Electronic supplementary information

A highly sensitive electrochemical aptasensor for vascular endothelial growth factor detection based on toehold-mediated strand displacement reaction

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The SWV voltammograms of different concentrations of Hp1 (Figure S1) verifies that the signal response reaches the peak value when the concentrations of Hp1 is 0.5 μmol L^{-1}, and conversely, the signal response decreases gradually with the further increase of concentration of Hp1. Therefore, the concentration of Hp1 is set to 0.5 μmol L^{-1}.

The SWV voltammograms of different concentrations of Hp2 (Figure S2) verifies that the signal response gradually enhances with the increasing of Hp2 concentration. But the signal response increases slightly when the concentrations of Hp2 is more than 50 nmol L^{-1}. Therefore, the concentration of Hp2 is set to 50 nmol L^{-1}.

The SWV voltammograms of different concentrations of VEGF aptamer (Figure S3) verifies that the signal response is proportional to the concentration of VEGF aptamer in the certain range, but increased slowly after the reaction rate saturated with the increase of VEGF aptamer concentration. Therefore, the concentration of VEGF aptamer is set to 30 nmol L^{-1}.

The SWV voltammograms of different reaction time (Figure S4) verifies that the signal response enhances gradually with the reaction time ranging from 10 to 60 minutes, and the signal response increases slowly and tends to be stable after 40 minutes. Therefore, the reaction time is set to 40 minutes.

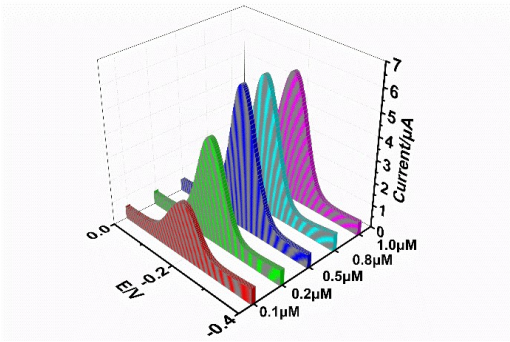

Figure S1. The SWV voltammograms of different concentrations of Hp1.

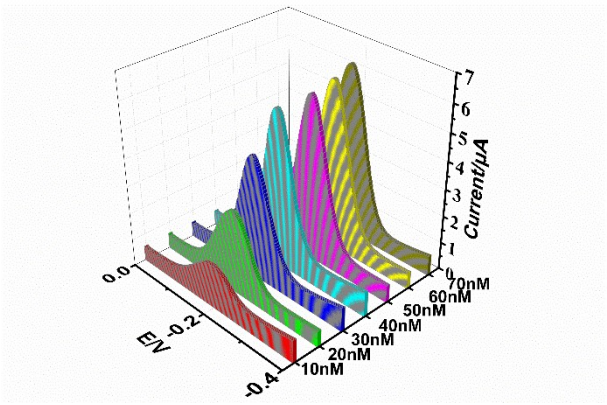

Figure S2. The SWV voltammograms of different concentrations of Hp2.

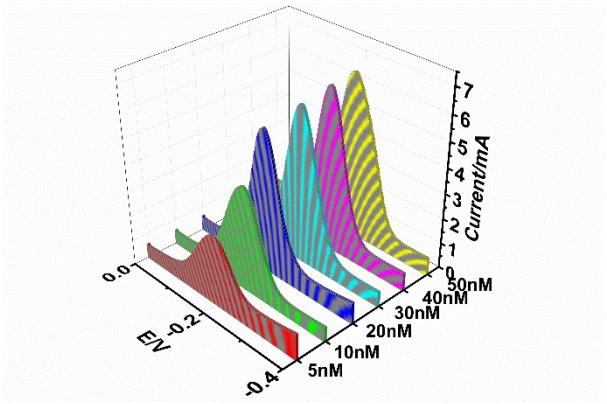

Figure S3. The SWV voltammograms of different concentrations of VEGF aptamer.

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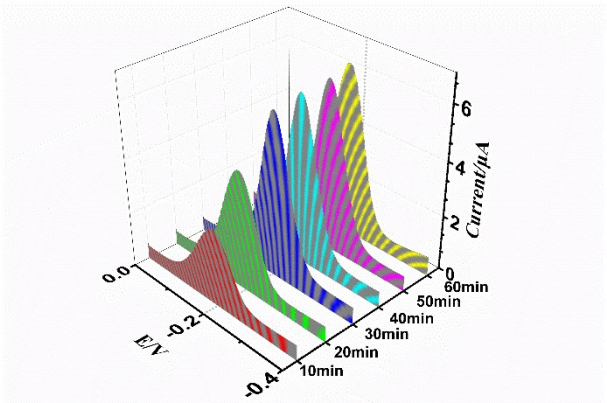

Figure S4. The SWV voltammograms of varying reaction time.

The recovery values of VEGF added in various biological samples were detected. Table S1 shows that the signal response changes in various biological samples with VEGF concentration of 10 ng mL^{-1} are small to negligible (RSD are less than 5.7%). The result reveals that the biosensor maintains good selectivity and high compatibility which can be applied to clinical application.

Table S1 Recoveries of VEGF spiked to different biological samples (n = 3)

Biological samples	VEGF added (ng mL^{-1})	VEGF determined (ng mL^{-1})	Recovery (%)	RSD (%)
Buffer	10.0	10.4	105	3.8
Serum	10.0	9.2	92	5.7
Urine	10.0	9.6	98	4.7
Saliva	10.0	9.4	94	4.3