Supporting Information

Sensitive Electrochemiluminescence Detection of Cancer Cells Based on CdSe/ZnS Quantum Dots Nanocluster by Multibranched Hybridization Chain Reaction on Gold Nanoparticles

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Table S1. The Sequences of the DNA in Scheme 1

DNA	Sequence
Romas cell Aptamer (c-DNA1) :	3'-SH- TTT TTT TAC AGA ACA CCG GGA GGA TAG TTC GGT GGC TGT TCA GGG T CTC CTC CCG GTG-5'
Probe DNA (p1) :	5'- GAG GAG GGC CAC GTG TAA TCC TTT- SH-3'
Initiator DNA (s1):	3'-SH- TTT TTT AATT GGGT GCGG CTTA GGAT CTGA-5'
H1:	5'- TTAA CC *CA CG*CC *GAAT* CCTA GACT CAAA GTAG TCTA GG*AT TC GG CGTG*- TTT TTT TTT TTT- NH_2-3'
H2:	3'- NH_2-GTTT CA*TC AGAT CCTA AGCC GCAC* **AATT GG***GT GCGG CTTA GGAT CTGA*- TTT TTT TTT TTT- NH_2-5'

Experimental Section

Chemicals and Materials. Chloroauric acid ($HAuCl_4$) and trisodium citrate were obtained from Shanghai Reagent Company (Shanghai, China). $NaBH_4$ (98.0%), $AgNO_3$ (AR), hexadecyl trimethyl ammonium Bromide ($C_{16}H_{33}(CH_3)_3NBr$) , ascorbic acid, ferric acetylacetonate (98%), $CdCl_2 \cdot 2.5H_2O$, selenium (99.9%, powder), $NaS \cdot 9H_2O$, $ZnSO_4$, mercaptoacetic acid were purchased from Aldrich.

All the DNA sequences were synthesized and purified by SBS Genetech Co. Ltd. (China), and the DNA sequences of this work are listed in Table S1. 1-Ethyl-3-(3-dimethylaminopropyl)-carbodiimide hydrochloride (EDC) was obtained from Sigma. 0.1 M PBS buffer (pH 7.4) was prepared according to the standard methods. All other reagents were of analytical grade. Double distilled water was used for all experiments.

Cells: Ramos cells (CRL-1596, B-cell, human Burkitt's lymphoma) and CEM cells were obtained from Chinese Academy of Medical Sciences. The cells were cultured in RPMI 1640 medium supplemented with 10% fetal bovine serum (FBS) and 100 IU/mL penicillin-Streptomycin. The cell density was determined using a hemocytometer, and this was performed prior to any experiments. After which, ~1 million cells dispersed in RPMI 1640 cell media buffer were centrifuged at 3000 rpm for 5 min and redispersed in cell media three times and were then redispersed in 1 mL cell media buffer. During all experiments, the cells were kept in an ice bath at 4 ºC.

Apparatus. Transmission electron microscopy (TEM) images were recorded using a JEOL JSM-6700F instrument (Hitachi). Photoluminescence (PL) spectra were obtained on an RF-540 spectrophotometer (Shimadzu). Field-emission scanning electron microscopy (FE-SEM) was carried out on a JEOL JSM-6700F instrument. UV absorption spectra were acquired with a Ruili

1200 photospectrometer (Peking Analytical Instrument Co., Peking, China). AFM was performed on a Multimode 8 atomic force microscope (Bruker, USA). ECL measurements were carried out on a MPI-A ECL analyzer (Xi'An Remax Electronic Science & Technology, Xi'An, China) using a three-electrode system. Electrochemical impedance spectroscopy (EIS) was performed on a CHI 660C electrochemical workstation (Shanghai CH Instruments, China), using the same three-electrode system as for ECL detection.

UV−vis absorption spectroscopy of the GNPs-DNA-QDs nanowires

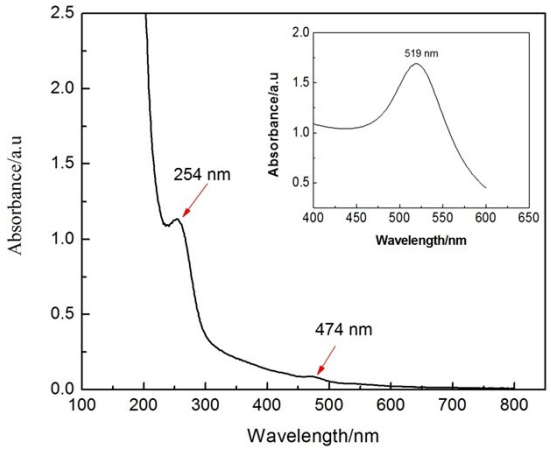

Figure S1. UV−vis absorption spectroscopy of the GNPs-DNA-QDs nanowires and pure GNPs (inset).

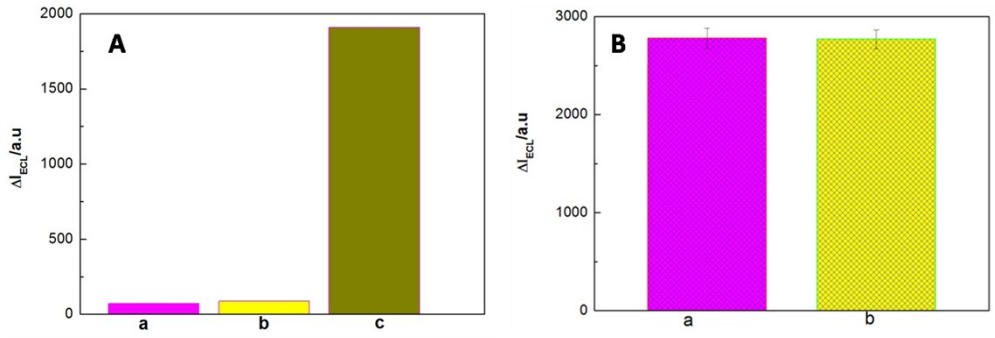

Figure S2 (A) Bar graph showing the change of intensity between a) the blank PBS without cell; b) the PBS with the control CEM cells; c) the PBS with the target Ramos cells. The numbers of cells is 2000 cells mL^{-1}. (B) Bar graph of ECL responses to a) the pure target cells in serum; b) complex of the target and control cells in serum. The concentrations of both the target cells and control cells were 4000 cells mL^{-1}.

Table S2. Comparison of Our Biosensor with Several Other Bioensors for Cell Detection (Units: Cells mL^{-1})

cell detection methods and related references	cell lines Ramos	Linear range	detection limit
Our Biosensor	Ramos	500−1.0×10^4	230
P5FIn-based electrochemiluminescence biosensor [S1]	Ramos	500−1.0×10^5	300
graphene-functionalized electrochemical aptasensor [S2]	Hela	0−1.0×10^6	1000
electrochemical immunoassay [S3]	MCF-7	1.6×10^3−2.0×10^5	700
3-D architectured electrochemical immunosensor [S4]	Hela	8.0×10^2−2.0×10^7	500
CdSe nanoclusters amplified fluorescence biosensor [S5]	Ramos	50−1.0×10^3	50
aptamer-conjugated magnetic nanosensor [S6]	CCRF-CEM	4−4.0×10^6	40
amplified ECL biosensor [S7]	Ramos	300−9000	100
ECL biosensor [S8]	Ramos	100−4000	68

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