

Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

DNA driven 2D Assembly of Nanoparticles on Lipid Surfaces

SUNITA SRIVASTAVA, DMYTRO NYKYPANCHUK, OLEG GANG, Brookhaven National Laboratory, Upton, NY, 11973 — Use of biomolecular linkers such as DNA due to its sequence-specific hybridization properties provides a versatile platform for assembly of nanoscale components. Here we investigated the DNA-based self-assembly of gold nanoparticles in 2D using lipid layer as fluid substrate. We examined the effect of lipid composition by vary the fraction of cationic and zwitterion lipids on formation of a particle monolayer. Using in-situ X -ray reflectivity we observed adsorption of DNA functionalized nanoparticles on charged lipid surfaces. The surface density of the particle monolayer can be tuned by changing the electrostatic interaction between the particles and the lipid surface. The in-situ measured particle desorption from the lipid surface due to a change of a salt concentration provides quantitative information on particle-surface interactions. The ex-situ studies on samples using XPS under similar conditions support our observations. Our studies explore the possibility to form regulated 2D systems, as well as provide basic understanding of interactions of charge nano-objects with lipids, which is important for the biomedical applications.

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Date submitted: 24 Nov 2010

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