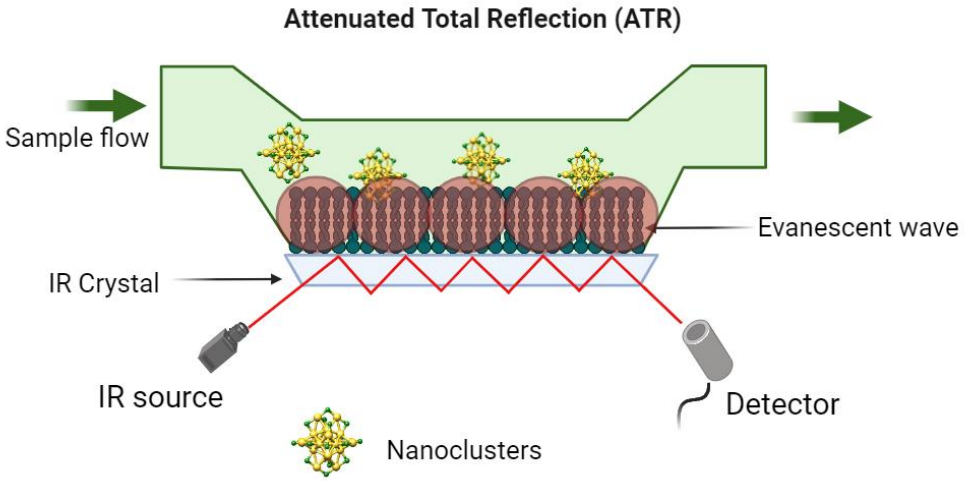
Examining the Interaction Between Thiolate Protected Gold Nanoclusters and Lipid Bilayers

Merve, ÖRER

merve.oerer@etu.unige.ch

Thiolate monolayer protected nanoclusters are the smallest member of nanoparticles, composed of tens to hundreds of metal atoms stabilized by a variety of ligands. These clusters are used in biomedical field due to their unique electro-optical and physicochemical properties. The understanding of the interaction between these small structures and biological membrane has great importance for implementation and tailoring new materials for medicine and biosensing.



In our study, supported lipid bilayers, composed of different phospholipids, were used as a model of bio membranes and we studied their interaction with different types of thiolate-protected clusters. Our experimental results were obtained by using atomic force microscopy (AFM), ellipsometry, quartz crystal microbalance (QCM) and attenuated total reflection infrared (ATR-IR) spectroscopy in a microfluidic and temperature-controlled flow-through cell with polarized light to study the orientation and concentration of phospholipids in the presence and absence of metal clusters. Our findings indicate that hydrogen-bonding between the carboxylate groups (R-COO-) of the cluster and the phospholipids plays an important role. It has been observed that the phase transition temperature (Tm) of phospholipids affects the strength of these interactions. Partial desorption of clusters from the surface was demonstrated, and some phospholipid molecules were also observed to desorb from the bilayer together with the clusters, leading to disruption of membrane integrity. However, the adsorption of clusters on and desorption from the bilayer only minimally affects the molecular orientation of phospholipids.