Poster

BIOMIMETIC MEMBRANE AND PROTEIN MICROARRAYS GENERATED BY DIP-PEN NANOLITHOGRAPHY

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To study biological membrane systems *in vitro* one needs to not only recreate the lipid bilayer itself but also incorporate biomolecular components such as proteins into it, in a way that will resemble the *in vivo* situation. Once this is achieved, such a biomimetic membrane is a powerful tool to study the complexity of biological interactions at the molecular level. We use Dip-Pen Nanolithography (DPN) to create heterogeneous or homogenous membrane systems with the possibility of incorporating many different functional molecules.

DPN makes use of an Atomic Force Microscope (AFM) tip to deliver molecular inks to a surface (1). Dip-Pen Nanolithography (DPN) patterning is a constructive method of surface patterning with a great potential for the creation of biomimetic systems.

When phospholipids are used as the ink for DPN, it becomes possible to generate fluid membranes or multilayer stacks that are stable under water on the appropriate substrates (2). Chemical characteristics of such fluid membranes allows stable incorporation of functional bio-molecules into the phospholipid inks (3) which opens new possibilities for the generation of biomimetic membrane systems. In experimental set up presented here we used biotin-streptavidin coupling and his-tag – nickel coordination to selectively adsorb proteins from solution onto phospholipid nanopatterns in order to generate functional proteins nanostructure arrays. Applications in cell culture and nanomechanical sensors will be discussed.

References:

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Figure:

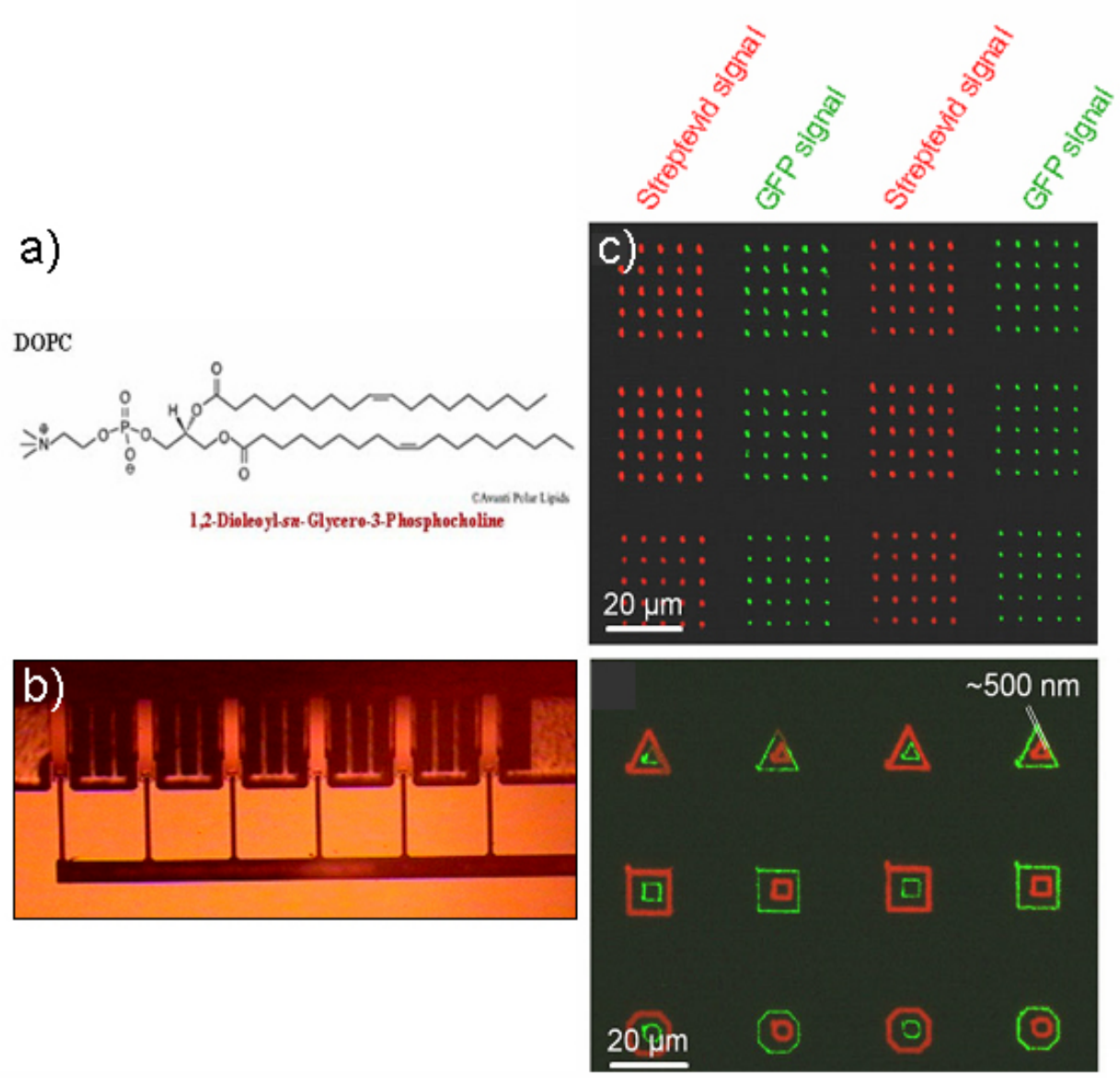

Figure: Parallel nano-arraying using dip-pen nanolithography a) chemical structures of the carrier lipid, b) array of tips over an ink well, c) phospholipis microarray with selectively adsorbed proteins.