Covalent attachment of streptavidin on colloidal gold nanoparticle and its characterization

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The synthesis and characterization of biomolecule-conjugated nanoparticles is currently a very active research field [1,2]. There were many works about the conjugation of biomolecule to nanoparticles as noncovalent [3]. However, little has been reported on the covalent conjugation of biomolecule to nanoparticles. In this study, we present a method for the covalent attachment of streptavidin onto alkanethiol-modified gold surfaces by forming amide bonds via an *N*-hydroxysulfosuccinimide (NHSS) ester intermediate. The colloidal gold nanoparticle of 13 nm diameter were prepared by the citrate reduction of $HAuCl_4$ [3]. The solution of colloidal particle was characterized by an adsorption maximum at 520 nm. Transmission electron microscopy (TEM) indicated a particle size of 13 nm. The gold colloids were immobilized with an organic molecule containing thiol group such as 11-mercaptoundecanoic acid (MUA), and mercaptosuccinic acid (MSA) as covalent. The amide bond is formed in two steps: the terminal carboxylic acid groups of an alkanethiol self-assembled monolayer (SAM) are first activated to the *N*-hydroxysulfosuccinimide (NHSS) ester, followed by reaction of this MUA-NHSS ester with amino groups of streptavidin. The obtained streptavidin conjugated gold nanoparticles were characterized by FT-IR, transmission electron microscopy (TEM), and UV spectroscopy. With the streptavidin conjugated nanoparticles, we are developing the universal nanoparticle-based labeling process by the use of the biotin-streptavidin coupling for the binding of biotinylated target DNA to streptavidin-conjugated gold colloids.

Reference

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