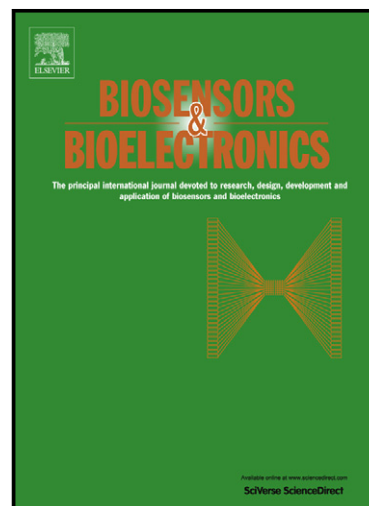


Author's Accepted Manuscript

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www.elsevier.com/locate/bios

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>

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

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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 $[\text{Ru}(\text{NH}_3)_6]^{3+}$, which could be used for electrochemical sensing of Hg^{2+} . The difference in the value of the peak currents of $[\text{Ru}(\text{NH}_3)_6]^{3+}$ before and after DNA hybridization was linear with the concentration of Hg^{2+} in the range from

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