

Supplementary Information

Engineered red blood cell membrane for sensitive and precise electrochemical detection of salivary exosomes

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Table S1 Sequences of DNA probes used in this work

DNA probes	Sequence (from 5' to 3')
AP	Cholesterol-TTTTTT-CACCCACCTCGCTCCCGTGACTAATGCTA
AP1	TTTTTT-CACCCACCTCGCTCCCGTGACTAATGCTA
Ap2	Cholesterol-TTTTTT-AGAGGTAAGTTATTAGAGCAGA
CP	FAM-TAGCATTAGTGTCACGGGA
SP	SH-TTTTTT-CACCCACCTCGCTCCCGTGACTAATGCTA
Control SP	SH-TTTTTT-CTGCTCTAATAACTTACC
Cy5-aptamer	CACCCACCTCGCTCCCGTGACTAATGCTA-TTTTTT-Cy5

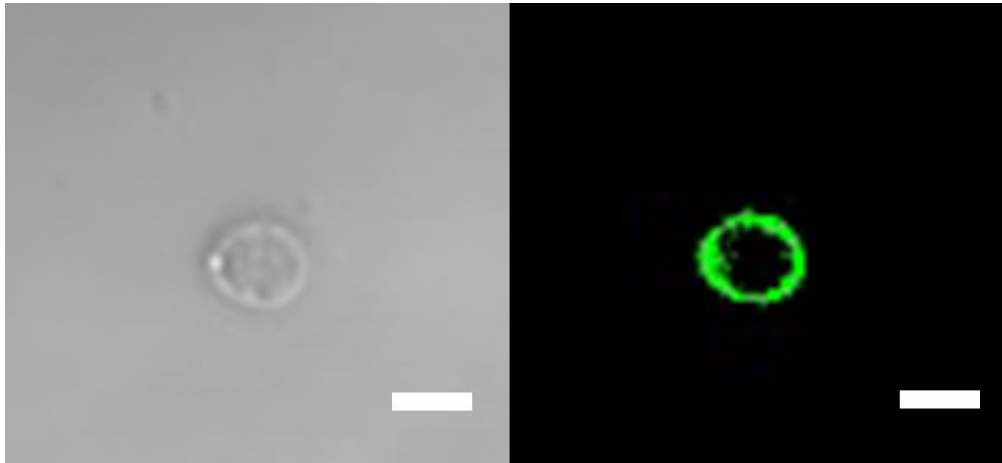


Fig. S1 Representative optical and fluorescence images of RBC. For fluorescence imaging, RBC was stained by membrane dye DiO. Scar bars, 5 μm .

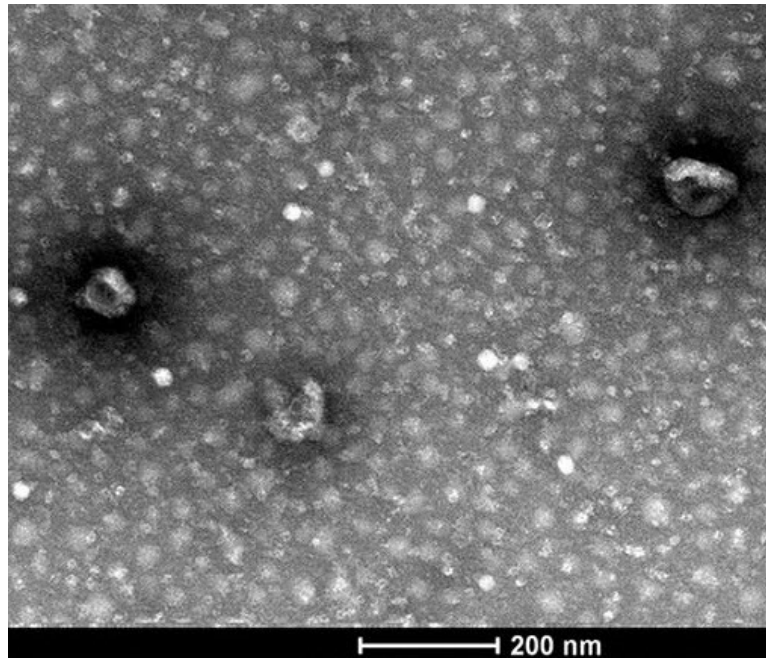


Fig. S2 TEM image of CAL27 cell-derived exosomes.

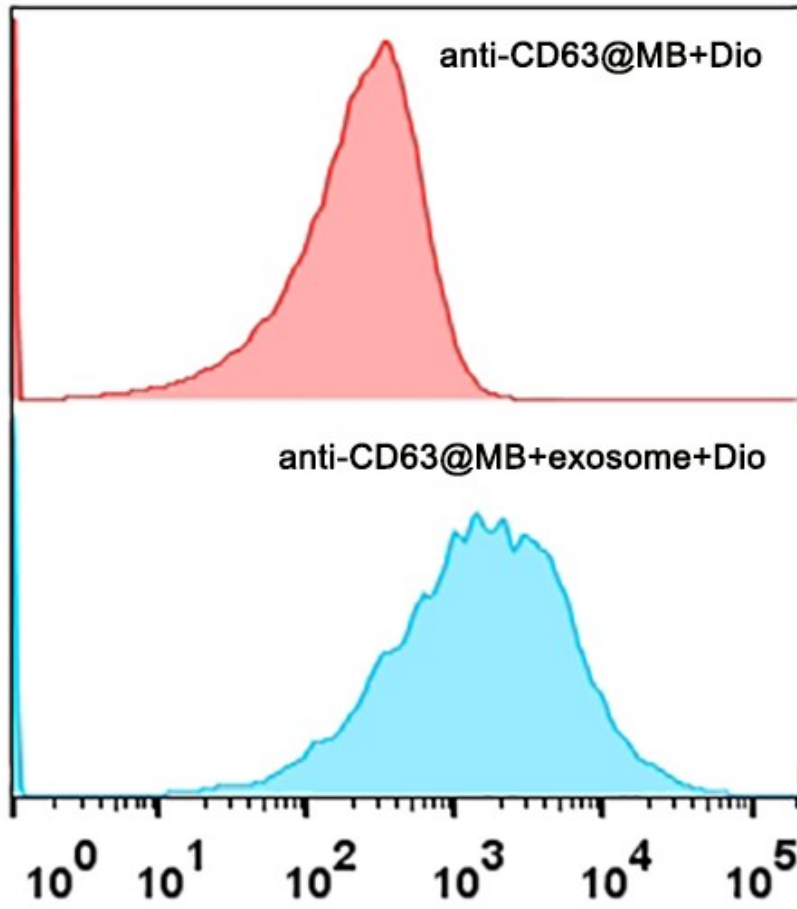


Fig. S3 Flow cytometry analysis of CAL27 cell-derived exosomes captured by anti-CD63@MB after Dio staining.

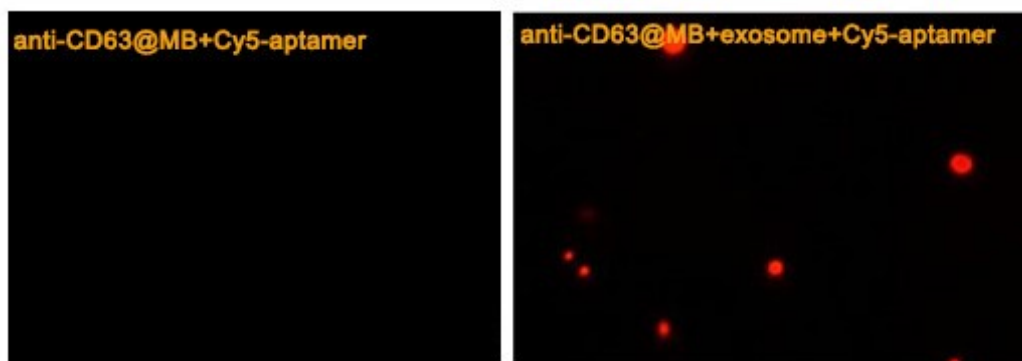


Fig. S4 Fluorescence images of CAL27 cell-derived exosomes captured by anti-CD63@MB with Cy5-labelled CD63 aptamer incubation.

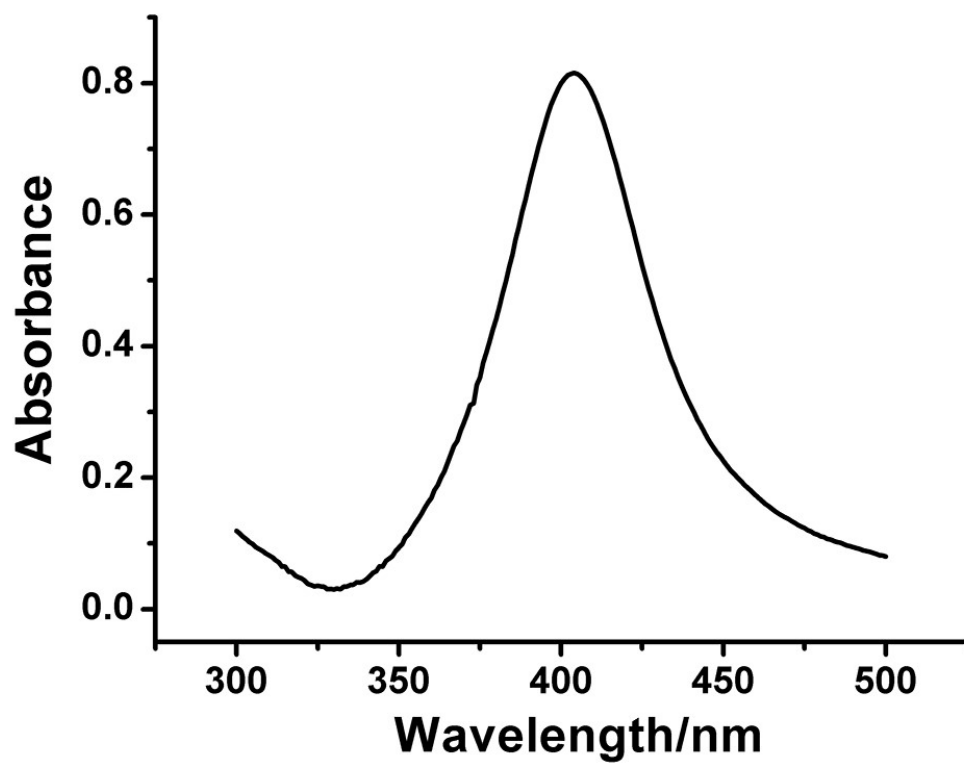


Fig. S5 UV-Vis spectrum of SP-AgNPs.

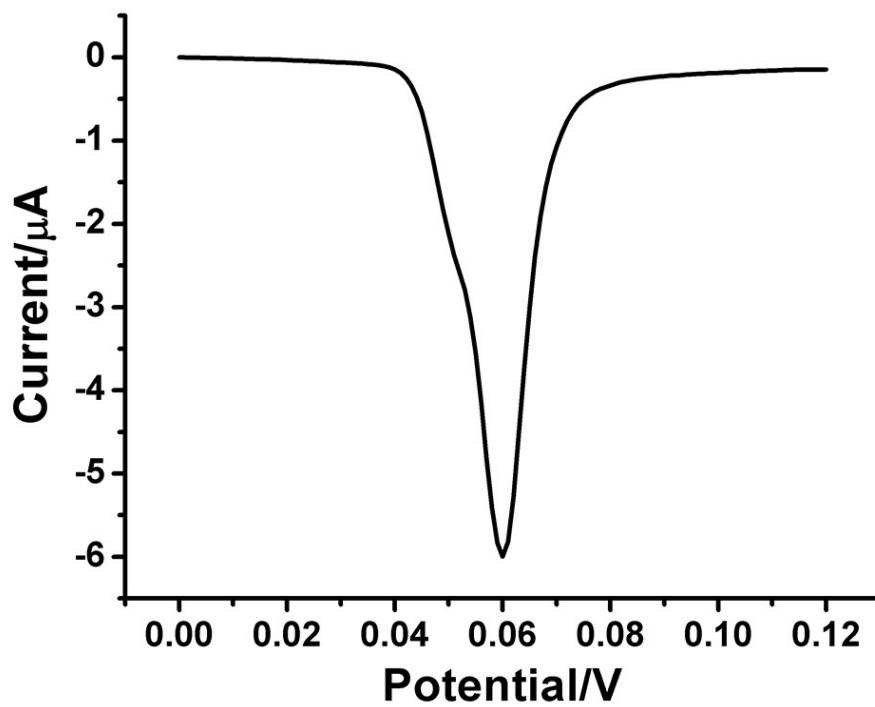


Fig. S6 LSV response of SP-AgNPs.

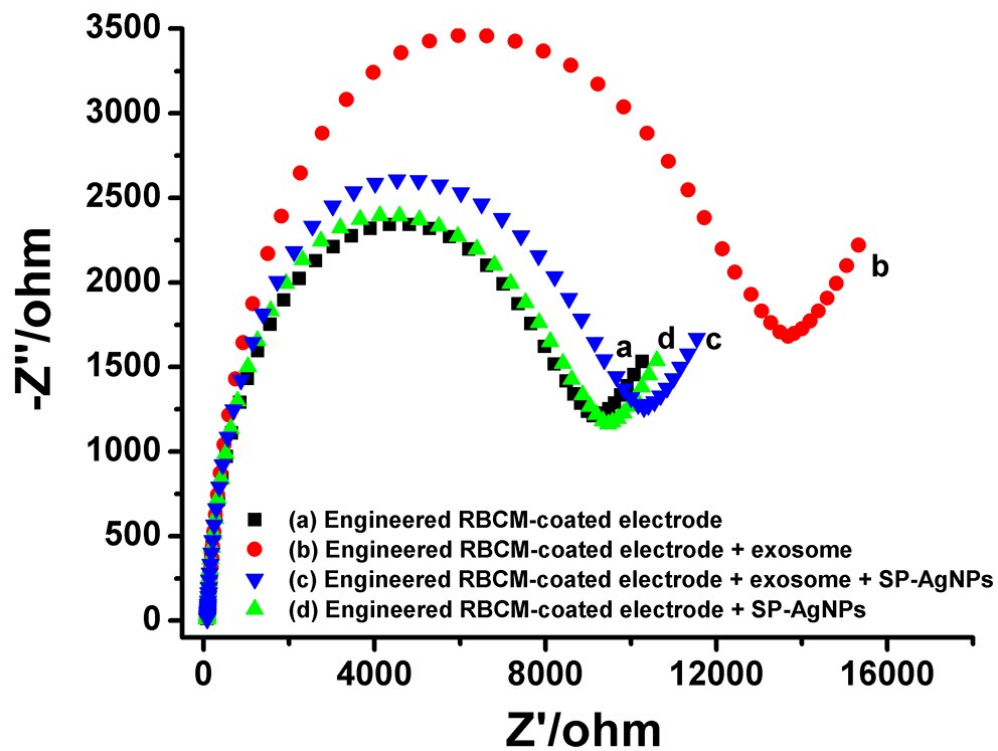


Fig. S7 Nyquist spectra of (a) engineered RBCM-coated electrode, and engineered RBCM-coated electrode with the treatment of (b) CAL27 cell-derived exosomes and (c) SP-AgNPs in sequence. Curve d corresponds to the Nyquist spectrum of engineered RBCM-coated electrode with the treatment of SP-AgNPs.

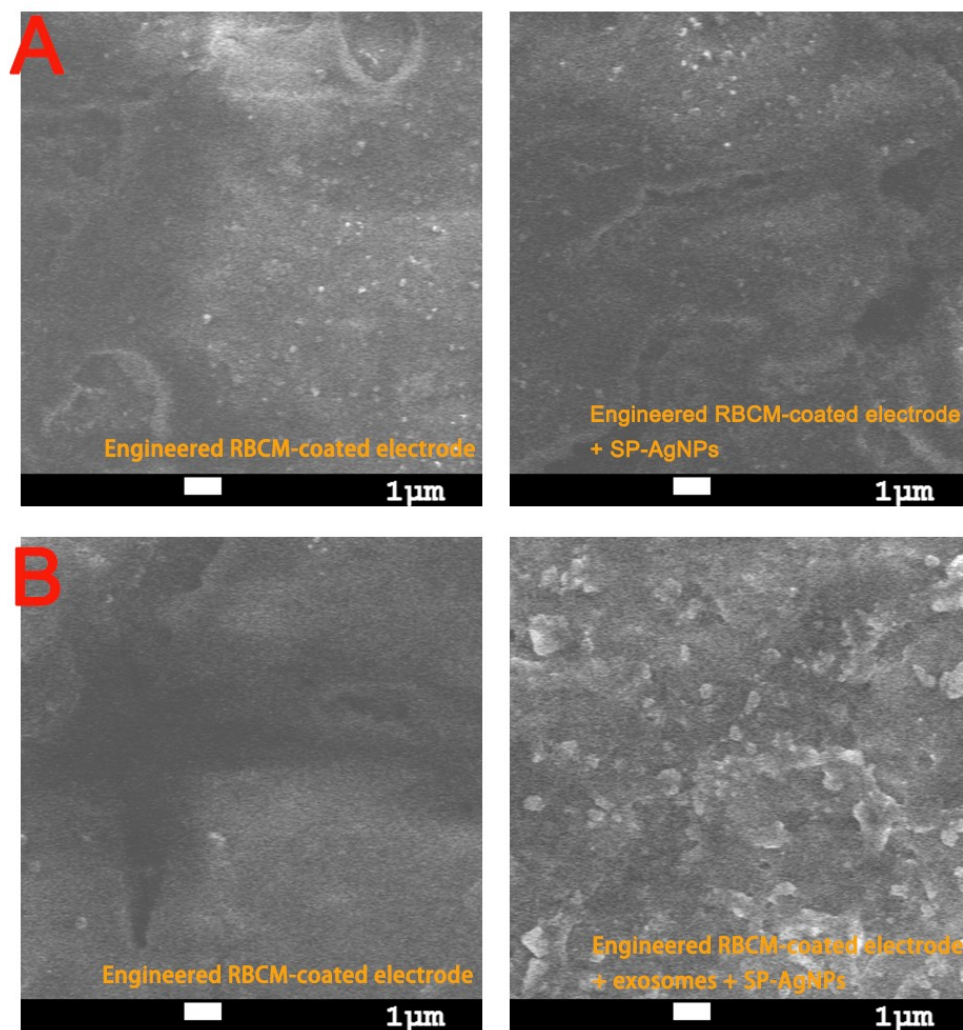


Fig. S8 SEM images of the engineered RBCM-coated electrode collected before and after treatment of SP-AgNPs: (A) in the absence of CAL27 cell-derived exosomes and (B) in the presence of CAL27 cell-derived exosomes.

Table S2 Comparison of recently reported methods for exosome detection

Method	Detection limit (particles/mL)	Linear range (particles/mL)	Reference
Electrochemical method using catalytic molecule machine	1.72×10^4	1×10^5 to 5×10^7	[1]
Electrochemical method based on DNA amplification-responsive metal-organic frameworks	3.34×10^2	1×10^3 to 1×10^{10}	[2]
Electrochemical method based on metal-organic framework-functionalized paper	5×10^3	1.7×10^4 to 3.4×10^8	[3]
Electrochemical method using Zr-based metal-organic frameworks	7.83×10^6	9.5×10^6 to 1.9×10^{10}	[4]
Fluorescence method based on combined aptamer recognition and quantum dot signal amplification	5×10^2	1.6×10^5 to 1.6×10^8	[5]
Fluorescence method based on branched rolling circle amplification	4.27×10^4	1×10^5 to 1×10^9	[6]
Electrochemical method using engineered RBCM	2.07×10^2	5×10^2 to 1×10^6	This work

References

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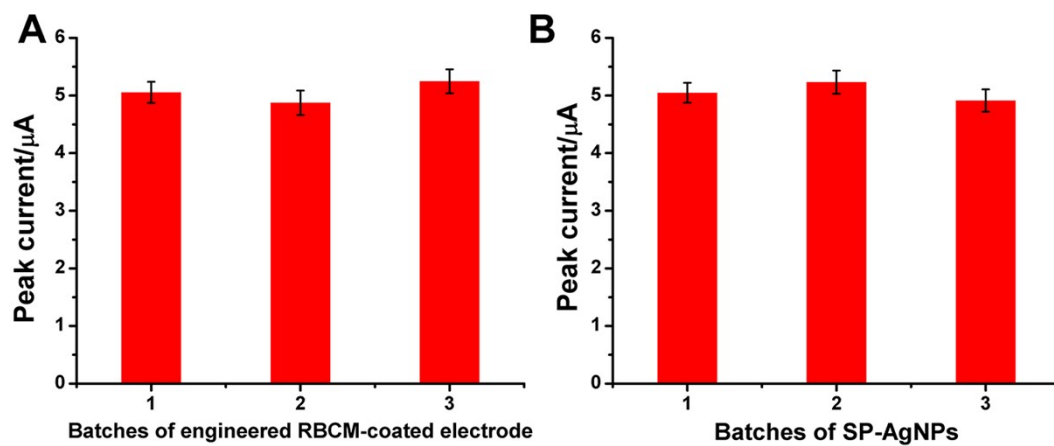


Fig. S9 LSV peak currents for detecting 1×10^6 CAL27 cell-derived exosomes with the use of three different batches of (A) engineered RBCM-coated electrodes and (B) SP-AgNPs.