Binding of bovine serum albumin-conjugated gold nanoparticles to APTES self-assembled monolayer : an imaging ellipsometry study

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Optical properties of noble metal nanoparticles (NPs) in solution are easily determined from transmission spectra [1]. To present them from aggregation, the NPs are usually capped by polymers or other small molecules such as thiols or citrate ions [2,3]. On the other hand, these NPs can be electrostatically adsorbed on solid surface using small ligand molecules such as APTES, a NH_2-terminated triethoxysilane. The capping of the NPs and their adsorption onto the functionalized solid surface appear thus as competing process. In this case, the optical properties can still be monitored via transmission spectra but ellipsometry revealed itself to be a more suitable technique to investigate the linear optical response of these materials due to its sensitivity to the phase changes of the incident light [4,5,6]. For a couple of years, imaging ellipsometry (IE) emerges as a technique which provides information about the optical properties at a local scale (microscale or less) [7].

In this contribution, we considered the influence of the (soft) capping by bovine serum albumin on the binding properties of gold NPs to APTES-coated glass substrates. AFM in intermittent contact mode was used to probe the topography of the samples and provide phase images. Imaging ellipsometry was used to monitor the optical response of the gold NPs/glass system.

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