Electronic Supplementary Information (ESI)

Exonuclease-assisted target recycling for ultrasensitive electrochemical detection of microRNA at vertically aligned carbon nanotubes

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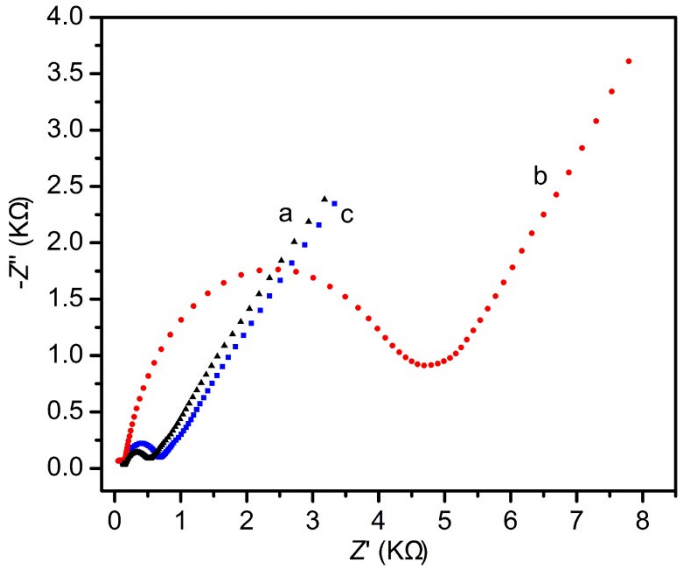

Fig. S1 EIS spectra of the bare (a), aryldiazonium salt (b) and vertically aligned SWCNTs modified (c) gold electrode recorded in 5.0 mM $K_3Fe(CN)_6/K_4Fe(CN)_3$ (1:1) containing 0.10 M KCl.

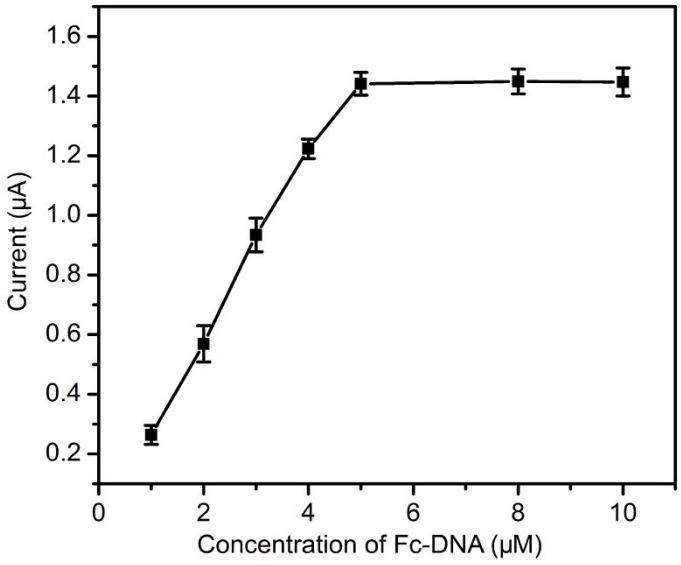

Fig. S2 DPV responses of the electrochemical biosensor in 50 mM pH 7.4 Tris-HCl containing 0.1 M $NaClO_4$ which is prepared from noncovalent adsorption of 3 μL Fc-DNA with different concentrations at the vertically aligned SWCNT-modified electrode.

Table S1 An overview on the detection strategy and analytical performance of the biosensing methods recently reported for miRNA analysis.

miRNA analyte	Detection strategy	Linear range	LOD	Ref.
miRNA-21	Enzymatic extension of poly-thymine for in situ formation of fluorescence copper nanoparticles	1.0 pM–1.0 nM	0.1 pM	10
hsa-miR-103a-3p	Phosphorus nanosheet-based fluorescence resonance energy transfer	10–1000 nM	9.37 nM	11
miRNA-122	Resonance energy transfer between TiO_2 nanorods/gold nanocomposites for photoelectrochemical biosensing	100 fM–3.0 nM	83 fM	15
miRNA-21	Hybridization reaction-induced electrochemical signal inhibition to thionine and gold nanoparticle-functionalized MoS_2	1.0 pM–10 nM	0.26 pM	19
let-7a miRNA	Catalyzed hairpin assembly coupled with hybridization chain reaction to generate G-quadruplex DNAzyme for colorimetric analysis	10 fM–10 nM	7.4 fM	34
let-7a miRNA	Bifunctional strand displacement reaction-mediated hyperbranched rolling circle amplification for fluorescence assay	0.1 pM–10 nM	0.18 pM	35
miRNA-21	Arched probe-mediated isothermal exponential amplification to generate G-quadruplex DNAzyme for electrochemical detection	20 fM–50pM	5.36 fM	36
miRNA-21	T7 Exo-assisted target recycling for electrochemical detection at vertically aligned carbon nanotubes	0.01–100 pM	3.5 fM	This work

Table S2 The results of the recovery tests of miRNA-21 in human serum samples (n=3).

no.	Added concentration (pM)	Found concentration (pM)	Recovery (%)	RSD (%)
1	0.05	0.0484	96.8	3.0
2	1.0	1.07	107.0	5.1
3	10.0	10.23	102.3	2.5