



The Hebrew University Center
for Nanoscience & Nanotechnology



Nano Seminar

Engineering Nanoscale Interface to Biology

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Abstract:

Nanoparticles (NPs) can be considered as “pseudo” sub-cellular entities similar to endogenous biomolecules such as DNA and proteins due to similarity in size and ability to interact with other biomolecules. The interaction between NPs and biomolecules gives rise to the nano-bio interface between a NP and its biological environment, and is often defined in terms of the biomolecules that are present on the surface of the nanoparticles. The nano-bio interface alters the surface characteristics and is what the biological system sees and interacts with. Intelligent design of this nano-bio interface is therefore crucial to the functionality of nanoscale systems in biology. Here, I will show some four examples of how we can engineer appropriate nano-bio interface formed from DNA and proteins for biomedical applications, specifically in the diagnosis and treatment of diseases (Figure 1). On the diagnostic front, I will show how we make use of the non-specific adsorption of proteins on the surface of NPs to develop a cost-effective and instantaneous biomolecular assay, as well as to diagnose diseases such as Hand, Foot and Mouth Disease (HFMD).

On the treatment front, I will demonstrate our exploit of the non-specific adsorption of proteins around NPs as a drug delivery vector for loading of multiple drugs to perform multimodal cancer therapy, as well as a scaffold for recruitment of cellular protein translation machineries to enhance the translation of insulin for treatment of insulin-deficient beta cells. For the purpose of disease therapy, it is also crucial for the NPs delivered into the circulation to have an efficient rheology that allow them to reach the target site. Hence, we will also examine the effect of this nano-bio interface on the margination and trans-endothelial migration of the NPs out of the circulatory vasculature. The outcomes of our study could therefore provide valuable insight into the proper design and engineering of protein corona on nanoparticulate systems that could enhance delivery of NPs out of the vascular circulation for disease therapy.

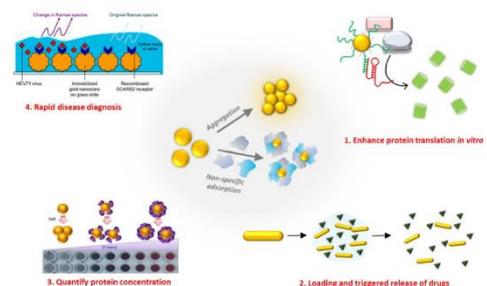


Figure 1. Engineering the nanoscale interface to biology for biomedical applications

Gathering & Refreshments at 10:50

Please contact Alexandra Bannykh at 6584919 if you are interested in meeting the lecturer.

Tuesday, Jan 17th 2017, 11:00 at the Seminar Hall
Los Angeles Building, entrance floor.