

Supplementary Information for

Tunable Accessibility of Dye-doped Liposomes towards Gold Nanoparticles for Fluorescent Sensing of Lipopolysaccharide

Jinhong Gao, Zhuoru Li, Ouyang Zhang, Chuanliu Wu*, and Yibing Zhao*

Department of Chemistry, College of Chemistry and Chemical Engineering, State Key Laboratory of Physical Chemistry of Solid Surfaces, and The MOE Key Laboratory of Spectrochemical Analysis and Instrumentation, Xiamen University, Xiamen, 361005, P.R. China

*To whom correspondence should be addressed, Email: ybzhao@xmu.edu.cn, chlwu@xmu.edu.cn

Table of contents

Determination of surface ligand composition of HDT AuNPs

Figure S1. UV-vis spectrum of HDT AuNPs

Figure S2. The TEM image and size distribution of HDT AuNPs

Figure S3. ¹H-NMR spectroscopy was used to quantify the composition of ligands on HDT AuNPs surface.

Figure S4. UV-vis spectrum of MUA AuNPs

Figure S5. The TEM image and size distribution of MUA AuNPs

Figure S6. Size distribution of DOPC-1% RhB liposomes characterized by DLS

Figure S7. HDT AuNPs (0.2 nM) was applied to quench RhB fluorophore in DOPC liposomes at various concentrations (0.26-1.3 μM).

Figure S8. Fluorescence of POPE-RhB in DOPC liposomes (0.52 μM) quenched by HDT-AuNPs at different concentrations (0.03-0.3 nM)

Figure S9. Fluorescence spectra of DOPC-1% RhB before and after quenched by HDT AuNPs and the fluorescence recovery by adding LPS

Figure S10. Fluorescence responses of RhB fluorophore after introducing HDT AuNPs simultaneously with or immediately after LPS respectively

Figure S11. Fluorescence spectra of DOPC-1% RhB before and after quenched by MUA AuNPs

Figure S12. Size distribution of DOCP-1% RhB liposomes characterized by DLS

Figure S13. Fluorescence spectra of DOCP-1% RhB before and after quenched by HDT AuNPs

Table S1. The ζ-potentials of the compositions of DOPC-1% RhB liposomes and LPS

Table S2. The ζ-potentials of DOCP doped DOCP-1% RhB liposomes

Figure S14. The doped DOCP in DOPC-1% RhB liposomes could dramatically retard the quench effort of HDT AuNPs in a dose-depend manner.

Figure S15. The remained fluorescence of the composition of DOPC-1% CP and the LPS of various concentration (0.1-100 nM) upon quenched by HDT AuNPs

Figure S16. The quenching behavior of RhB fluorophore in DOPC-7% RhB liposomes by HDT AuNPs

Figure S17. The remained fluorescence of the composition of DOPC-7% RhB and the LPS of various concentration (0.1-100 nM) upon quenched by HDT AuNPs added

Figure S18. The remained fluorescence of DOPC-1% RhB in DMEM medium after introducing HDT-AuNPs and background fluorescence of DMEM medium

Determination of surface ligand composition of HDT-AuNPs

The surface ligand composition of HDT-AuNPs was determined via $^1\text{H-NMR}$ characterization based on a method reported by Lee, et al (J. Am. Chem. Soc., 2013, 135, 12476-12476). Briefly, HDT-AuNPs (~50 mg) was dispersed in methanol and oxidized by I_2 under vigorous sonication for ~12 h in order to liberate the surface ligands. Then, the supernatant was collected and the methanol was removed under reduced pressure. The oxidized product was dissolved in deuterated chloroform and analyzed by 400 MHz $^1\text{H-NMR}$. The ratio of HDT/MUA can be calculated from the ratio of the integrated peak intensities at ~0.86-0.93 and ~2.29-2.40 ppm, respectively.

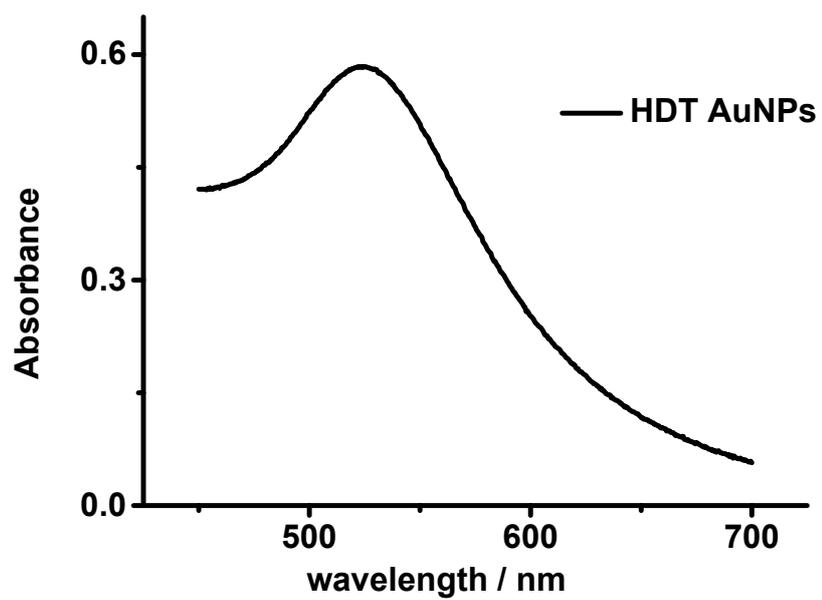


Figure S1. UV-vis spectrum of HDT AuNPs

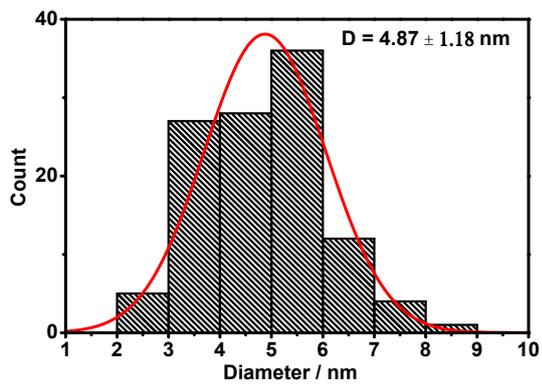
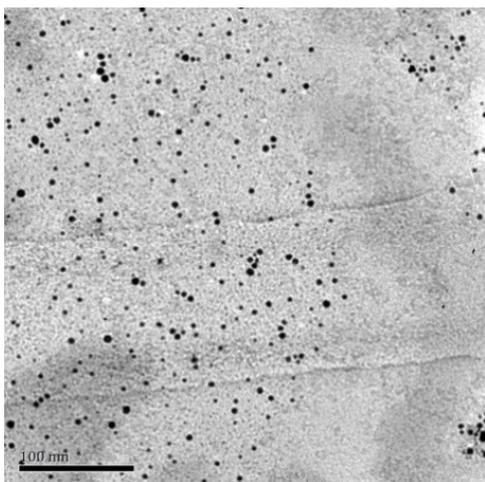


Figure S2. The TEM image (left) and size distribution (right) of HDT AuNPs.

20151121-GJH-MUA-HDT
20151121-GJH-MUA-HDT-CDCl3

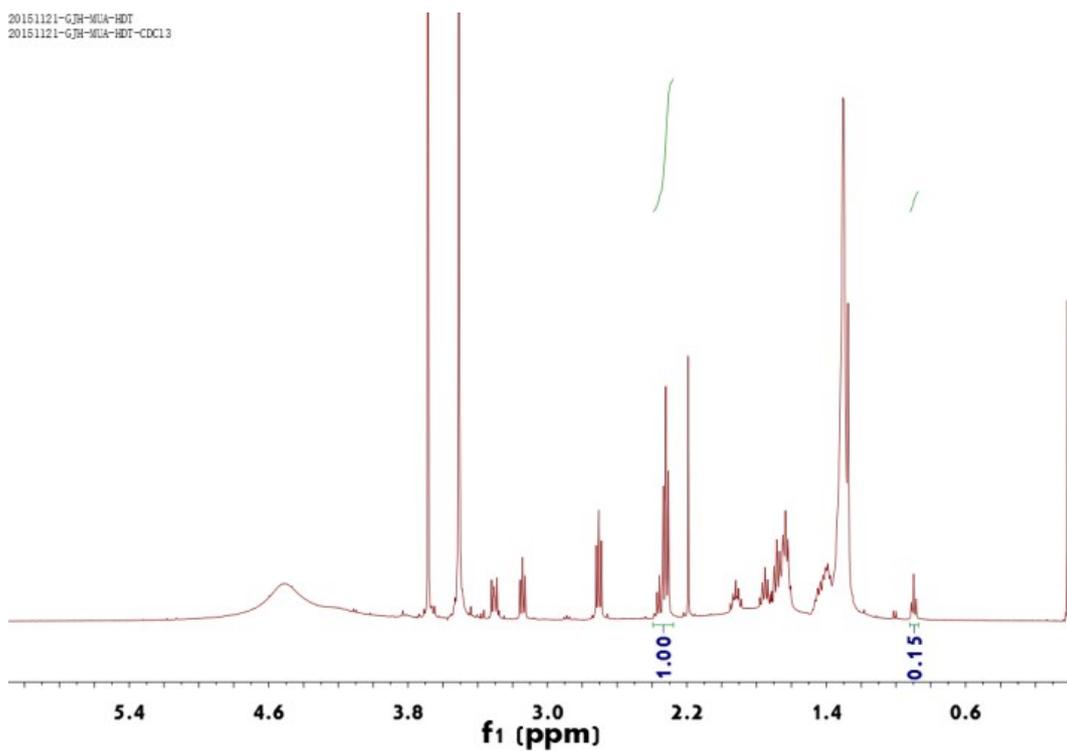


Figure S3 ¹H-NMR spectroscopy was used to quantify the composition of ligands on HDT AuNPs surface.

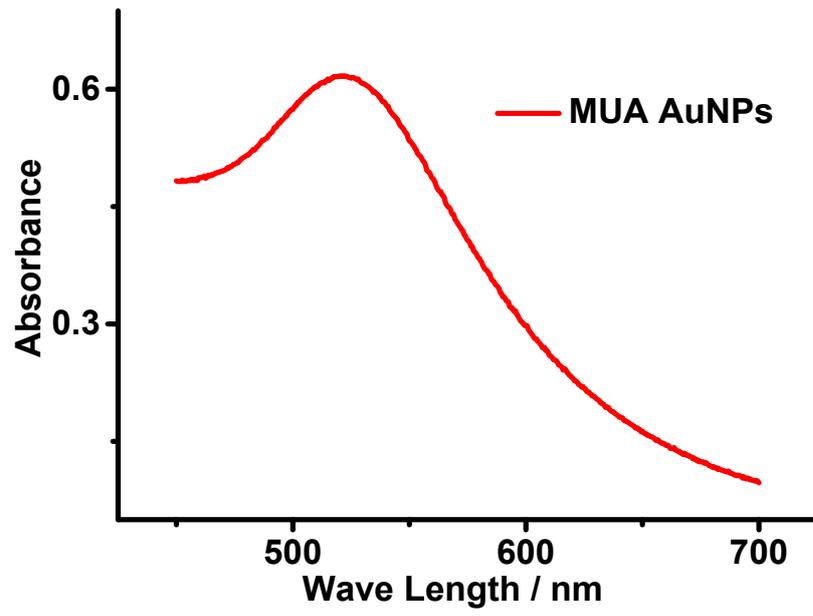


Figure S4. UV-vis spectrum of MUA AuNPs

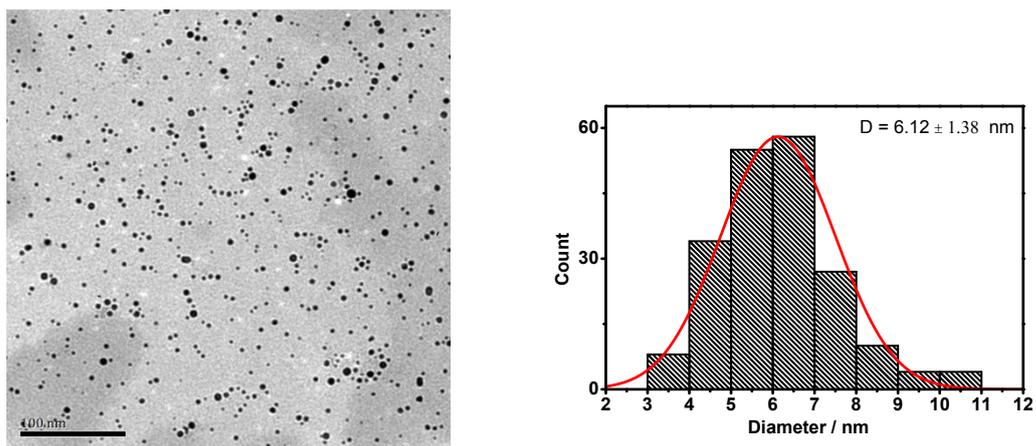


Figure S5. The TEM image (left) and size distribution (right) of MUA AuNPs

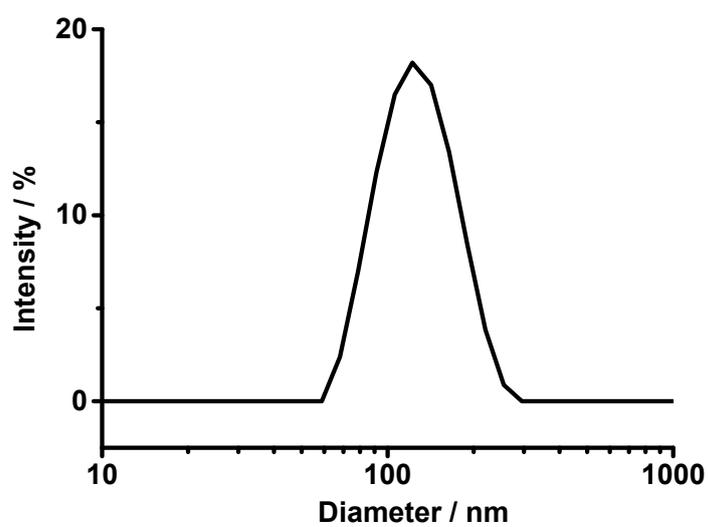


Figure S6. Size distribution of DOPC-1% RhB liposomes characterized by DLS

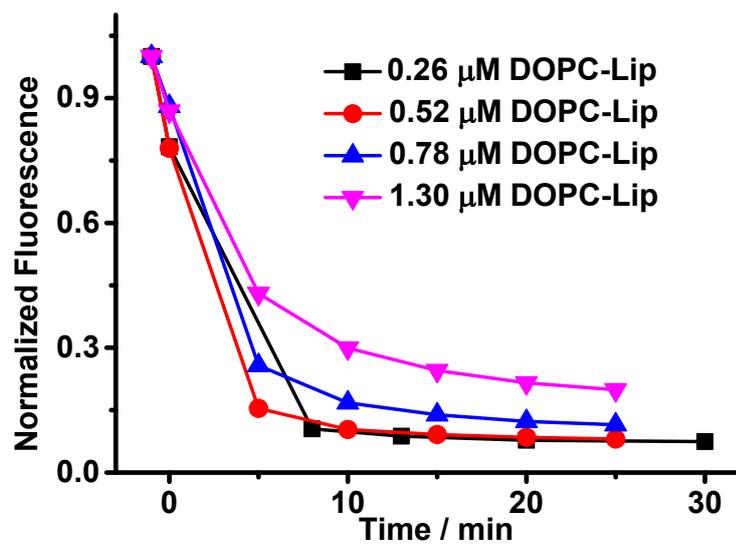


Figure S7. HDT AuNPs (0.2 nM) was applied to quench RhB fluorophore in DOPC liposomes at various concentrations (0.26-1.3μM).

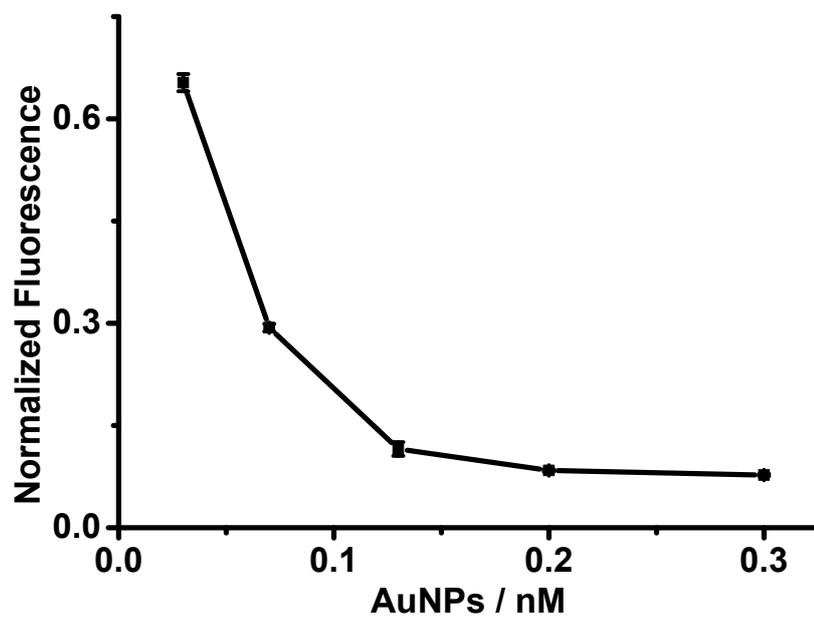


Figure S8. Fluorescence of POPE-RhB in DOPC liposomes (0.52 μ M) quenched by HDT-AuNPs at different concentrations (0.03-0.3 nM)

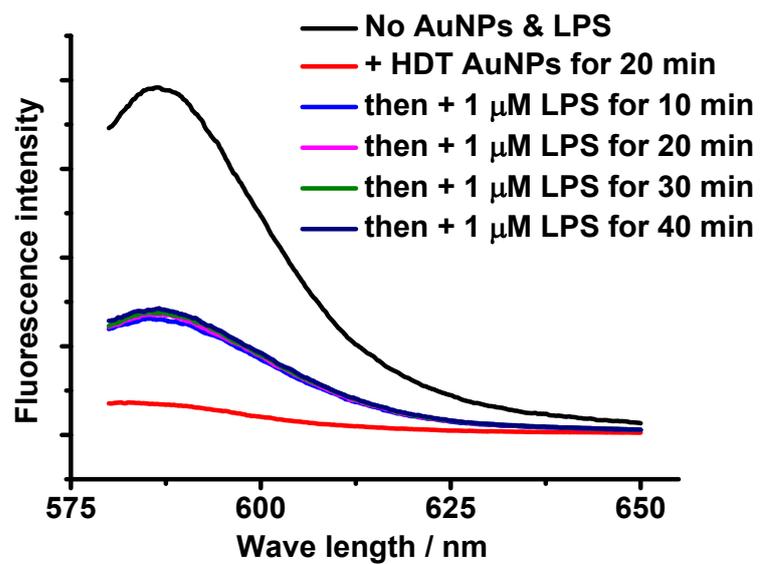


Figure S9. Fluorescence spectra of DOPC-1% RhB before (black) and after (red) quenched by HDT AuNPs and the fluorescence recovery by adding LPS (cyan to blue).

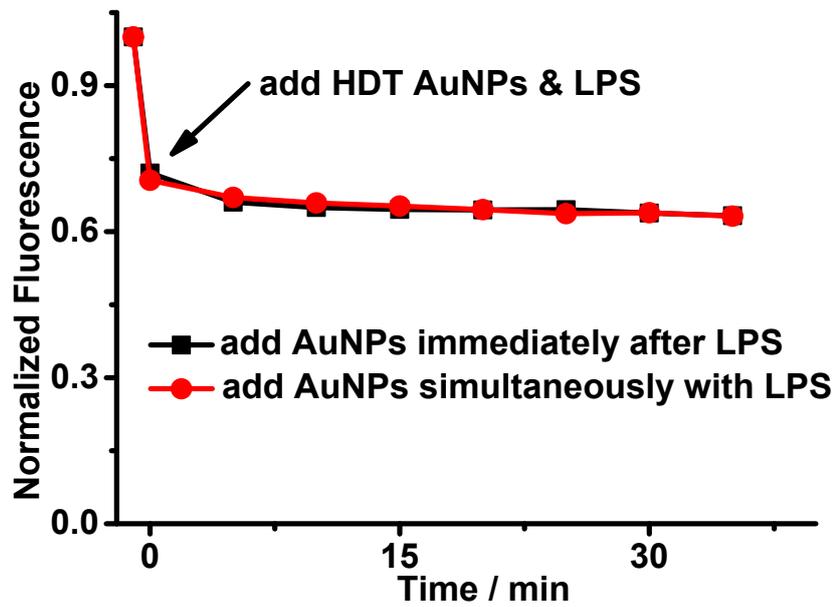


Figure S10. Fluorescence responses of RhB fluorophore after introducing HDT AuNPs simultaneously (red) with or immediately (black) after LPS, respectively

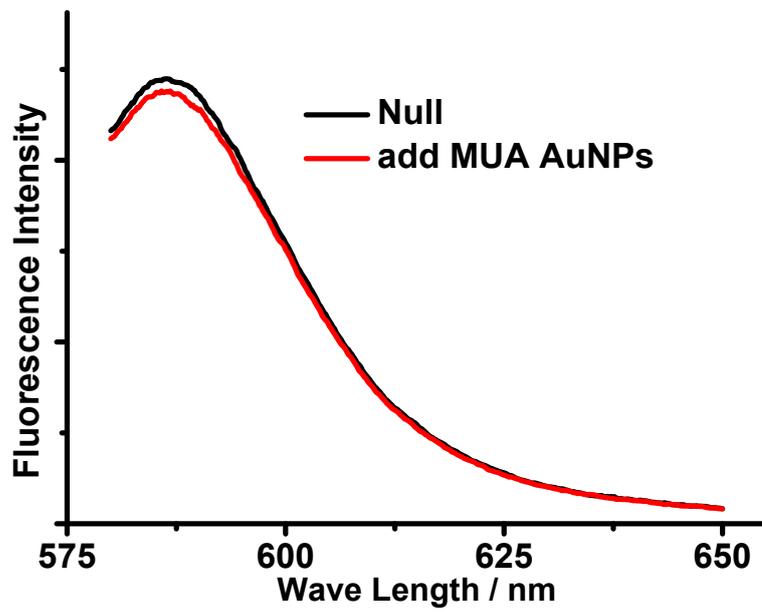


Figure S11. Fluorescence spectra of DOPC-1% RhB before (black) and after (red) quenched by MUA AuNPs

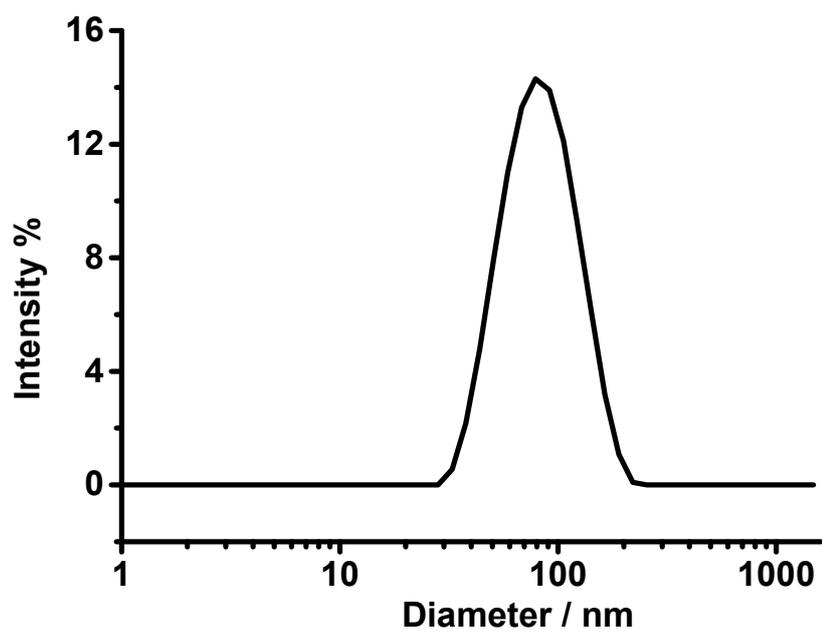


Figure S12. Size distribution of DOCP-1% RhB liposomes characterized by DLS

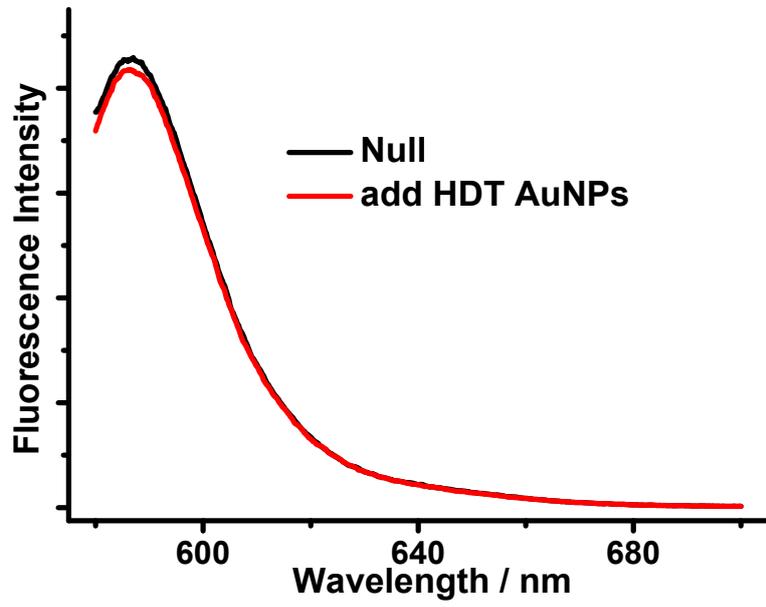


Figure S13. Fluorescence spectra of DOCP-1% RhB before (black) and after (red) quenched by HDT AuNPs.

Table S1. The ζ -potentials of the compositions of DOPC-1% RhB liposomes and LPS

LPS/DOPC	Only DOPC	2:100	5:100	10:100	Only LPS
ζ -potentials/mV	-6.1 \pm 2.3	-11.17 \pm 0.4	-18.6 \pm 1.7	-17.5 \pm 2.2	-22.1 \pm 1.3

Table S2. The ζ -potentials of DOCP doped DOCP-1% RhB

n% DOCP doped	1	3	5	10
ζ potentials/mV	-15.2 \pm 0.9	-20.1 \pm 0.42	-22.9 \pm 2.0	-25.3 \pm 1.3

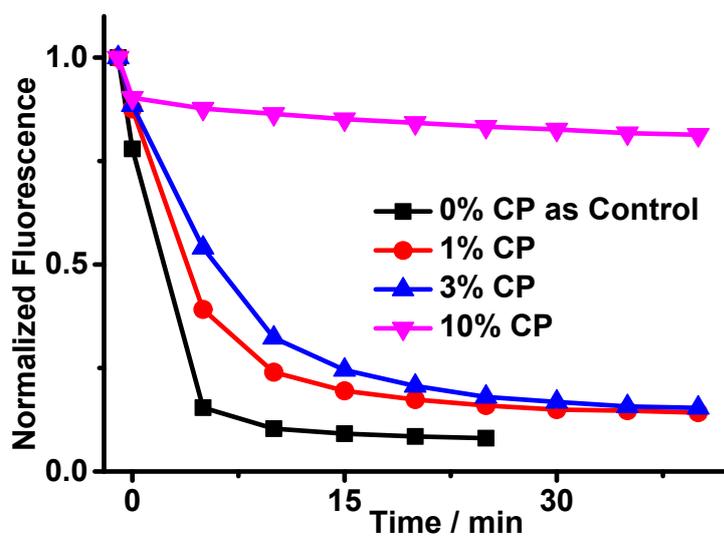


Figure S14. The doped DOCP in DOPC-1% RhB liposomes could dramatically retard the quench effort of HDT AuNPs over RhB fluorophore in a dose-depend manner.

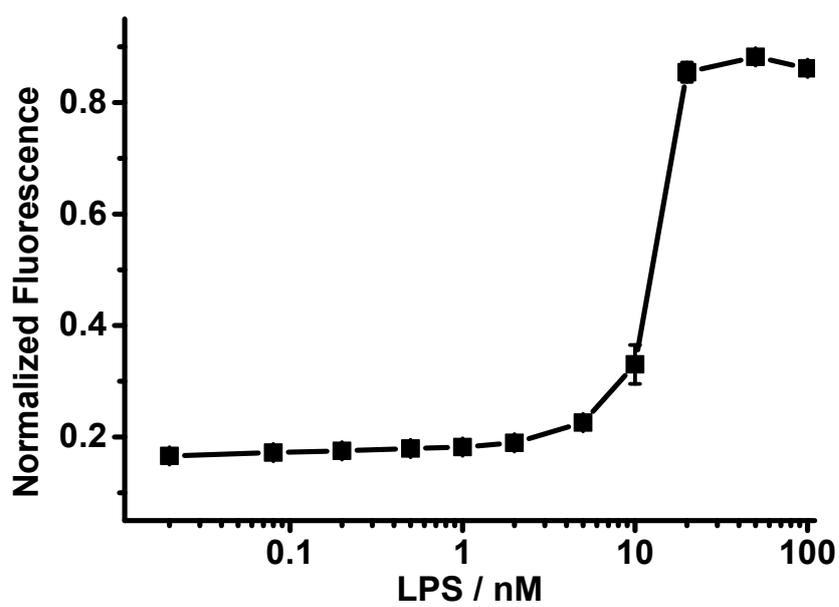


Figure S15. The remained fluorescence of the composition of DOPC-1% CP and the LPS of various concentration (0.1-100 nM) upon quenched by HDT AuNPs added.

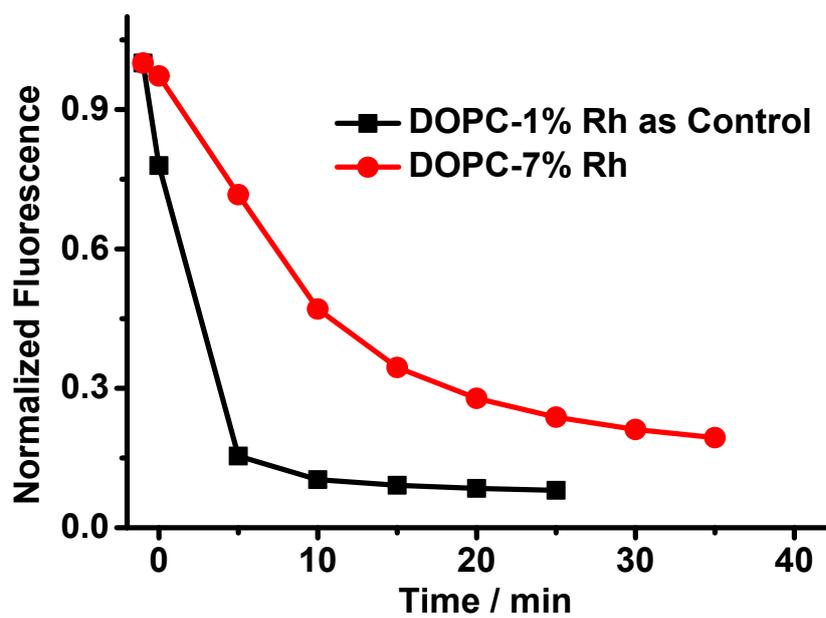


Figure S16. The quenching behavior of RhB fluorophore in DOPC-7% RhB liposomes by HDT AuNPs was different from that of DOPC-1% RhB liposomes.

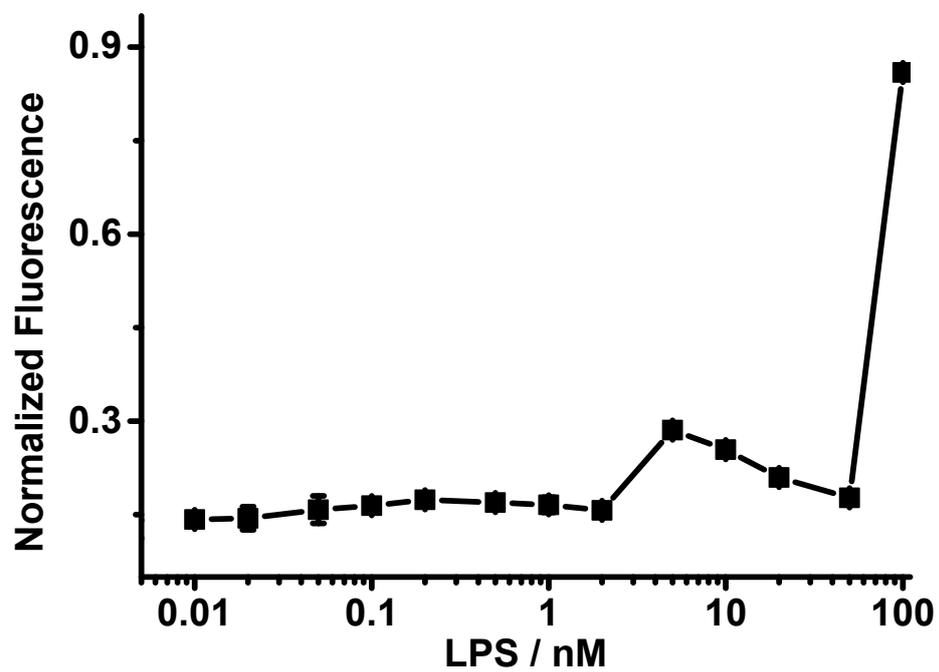


Figure S17. The remained fluorescence of the composition of DOPC-7% RhB and the LPS of various concentration (0.1-100 nM) upon quenched by added HDT AuNPs

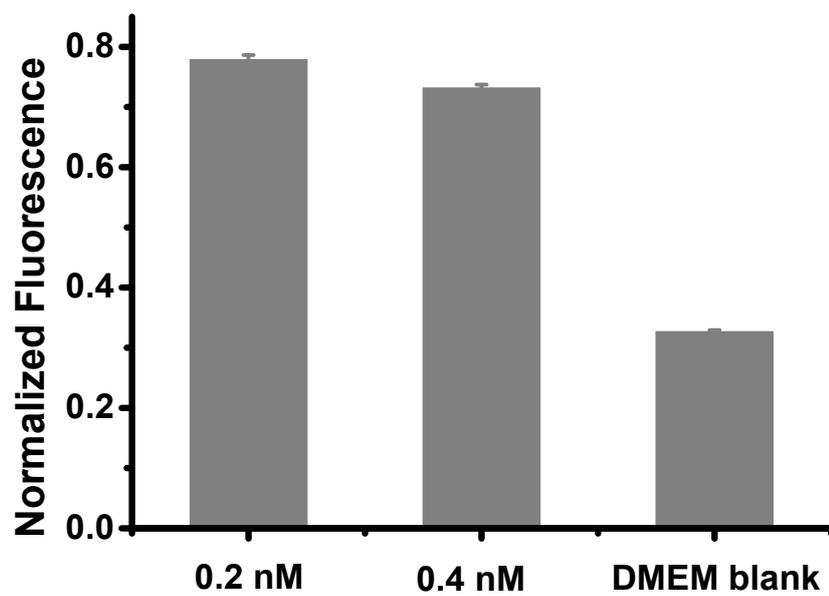


Figure S18. The remained fluorescence of DOPC-1% RhB in DMEM medium after introducing HDT-AuNPs and background fluorescence of DMEM medium