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A label-free colorimetric aptasensor for simple, sensitive and selective detection of Pt (II) based on platinum (II)-oligonucleotide coordination induced gold nanoparticles aggregation

Daoqing Fan^{a,b}, Qingfeng Zhai^{a,b}, Weijun Zhou^{a,b}, Xiaoqing Zhu^{a,b}, Erkang Wang^{a,b} and Shaojun Dong^{a,b*}

^a State Key Laboratory of Electroanalytical Chemistry, Changchun Institute of Applied Chemistry, Chinese Academy of Sciences, Changchun, Jilin, 130022, PR China

^b University of Chinese Academy of Sciences, Beijing, 100039, China

*Corresponding author: dongsj@ciac.ac.cn.

Abstract

Herein, a gold nanoparticles (AuNPs) based label-free colorimetric aptasensor for simple, sensitive and selective detection of Pt (II) was constructed for the first time. Four bases (G-G mismatch) mismatched streptavidin aptamer (MSAA) was used to protect AuNPs from salt-induced aggregation and recognize Pt (II) specifically. Only in the presence of Pt (II), coordination occurs between G-G bases and Pt (II), leading to the activation of streptavidin aptamer. Streptavidin coated magnetic beads (MBs) were used as separation agent to separate Pt (II)-coordinated MSAA. The residual less amount of MSAA could not efficiently protect AuNPs anymore and aggregation of AuNPs will produce a colorimetric product. With the addition of Pt (II), a pale purple-to-blue color variation could be observed by the naked eye. A detection limit of 150 nM and a linear range from 0.6 μ M to 12.5 μ M for Pt (II) could be achieved without any amplification.

Keywords

Gold nanoparticles; Platinum ion; Colorimetric; Aptamer sensor; Streptavidin.

1. INTRODUCTION

There are various existence forms of bivalent platinum ion in chemical, biochemical and pharmaceutical areas. For instance, potassium tetrachloroplatinate (II) (K_2PtCl_4) is an important platinum source for the synthesis of platinum based nanomaterials. (Huang et al. 2011; Ma et al.

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