Supporting Information *for*

Cation-Driven Luminescent Self-Assembled Dots of Copper Nanoclusters with Aggregation-Induced Emission for β-Galactosidase Activity Monitoring

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phosphatase (ACP) and β-galactosidase (β-Gal) separately. The levels of IgG, ACP, AChE, LYS, TYR and β-Gal are 320.0 U/L, and the concentrations of BSA, GOx are 1.0 g/L.

13. **Table S1.** Data for standard addition experiment based on β-Gal assay using 100-fold dilution of calf serum as the matrix.

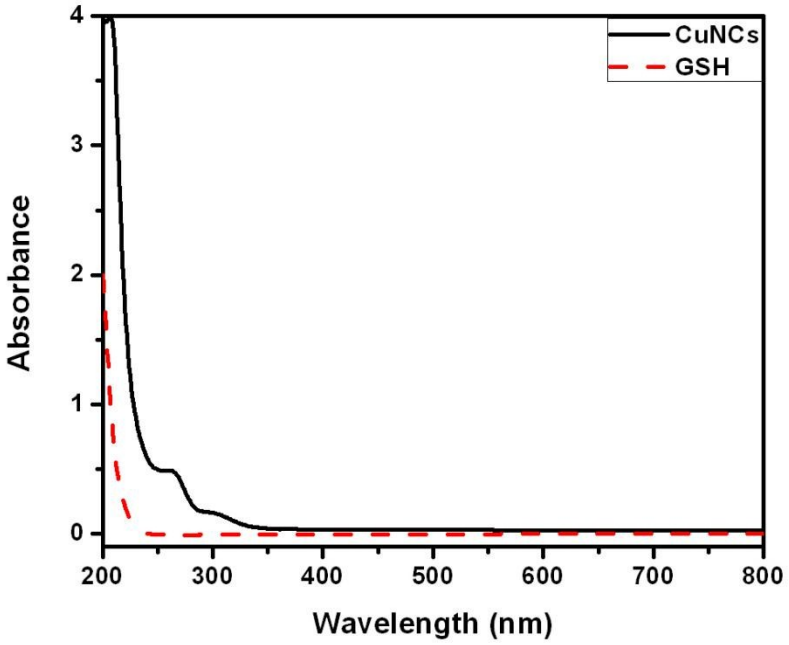

Figure S1. UV-visible absorption spectra of CuNCs and GSH.

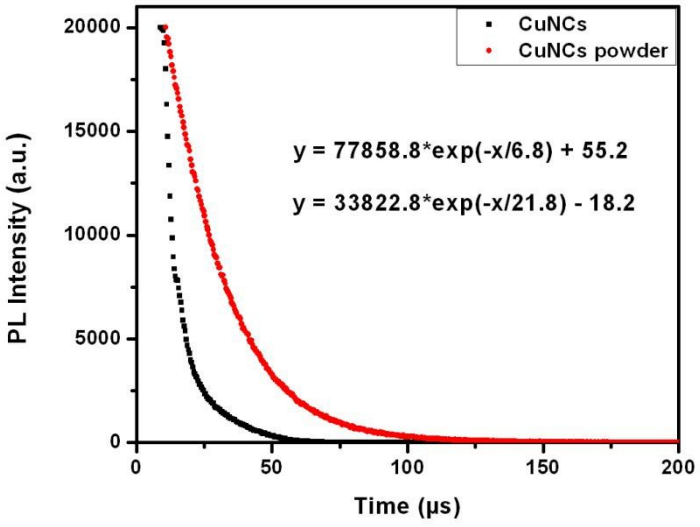

Figure S2. The time-resolved luminescence decay curves of CuNCs dispersion at pH 7.0 and CuNCs powder. The lifetimes of CuNCs dispersion and powder are calculated to be 6.8 and 21.8 μs, respectively.

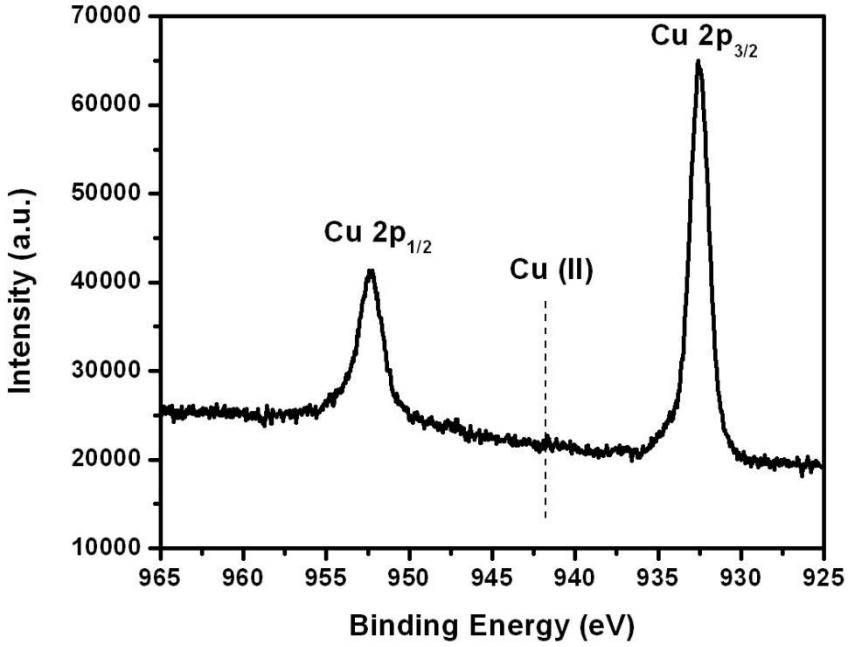

Figure S3. X-ray photoelectron spectrum of Cu 2p electrons in CuNCs. The dashed line shows the binding energy of Cu 2p electrons for Cu(II).

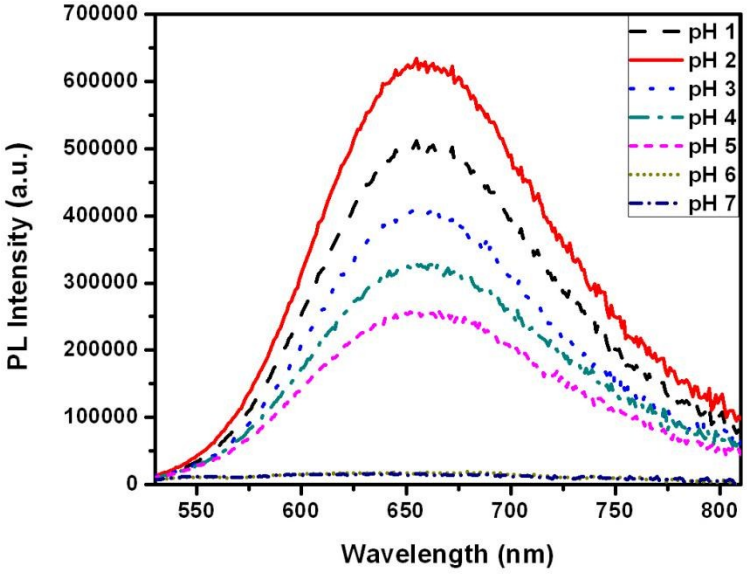

Figure S4. Luminescence spectra of CuNCs at variable pHs.

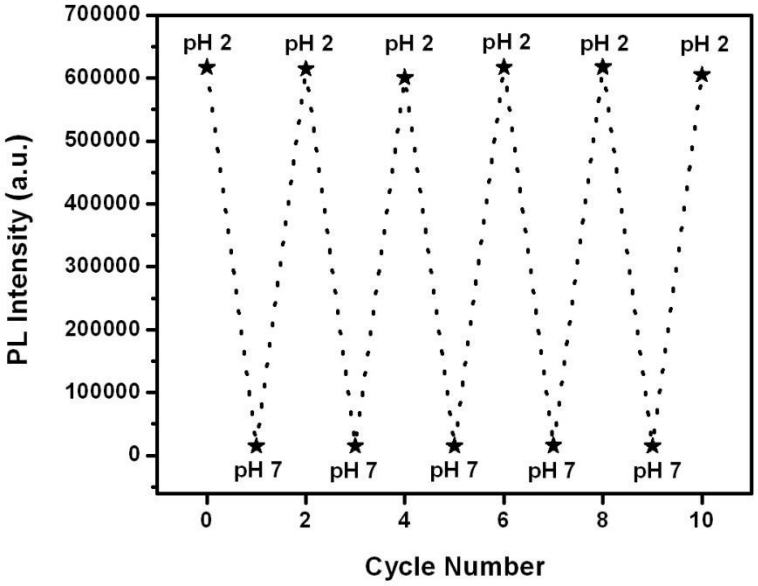

Figure S5. Reversibility of luminescence switch based on CuNCs by alternating pHs between 2.0 and 7.0.

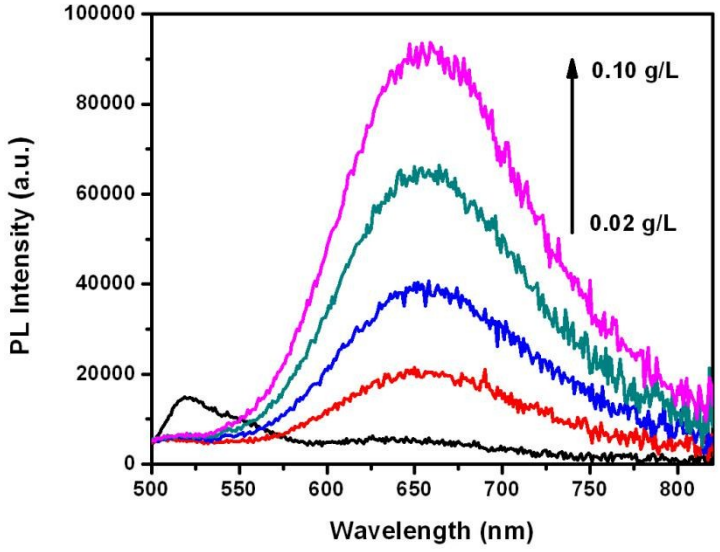

Figure S6. The impact of concentration of CuNCs on its luminescence at pH 3.0.

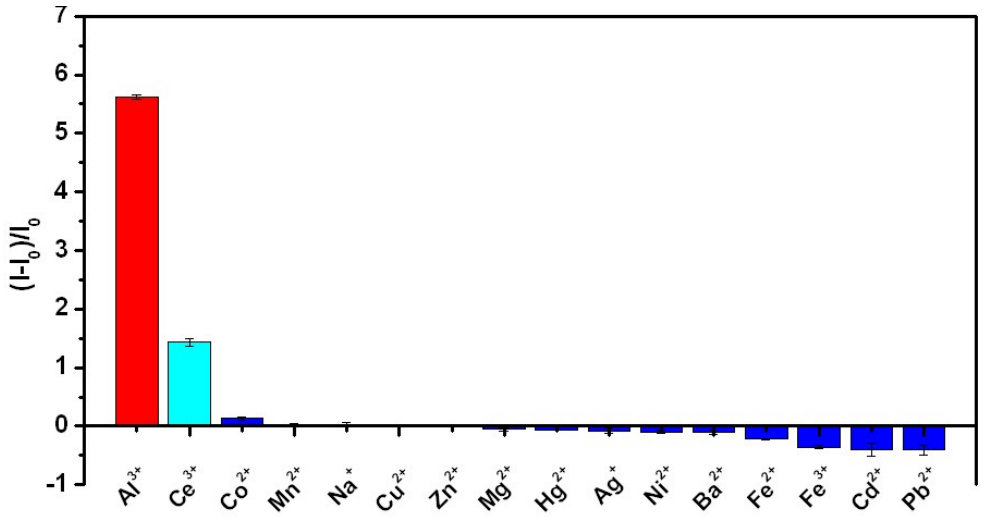

Figure S7. The influence of metal cations on the luminescence of CuNCs.

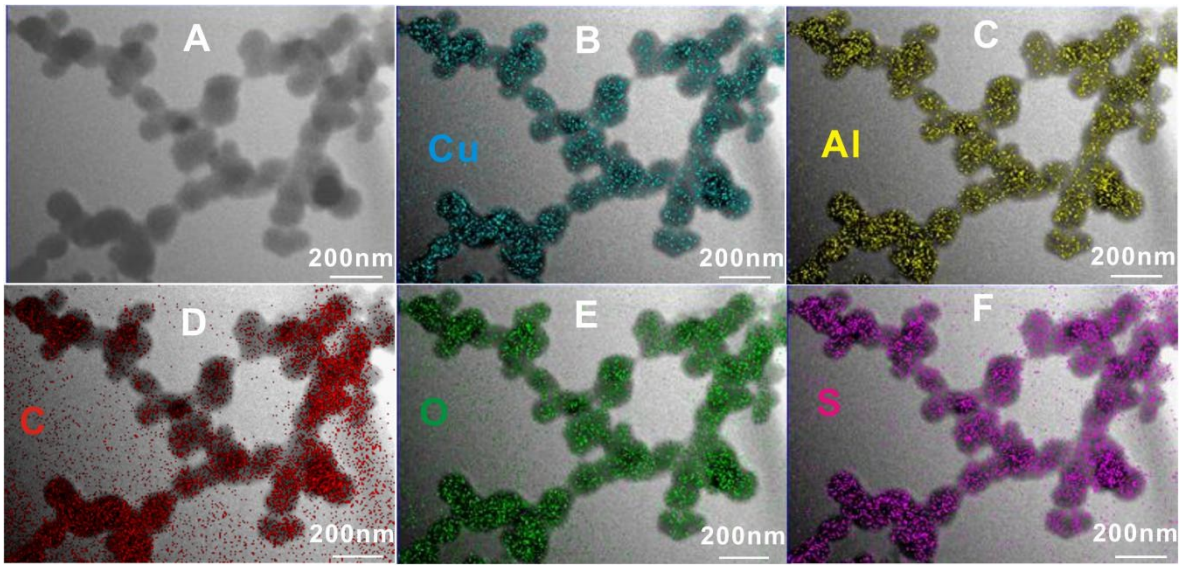

Figure S8. Element mapping of Al, Cu, C, O and S for CuNC dots assembled by aluminum cations.

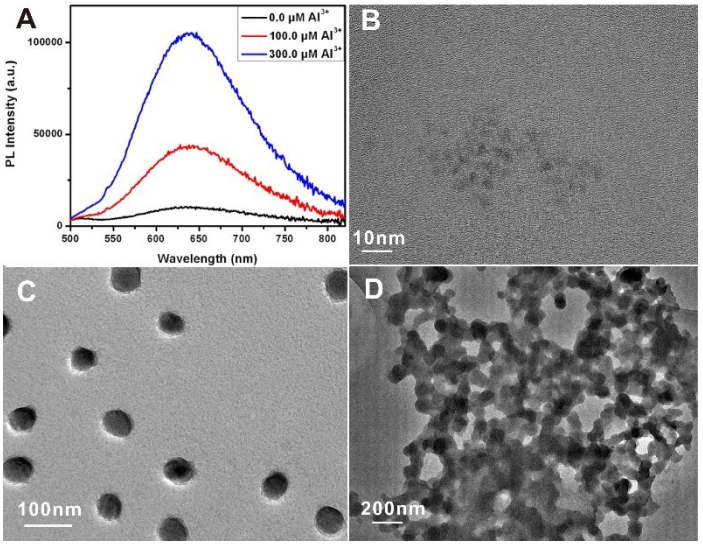

Figure S9. (A) Luminescent spectra of CuNCs with different amounts of aluminum cations (0.0, 100.0, 300.0 μM). (B) TEM image of CuNCs in the absence of aluminum cation. (C) TEM image of CuNC dots assembled by 100.0 μM aluminum cation. (D) TEM image of CuNC dots assembled by 300.0 μM aluminum cation.

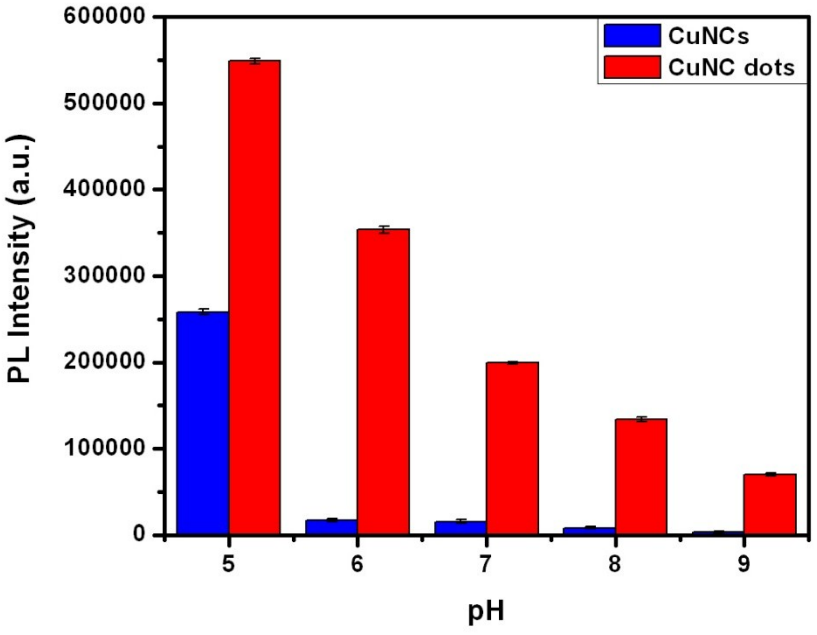

Figure S10. The influence of pH values on luminescence of CuNCs and CuNC dots at variable pHs from 5.0 to 9.0.

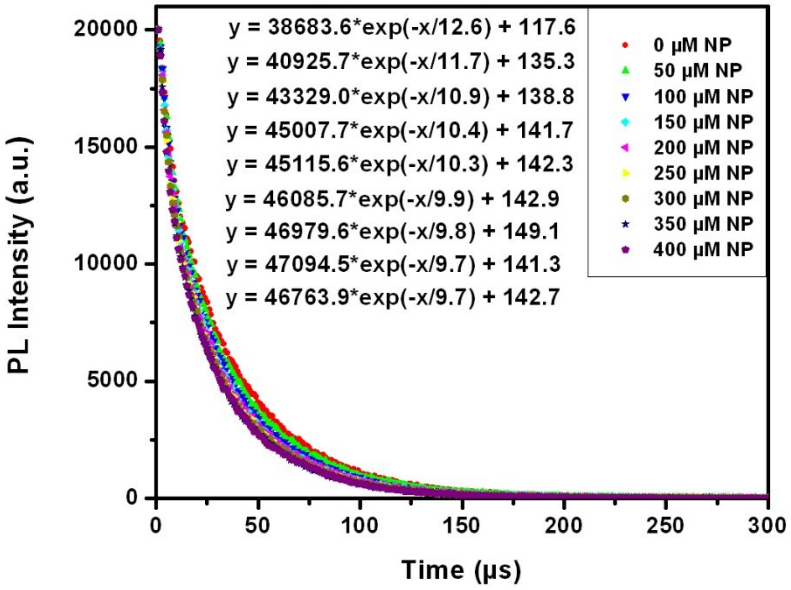

Figure S11. Normalized time-resolved decay curves of CuNC dots in the presence of different amounts of *p*-nitrophenol in the range of 0.0 – 400.0 μM.

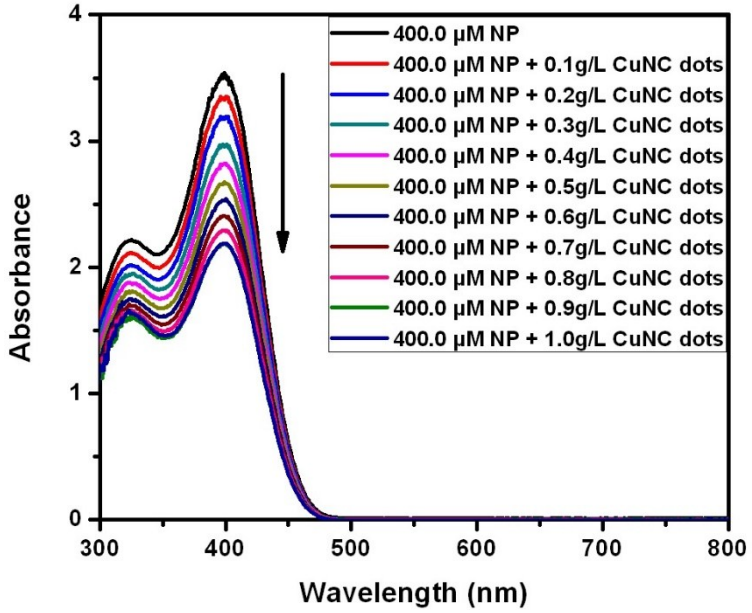

Figure S12. Change of UV-visible spectra of *p*-nitrophenol (400.0 μM) versus the added amount of CuNC dots in the range of 0.0 - 1.0 g/L.

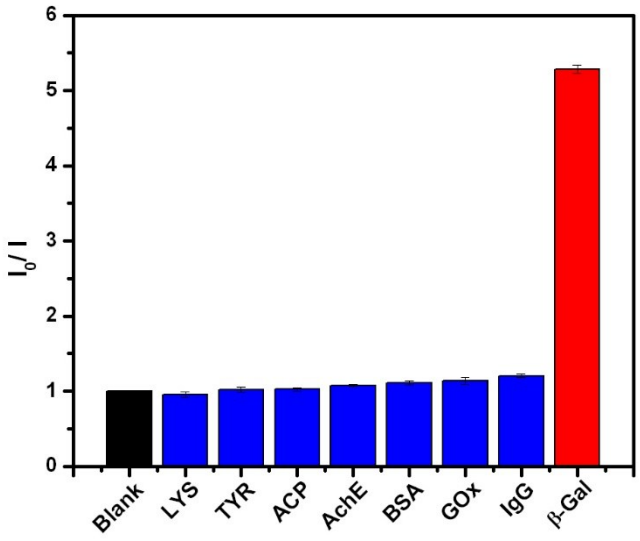

Figure S13. Specificity test of assay toward β-Gal. I0 and I represent the luminescence intensity in the absence and presence of different composition including immunoglobulin G (IgG), acetylcholinesterase (AChE), lysozyme (LYS), bovineserumalbumin (BSA), glucoseoxidase (GOx), tyrosinase (TYR), acid phosphatase (ACP) and β-galactosidase (β-Gal) separately. The levels of IgG, ACP, AChE, LYS, TYR and β-Gal are 320.0 U/L, and the concentrations of BSA, GOx are 1.0 g/L.

Table S1. Data for standard addition experiment based on β-Gal assay using 100-fold dilution of calf serum as the matrix.

Sample Number	Added β-Gal (U/L)	Measured β-Gal (U/L)	Recovery Ratio (%)	RSD (n = 3, %)
1	2.5	2.4	97.6	1.2
2	20.0	19.9	99.7	0.1
3	40.0	39.9	99.8	0.2
4	60.0	59.6	99.4	0.2
5	75.0	74.9	99.9	0.1
6	90.0	89.6	99.5	0.2