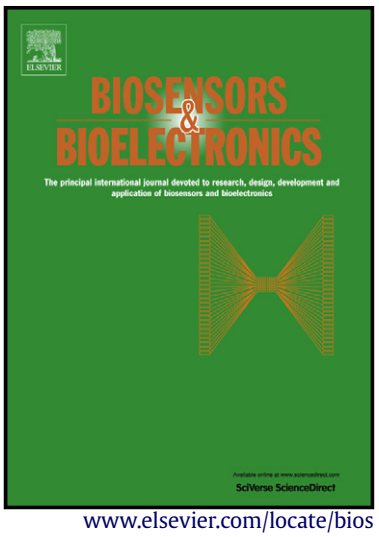

www.elsevier.com/locate/bios

A novel graphene-DNA biosensor for selective detection of mercury ions

Yang Zhang, Hong Zhao, Zhijiao Wu, Ying Xue, Xiaofang Zhang, Yujian He, Xiangjun Li, Zhuobin Yuan

PII: S0956-5663(13)00279-0
DOI: http://dx.doi.org/10.1016/j.bios.2013.04.013
Reference: BIOS5893

To appear in: *Biosensors and Bioelectronics*

Received date: 12 October 2012
Accepted date: 12 April 2013

Cite this article as: Yang Zhang, Hong Zhao, Zhijiao Wu, Ying Xue, Xiaofang Zhang, Yujian He, Xiangjun Li, Zhuobin Yuan, A novel graphene-DNA biosensor for selective detection of mercury ions, *Biosensors and Bioelectronics,* http://dx.doi.org/10.1016/j.bios.2013.04.013

A novel graphene-DNA biosensor for selective detection of mercury ions

Yang Zhang, Hong Zhao*, Zhijiao Wu, Ying Xue, Xiaofang Zhang, Yujian He, Xiangjun Li, Zhuobin Yuan

College of Chemistry and Chemical Engineering, University of Chinese Academy of Sciences, 19A YuQuan Road, 100049, Beijing, China

ABSTRACT

A novel electrochemical biosensor for sensitive and selective detection of mercury (II) ions (Hg^{2+}) based on a DNA grafted graphene is proposed. Graphene oxide (GO) was reduced by dopamine, and then the single-strand probe DNA modified at the 5'-end with an alkylamino modifier (NH_2-ssDNA) was grafted on the reduced graphene oxide (RGO) surface via Michael addition reaction. In the presence of Hg^{2+}, the target DNA with four thymine-thymine (T-T) mismatches would hybridize with the probe DNA on the glassy carbon electrode (GCE) through T-Hg^{2+}-T coordination chemistry. The hybridization of the two oligonucleotides leads to the increase in the peak currents of $[Ru(NH_3)_6]^{3+}$, which could be used for electrochemical sensing of Hg^{2+}. The difference in the value of the peak currents of $[Ru(NH_3)_6]^{3+}$ before and after DNA hybridization was linear with the concentration of Hg^{2+} in the range from

* Corresponding author. Tel: +86-10-88256827; Fax: +86-10-88256092.
E-mail addresses: hongzhao@gucas.ac.cn