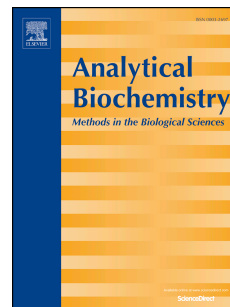


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An aptasensor for *staphylococcus aureus* based on nicking enzyme amplification reaction and rolling circle amplification

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1 **An aptasensor for *staphylococcus aureus* based on nicking enzyme**  
2 **amplification reaction and rolling circle amplification**

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10 **Highlights**

- 11 ➤ A chemiluminescence aptasensor for *S. aureus* detection based on aptamer recognition and DNA  
12 amplifying cycle was established.
- 13 ➤ The LoD was as low as 5 CFU/mL with a good linear correlation at  $5-10^4$  CFU/mL.
- 14 ➤ The aptasensor can selectively distinguish living *S. aureus* against dead ones inactivated by HTHP  
15 method.

16 **Abstract**

17 An ultra-sensitive aptamer-based biosensor for the detection of *staphylococcus aureus* was  
18 established by adopting the nicking enzyme amplification reaction (NEAR) and the rolling circle  
19 amplification (RCA) technologies. Aptamer-probe (AP), containing an aptamer and a probe sequence,  
20 was developed to act as the recognition unit of the biosensor, which was specifically bound to *S. aureus*.  
21 The probe was released from AP and initiated into the subsequent DNA amplification reactions where *S.*  
22 *aureus* was present, converting the detection of *S. aureus* to the investigation of probe oligonucleotide.  
23 The RCA amplification products contained a G-quadruplex motif and formed a three dimensional  
24 structure in presence of hemin. The G4/hemin complex showed horseradish peroxidase (HRP)-mimic  
25 activity and catalyzed the chemiluminescence reaction of luminol mediated by  $H_2O_2$ . The results  
26 showed that the established biosensor could detect *S. aureus* specifically with a good linear correlation  
27 at  $5-10^4$  CFU/mL. The signal values based on NEAR-RCA two-step cycle were boosted acutely, much  
28 higher than that relied on one-cycle magnification. The limit of detection (LoD) was determined to be  
29 as low as 5 CFU/mL. The established aptasensor exhibited a good discrimination of living against dead

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