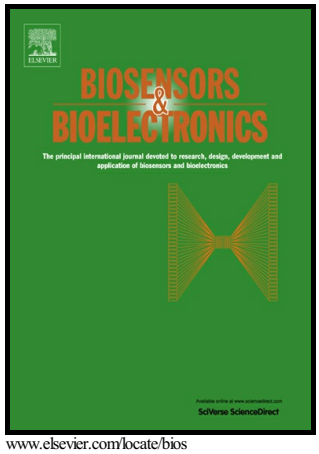

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PII: S0956-5663(18)30782-6
DOI: https://doi.org/10.1016/j.bios.2018.09.085
Reference: BIOS10825

To appear in: *Biosensors and Bioelectronic*

Received date: 27 June 2018
Revised date: 13 September 2018
Accepted date: 25 September 2018

Cite this article as: Naveen K. Singh, Phurpa Dema Thungoan, Pedro Estrela and Pranab Goswami, Development of an aptamer-based field effect transistor biosensor for quantitative detection of *Plasmodium falciparum* glutamate dehydrogenase in serum samples, *Biosensors and Bioelectronic,* https://doi.org/10.1016/j.bios.2018.09.085

Development of an aptamer-based field effect transistor biosensor for quantitative detection of *Plasmodium falciparum* glutamate dehydrogenase in serum samples

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Abstract

There has been a continuous strive to develop portable, stable, sensitive and low cost detection system for malaria to meet the demand of effective screening actions in developing countries where the disease is most endemic. Herein, we report an aptamer-based field effect transistor (aptaFET) biosensor, developed by using an extended gate field effect transistor with inter-digitated gold microelectrodes (IDμE) for the detection of the malaria biomarker *Plasmodium falciparum* glutamate dehydrogenase (*Pf*GDH) in serum samples. A 90 mer long ssDNA aptamer (NG3) selective to *Pf*GDH was used in the aptaFET to capture the target protein. The intrinsic surface net charge of the captured protein led to change in gate potential of the aptaFET device, which could be correlated to the concentration of the protein. This biosensor exhibited a sensitive response in broad dynamic range of 100 fM - 10 nM with limits of detection of 16.7 pM and 48.6 pM in spiked buffer and serum samples, respectively. The high selectivity of the biosensor for *Pf*GDH was verified by testing relevant analogous human and parasitic proteins on the device. Overall, the results validated the application