Electroanalysis 2013 vol.25 N8, pages 1855-1863

Electrochemical aptasensor based on ZnO modified gold electrode

Evtugyn G., Cherkina U., Porfireva A., Danzberger J., Ebner A., Hianik T.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

We developed an electrochemical thrombin aptasensor based on ZnO nanorods functionalized by electrostatically adsorption of 30-mer DNA aptamers. The sensor surface was characterized by AFM and SEM. The surface layer assembling was optimized using cyclic voltammetry (CV) and electrochemical impedance spectroscopy (EIS) with ferricyanide ions as redox markers. The peak current of the ferricyanide and the charge transfer resistance gradually decreased with increasing concentration of thrombin in the range from 3pM to 100nM due to formation of aptamer-thrombin complexes and slower diffusion of the marker ions through the surface layer. At optimal conditions, a limit of detection (LOD) of 3pM for EIS measurements and 10pM for CV response was calculated from the S/N=3. © 2013 WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim.

http://dx.doi.org/10.1002/elan.201300195

Keywords

Aptasensor, DNA Aptamer, Electrochemical impedance spectroscopy, Nanorods, Thrombin, Voltammetry, Zinc oxide