Supporting Information

Phenylsulfonic acid functionalized carbon quantum dots based biosensor for acetylcholinesterase activity monitoring and inhibitor screening

Fengqi Zhou,† Hui Feng,† Yafen Fang, Qian Sun, and Zhaosheng Qian*

College of Chemistry and Life Science, Zhejiang Normal University, Jinhua 321004, China

1. **Figure S1.** (A) TEM image of CQDs. (B) TEM image of PSA-CQDs nanoprobe. Insets: high-resolution TEM images.
2. **Figure S2.** Comparison of XPS wide spectra between mere CQDs (A) and PSA-CQDs nanoprobe (B), and high-resolution S2p XPS spectrum for PSA-CQDs nanoprobe (C).
3. **Figure S3.** IR spectra of PSA-CQDs nanoprobe and CQDs.
4. **Figure S4.** Fluorescence spectra of PSA-CQDs nanoprobe with the change of excitation wavelengths in the range of 395 – 465 nm.
5. **Figure S5.** Time-resolved decay curves of PSA-CQDs nanoprobe in the presence of different amount of Cu$^{2+}$. The lifetimes are calculated to be 4.4 ns.
6. **Figure S6.** The influence of metal cations on the fluorescence of PSA-CQDs nanoprobe. The concentration for each metal ion is 40.0 µM.
7. **Figure S7.** The influence of amino acids and amines on the fluorescence of PSA-CQDs/Cu(II) solution.
8. **Figure S8.** The influence of ATCh on the fluorescence of PSA-CQDs nanoprobe.
9. **Figure S9.** Fluorescence intensity of the sensing system containing PSA-CQDs nanoprobe, Cu$^{2+}$ (12.0 µM), ATCh (1480.0 µM) and AChE (600.0 U/L) as a function of incubation time.
10. **Figure S10.** The reversibility of PSA-CQDs nanoprobe in response to Cu$^{2+}$ and GSH. The concentration for each species is 20.0 µM.
11. **Figure S11.** Selectivity of the assay toward AChE with comparison to ACP, ALP, BSA, and IgG in buffer solution. I$_0$ and I represent the fluorescence intensity before and after the addition of analytes. Activity used for each enzyme is 600.0 U/L.
Figure S1. (A) TEM image of CQDs. (B) TEM image of PSA-CQDs nanoprobe. Insets: high-resolution TEM images.

Figure S2. Comparison of XPS wide spectra between mere CQDs (A) and PSA-CQDs nanoprobe (B), and high-resolution S2p XPS spectrum for PSA-CQDs nanoprobe (C).
Figure S3. IR spectra of PSA-CQDs nanoprobe and CQDs.

Figure S4. Fluorescence spectra of PSA-CQDs nanoprobe with the change of excitation wavelengths in the range of 395 – 465 nm.
Figure S5. Time-resolved decay curves of PSA-CQDs nanoprobe in the presence of different amount of Cu$^{2+}$. The lifetimes are calculated to be 4.4 ns.

Figure S6. The influence of metal cations on the fluorescence of PSA-CQDs nanoprobe. The concentration for each metal ion is 40.0 µM.
Figure S7. The influence of amino acids and amines on the fluorescence of PSA-CQDs/Cu(II) solution.

Figure S8. The influence of ATCh amount on the fluorescence of PSA-CQDs nanoprobe.
Figure S9. Fluorescence intensity of the sensing system containing PSA-CQDs nanoprobe, Cu\(^{2+}\) (12.0 µM), ATCh (1480.0 µM) and AChE (600.0 U/L) as a function of incubation time.

Figure S10. The reversibility of PSA-CQDs nanoprobe in response to Cu\(^{2+}\) and GSH. The concentration for each species is 20.0 µM.
Figure S11. Selectivity of the assay toward AChE with comparison to ACP, ALP, BSA, and IgG in buffer solution. $I_0$ and $I$ represent the fluorescence intensity before and after the addition of analytes. Activity used for each enzyme is 600.0 U/L.