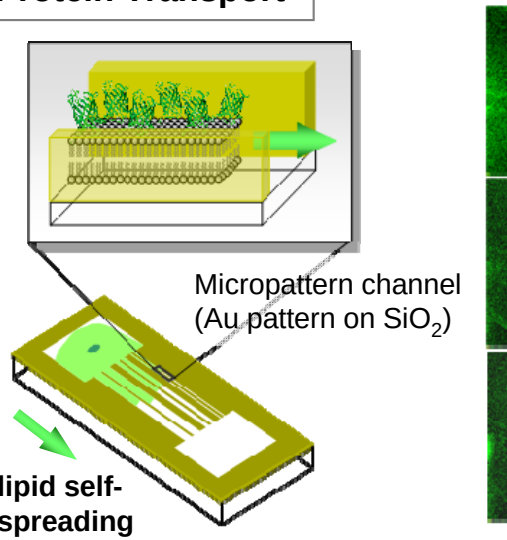
Selective Adsorption of Proteins on Artificial Cell Membrane

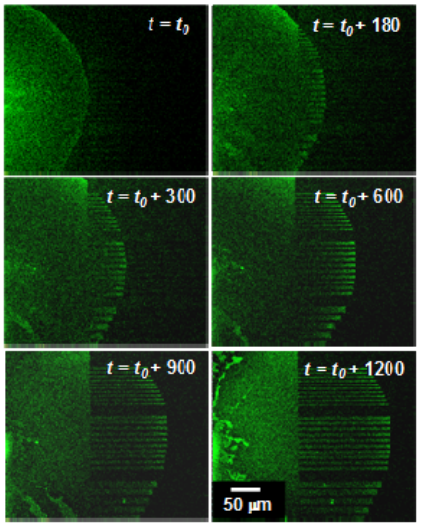


Artificial cell membrane with domain structures



Protein Transport





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