Electronic Supplementary Material (ESI) for Analytical Methods.

An immobilization-free electrochemical aptamer-based assay for Zearalenone based on target-triggered dissociation of DNA from the polydopamine nanosphere with strand displacement amplification

Optimal conditions

In order to achieve better results, some experimental conditions are optimized. Firstly, the dosage of FAM-labeled hairpin DNA on the PDANS is investigated. From Fig. S1A, the fluorescent intensity hardly changed when hairpin DNA concentration was 0 ~ 1 μM. While DNA concentration exceeded 1 μM, the fluorescence enhanced obviously, indicating hairpin DNA on the PDANS was saturated. Thus, in the following experiment hairpin DNA concentration is set to 1 μM. The concentrations of enzymes played a vital role in the SDA reaction. Here, the concentrations of enzymes were investigated, which were set to be equal. The results are shown in Fig. S1B. With the increasing concentrations of polymerase and nicking endonuclease, the current intensity decreased. Once the concentration exceeded 10 U/μL, the current signals reached the plateau. Thus, their concentrations were both set to be 10 U/μL. Next, the reaction time of SDA was investigated (Fig. S1C). Within 100 min of the reaction time, the current signal obviously declined. While the time continued to extend, the signal slightly declined. As a result, the reaction time was set to be 100 min.

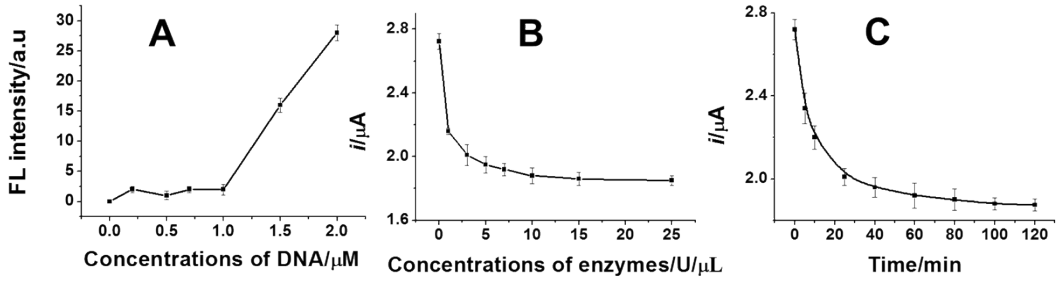

Fig. S1. The effect of current signal of the electrochemical biosensor upon different conditions. (A) The dosage of hairpin DNA on the PDANS. (B) The concentrations of enzymes. (C) The reaction time of SDA.

Table S1 Comparisons of the proposed sensing platform with different ones for ZEN

Methods	Probe	Immoboilizaion or Labeling	LOD	Ref.
Colorimetric	4-nitrophenol	Need	1.7 ng/mL	[1]
Fluorescent	AuNCs	Need	0.53 pg/mL	[2]
Fluorescent	FAM	Need	0.5 ng/mL	[3]
Fluorescent	NaYF4: Ce/Tb	Need	0.21 pg/mL	[4]
Electrochemical	$[Fe(CN)_6]^{4-/3-}$	Need	0.017 ng/mL	[5]
Electrochemical	MB	No need	0.18 pg/mL	This work

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