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Label-free aptasensor for thrombin determination based on the nanostructured phenazine mediator

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ABSTRACT

New aptasensors based on DNA aptamer and polycarboxylated thiacalix[4]arenes in *cone*, 1,3-*alternate* and *partial cone* configurations bearing Neutral Red (NR) at substituents at the lower rim have been developed and applied for thrombin detection. The assembly of the biorecognition layer was optimized by AFM and EIS study to reach the maximal coverage and regular composition of the surface layer. The interaction of the NR groups with thrombin suppressed the electron hopping between oxidized and reduced mediator groups. This regularly decreased the NR peak current and increased the resistance of the charge transfer. The aptasensor makes it possible to detect from 1 nM to 1 μM of thrombin with the detection limit of 0.05–0.5 nM. No effect of the 1000 excess of bovine serum albumin on the signal was observed. The influence of thiacalix[4]arene configuration on the sensitivity of aptasensor signal toward thrombin is discussed.

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