Electronic Supplementary Material (ESI) for Journal of Materials Chemistry B.

Supporting Information

Anion-Exchange Reaction: Facile and General Access to Sensitive Photoelectrochemical Platforms for Biomarker Immunosensing

Kaili Niu, Yuzhen Li, Ruili Bai, Yongfang Qu and Yanyan Song *[a]

Department of Chemistry, Northeastern University, Shenyang 110004, China, *Email: yysong@mail.neu.edu.cn

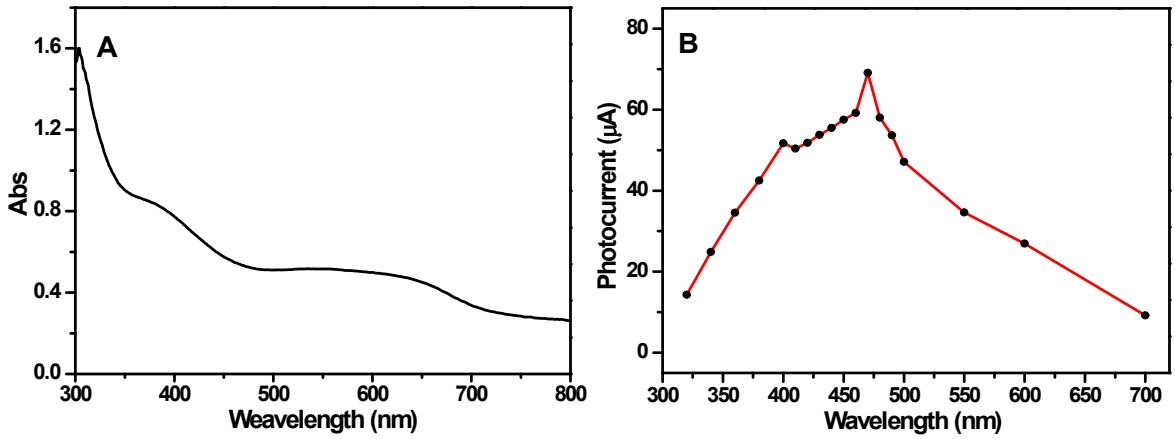

Fig. S1 (A) UV-vis spectrum of the as-prepared CdSe/ITO sample. (B) Photocurrent responses of CdSe/ITO at various excitation wavelengths. The PEC tests were performed in 0.1 M PBS containing 0.1 M TEA with 0 V applied potential.

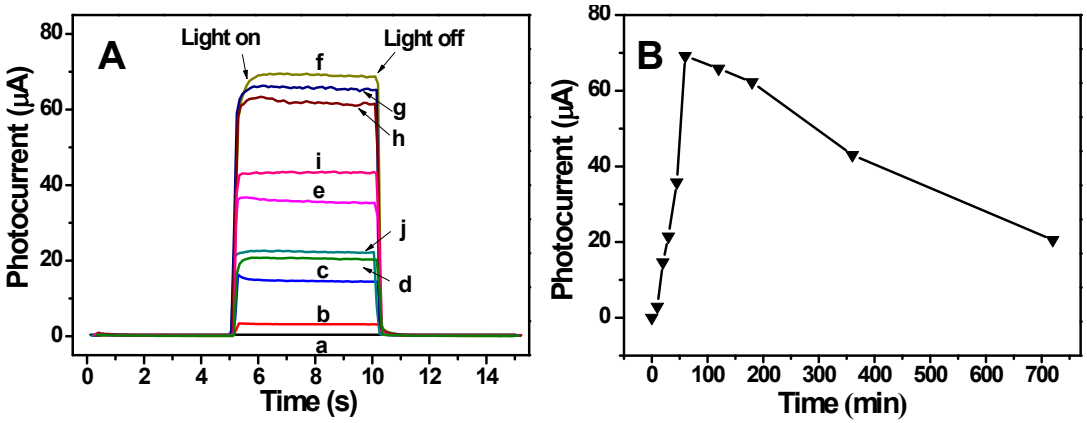

Fig. S2 (A) Photocurrent responses of CdSe/ITO electrode at the same anion-exchange temperature (60 °C) and different exchange times of (a) 0 min, (b) 10 min, (c) 20 min, (d) 30 min, (e) 45 min, (f) 60 min, (g) 120 min, (h) 180 min, (i) 360 min, and (j) 720 min. (B) The corresponding photocurrent versus anion-exchange time curve. The PEC tests were performed in 0.1 M PBS containing 0.1 M TEA with 0 V applied potential and 470 nm excitation.

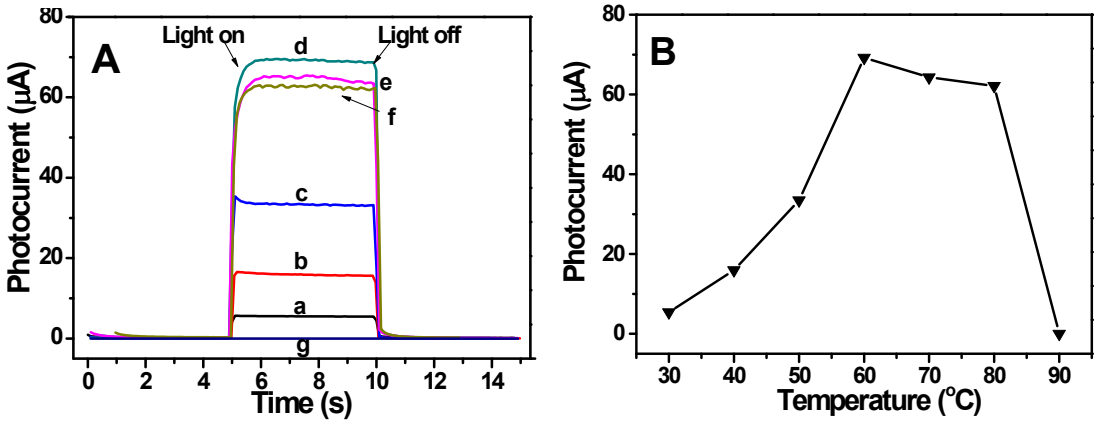

Fig. S3 (A) Photocurrent responses of CdSe/ITO electrode at the same anion-exchange time (60 min) and different exchange temperatures of (a) 30 °C, (b) 40 °C, (c) 50 °C, (d) 60 °C, (e) 70 °C, (f) 80 °C, and (g) 90 °C. (B) The corresponding photocurrent versus exchange temperature curve. The PEC tests were performed in 0.1 M PBS containing 0.1 M TEA with 0 V applied potential and 470 nm excitation.

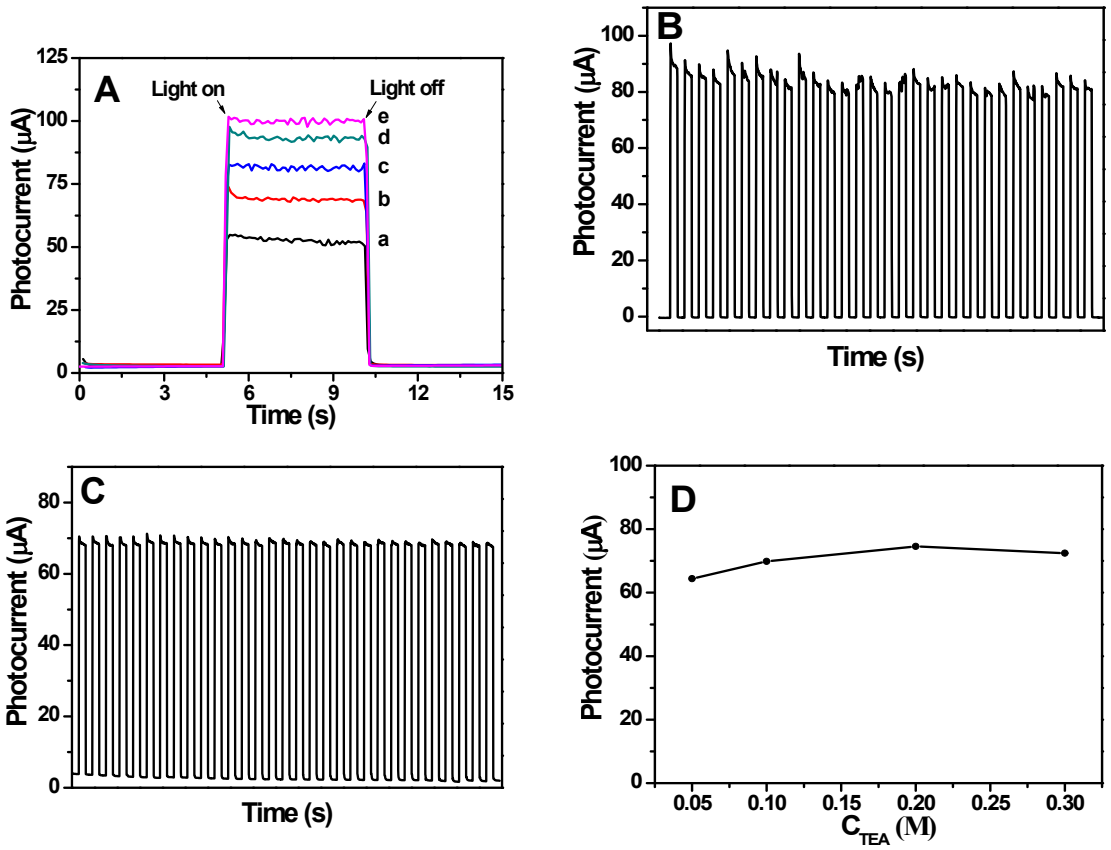

Fig. S4 (A) Photocurrent responses of CdSe/ITO electrode in different solutions: (a) 0.1 M PBS (pH 7.4) only, (b) 0.1 M PBS containing 0.1 M TEA, (c) 0.1 M PBS containing 0.1 M AA, (d) 0.1 M PBS containing 0.1 M Na_2SO_3, and (e) 0.1 M PBS containing 0.1 M Na_2S and 0.1 M Na_2SO_3. (B) Time-based photocurrent responses of the prepared CdSe/ITO electrode in 0.1 M PBS containing 0.1 M AA. (C) Time-based photocurrent response of the prepared CdSe/ITO electrode in 0.1 M PBS containing 0.1 M TEA. (D) Photocurrent responses of 0.1 M PBS containing different concentrations of TEA. The PEC tests were performed with 0 V applied potential and 470 nm excitation wavelength.

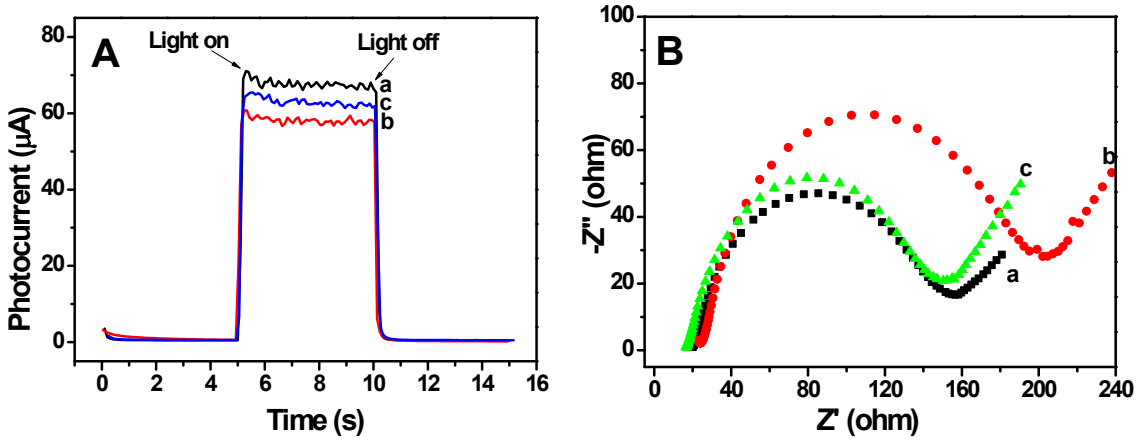

Fig. S5 (A) Photocurrent responses of CdSe/ITO electrode (a) before and (b) after TDPA passivation, and (c) after immersion in PMA. The PEC tests were performed in 0.1 M PBS containing 0.1 M TEA with 0 V applied potential and 470 nm excitation. (B) EIS of CdSe/ITO electrode (a) before and (b) after TDPA passivation, and (c) after immersion in PMA.

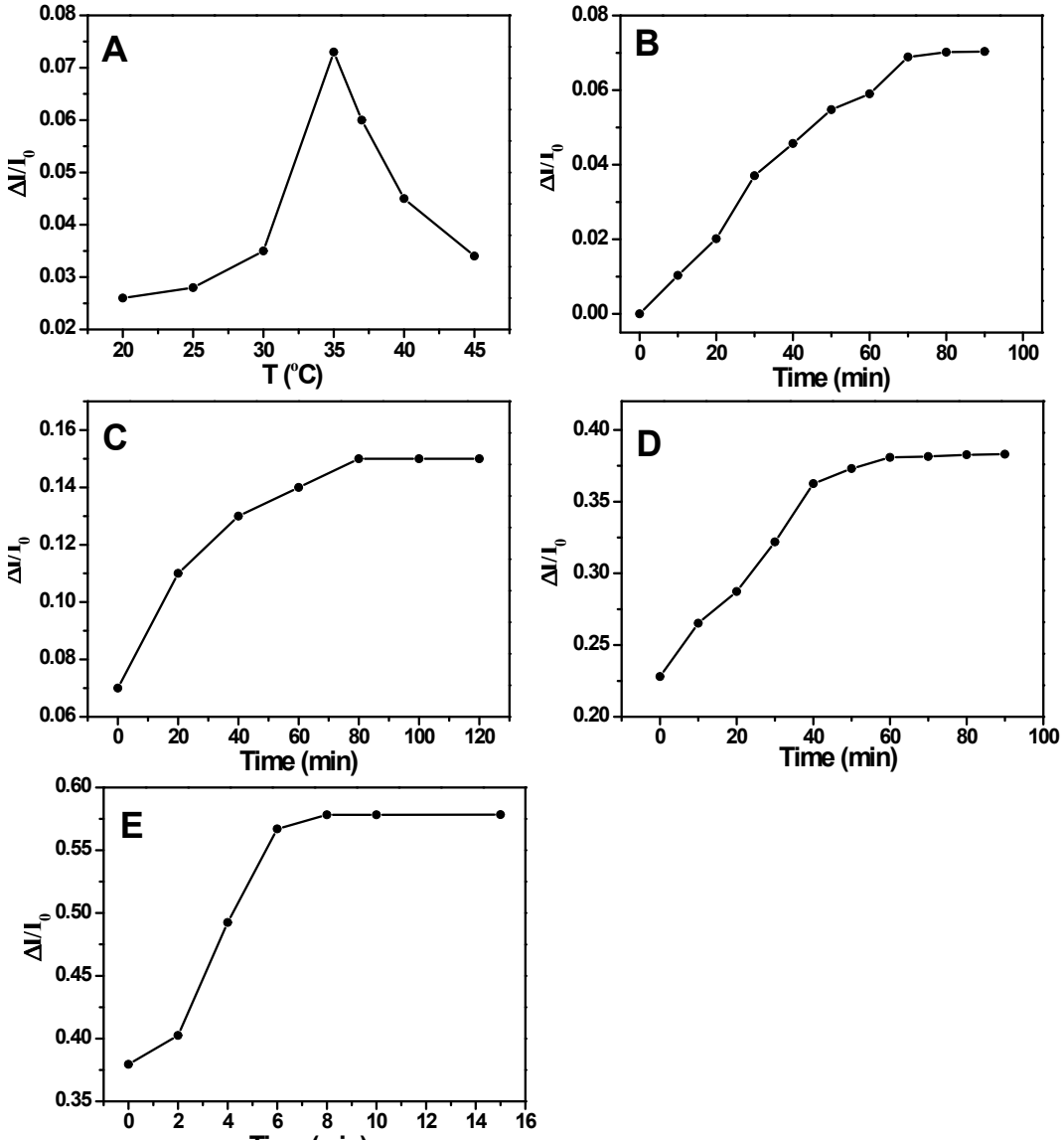

Fig. S6 (A) The effect of various incubation temperatures on the RIgG binding step. The effect of various incubation times for (B) RIgG, (C) B-Ab_2, (D) B-HRP, and (E) BCP.

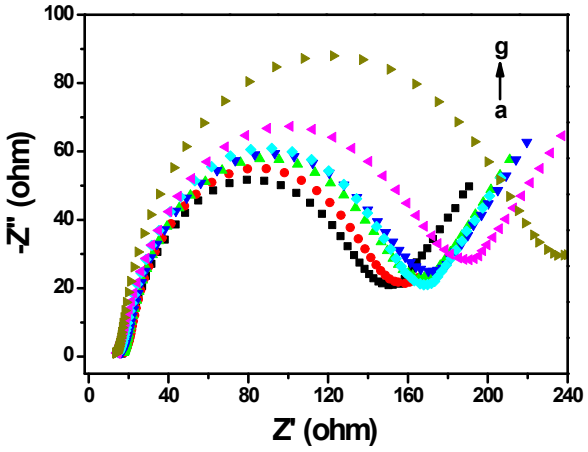

Fig. S7 EIS of CdSe/ITO electrode (a) before and (b) after Ab_1 immobilization, (c) after further blocking with BSA, (d) after anchoring RIgG corresponding to 0.1 μg/mL, (e) after B-Ab_2 immobilization, (f) after labeling with avidin and B-HRP, and (g) after a final 8 min enzyme-catalyzed BCP.

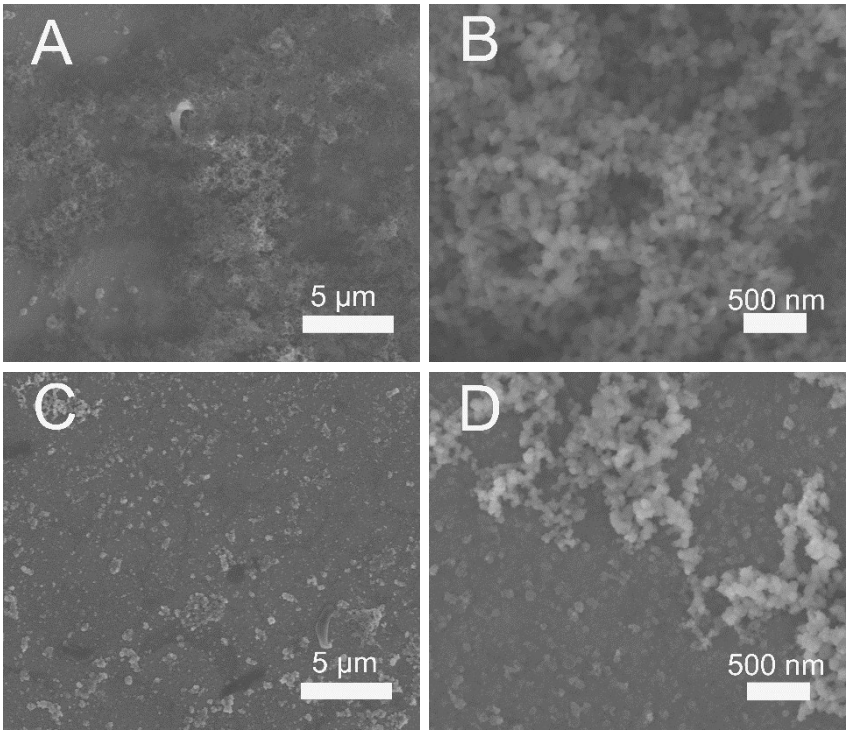

Fig. S8 SEM images of (A,B) the amplified photoelectrochemical immunosensing after BCP and (C,D) the normal photoelectrochemical immunosensing after BCP.

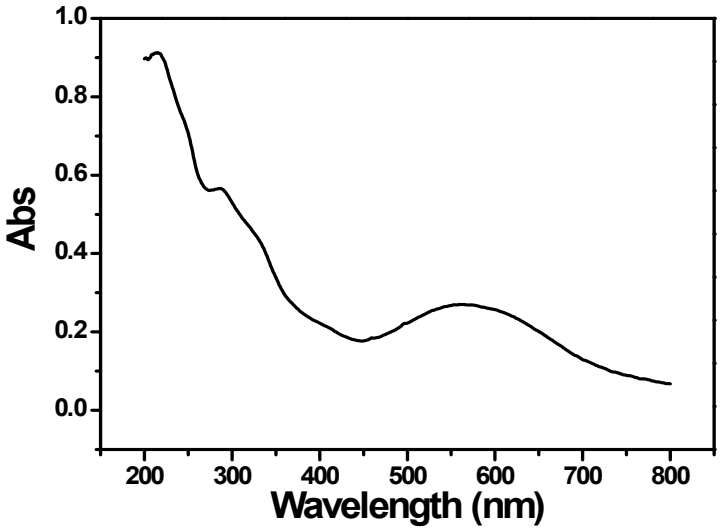

Fig. S9 UV–vis spectrum of benzo-4-chlorohexadienone from BCP.

Table S1. Recoveries of RIgG in rabbit serum samples using the CdSe/ITO PEC platform.

Sample	**RIgG($\times 10^{-8}$)**			
	added	**Found (mean[a]±SD[b])**	**RSD[c] (%)**	**Recovery**
Rabbit Serum	0	2.347±0.031	1.32	—
	1	3.253±0.059	1.81	90.60%
	5	7.433±0.064	0.86	101.72%
	10	12.193±0.061	0.50	98.46%

[a] Mean of three measurements
[b] Standard deviation
[c] Relative standard deviation