Supporting Information

Adsorption behavior of carbon nanodots modulated by cellular membrane potential

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These two authors contributed equally to this work.

Table of contents

1. Synthetic routes of CDs

The CDs were synthesized according to previous work with some modifications [1]. In general, 1.5 g GSH dissolved in 50 mL formamide was transferred into Teflon-sealed autoclave and heated in oven to 160 ºC for 10 h, and then cooled to room temperature in air. Subsequently, the reaction mixture was directly subjected to dialysis (MW=3500) for 3 days to remove unreacted raw materials and small molecular weight fluorescent products. Finally, the product was filtered through a 0.22 μm Millipore membrane to remove large particles and dried in vacuum oven to obtain solid products.

[1] L. Pan, S. Sun, L. Zhang, K. Jiang and H. Lin, Near-infrared emissive carbon dots for two-photon fluorescence bioimaging, Nanoscale, 2016, 8, 17350-17356.

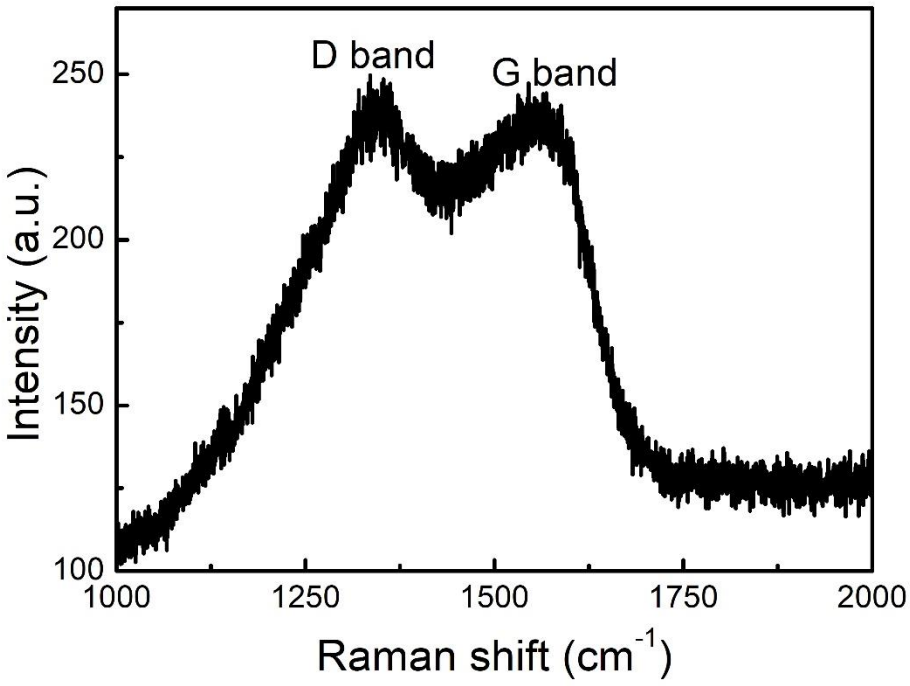

Figure S1. The Raman spectra of CDs.

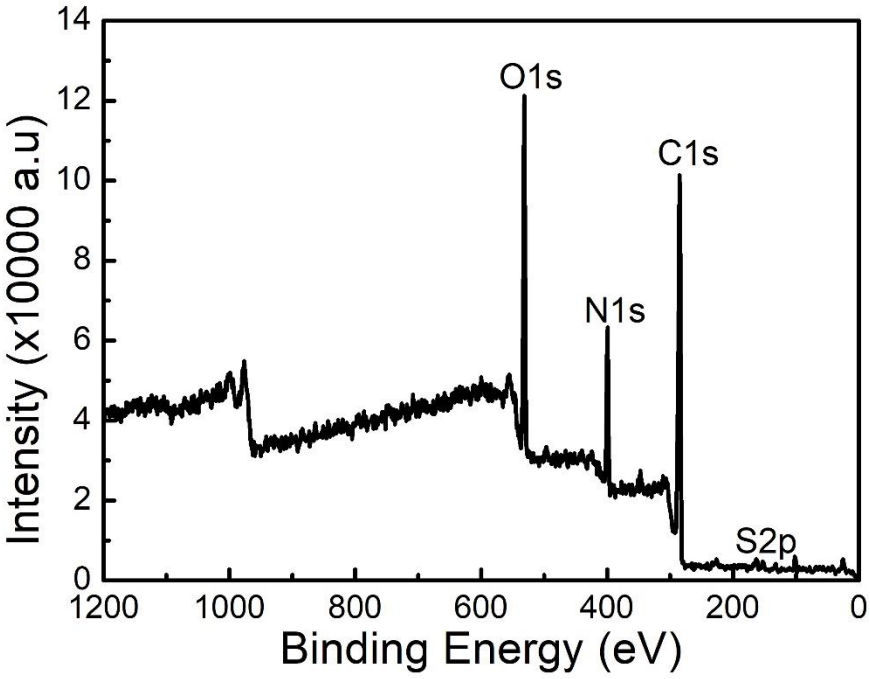

Figure S2. The full XPS spectra of CDs.

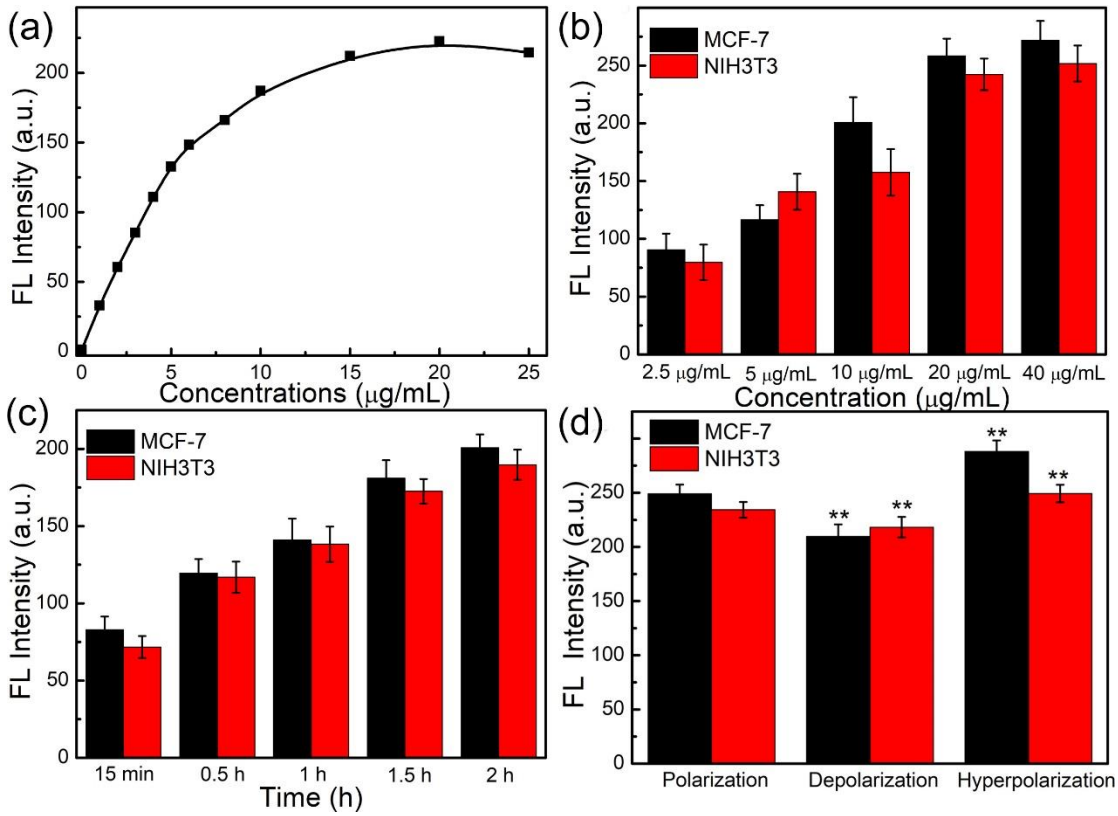

Figure S3. (a) The FL intensity derived from CDs versus their concentrations. (b) The influence of concentration of CDs on their adsorption capacity onto cellular membrane. (c) The influence of incubation time on their adsorption capacity onto cellular membrane. (d) The adsorption of CDs on membrane of cells with different status. Error bars represent the standard error of the mean (n = 3). **P < 0.01 versus the polarization group.

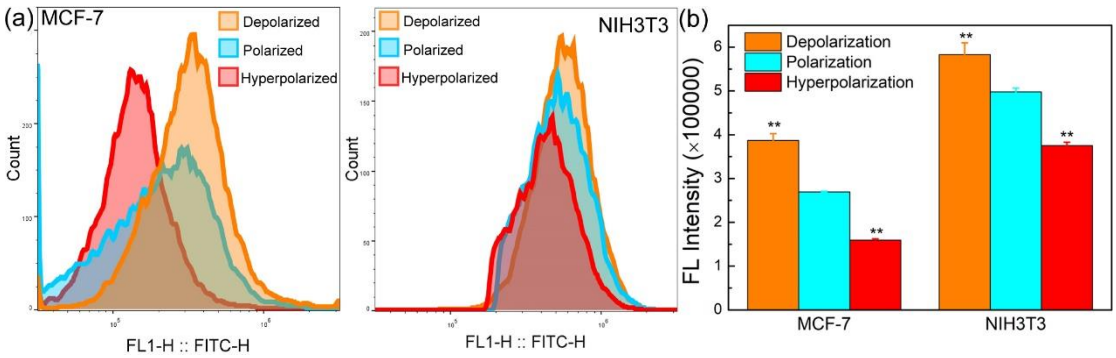

Fig. S4 (a) The membrane potential of cells with different status determined by DiBAC4(3) via flow cytometry. (b) The statistical FL intensity of flow cytometry results for the adsorption of CDs to cells with different status. **P < 0.01 versus the polarization group.

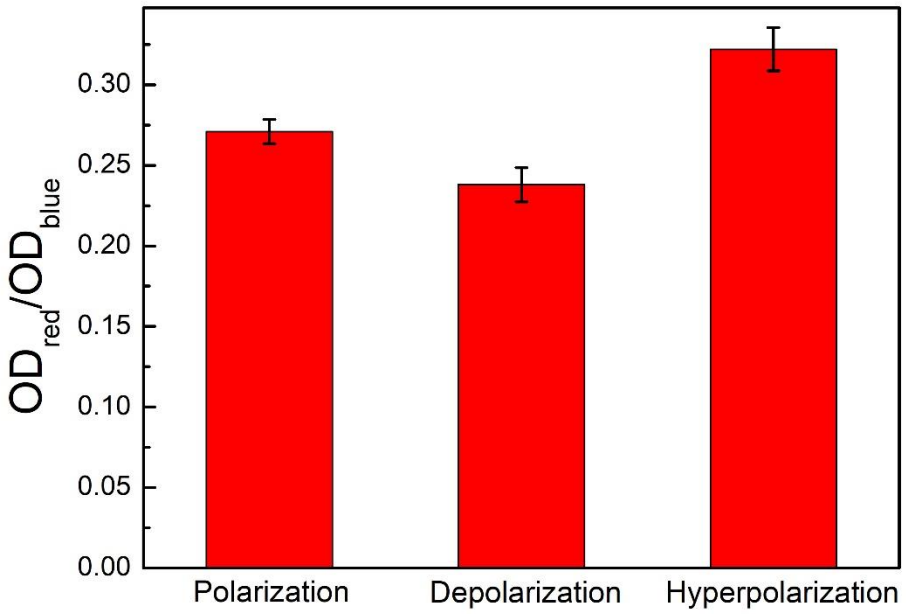

Figure S5. The ratio of OD_{red} to OD_{blue} in confocal FL microscopy images. Error bars represent the standard error of the mean (n = 3).

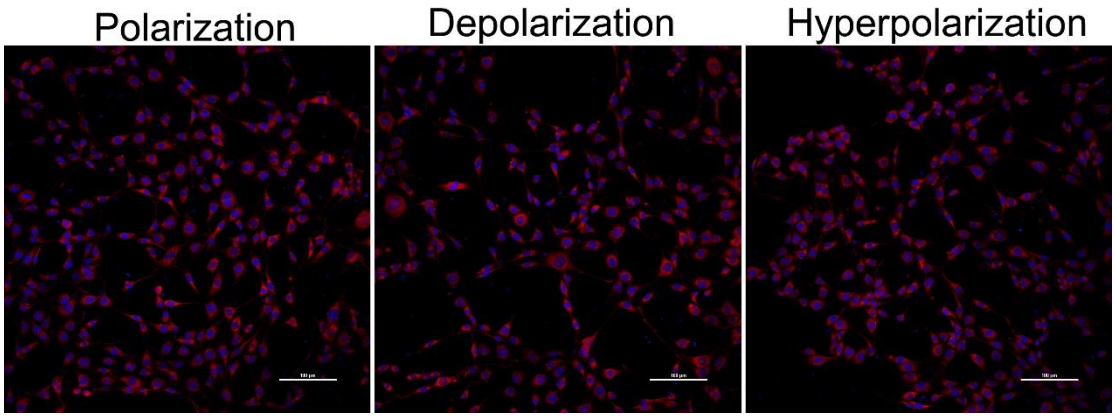

Figure S6. The adsorption of CDs on cellular membrane of NIH3T3 with different status detected by confocal FL microscopy. Scale Bar: 100 μm.

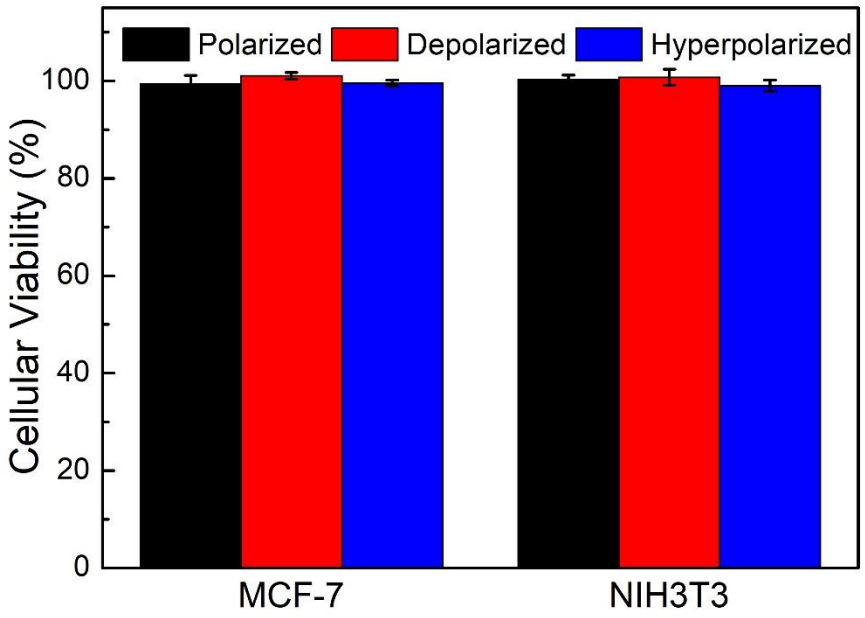

Figure S7. Viability of cells (MCF-7 and NIH3T3) treated with different medium (PBS, depolarization and hyperpolarization).

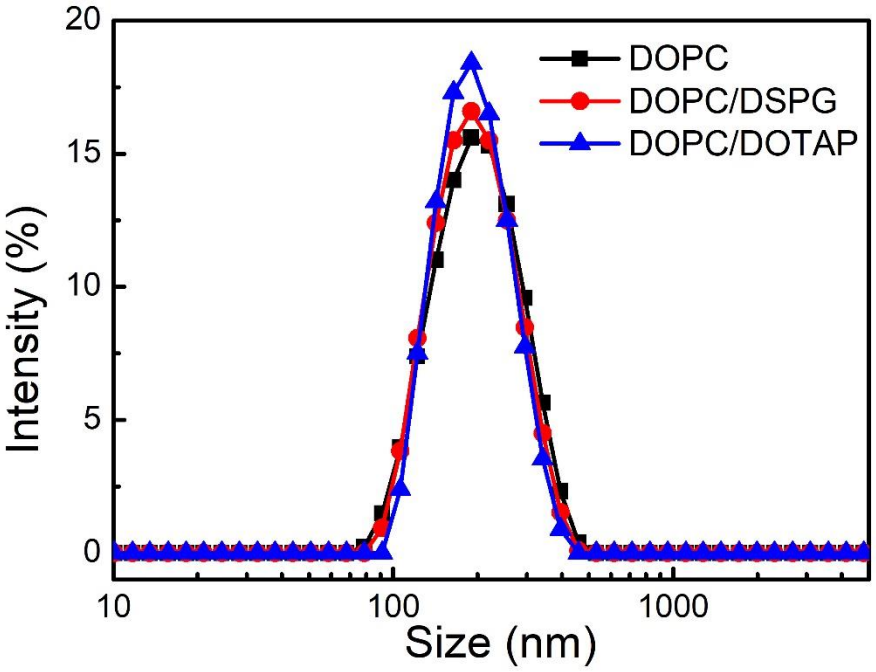

Figure S8. The HD sizes of three kinds of liposome measured by DLS.

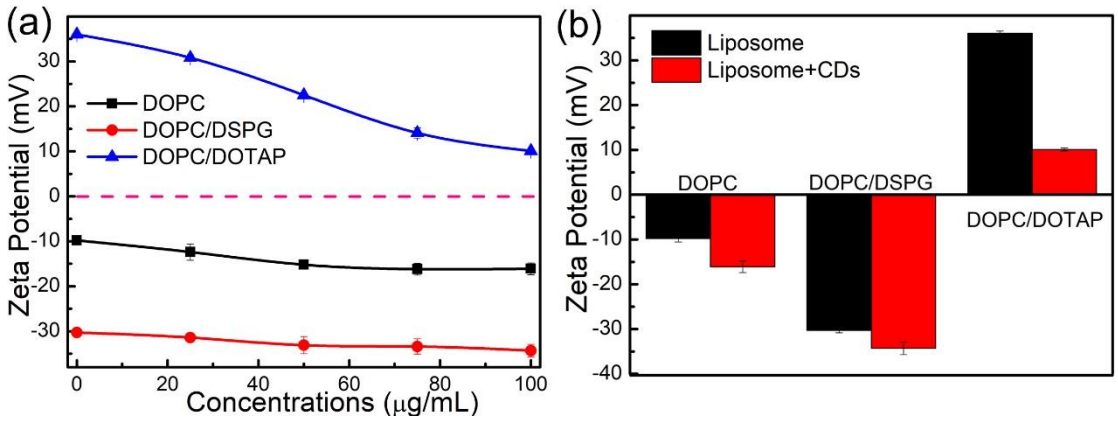

Figure S9. (a) The influence of CDs with different concentration on the zeta potential of liposome. (b) The zeta potential of liposome in the absence and presence of 100 μg/mL CDs. Error bars represent the standard error of the mean (n = 3)

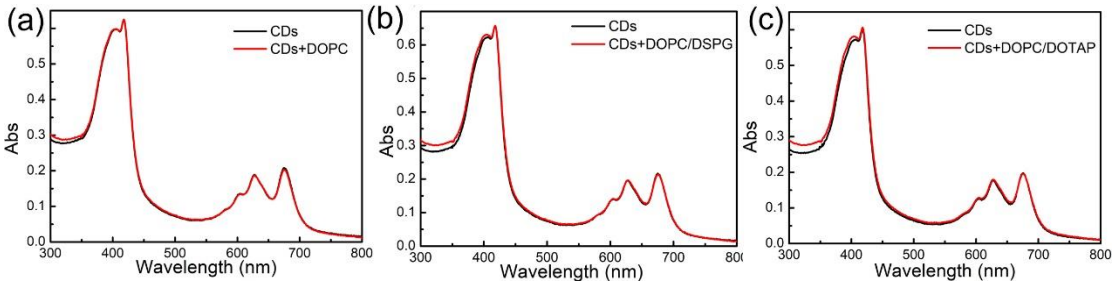

Figure S10. The UV-vis absorption spectra of CDs in the absence and presence of 50 μg/mL liposome.

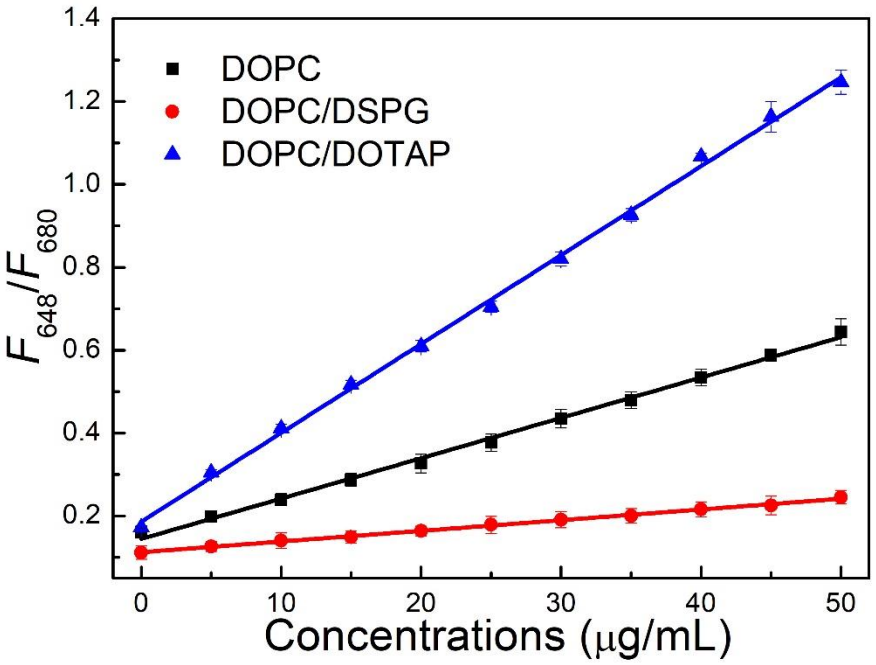

Figure S11. The ratio of FL intensity of CDs at 648 nm to that at 680 nm versus their concentration.

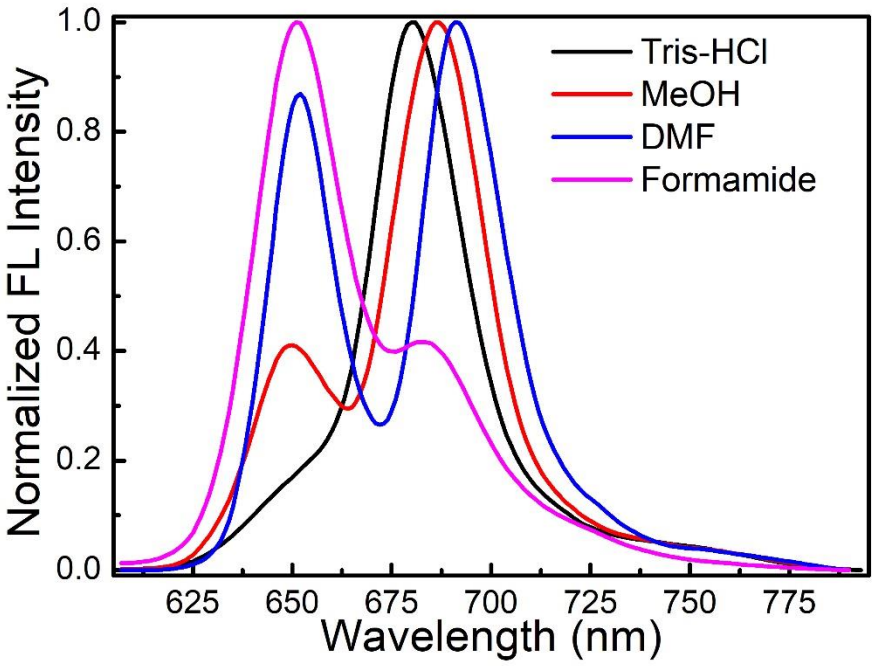

Figure 12. The FL spectra of CDs dispersed in different solvent.

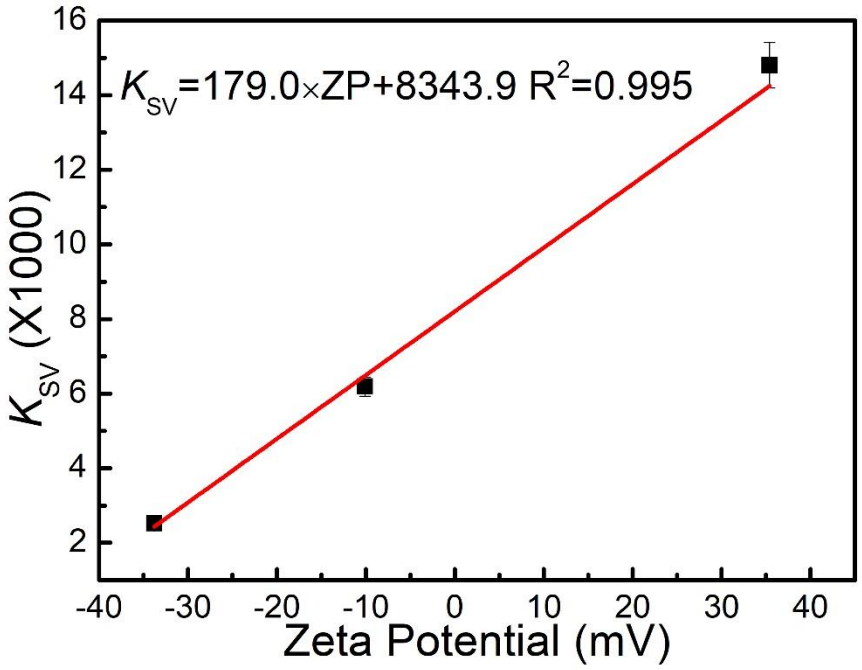

Figure 13. Linear plots for the quenching constant (K_{sv}) versus the zeta potential of liposome. Error bars represent the standard error of the mean (n = 3)

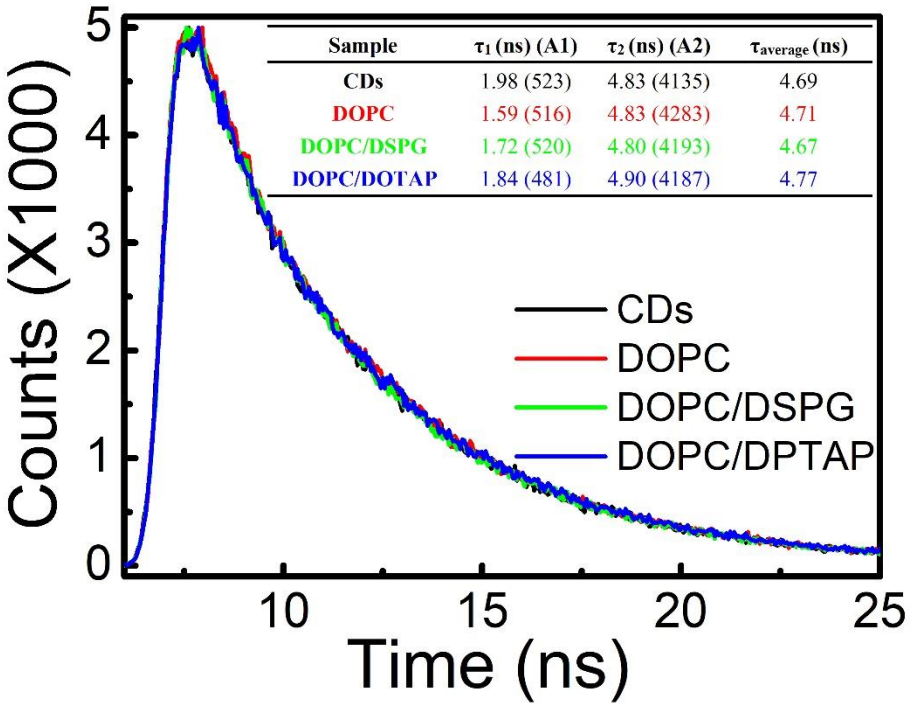

Figure S14. FL decay curves of CDs and their mixture with three kinds of liposome. $I(t) = A_1\exp(-t/\tau_1)+A_2\exp(-t/\tau_2)$, $\tau_{average} = (A_1\tau_1^2+A_2\tau_2^2)/(A_1\tau_1+A_2\tau_2)$.

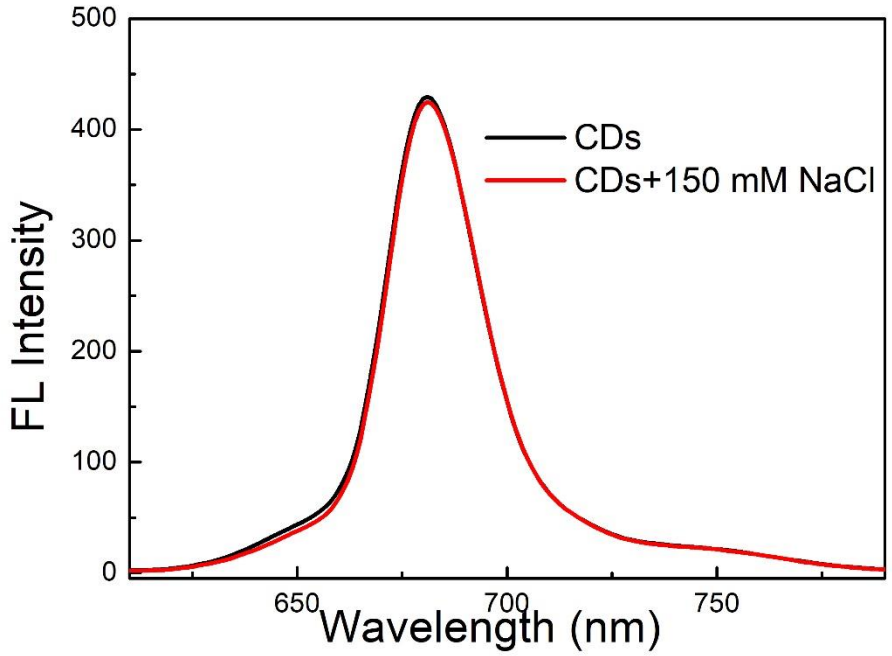

Figure S15. The FL spectra of CDs in the absence and presence of NaCl (150 mM).

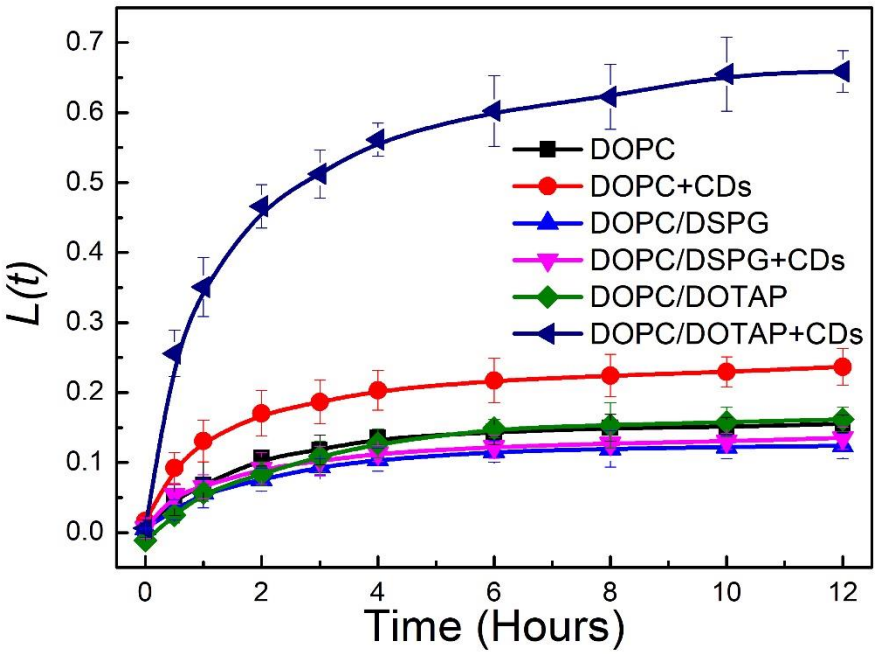

Fig. S16. Time-dependence determination of CF leakage from liposomes induced by CDs (40 μg/mL).

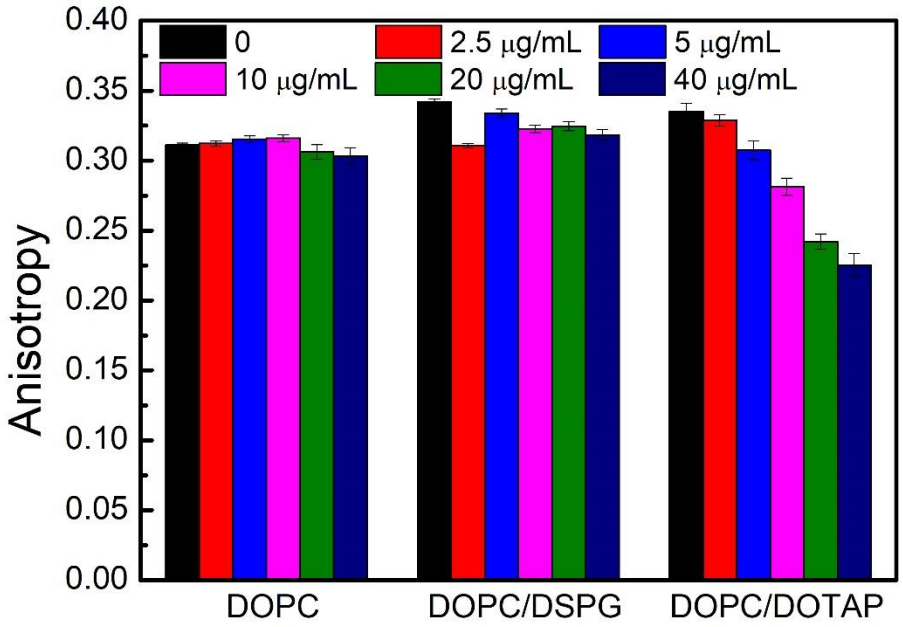

Figure 17. The membrane fluidity of liposome treated with different concentration of CDs. Error bars represent the standard error of the mean (n = 4).