-Supporting information-

A universal photoelectrochemical biosensor for dual microRNAs detection based on two CdTe nanocomposites

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1. Optimization of Experimental conditions

To construct a highly sensitive biosensor, some detection conditions were optimized. In Fig. S1A, the cathodic and anodic photocurrent values gradually declined with the increasing probe DNAs concentrations because of the enhanced steric hindrance. When the concentration reached 1 μM, the cathodic and anodic photocurrents became steady because the ITO electrode surface was saturated. Therefore, the 1 μM was chosen as the optimal probe DNA concentration. Likewise, as shown in Fig. S1B, the photocurrents of cDNA-Au/target /probeDNA/CdTe-3DGH/CdTe-C_3N_4 ITO

electrodes decreased after 10, 20, 30, 40 and 50 min binding time between the probe DNA and target. It was clear that 40 min was enough for probe DNA and miRNA to react and was the best choice.

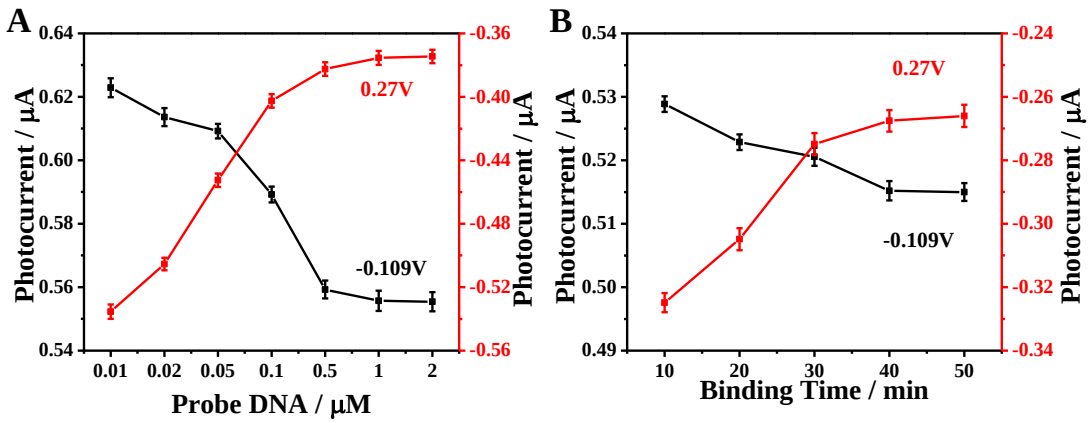

Fig. S1 Photocurrents of CdTe-3DGH/CdTe-C_3N_4 ITO electrodes in different concentrations of probe DNAs (A); photocurrents of cDNA-Au/target /probeDNA/CdTe-3DGH/CdTe-C_3N_4 after different binding time(B).

2. The photocurrents of different modified electrodes

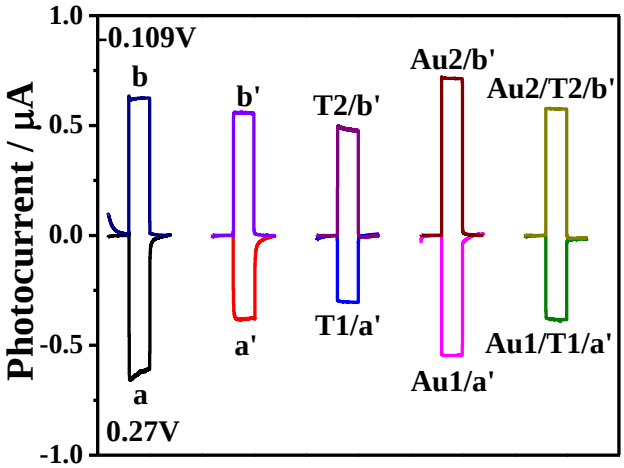

Fig. S2 The photocurrent reponses of a (CdTe-3DGH), a´ (probe1/a), T1/a´ (miRNA141/a´), Au1/a´ (cDNA1-Au/ a´) and Au1/T1/a´ modified ITO electrodes at 0.27 V and b (CdTe-C_3N_4), b´

(probe2/b), T2/b´ (miRNA21/b´), Au2/b´ (cDNA2-Au/b´) and Au2/T2/b´ modified ITO electrodes at -0.109 V

3. Comparison of different detection methods

Table S1. Comparison of different methods for miRNA21 and miRNA141 detection.

Detectin Method	Target	Detection limit	Detection range	Reference
CV and ECL	miRNA21	0.02-150 pM	6.3 fM	[1]
	miRNA141	0.03-150 pM	8.6 fM	
ECL	miRNA 21	0.005-500 pM	1.51 fM	[2]
	miRNA 155	0.005-500 pM	1.67 fM	
Fluorescence	miRNA21	5-5×10^4 pM	1.5 pM	[3]
	miRNA141	5-5×10^4 pM	1.5 pM	
SWV	miRNA21	0.005-50 pM	3.0 fM	[4]
	miRNA141	0.005-50 pM	4.2 fM	
DPV	miRNA21	1-1×10^3 pM	0.46 fM	[5]
	miRNA141	1-1×10^3 pM	0.44 fM	
This work	miRNA21	0.001-100 pM	0.31 fM	
	miRNA141	0.001-10 pM	0.29 fM	

References

1. X. Feng, N. Gan, H. Zhang, T. Li, Y. Cao, F. Hu and Q. Jiang, *Biosensors & Bioelectronics*, 2016, **75**, 308-314.
2. L. Peng, P. Zhang, Y. Chai and R. Yuan, *Analytical Chemistry*, 2017, **89**, 5036-5042.

3. G. Jie, Y. Zhao, X. Wang and C. Ding, *Sensors and Actuators B: Chemical*, 2017, **252**, 1026-1034.
4. C. Yang, B. Dou, K. Shi, Y. Chai, Y. Xiang and R. Yuan, *Analytical Chemistry*, 2014, **86**, 11913-11918.
5. Y.-H. Yuan, Y.-D. Wu, B.-Z. Chi, S.-H. Wen, R.-P. Liang and J.-D. Qiu, *Biosensors and Bioelectronics*, 2017, **97**, 325-331.