

## Supplementary Information

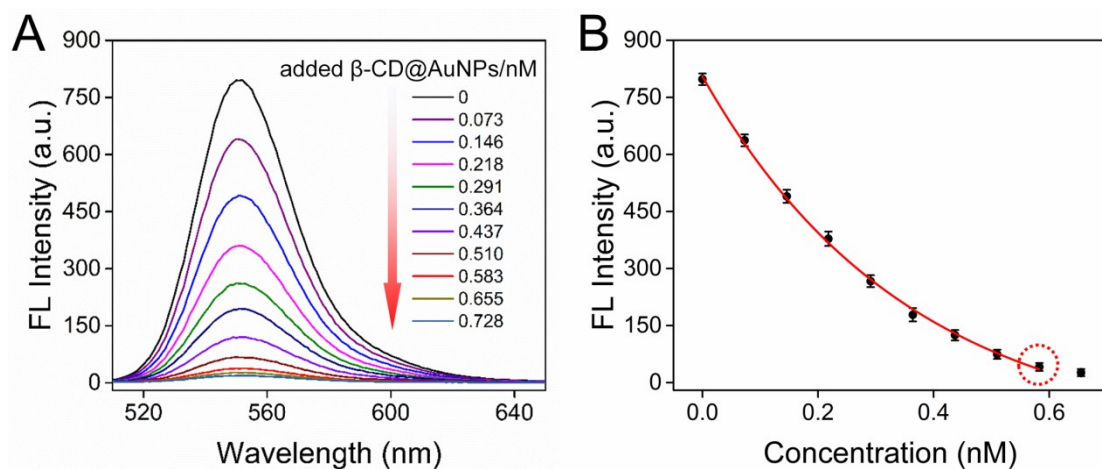
### **Discrimination of cysteamine from mercapto amino acids through isoelectric point-mediated surface ligand exchange of $\beta$ -cyclodextrin modified gold nanoparticles**

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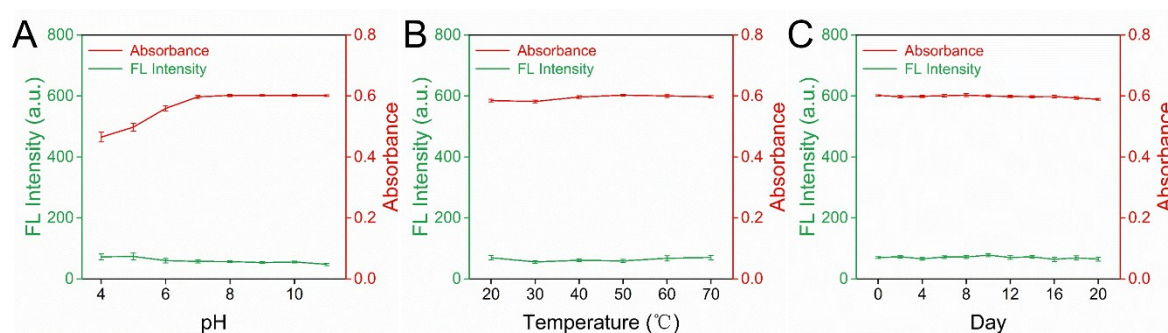
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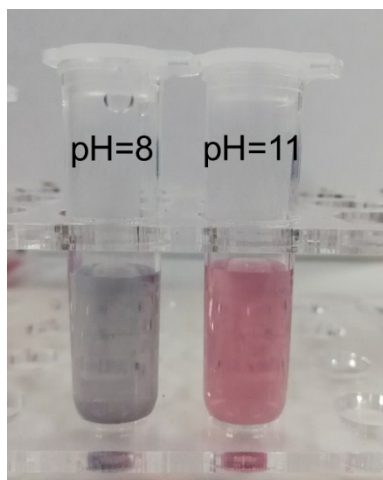
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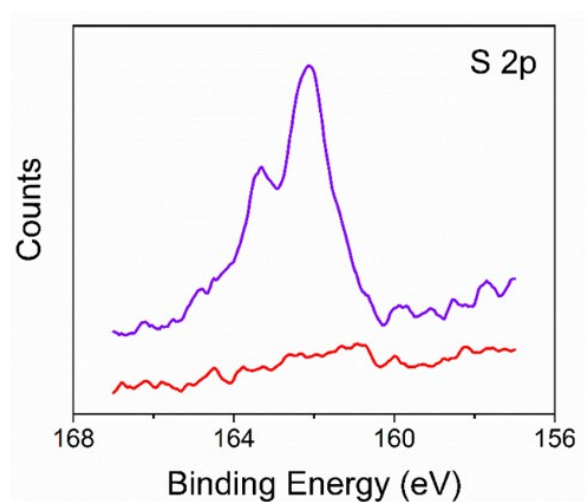
**Figure S1.** (A) Fluorescence spectra of R6G in the presence of different concentrations of  $\beta$ -CD@AuNPs; (B) Plot of R6G fluorescence intensities versus concentrations of  $\beta$ -CD@AuNPs. Error bars represent the standard deviations (n = 3).



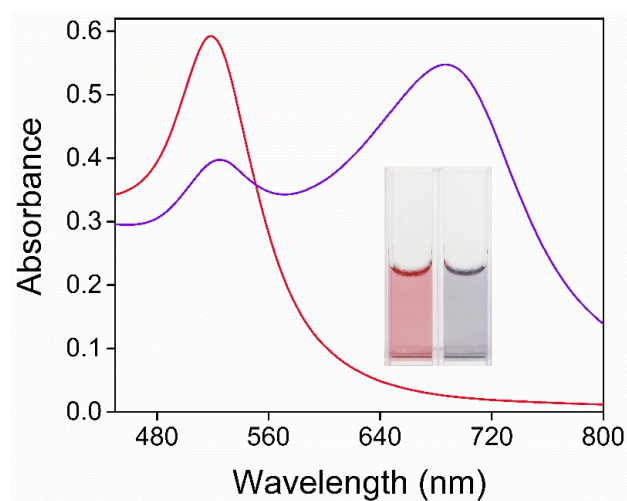
**Figure S2.** Effects of pH (A), temperature (B) and storage time (C) on the fluorescence intensity and absorbance of R6G- $\beta$ -CD@AuNPs. Error bars represent the standard deviations (n = 3).



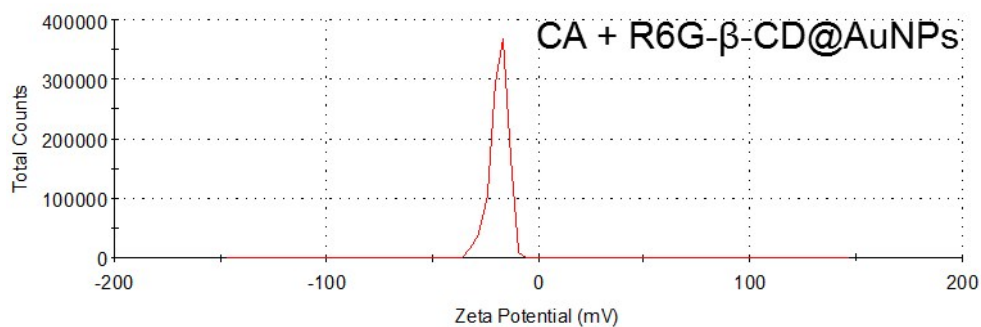
**Figure S3.** Photographs of R6G- $\beta$ -CD@AuNPs after the addition of CA under different pH conditions (Left: pH < pI, Right: pH > pI).



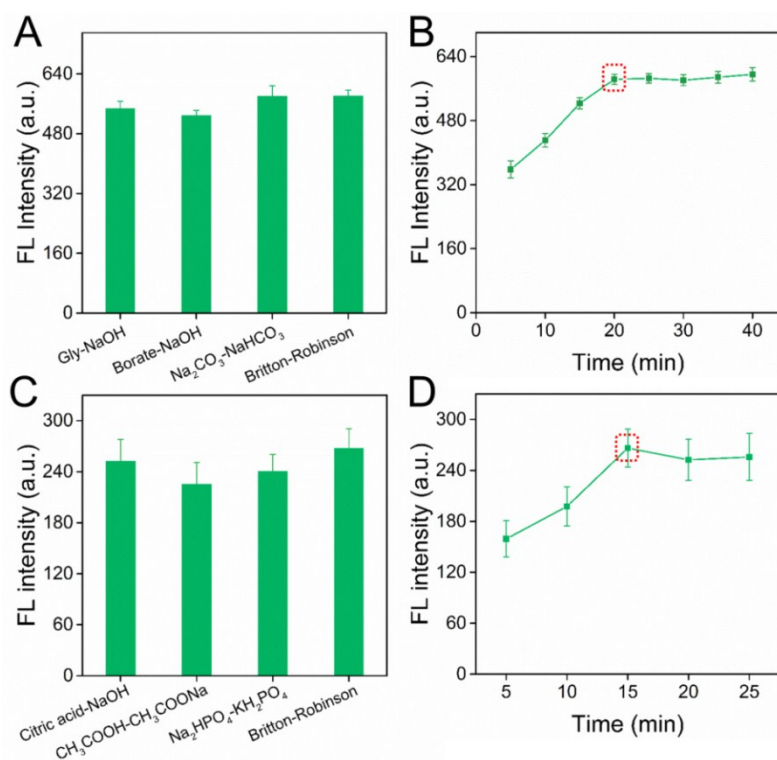
**Figure S4.** High resolution XPS analysis of S 2p peaks related to R6G- $\beta$ -CD@AuNPs before (red line) and after (purple line) the addition of CA.



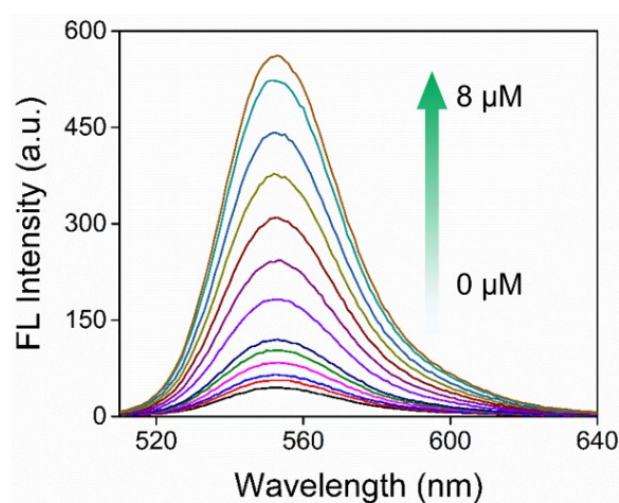
**Figure S5.** Absorption spectra of R6G- $\beta$ -CD@AuNPs before (red line) and after (purple line) the addition of CA. Inset: the corresponding photographs under ambient light.



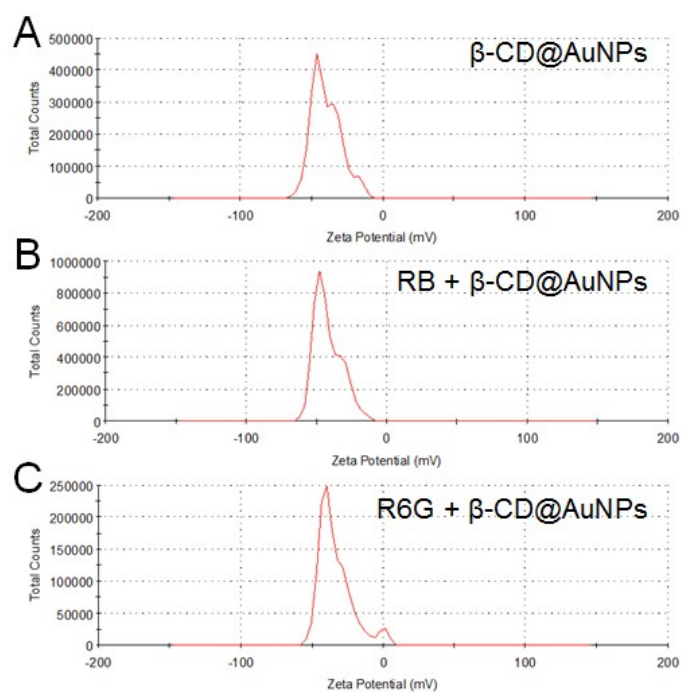
**Figure. S6.** Zeta potential value of R6G- $\beta$ -CD@AuNPs after the addition of CA.



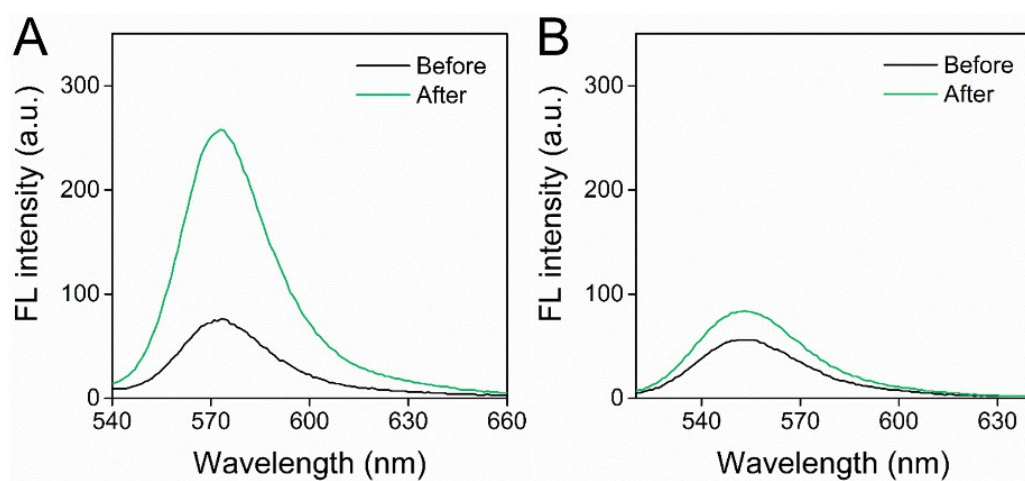
**Figure S7.** Effects of buffer solution (A, C) and reaction time (B, D) on the surface ligand exchange process of R6G-β-CD@AuNPs towards CA and Cys, respectively. Error bars represent the standard deviations ( $n = 3$ ).



**Figure S8.** Fluorescence spectra of R6G-β-CD@AuNPs nano-assemble in the presence of different concentrations of CA.



**Figure S9.** Zeta potential values of  $\beta$ -CD@AuNPs (A), RB- $\beta$ -CD@AuNPs (B) and R6G- $\beta$ -CD@AuNPs (C).



**Figure S10.** Fluorescence intensities of RB- $\beta$ -CD@AuNPs (A) and R6G- $\beta$ -CD@AuNPs (B) before and after the addition of cholesterol.