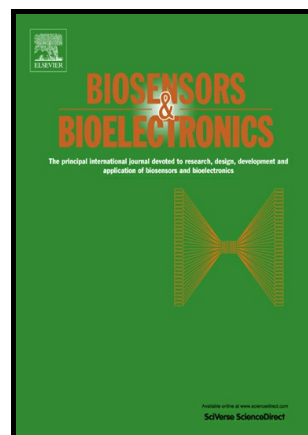


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# **An electrochemical label-free and sensitive thrombin aptasensor based on graphene oxide modified pencil graphite electrode**

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## **Abstract**

In this work, we tactfully constructed a novel label-free electrochemical aptasensor for rapid and facile detection of thrombin using graphene oxide (GO) and thrombin binding aptamer (TBA).

The strategy relies on the preferential adsorption of single-stranded DNA (ssDNA) to GO over aptamer-target complexes. The TBA-thrombin complex formation was monitored by differential pulse voltammetry (DPV) using the guanine oxidation signal. In the absence of thrombin, the aptamers adsorbed onto the surface of GO leading to a strong background guanine oxidation signal. Conversely, in the presence of thrombin, the conformational transformation of TBA after incubating with the thrombin solution and formation of the aptamer-thrombin complexes which had weak binding ability to GO, leads to the desorption of TBA-thrombin complex from electrode surface and significant oxidation signal decrease.

The selectivity of the biosensor was studied using other biological substances. The biosensor's signal was proportional to the thrombin concentration from 0.1 to 10 nM with a detection limit of 0.07 nM.

Particularly, the proposed method could be widely applied to the aptamer-based determination of other target analytes.

Keywords: Thrombin; Graphene oxide; Aptamer; Label free; Conformational transformation

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