Invited Speaker

Nanoscale imaging of artificial membrane using AFM

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Thanks to their ability to mimic biological membranes and their relative ease to be handled, supported lipid bilayers (SLBs) represent an attractive system in the development of membrane-inspired biosensors [1]. The issue for biosensor applications is to get bilayers separating two compartments for studying the properties of cell membranes such as permeability, active transport or signal transduction by transmembrane proteins.
In this talk, we will briefly describe the main strategies to prepare SLBs that are suitable for AFM analysis, a technique allowing topology of the membrane to be delineated with a resolution in the nanometer range. This approach has been recently used in the development of a membrane biosensor platform using mesoporous silicon [2]. Porous materials have emerged as good candidates for supporting lipid membranes, providing a reservoir of buffer below the membrane. Porous silicon obtained by electrochemically etching of crystalline silicon wafers is especially interesting because it behaves as a photonic crystal reflector and can be used as a label-free optical biosensor. Deposition of a continuous planar phospholipid bilayer at the surface of porous silicon has validated the proof of concept.
In the last part of the talk, we will stress on the incorporation of functional transmembrane proteins within bio-inspired membranes that still remains a challenge. I will introduce a technique developed in the laboratory and based on the direct incorporation of protein within SLBs destabilized by low cmc detergents. This technique requires very small amount of purified proteins (in the picomole range) allowing protein oligomerization to be delineated by AFM [3,4].

References:

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