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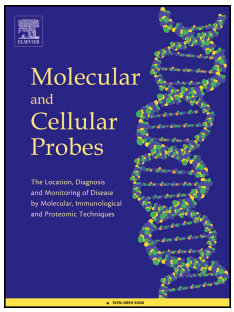

Gold nanoparticle biosensors, a novel application in gene transformation and expression

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Gold nanoparticle biosensors, A novel application in gene transformation and expression

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Abstract

The conventional techniques of PCR, Southern blot, Northern blot, in situ hybridization, and RNase protection assay have long been used to investigate transformation and expression of genes, but most of them are time-consuming and have relatively low sensitivity. In recent years, applying biosensors for molecular identification of biomolecules has been expanding significantly. Hence in this study, Zabol mildew melon was used as a model plant to introduce new DNA and RNA-based biosensors for confirming gene transformation and expression. First, the melon seeds were grown *in vivo* and *Agrobacterium tumefaciens* LBA4404 was used to introduce *GUS* reporter gene to the plant. In order to analyze *GUS* gene transformation and expression, probes were designed based on DNA, RNA, and cDNA of *GUS* gene sequence. Then, the analysis was performed using probes attached to gold nanoparticles to observe color change of the solution in presence of the target biomolecules. Hybridization of the probes with target molecules was evaluated at a wavelength of 400 to 700 nm and maximum change was observed in the wavelength range of 550 to 650 nm. In addition, detection limit of the assay was 0.25ng/µL and linear regression showed the relationship between different concentrations of the genomic DNA and absorbance. Consequently, results showed that application of detectors attached to gold nanoparticles for investigation on gene transformation and expression is more rapid, specific and economic compared to the biochemical and molecular techniques. These tests can be carried out with initial optimization at research centers using the least facilities; hence there will be no need for special equipment.

Keywords: gold nanoparticles, unmodified probe, *GUS* reporter gene, PCR, RT-PCR