Supporting Information

Gap-tethered Au@AgAu Raman Tags for the Ratiometric Detection of MC-LR

Yuan Zhao,*,† Fangjie Zheng,† Wei Ke,† Wei Zhang,‡ Lixia Shi,† Han Liu†

†Key Laboratory of Synthetic and Biological Colloids, Ministry of Education, School of Chemical and Material Engineering, Jiangnan University, Wuxi, Jiangsu 214122, China.

‡Chongqing Institute of Green and Intelligent Technology, Chinese Academy of Sciences, Chongqing, 400714, China.

Corresponding author. E-mail: zhaoyuan@jiangnan.edu.cn

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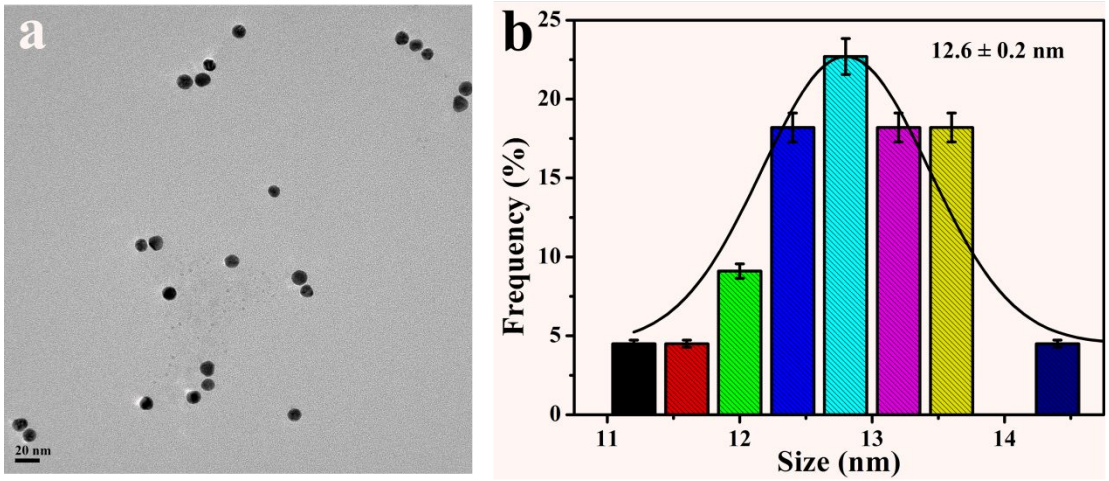

Figure S1. (a) TEM image of Au NPs. (b) Statistical analysis of diameters for Au NPs.

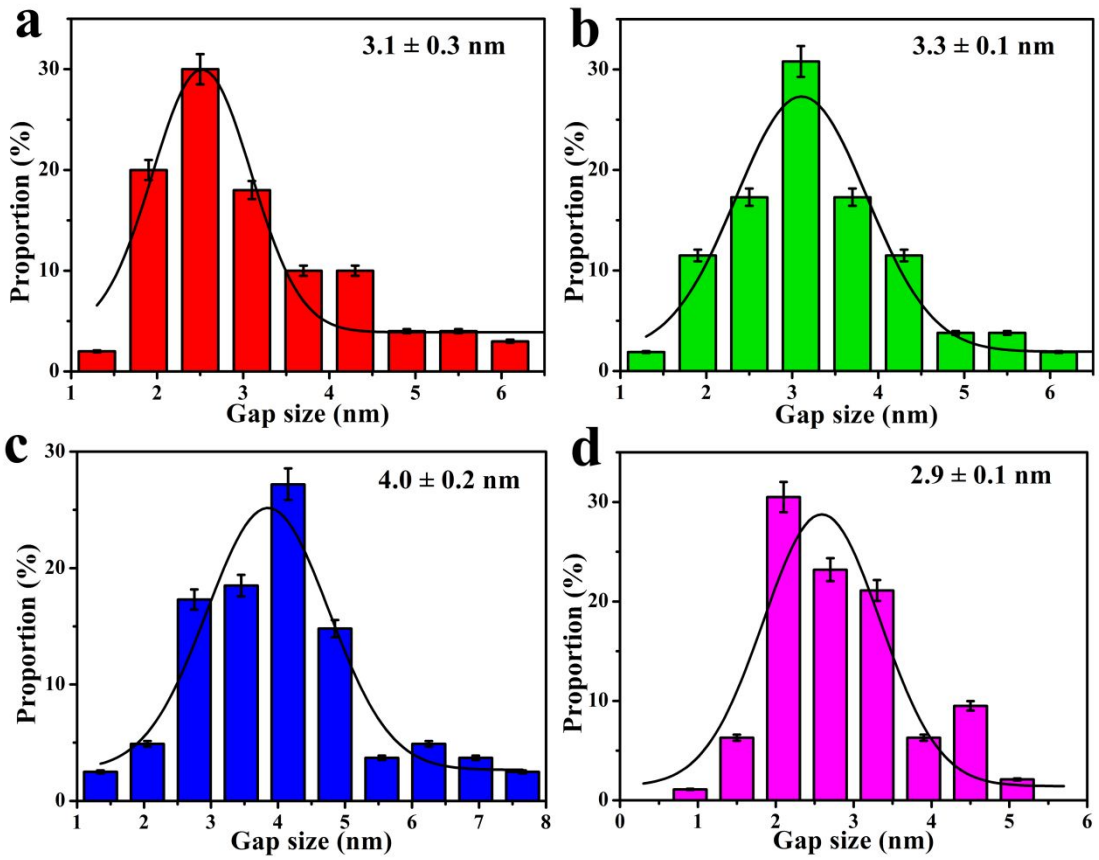

Figure S2. Statistical analysis of gap size for Au@gap@AgAu NPs. (a) Au@gap@$AgAu_{(1)}$ NPs. (b) Au@gap@$AgAu_{(2)}$ NPs. (c) Au@gap@$AgAu_{(3)}$ NPs. (d) Au@gap@$AgAu_{(4)}$ NPs.

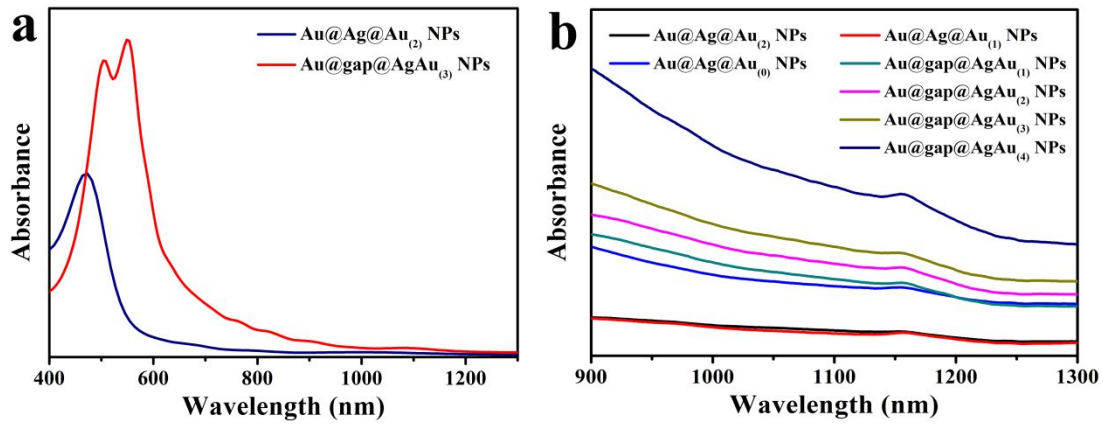

Figure S3. (a) Theoretically calculated optical absorption spectra of prepared $Au@Ag@Au_{(2)}$ NPs and $Au@gap@AgAu_{(3)}$ NPs. (b) Absorption spectra of prepared Au@Ag@Au NPs and Au@gap@AgAu NPs.

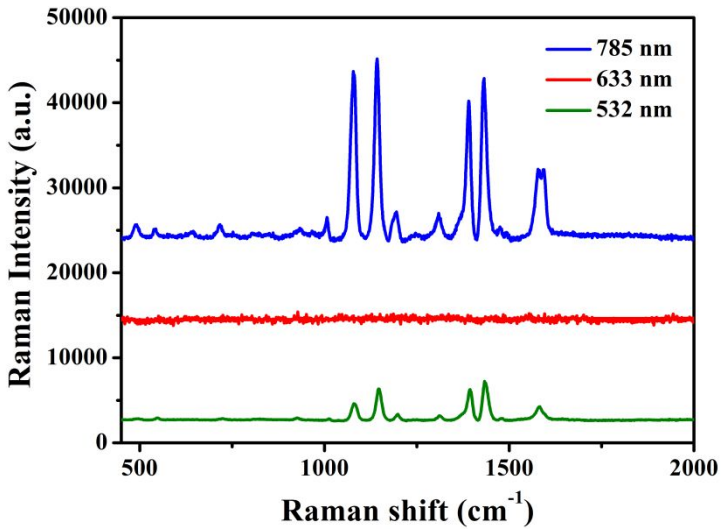

Figure S4. Raman spectra of Au@gap@$AgAu_{(3)}$ NPs using three different laser wavelengths.

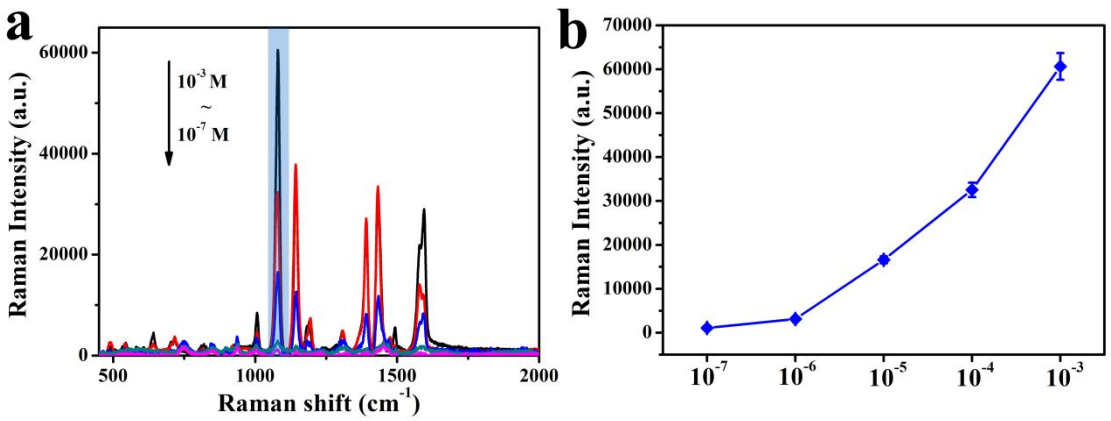

Figure S5. (a) SERS spectra of 4-ATP molecules (from 10^{-7} M to 10^{-3} M) embedded in Au@gap@$AgAu_{(3)}$ NPs. (b) The plot of averaged Raman intensity at 1078 cm^{-1} with different concentrations of 4-ATP.

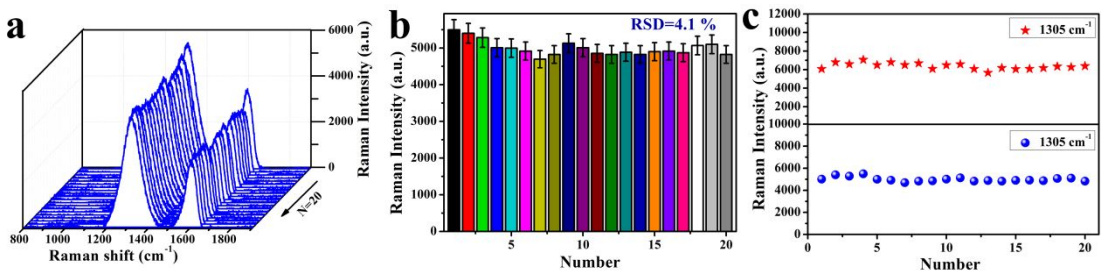

Figure S6. (a) Time-depending SERS spectra of GO/Fe_3O_4 NPs. (b) The corresponding RSD results of (a) calculated at 1305 cm^{-1}. (c) Plots of the SERS intensities of Au@gap@AgAu NPs-GO/Fe_3O_4 NPs assemblies at 1305 cm^{-1} (red points) and GO/Fe_3O_4 NPs at 1305 cm^{-1} (blue points) vs number of times.

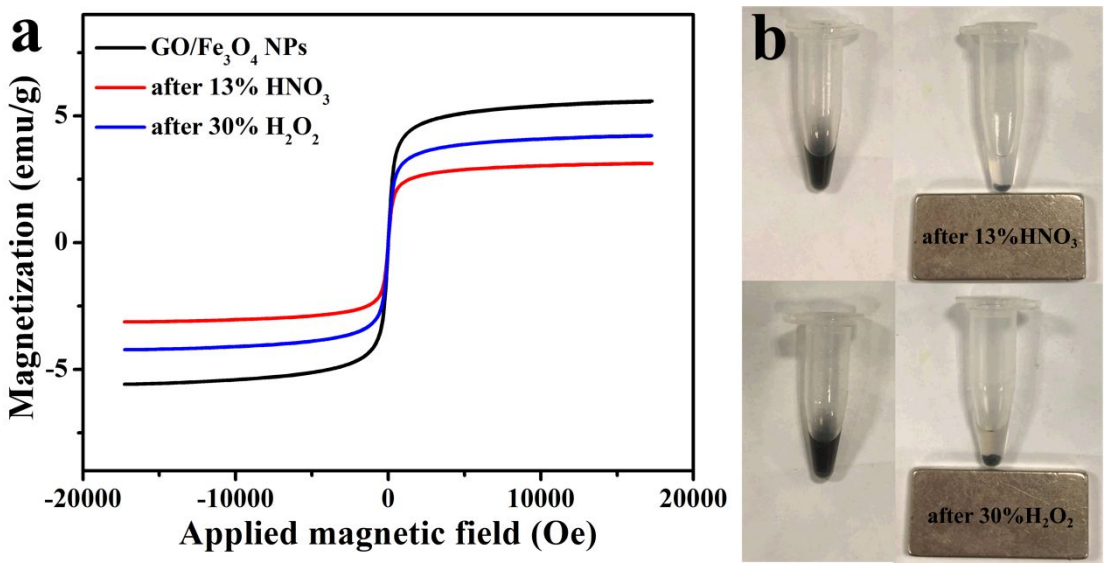

Figure S7. (a) Magnetization curves of GO/Fe_3O_4 NPs, GO/Fe_3O_4 NPs after adding 13% HNO_3 and GO/Fe_3O_4 NPs after adding 30% H_2O_2. (b) Magnetic separation pictures of GO/Fe_3O_4 NPs after treatment with 13% HNO_3 and 30% H_2O_2.

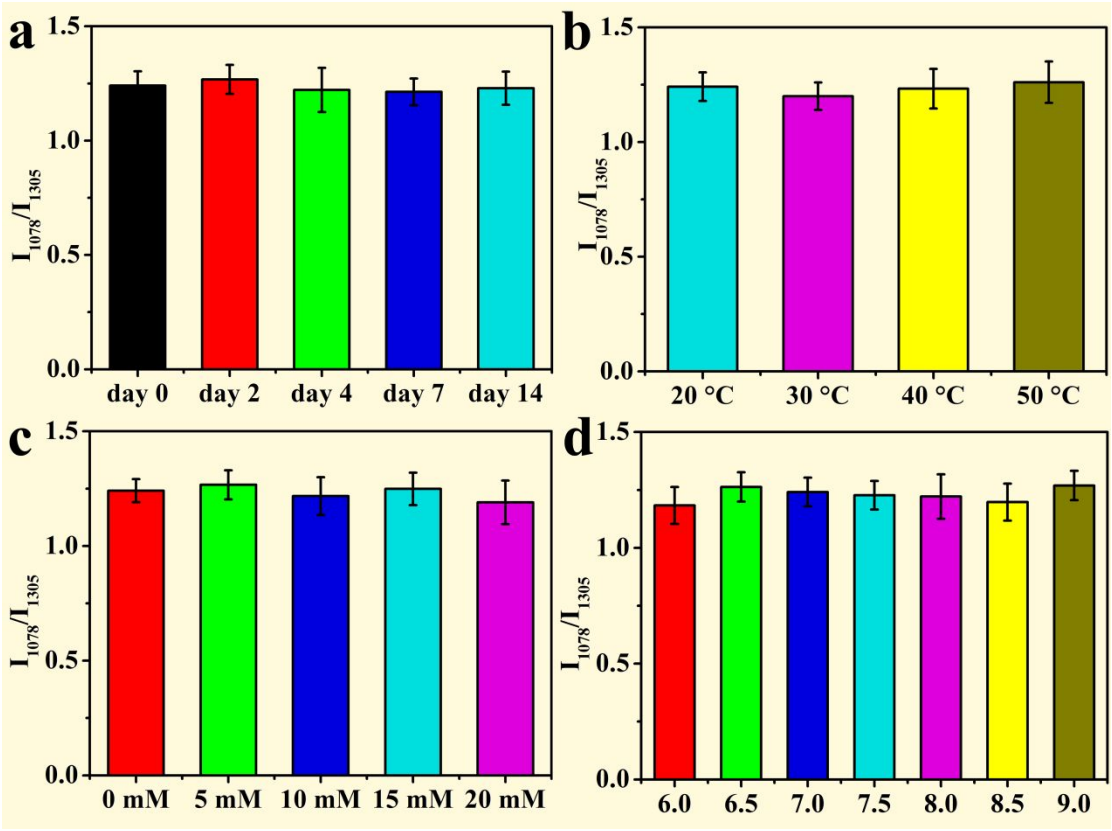

Figure S8. I_{1078}/I_{1305} values with different stored time (a), different temperatures (b), different salt concentrations (c) and different pH values (d).

Table S1. The detail sequences of aptamers of MC-LR.

Name	Sequences (5′-3′)
Aptamers	-SH-GGC GCC AAA CAG GAC CAC CAT GAC AAT TAC CCA TAC CAC CTC ATT ATG CCC CAT CTC CGC

Table S2. Detection of MC-LR spiked in Tai lake water.

Polluted water	Original concentration (ng/mL)	Spiked concentration (ng/mL)	Detected concentration (mean ± SD, ng/mL)	Recovery (mean± SD)
1	0.39	0.25	0.61 ± 0.07	95.31 ± 2.65
2	0.27	0.5	0.76 ± 0.12	98.70 ± 3.36
3	0.62	2.5	3.05 ± 0.43	97.76 ± 3.07