Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.


# Supporting Information *for*

## A Reversible Fluorescence Nanoswitch Based on Dynamic Covalent B-O Bonds Using Functional Carbon Quantum Dots and Its Application for α-Glucosidase Activity Monitoring

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**10. Figure S10**. Fluorescence intensity of PBA-CQD versus incubation time with a certain amount of *p*-nitrophenol (50.0 μM).

**11. Figure S11**. Fluorescence intensity of (a) PBA-CQD and (b) PBA-CQD with a certain amount of *p*-nitrophenol (200.0 μM) at different pH values in the range of 3.0 to 12.0.

**12. Figure S12.** Changes of fluorescence spectra of PBA-CQD nanoprobe in the presence of different components: (a) mere nanoprobe; (b) PBA-CQD and *p*-nitrophenol (173.5 μM); (c) PBA-CQD and glucose (6.0 mM); (d) PBA-CQD, glucose (6.0 mM) and *p*-nitrophenol (173.5 μM).

**13. Figure S13**. The fluorescence quenching efficiency versus incubation time at different amounts of NPGlu (200.0, 300.0, 400.0 μM) in the sensing system containing PBA-CQD and α-Glucosidase (120.0 U/L).

**14. Figure S14**. Selectivity test of the assay toward α-glucosidase. $I_0$ and I represent the fluorescence intensity in the absence and presence of different composition including tyrosinase (TYR), acetylcholinesterase (AChE), acid phosphatase (ACP), alkaline phosphatase (ALP), glucose oxidase (GOx), lysozyme (LYS), bovine serum albumin (BSA) and immune globulin G (IgG) and α-glucosidase (α-Glu) separately.

**15.Table S1.** Data for standard addition experiments of α-glucosidase assay using 100-fold dilution of calf serum as the matrix.

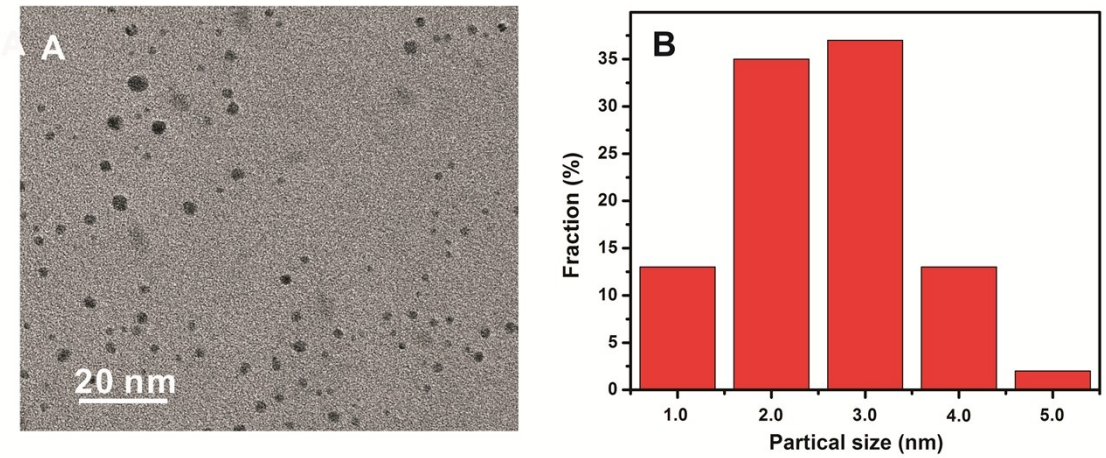



**Figure S1**. TEM image (A) and size distribution (B) of mere carbon quantum dots.

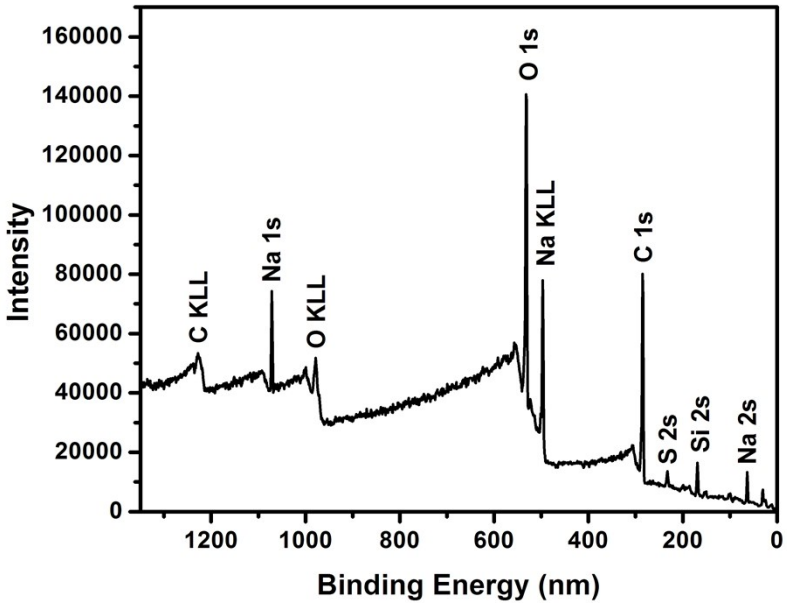



**Figure S2**. XPS wide spectrum of mere CQDs.

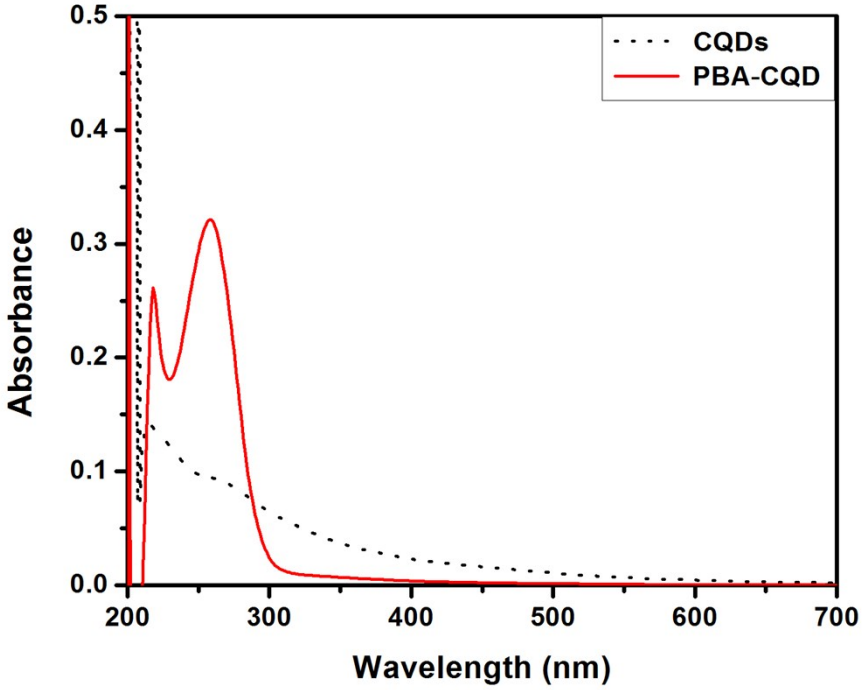



**Figure S3**. UV-Vis spectra of mere CQDs and PBA-CQD nanoprobe.

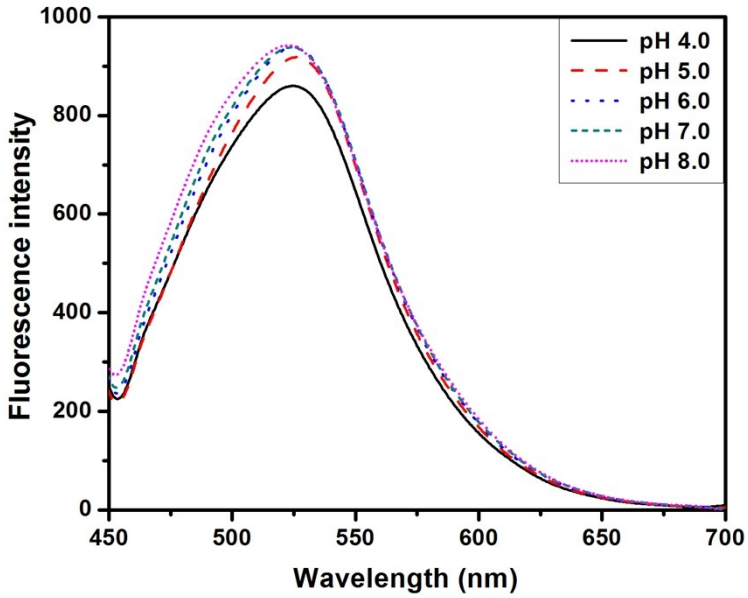



**Figure S4**. Fluorescence spectra of PBA-CQDs at different pHs varying from 4.0 to 8.0.

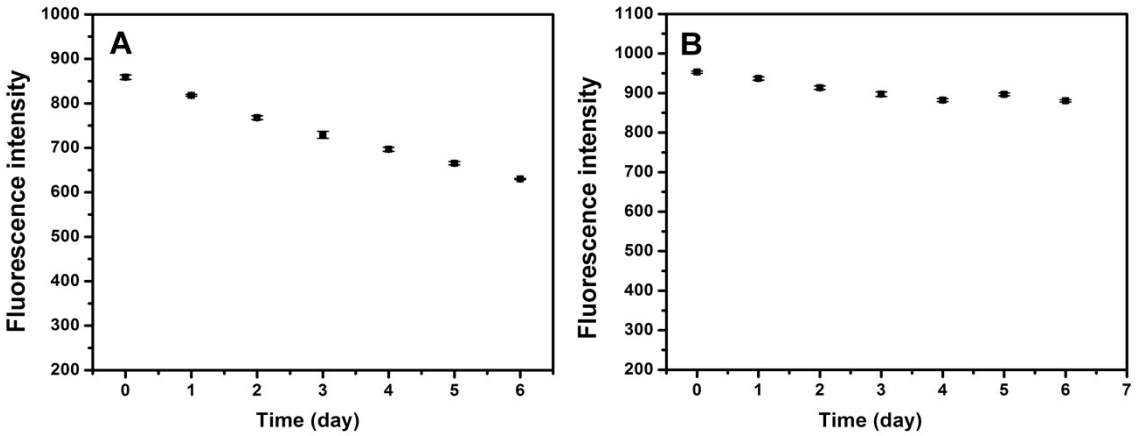



**Figure S5**. Stability tests of PBA-CQD nanoprobe under UV light (365 nm) (A) and white light (B).

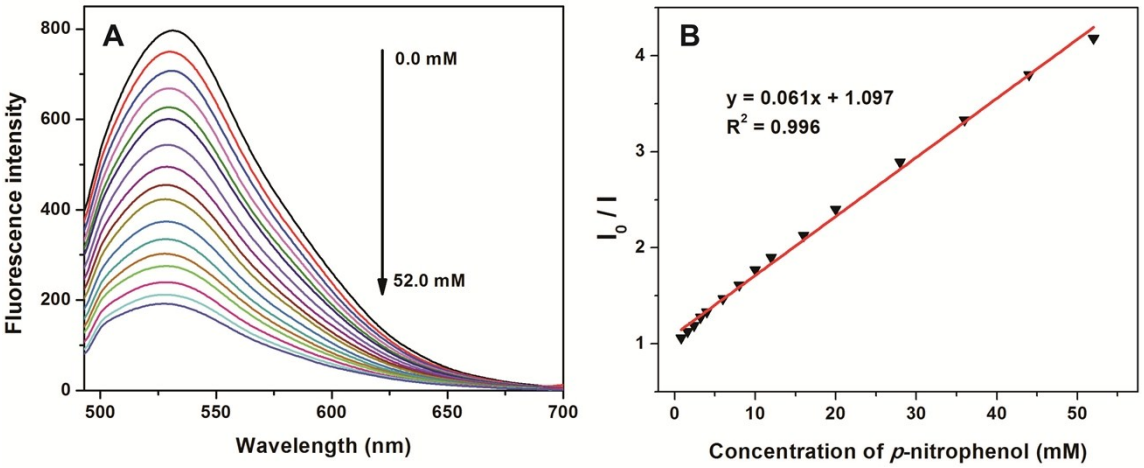



**Figure S6.** (A) The fluorescence spectra of CQDs as a function of *p*-nitrophenol concentration in the range of 0.0 – 52.0 mM. (B) Linear fitting curve between quenching efficiency $I_0/I$ and the concentration of *p*-nitrophenol according to Stern-Volmer equation.

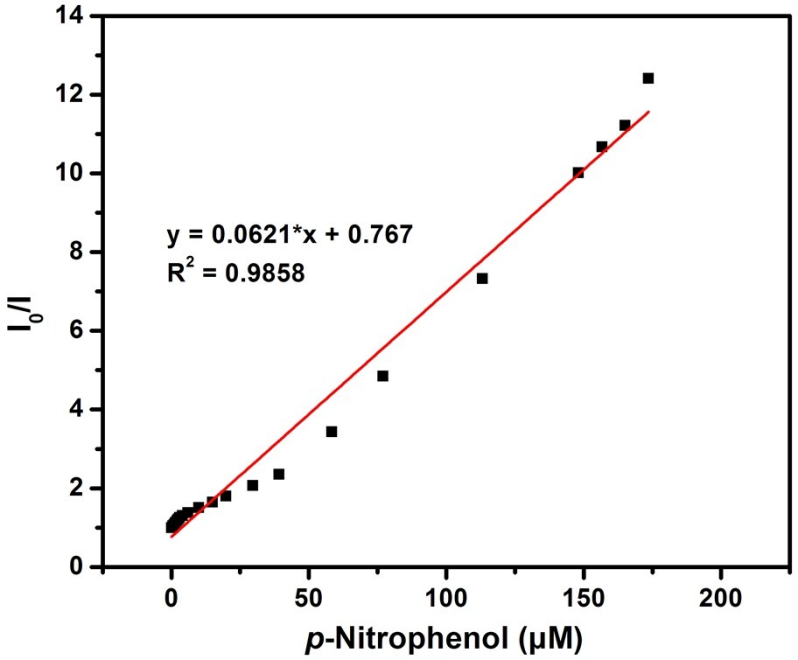



**Figure S7.** Linear fitting curve between quenching efficiency $I_0/I$ of PBA-CQD and the concentration of *p*-nitrophenol in the range from 0.0 to 173.5 μM.

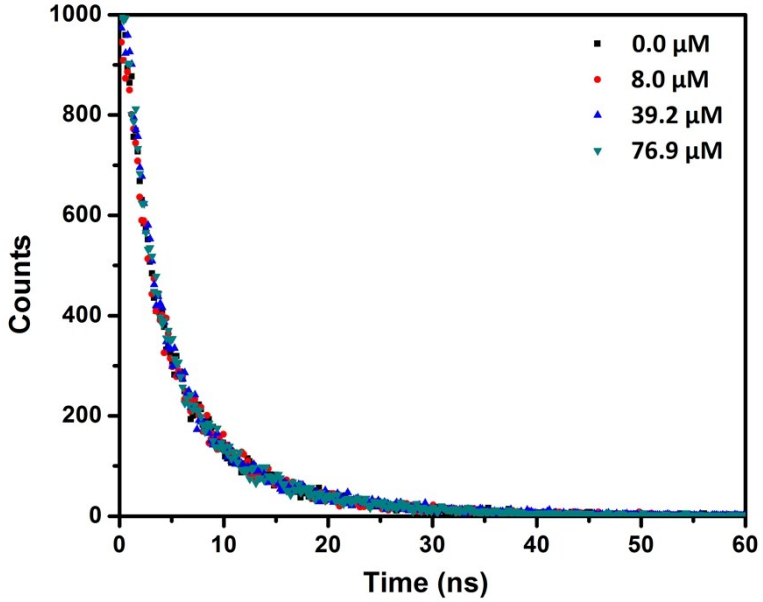



**Figure S8**. Normalized time-resolved decay curves of PBA-CQD nanoprobe in the presence of different amounts of *p*-nitrophenol in the range of 0.0–76.9 μM.

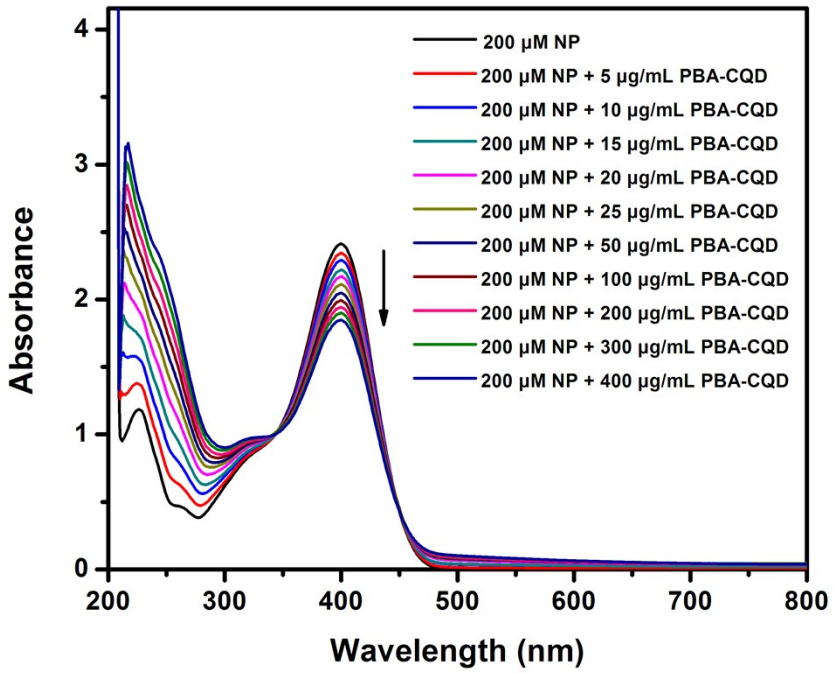
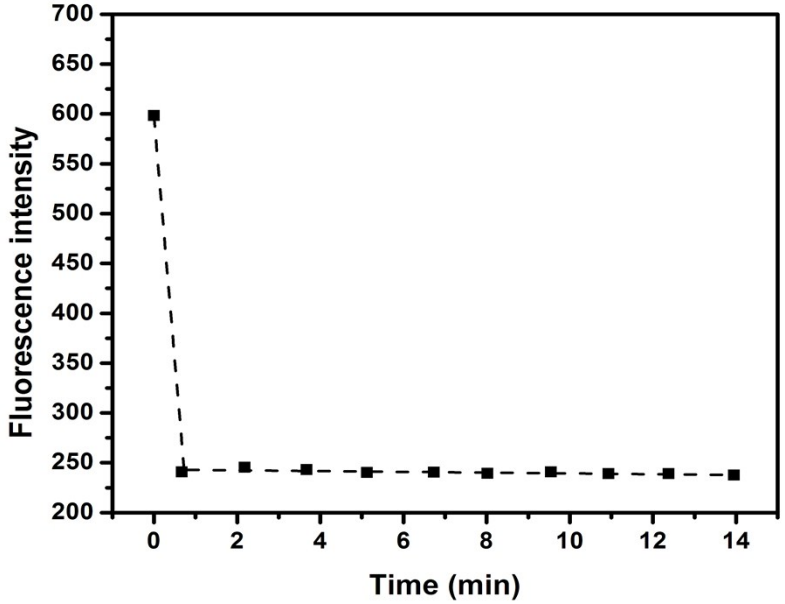



**Figure S9**. Change of UV-visible spectra of *p*-nitrophenol (200 μM) as the concentration of PBA-CQD nanoprobe increases in the range of 0 – 400 μg/mL.

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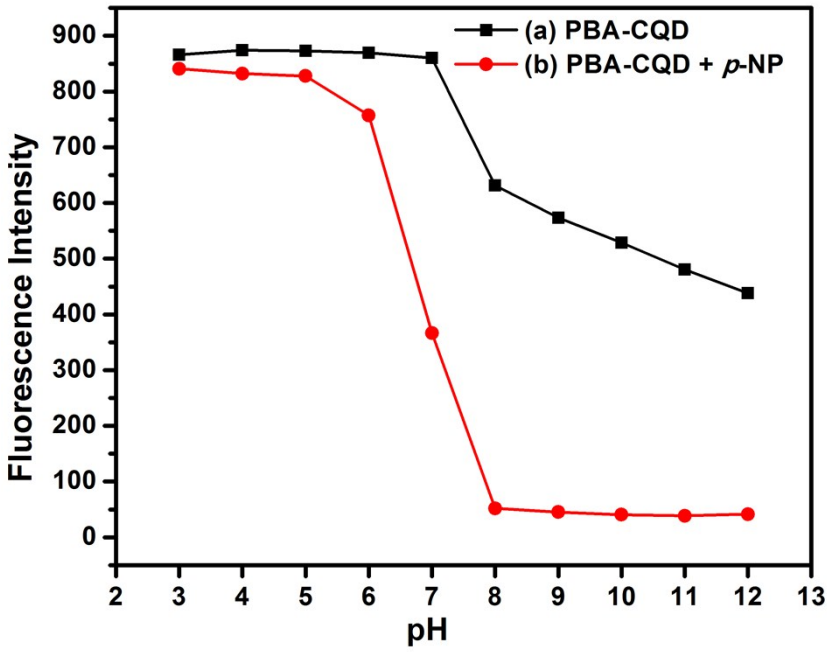


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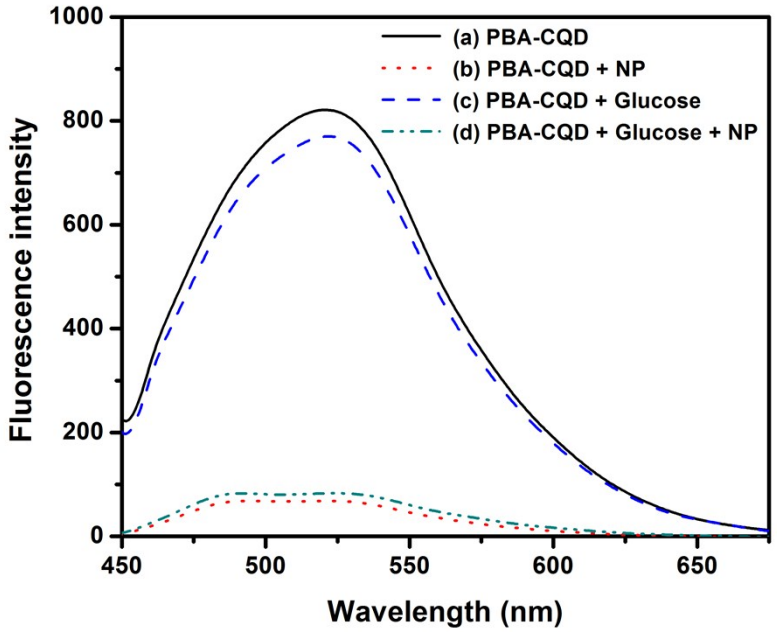


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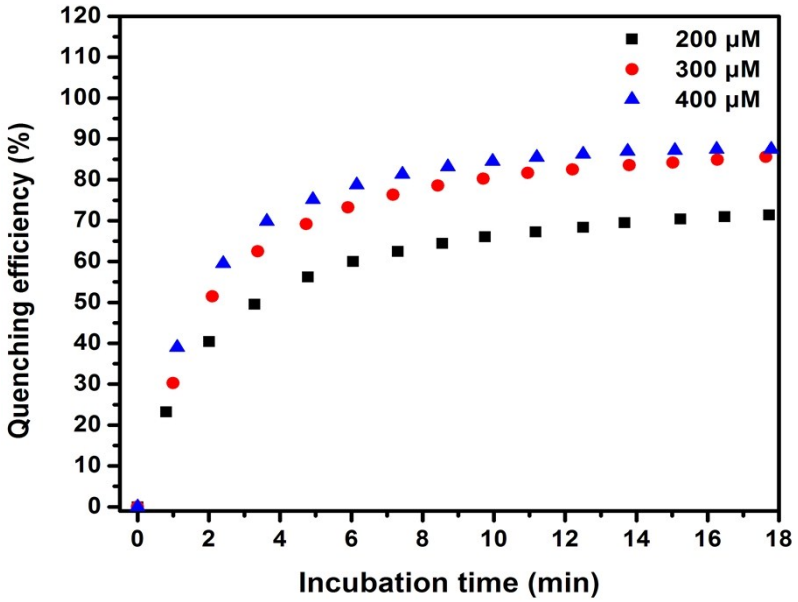


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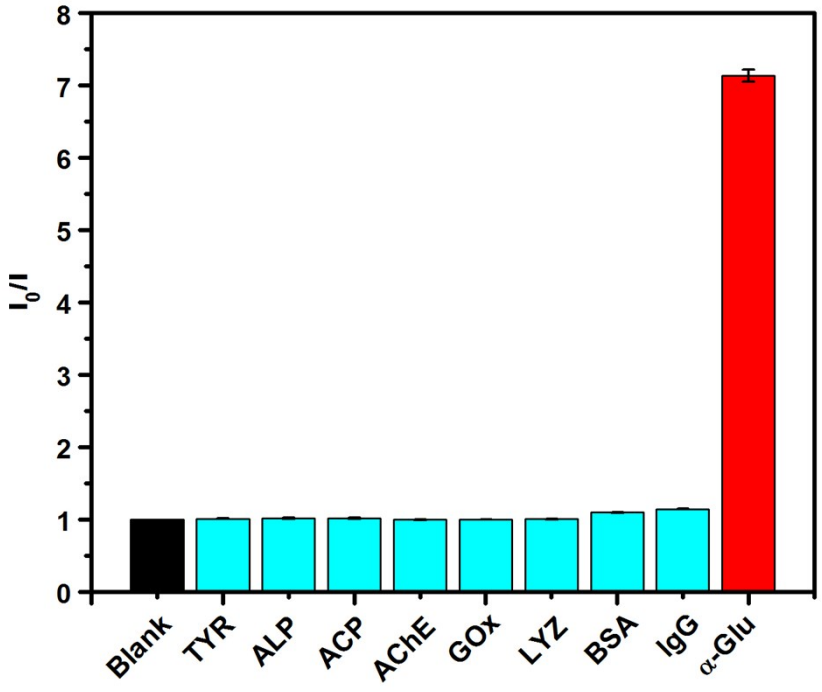


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Table S1. Data for standard addition experiments of α-glucosidase assay using 100-fold dilution of calf serum as the matrix.

| Sample Number | Added α-glucosidase (U/L) | Measured α-glucosidase (U/L) | Recovery Ratio (%) | RSD (n = 3, %) |
|---|---|---|---|---|
| 1 | 7.0 | 6.79 | 97.0 | 0.52 |
| 2 | 10.0 | 9.88 | 98.8 | 0.17 |
| 3 | 13.0 | 12.58 | 96.8 | 0.74 |
| 4 | 16.0 | 16.51 | 103.2 | 0.11 |