Full Paper

Amplified Electrical Transduction of DNA Hybridization Based on Polymeric Beads Loaded with Multiple Gold Nanoparticle Tags

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Abstract
A new strategy for amplifying particle-based electrical DNA detection based on oligonucleotides functionalized with polymeric beads carrying numerous gold nanoparticle tags is described. The gold-tagged beads were prepared by binding biotinylated metal nanoparticles to streptavidin-coated polystyrene spheres. Such use of carrier-sphere amplification platforms is combined with catalytic enlargement of the multiple gold tags and an ultrasensitive electrochemical stripping detection of the dissolved gold tags. The gold-nanoparticle loaded beads and the resulting DNA-linked assembly were characterized by transmission electron microscopy (TEM) and scanning electron microscopy (SEM). Factors affecting the performance have been optimized. Such amplified electrical transduction allows detection of DNA targets down to the 300amol level, and offers great promise for ultrasensitive detection of other biorecogntion events.

Keywords: DNA hybridization, Gold nanoparticles, Amplification, Stripping analysis