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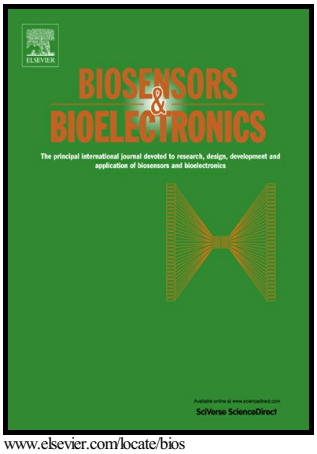

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Ultrasensitive paper based nucleic acid detection realized by three-dimensional DNA-AuNPs network amplification

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Abstract

A novel three-dimensional DNA-AuNPs network structure amplification strategy was employed to design a lateral flow biosensor by introducing streptavidin coated gold nanoparticles (Au-SA) in this paper. They act as amplification probes which aggregate numerous gold nanoparticles (AuNPs) on test line by forming a three-dimensional DNA-AuNPs network structure in the presence of target. Sensitive detection of nucleic acid with point-of-care analysis is significant for infectious agent, early diagnosis and treatment of genetic diseases. The use of these particles in rapid ultrasensitive point of care (POC) lateral flow assays lead to a linear range from 0.1 pM to 250 nM with a limit of detection of 0.01 pM without polymerase chain reaction (PCR). The proposed method could increase the sensitivity by 4 orders of magnitudes than traditional sandwich assays labeled with AuNPs. Furthermore, the assay owns good reproducibility and stability, which will prove practical diagnostic applications.

Keywords: Lateral flow assay, Gold nanoparticles, Nucleic acid, Network amplification