Electronic Supplementary Information

A novel fluorescent turn-on biosensor based on QDs@GSH-GO fluorescence resonance energy transfer for sensitive glutathione s-transferases sensing and cellular imaging

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Fig. S1 The statistics of Mn-doped ZnS QDs diameters (A) and the zeta potential (B).
**Fig. S2** The decay curves of QDs (black line) and QDs-GO (red line) at 607 nm emission.
Fig. S3 Effect of the interaction time between QDs@GSH and GO on the fluorescence intensity. The concentrations of the QDs@GSH and GO were 50 mg L$^{-1}$ and 0.24 mg mL$^{-1}$, respectively.
Fig. S4 Plot of fluorescence emissions (607 nm) against interaction time of the QDs-GO system in the presence of 100 nM GST (A) and 1 nM ATP6V1F (B) in 10 mM PBS (pH = 7.4).
Fig. S5 Linear relationships between the fluorescence intensity and the concentrations of GST in the range of 0.0-10.0 nM (R = 0.996) (A) and ATP6V1F in the range of 0.5-3.0 nM (R = 0.990) (B). The error bars represented the standard deviations of three independent experiments. (C) Fluorescence emission at 607 nm for the QDs@GSH-GO system at different concentrations of GST (0, 0.5, 1.0, 2.0, 4.0, 8.0, 10 nM) added. A linear range of GST could be obtained in the 0.0-10.0 nM (y = 1066.5 + 30.6x, R = 0.996). (D) Fluorescence emission at 607 nm for the QDs@GSH-GO system at different concentrations of ATP6V1F (0.5, 1.0, 1.5, 2.0, 3.0 nM) added. A linear range of ATP6V1F could be obtained in the 0.5-3.0 nM (y = 1442.2 + 88.5x, R = 0.990). The detection limits of the QDs-GO system for both GST and ATP6V1F were then measured to be 2.1×10^{-10} M and 0.72 ×10^{-10} M, respectively. The values were calculated with the equation: detection limit = 3σ/m, where σ is the standard deviation of blank measurement (σ = 2.12, derived from nine measurements (1112, 1116, 1115, 1114, 1118, 1115, 1116, 1114, 1111)), m is the slope between intensity versus sample concentration.
Fig. S6 Fluorescence spectra of urine sample (black), QDs@GSH-GO adding into urine sample (red), QDs@GSH-GO adding into urine sample spiked 0.5 nM ATP6V1F (blue) and 1.0 nM ATP6V1F (pink). All urine samples conducted in this experiment were diluted by 100-fold with 10 mM PBS buffer (pH = 7.4).
<table>
<thead>
<tr>
<th></th>
<th>$\chi^2$</th>
<th>$\tau_1$ (ns)</th>
<th>Rel%</th>
<th>$\tau_2$ (ns)</th>
<th>Rel%</th>
<th>$\tau$ (ns)</th>
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<tbody>
<tr>
<td>QDs</td>
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<td>2.1872</td>
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<td>47.98</td>
<td>2.1863</td>
<td>52.02</td>
<td>1.38</td>
</tr>
</tbody>
</table>

$\chi^2$ is defined as a coefficient; $\tau_1$ and $\tau_2$ stand for the two different lifetimes of the QDs, respectively; Rel% is the relative amount of the two lifetimes; $\tau$ is the average lifetime.