Supplementary Material (ESI) for Analytical Methods


# Electronic Supplementary Information

## Fluorescein isothiocyanate-capped gold nanoparticles for fluorescent detection of reactive oxygen species based on thiol oxidation and their application for sensing glucose in serum

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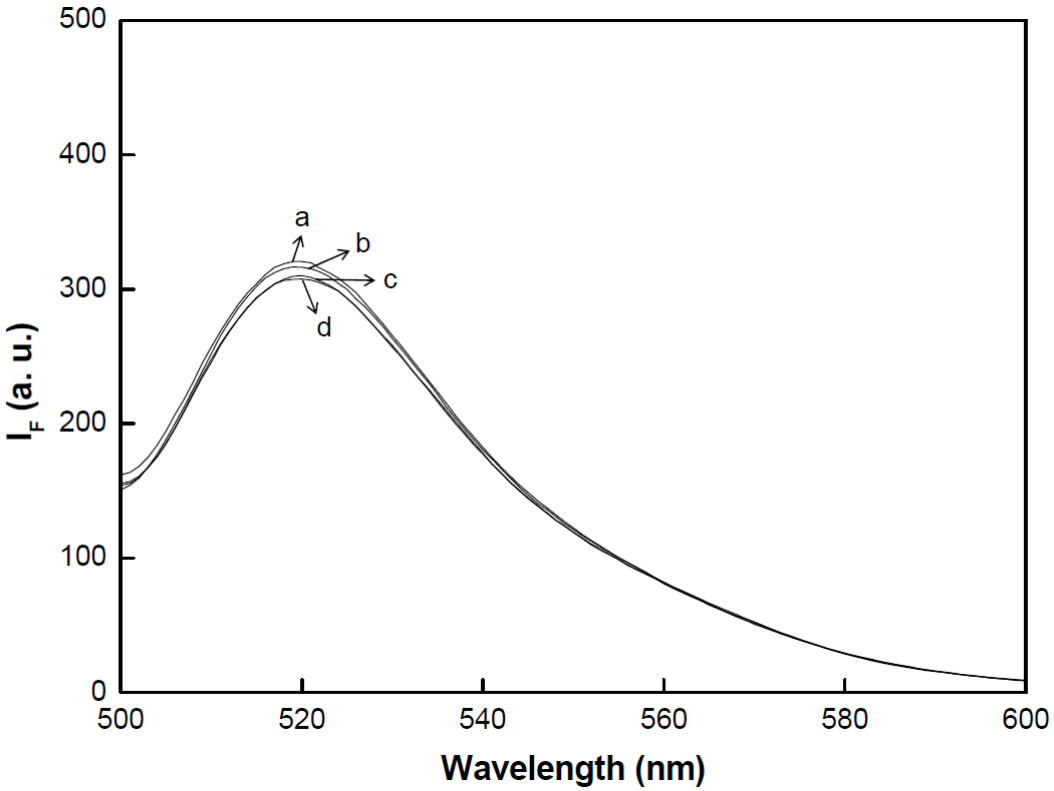


**Fig. S1.** Fluorescence spectra of (a) FITC, (b) FITC and 2-ME, (c) FITC and $H_2O_2$, and (d) FITC and $H_2O_2$-treated 2-ME. The concentrations of FITC, 2-ME, and $H_2O_2$ are 0.1, 1, and 100 μM. (d) A solution of 2-ME (1 μM) was reacted with $H_2O_2$ (100.0 μM) in 20 mM sodium phosphate at pH 12.0 for 20 min. The resulting solution was incubated with 0.1 μM FITC for 20 min. The excitation wavelength was set at 488 nm.

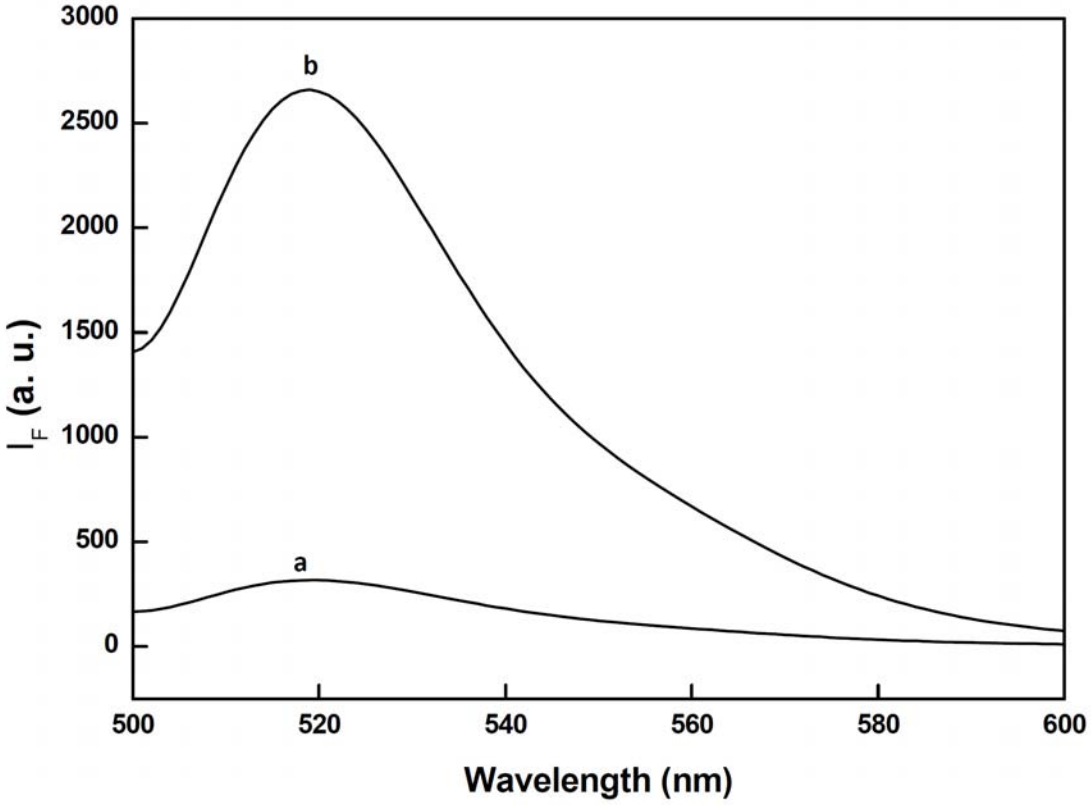


**Fig. S2.** Fluorescence spectra of the supernatants from centrifugation of a solution of (a) 2-ME disulfide, citrate-capped AuNPs, and FITC and (b) 2-ME, citrate-capped AuNPs, and FITC. (a) A solution of 1 μM 2-ME was reacted with 100 μM $H_2O_2$ in 20 mM phosphate at pH 12.0 for 20 min. The resulting solution was incubated with 0.8 nM citrate-capped AuNPs for 20 min. Subsequently, 0.1 μM FITC was added to a solution containing 2-ME disulfide and citrate-capped AuNPs. (b) A solution of 1 μM 2-ME was incubated with 0.8 nM citrate-capped AuNPs for 20 min. Subsequently, 0.1 μM FITC was added to a solution containing 2-ME and citrate-capped AuNPs. (a, b) After removal of the AuNPs by centrifugation, the supernatant was detected by exciting at 488 nm.

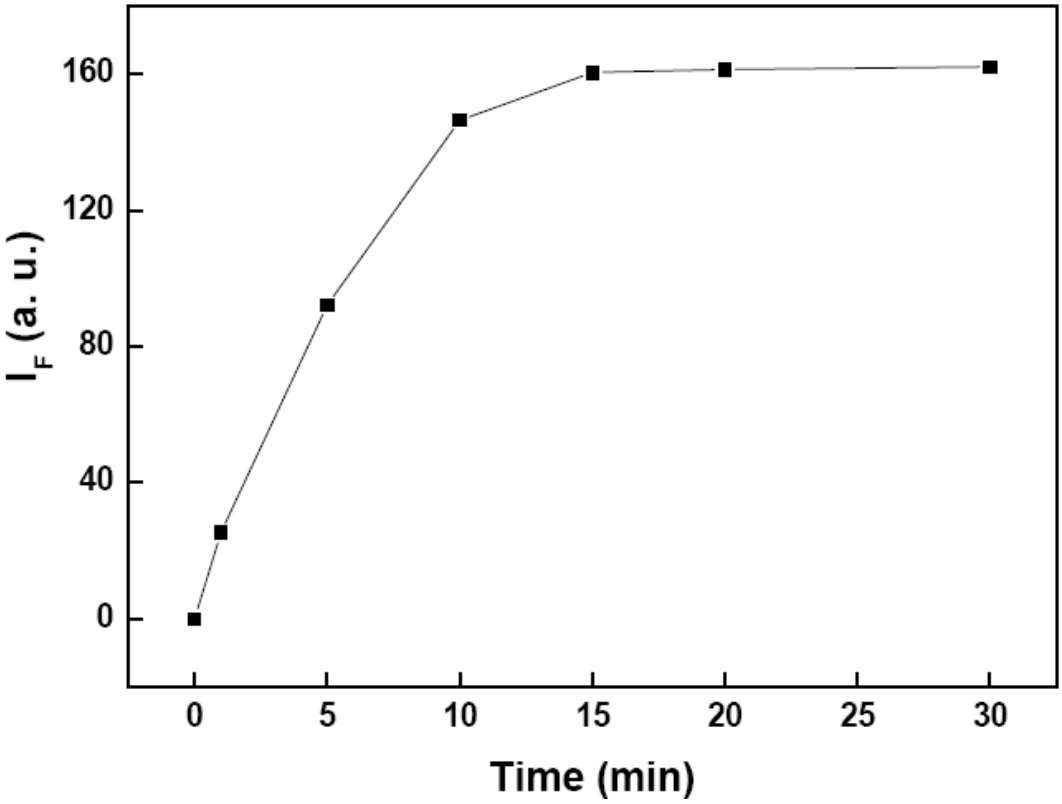


**Fig. S3.** Time course measurement of fluorescence intensity at 520 nm of the supernatants from centrifugation of a solution of $H_2O_2$-treated 2-ME and FITC-AuNPs. A solution of 1 μM 2-ME was reacted with 100 μM $H_2O_2$ in 20 mM phosphate at pH 12.0 for 20 min. The $H_2O_2$-treated 2-ME was incubated with 0.8 nM FITC-AuNPs for 0–30 min. The excitation wavelength was set at 488 nm.

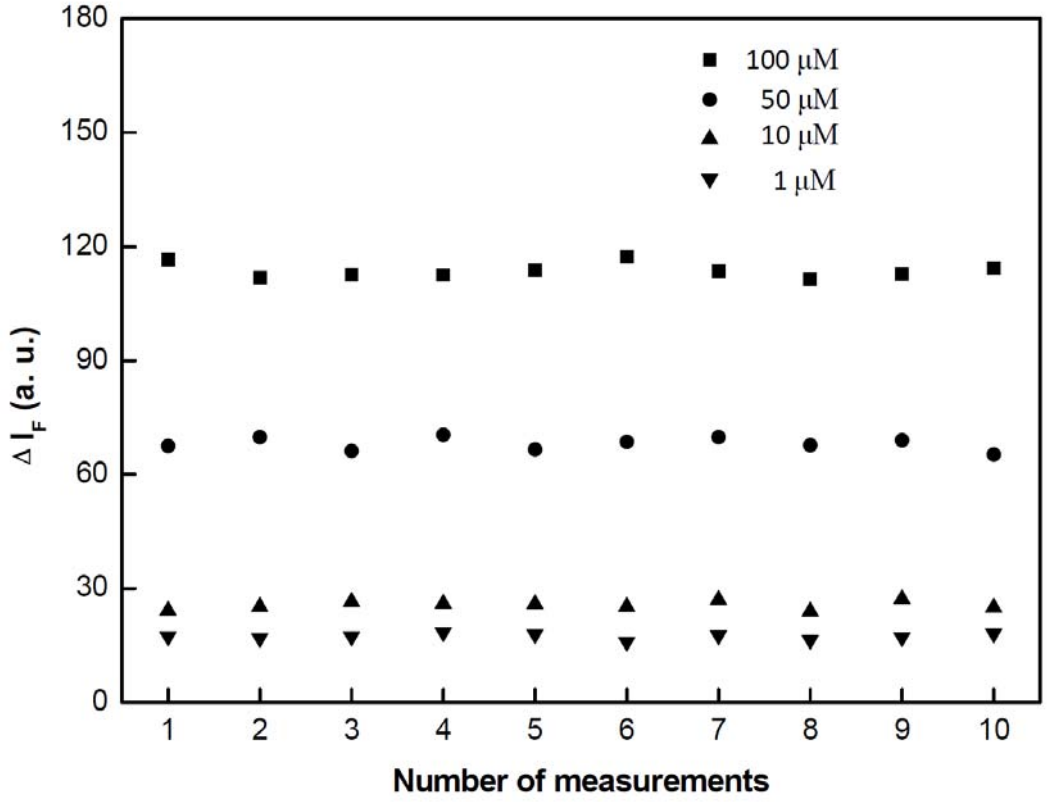


**Fig. S4**. The reproducibility of this method for the determination of 1, 10, 50, and 100 μM $H_2O_2$. A solution of 2-ME (1 μM) was reacted with different concentrations of $H_2O_2$ in 20 mM sodium phosphate at pH 12.0 for 20 min. The resulting solution was incubated with 0.8 nM FITC-AuNPs for 15 min. After removal of the AuNPs by centrifugation, the supernatant was detected by exciting at 488 nm.

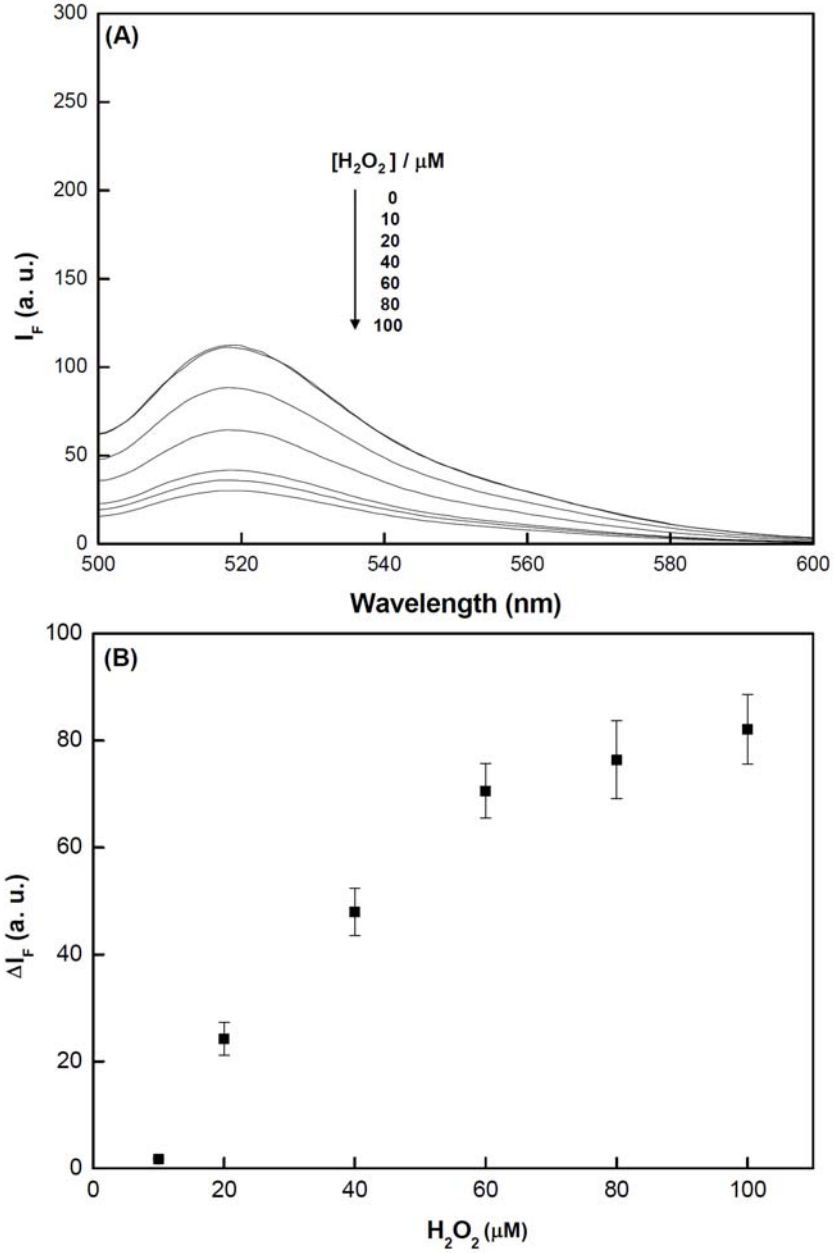


**Fig. S5.** (A) Fluorescence response of solutions of FITC-AuNPs upon the addition of a mixture of 0–100 μM $H_2O_2$ and 1 μM 2-ME (B) Calibration curve for the detection of $H_2O_2$. $H_2O_2$ was reacted with at pH 12.0 for 20 min. The resulting mixture was incubated with 0.8 nM FITC-AuNPs for 15 min. The excitation wavelength was set at 488 nm. The error bars represent standard deviations based on three independent measurements.

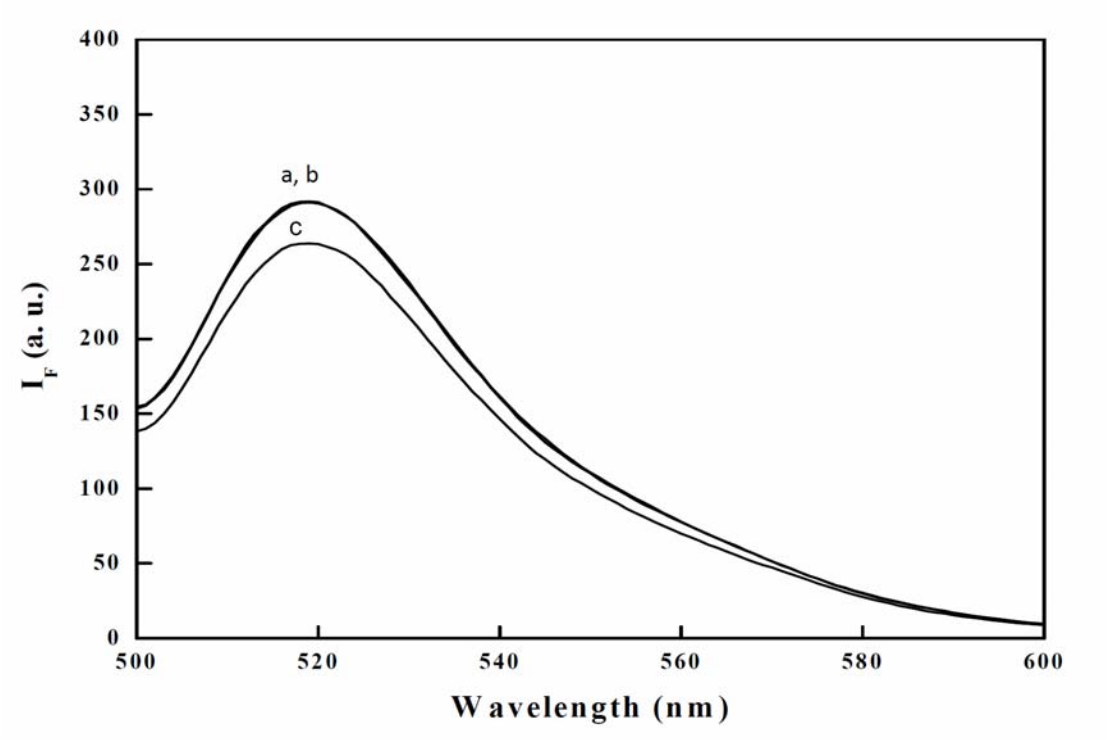


**Fig. S6.** Fluorescence spectra of the supernatant from centrifugation of solutions of (a) 2-ME and FITC-AuNPs, (b) glucose, 2-ME, and FITC-AuNPs, and (c) GOx, 2-ME, and FITC-AuNPs. (a) A solution of 2-ME (1 μM) was incubated with 0.8 nM FITC-AuNPs for 15 min.After removal of the AuNPs by centrifugation, the supernatant was detected by exciting at 488 nm. (b, c) A solution of 2-ME (1 μM) was reacted with glucose or GOx in 20 mM sodium phosphate at pH 12.0 for 20 min. The resulting solution was incubated with 0.8 nM FITC-AuNPs for 15 min. After removal of the AuNPs by centrifugation, the supernatant was detected by exciting at 488 nm.

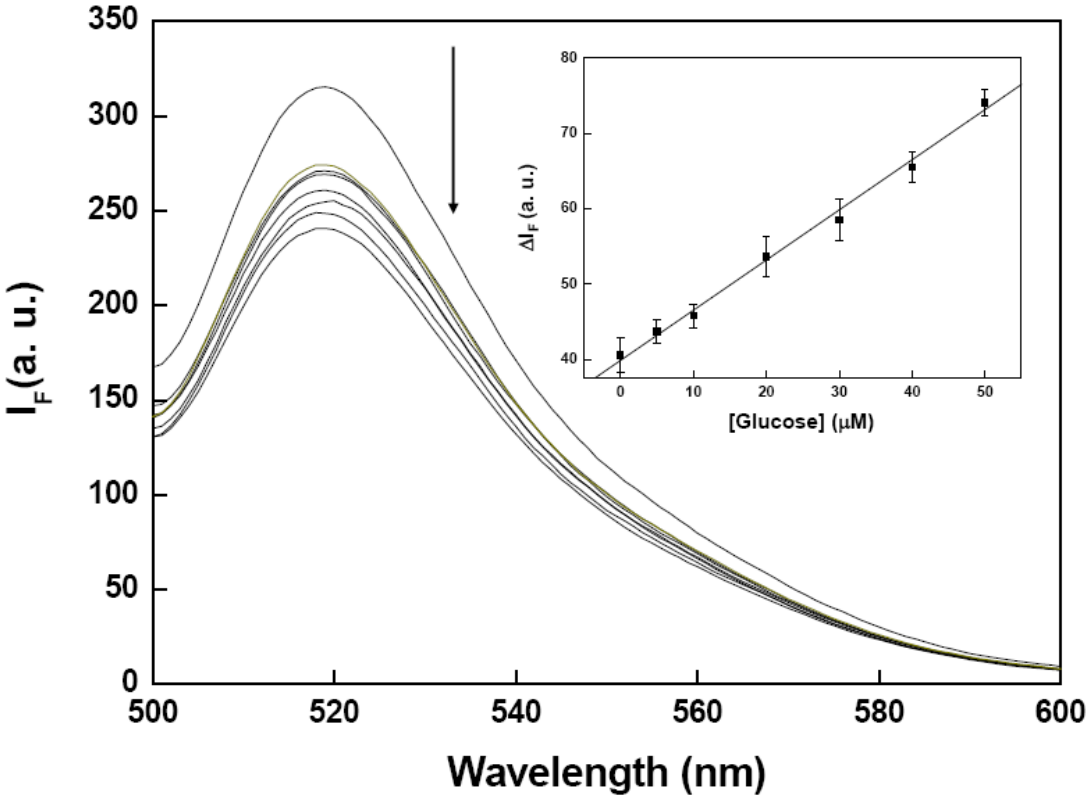


**Fig. S7.** Quantification of glucose in serum by a two-step analysis. Serum samples were spiked with standard glucose (0–5 mM). The resulting solutions were diluted to 10-fold with 10 mM phosphate (pH 7.0). The 10-diluted serum samples were filtered using the 3 kDa Nanosep centrifugal device. GOx (0.4 mg/mL) catalyzed the oxidation of nonspiked and glucose-spiked serum samples to $H_2O_2$. The produced $H_2O_2$ was reacted with 1 μM 2-ME at pH 12.0 for 20 min. The resulting mixture was incubated with FITC-AuNPs for 15 min. After removal of the AuNPs by centrifugation, the supernatant was detected by exciting at 488 nm. The arrows indicate the signal changes with increases in the concentrations of glucose (0, 5, 10, 20, 30, 40, and 50 μM). Inset: Plot of $\Delta I_F$ as a function of glucose concentration. The error bars represent standard deviations based on three independent measurements.