Selective Aggregation of Unmodified Gold Nanoparticles for Detection of Single Nucleotide Polymorphism

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We have performed the detection of specific DNA sequences using selective aggregation of unmodified gold nanoparticles by the hybridization of oligonucleotide. Oligonucleotide sequences were designed to detect the signal-induced proliferation-associated gene 1 (Sipa1) since Sipa1 polymorphism is known to be associated with metastatic process. To monitor selective aggregation of gold nanoparticles, we use the UV-vis absorption spectroscopy, quasi-elastic light scattering (QELS) and zeta potential measurement. Because ssDNA and dsDNA have different electrostatic properties, and because adsorption of ssDNA stabilizes the gold nanoparticle surfaces against aggregation, we were able to selectively aggregate gold nanoparticles for the perfectly matched DNA under optimal salt concentration in presence of a phosphate buffer solution. This enables a detection of perfectly matched DNA from the single point-mutated one. Our results indicate that a change in the electrostatic interaction is responsible for the selective aggregation of gold nanoparticles upon the addition of DNA.