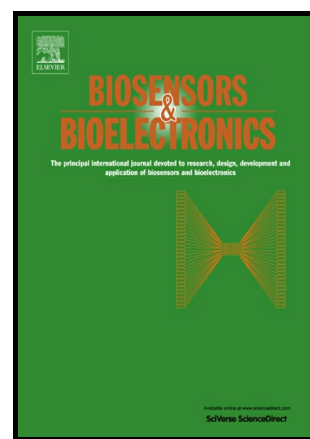


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Hybridization conditions of oligonucleotide-capped gold nanoparticles for SPR sensing of microRNA

Long Hong^{1,2}, Mengdi Lu^{2,3}, Marie-Pier Dinel², Philippe Blain², Wei Peng³, Hongya Gu^{1*}, Jean-Francois Masson^{2,4*}

¹ School of Life Sciences, Biotechnology Building, Peking University, No.5 Yiheyuan Road, Haidian District, Beijing, P.R.China 100871

² Département de Chimie, C.P. 6128 Succ. Centre-Ville, Montreal, QC, Canada, H3C 3J7

³ Optics Engineering, Department of Physics and Optoelectronic Engineering, Dalian University of Technology, Dalian 116024, China

⁴ Centre Québécois sur les Matériaux Fonctionnels (CQMF)

Contact addresses :

Hongya Gu : guhy@pku.edu.cn, tel :+86-10-62751847

Jean-Francois Masson : jf.masson@umontreal.ca , tel :+1-514-343-7342

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 hybridization 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

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