Electronic Supplementary Information

MnO_2-induced synthesis of fluorescent polydopamine nanparticles for reduced glutathione sensing in human whole blood

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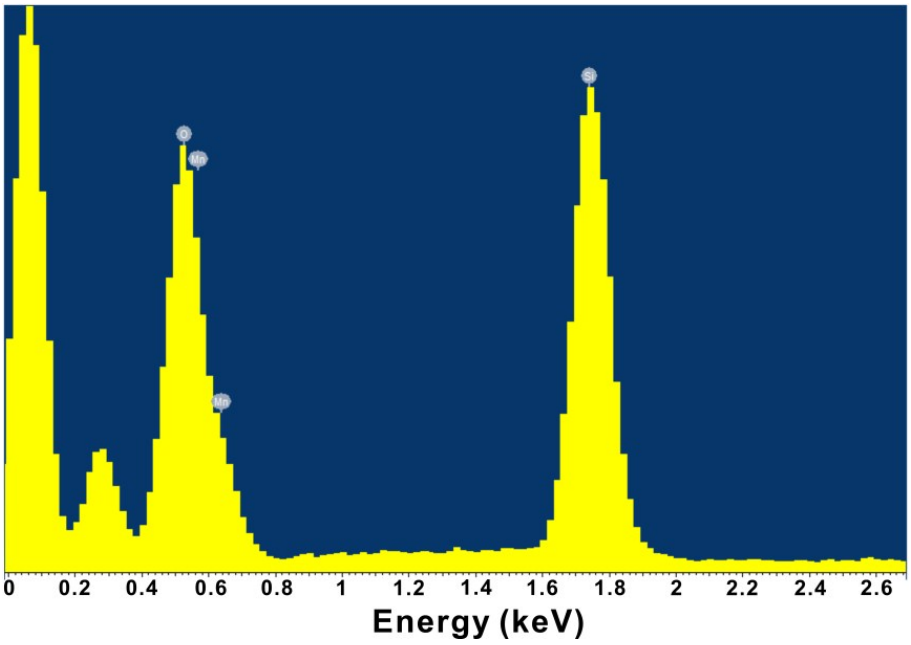

Fig. S1 Energy dispersive X-ray spectroscope (EDS) spectra of the synthesized MnO_2.

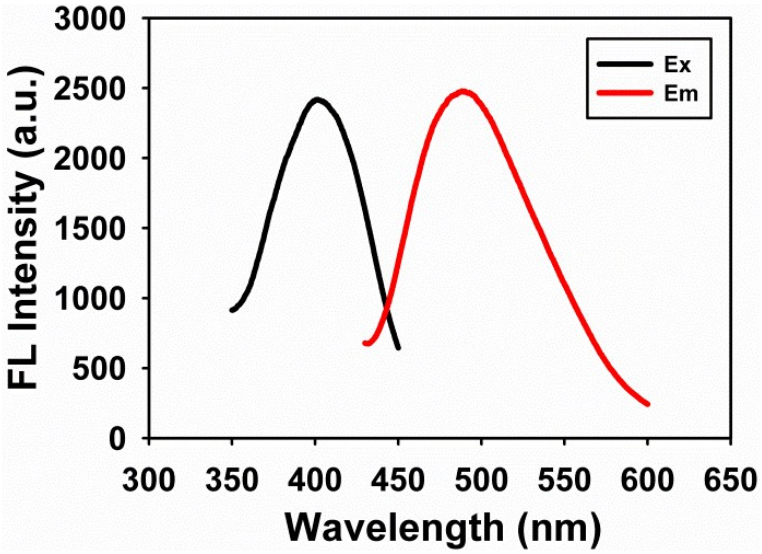

Fig. S2 Fluorescence excitation (black line, λex=400 nm) and emission (red line, λem=485 nm) spectrum of the fluorescent PDA nanoparticles.

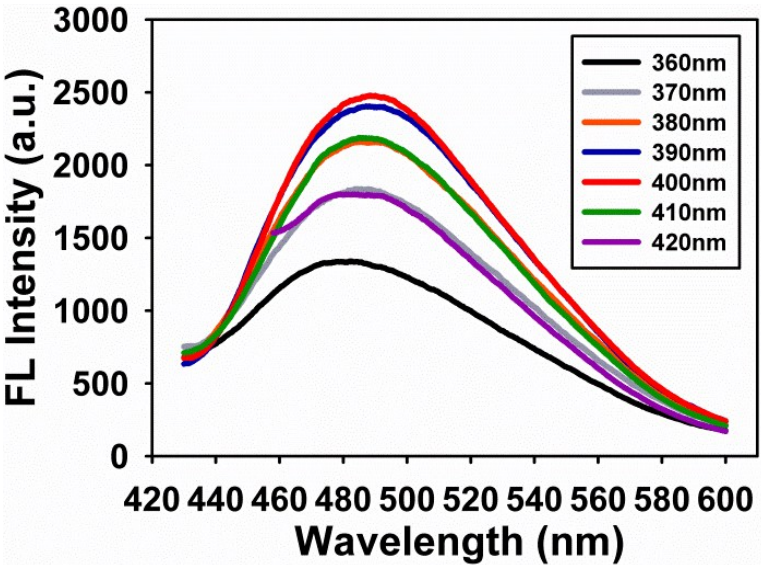

Fig. S3 Fluorescence emission spectra of PDA nanoparticles at different excitation wavelength.

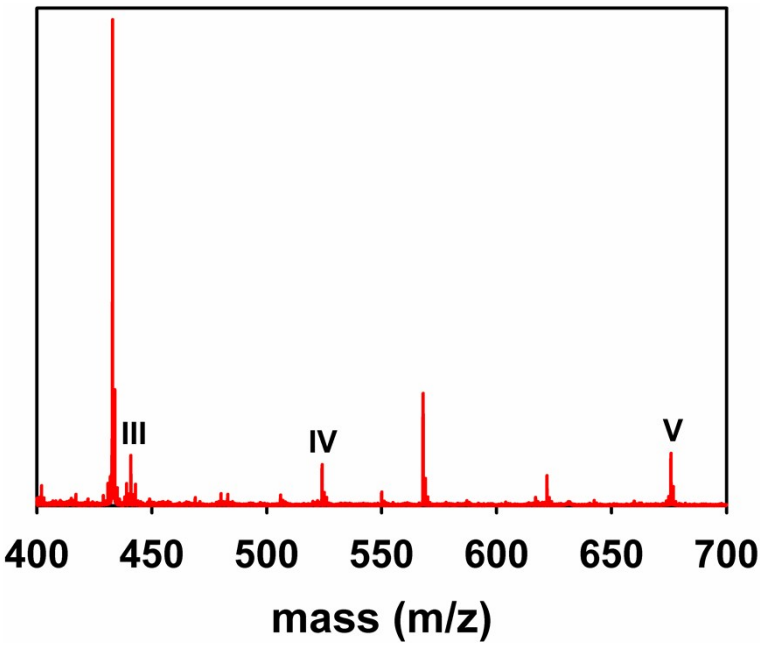

Fig. S4 MALDI-TOF mass spectrometry of the synthesized fluorescent PDA nanoparticles. The sample was obtained in the mixture solution of 1.25 mM dopamine and 60 μg/mL MnO_2 at room temperature 30 min and filtered with a 0.22 μm syringe filter.

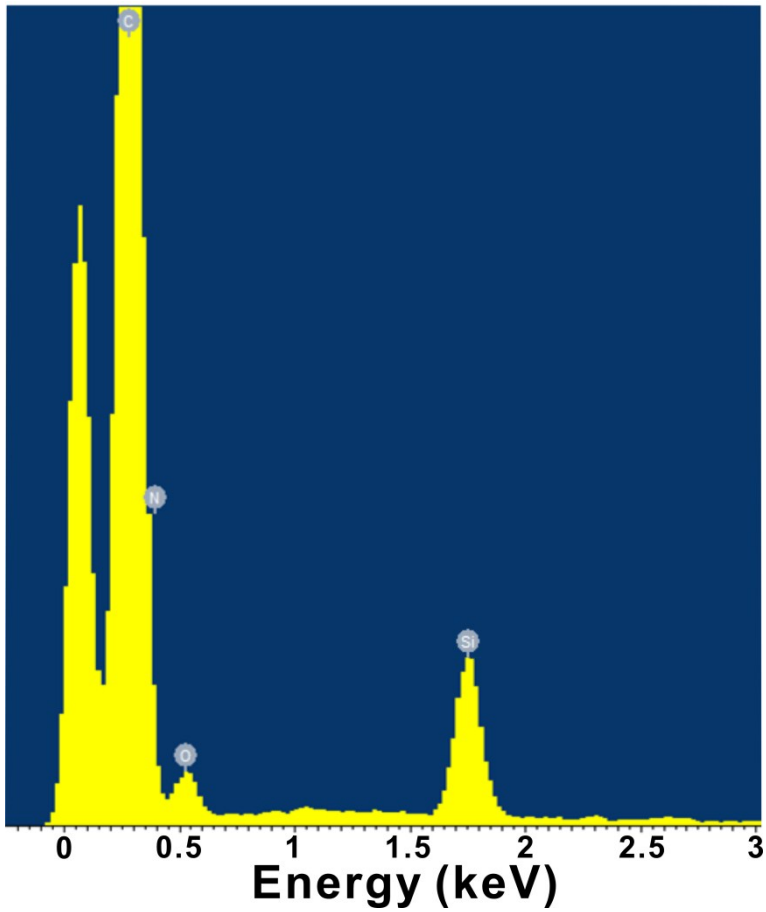

Fig. S5 EDS spectra of the synthesized PDA nanoparticles.

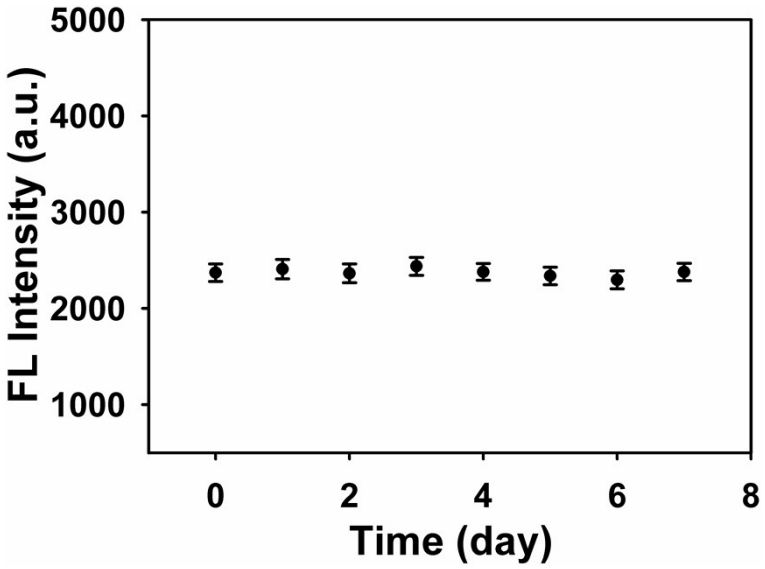

Fig. S6 Fluorescence stability of the synthesized PDA nanoparticles in water. Error bars are standard deviation of three repetitive experiments.

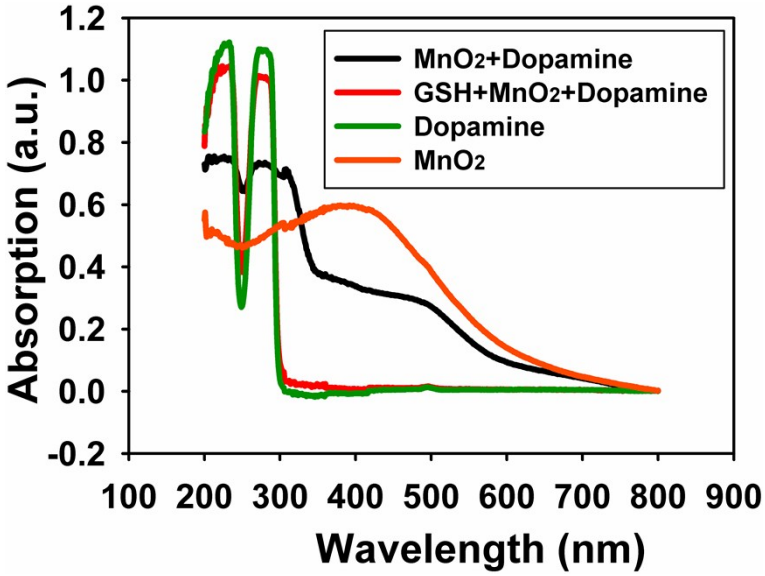

Fig. S7 UV-Vis absorption spectrum responses of the sensing system in the presense of dopamine (green line), MnO_2 (orange line), MnO_2+dopamine (black line) and GSH+MnO_2+dopamine (red line) in water. Conditions: MnO_2, 60 μg/mL; dopamine, 1.25 mM; GSH, 500 μM; reaction time: 30 min.

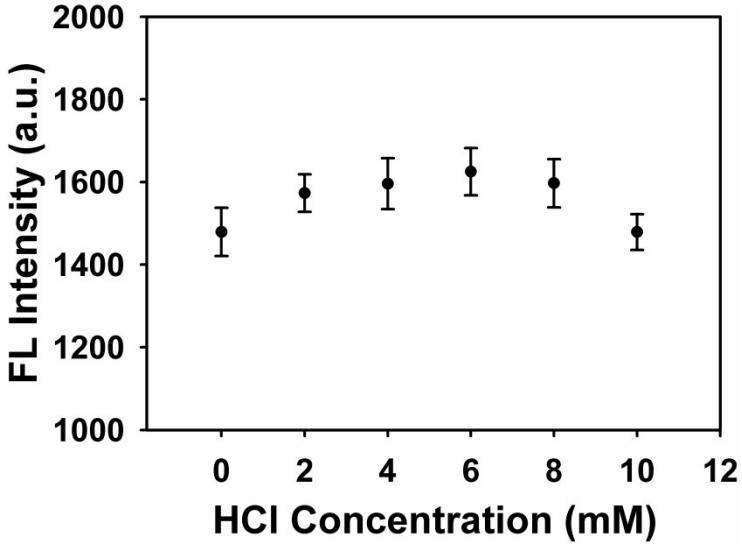

Fig. S8 Fluorescence intensity responses of the PDA nanoparticles at 485 nm with various concentrations HCl addition. Error bars are standard deviation of three repetitive experiments.

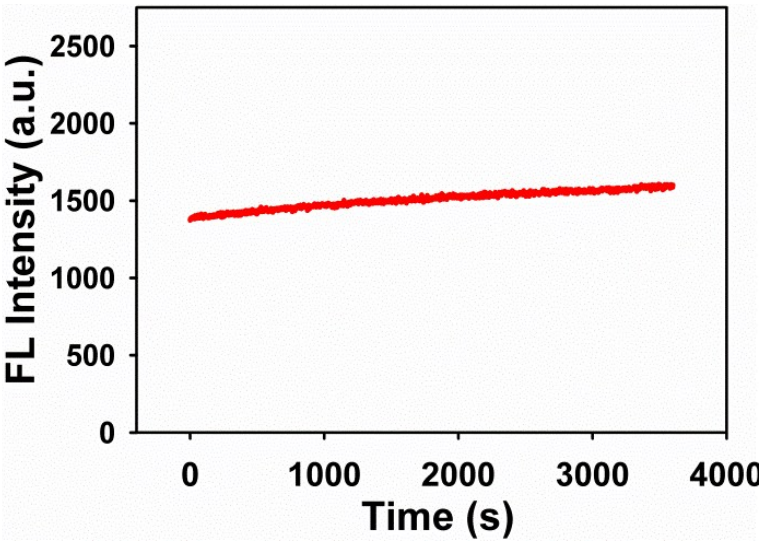

Fig. S9 Time-dependent fluorescence intensity curve after 6 mM HCl addition.

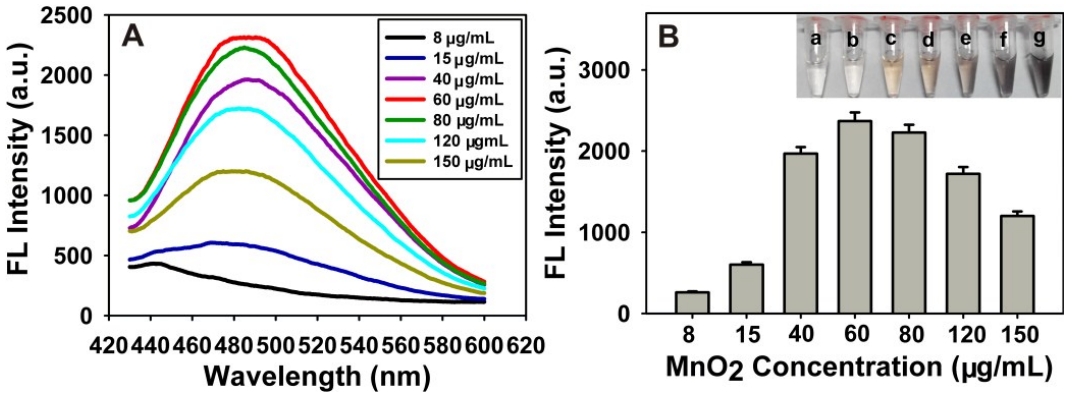

Fig. S10 Optimization of MnO_2 concentration for the fluorescent PDA nanoparticles synthesis. Inset: photographs of the synthesized fluorescent PDA nanoparticles at a series of different MnO_2 concentrations: 8 μg/mL (tube a), 15 μg/mL (tube b), 40 μg/mL (tube c), 60 μg/mL (tube d), 80 μg/mL (tube e), 120 μg/mL (tube f) and 150 μg/mL (tube g). Error bars are standard deviation of three repetitive experiments.

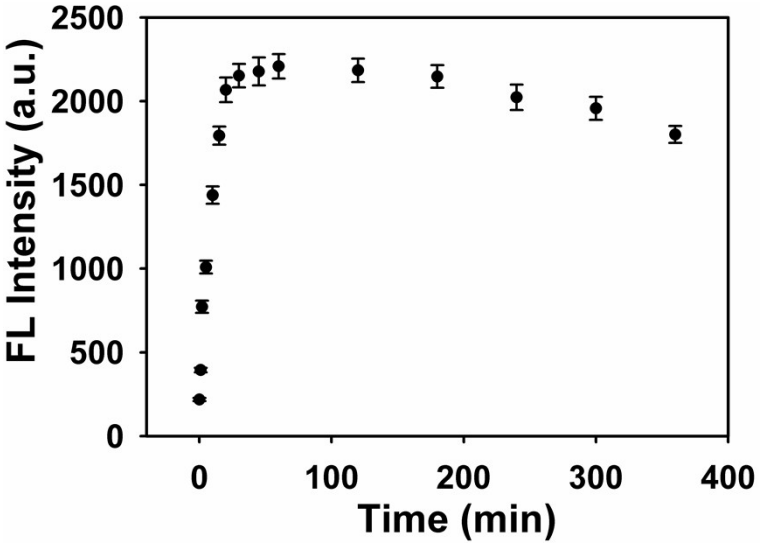

Fig. S11 Optimization of reaction time of dopamine and MnO_2 nanosheets for the fluorescent PDA nanoparticles synthesis. Error bars are standard deviation of three repetitive experiments.

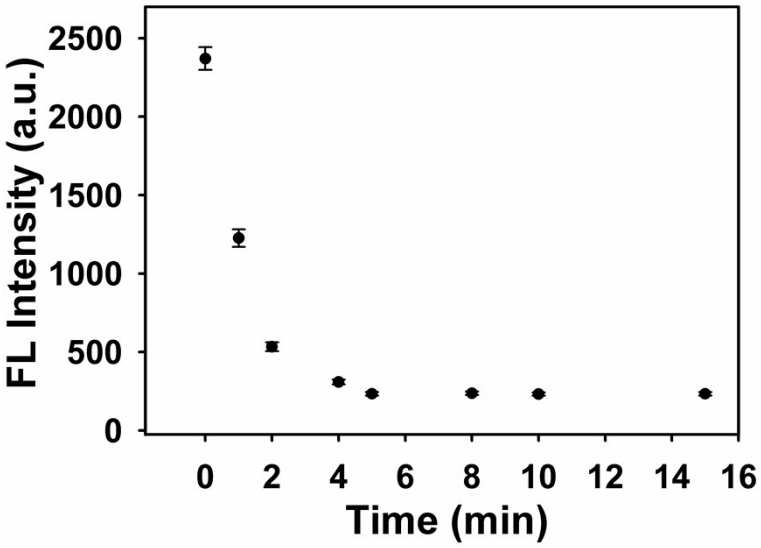

Fig. S12 Time dependence of fluorescence intensity at 485 nm for the fluorescent PDA nanoparticles in the presence of GSH (500 μM). Error bars are standard deviation of three repetitive experiments.

Table S1. Comparison of various reported methods for GSH detection.

Method	Signal	Detection range	Limit of detection	Reference
Based on electropolymerized molecularly imprinted polymer	Electrochemical response	25-300 μM	1.25 μM	S1
Based on a coenzyme pyrroloquinoline quinone modified electrode	Electrochemical response	Not given	11.4 μM	S2
Based on CdTe quantum dots-Hg (II) system	Fluorescence	0.6-20 μM	0.1 μM	S3
Naphthalimide-based colorimetric and fluorescent probe	Fluorescence	0.5-10 mM	28 μM	S4
Electrophoresis	UV Absorption	2.5-30 μM	2.5 μM	S5
Based on upconversion nanoparticles	Fluorescence	Not given	0.9 μM	S6
Based on polydopamine nanoparticles	Fluorescence	0-350 μM	1.5 μM	This work

Table S2. Concentrations of the investigated interferents.

Interferent	Concentration
Na^+	1.6 mM
K^+	2.0 mM
Mg^{2+}	0.29 mM
Ca^{2+}	14 mM
Zn^{2+}	50 μM
Fe^{3+}	2 μM
Glucose (Glu)	6 mM
Alanine (Ala)	50 μM
Glutamine (Gln)	50 μM
Histidine (His)	50 μM
Glutamic acid (Gla)	50 μM
Glycine (Gly)	200 μM
Vitamine C (Vc)	50 μM
Homocysteine (Hcy)	15 μM
Cysteine (Cys)	250 μM

Table S3. Analytical results of GSH in human whole blood sample using the fluorescent PDA nanoparticles as a fluorescence signal indicator.

Sample	Measured (μM)	Added (μM)	Found (μM)	RSD (n=3)	Recovery (%)
1		25	41.4	4.3%	103.2
2	15.6	50	66.5	5.7%	101.8
3		100	112.8	3.2%	97.2

References

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