Molecular Detection Technique
ABSTRACT

There is a growing need for the development of biosensing technologies capable of detecting proteins and genetic material in a fast, sensitive, and inexpensive manner. The most effective technologies will provide significant signal from minuscule amounts of target material in a highly discriminatory manner. Of particular interest is the detection of DNA using methods that are superior to the standard set by PCR-based technologies. This is now possible with the use of nanoparticles and tailored biomolecules as detection tools. We report a novel DNA detection method that relies on the construction of a molecular semaphore device. Assembly occurs through a functionalized oligonucleotide bridge between an immobilized F1-ATPase enzyme and modified gold nanoparticle. The functionalized DNA bridge is only formed in the presence of a fully complimentary target DNA sequence in a ligation chain reaction. Upon complete assembly of the device, the gold nanorod rotates concurrent with F1 enzymatic hydrolysis of ATP to ADP.