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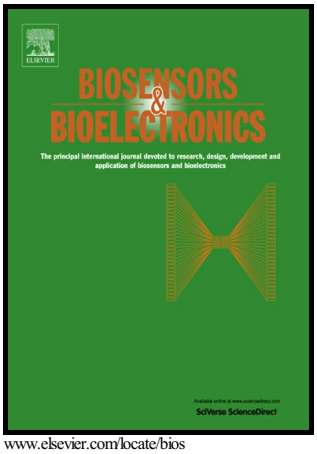


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# Hybridization conditions of oligonucleotide-capped gold nanoparticles for SPR sensing of microRNA

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**Abstract**

MicroRNA (miRNA) sensing, especially the miRNA-200 family, is increasingly targeted for cancer diagnostics. As the sensing schemes often rely on nanoparticles functionalized with a specific oligonucleotide, we investigate the hydribization conditions using the common case of surface plasmon resonance (SPR) sensing of miRNA and a gold nanoparticle (Au NP) competitor. In this type of assays, the Au NPs compete with the microRNA to bind the capture probe immobilized on the gold surface. In our study, we simplify and improve the detection procedure by adopting 11-mercaptoundecanoic acid (11-MUA) as linker to the gold surface, not only omitting the blocking step of 6-mercapto-1-hexanol (MCH), but also increasing the probe density. We report that the response in our SPR sensing studies increased with the size of Au NPs according to the plasmon ruler equation, but the larger AuNPs of 32 nm lacked colloidal stability. In addition, decreasing the ratio of oligonucleotide to Au NPs and the addition of polyethylene glycol (PEG) to hybridization buffer also favored a better response in SPR sensing of miRNA. The optimization led to an improved detection sensitivity in our competition method