Surface Co-localization of Gold Nanoparticles and Oligonucleotides: A Novel Approach to Biosensing

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The unique optical and energetic properties of gold nanoparticles (AuNPs) make them a suitable candidate for use in many analytical and biosensing applications. Investigation into the thermal stability of colloidal solutions of 5nm-diameter gold particles was conducted both with and without AuNP stabilization by K2BisPy (dipotassium bis-sulfonato-phenylphenolphosphonate dihydrate) complexation and in both water and phosphate buffer. Results of these thermal stability studies led us to believe that optimum thermal stability of a gold nanoparticle/oligonucleotide biosensing system could best be achieved by independent immobilization of individual components to a solid substrate. Accordingly, we have developed a mercaptoamine based method which we hypothesize will lead to effective and controllable surface co-localization of gold nanoparticles and oligonucleotides via covalent bond formation on silicon based substrates. Once derivatized, these surfaces could be used for sensing applications in which a high level of thermal stability is needed and in which heating and sensing could be done simultaneously by exploitation of the surface plasmon resonance behavior of the AuNPs. Investigation and refinement of this novel approach is ongoing.

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