Interactions of Gold Nanoparticles with Biomimetic Lipid Matrices

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Résumé:

The biomedical application of gold nanoparticles (AuNPs) as delivery, diagnostic, and therapeutic agents has been growing constantly in recent years.[1,2,3] On the other hand, not much is know about their potential adverse effects on health and environment and gives more and more rise to safety concerns. The first natural barrier that all engineered nanomaterials must penetrate to enter a living organism are lipid assemblies, such as pulmonary surfactant or lipid bilayers that make up the fundamental structure of cell membranes. Lipid matrices are therefore biologically relevant models to mimic nanomaterial/cell interactions in the context of nanomaterial toxicity. AFM, BAM and oscillation experiments were carried out to study the influence of alkylthiolate-modified AuNPs on biomimetic phospholipid monolayers and revealed perturbations in monolayer morphology and viscoelastic properties. Neutron reflectometry studies of the interaction of AuNPs with phospholipid bilayers showed an alteration in bilayer structure upon the addition of cationic and hydrophobic AuNPs, whereas anionic AuNPs did not interact with the bilayer. The goal of these studies is to identify how AuNPs interact with lipid assemblies to eventually develop a NP/lipid interaction-toxicity interrelationship.

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