

Rapid detection using gold nanoparticle-based DNA hybridization

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The development of a nanoparticle-based detection for specific DNA-based application is described. The technology utilizes gold nanoparticle derivatized with thiol modified oligonucleotides that are designed to bind complementary DNA target. When the target DNA is perfectly complementary to the probe, in sequence as well as in chain length, the nanoparticles aggregate at considerably high salt concentration. Aggregation of the nanoparticles shifts the absorption peak toward longer wavelength and changes the color of the colloidal solution to purple. Gold nanoparticle-based spectroscopic detection of DNA hybridization was also attempted by means of surface-enhanced Raman scattering (SERS). The oligonucleotide-functionalized gold nanoparticles indicated a more distinct color change after hybridization. The perfectly matched single-stranded DNA different from the case of the single-base-pair mismatched strand. Aggregation and SERS could be used to rapidly detect DNA hybridization.