Supplementary Information

C0CC02698K

Experimental details

Instrumentation. A U-3900H UV-Vis Spectrophotometer (Hitachi, Japan) was used to record the absorption spectra of the reaction product of TMB at room temperature in the wavelength range from 450 to 800 nm. The photographs were taken with an Olympus C-370 digital camera.

Preparation of positively-charged gold nanoparticles ((+)AuNPs). The (+)AuNPs were prepared according to the published protocol [1]. Briefly, a cysteamine solution (400 μL, 213 mM) was added to 40 mL of 1.42 mM $HAuCl_4$ solution. After stirring for 20 min at room temperature, 10 μL of 10 mM $NaBH_4$ solution was added, and the mixture was vigorously stirred for 10 min at room temperature in the dark. Then, the mixture was further stirred 15 min, and the resulting win-red solution was stored in the refrigerator (4 °C) and ready for use. The as-prepared (+)AuNPs were charactered with UV-Visible absorption spectra (Fig. S1) and transmission electron microscopy (TEM). The results of TEM (Fig. S2) showed the size of the AuNPs was about 34 nm. The concentration of the AuNPs solution was estimated by the original concentration of the gold solution [2].

H_2O_2 detection using the (+)AuNPs as peroxidase mimic. A typical colorimetric analysis realized as follows. Firstly, 300 μL of 5 mM TMB, 70 μL of 1.62 nM (+)AuNPs, and 200 μL of H_2O_2 with different concentrations were added into 430 μV of 0.5 M acetate buffer (pH 4.0). Secondly, the mixed solution was incubated in a 45 °C water bath for 10 min and cooled to the room temperature. Finally, the resulting

solution was used for adsorption spectroscopy measurement.

Glucose detection using the (+)AuNPs and GOD. Glucose detection was realized was realized as follows: (1) 20 μL of 5.0 mg/mL GOD and 200 μL of glucose with different concentrations in 10 mM phosphate buffer solution (pH 7.4) were incubated at 37 °C water bath for 15 min; (2) 300 μL of 5 mM TMB, 70 μL of 1.62 nM (+)AuNPs, and 300 μL of 0.5 M acetate buffer (pH 4.0) were added into the above 220 μL glucose reaction; (3) the mixed solution was incubated in a 45 °C water bath for 10 min; (4) the resulting solution was cooled to the room temperature and used for adsorption spectroscopy measurement. In control experiments, 5 mM maltose, 5 mM lactose, and 5 mM fructose were used instead of glucose in a similar way.

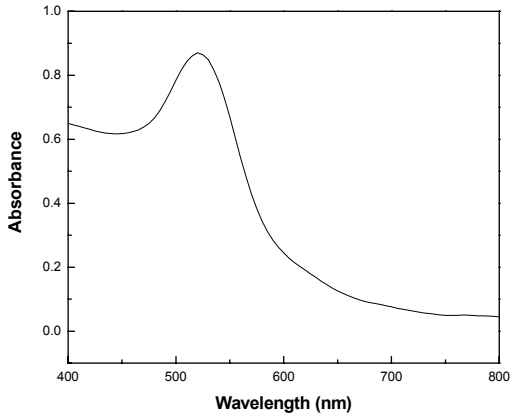

Fig. S1 UV-visible absorption spectra of the as-prepared (+)AuNPs

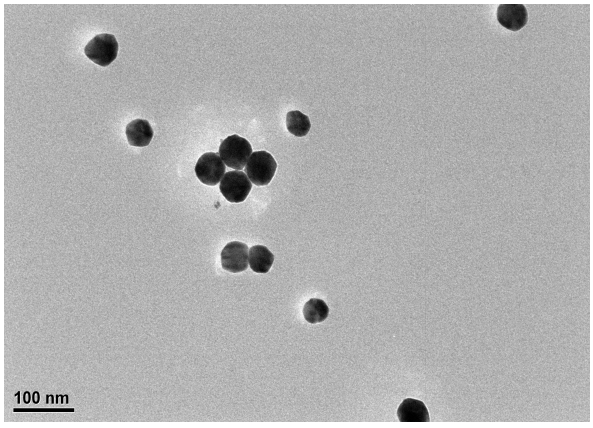

Fig. S2 TEM of the as-prepared (+)AuNPs

Comparison of the catalytic activity of (+)AuNPs with mercaptoacetic acid-capped AuNPs (TGA-capped AuNPs)

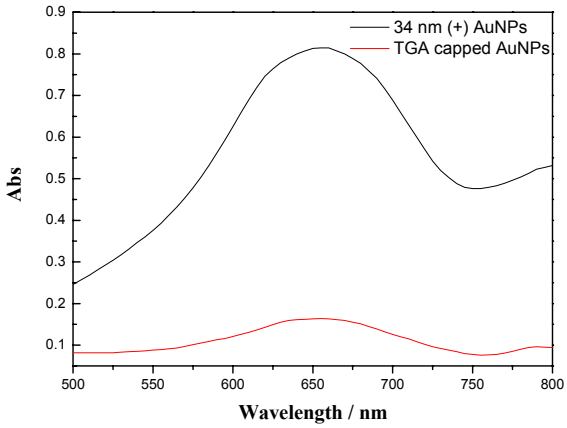

Fig. S3 Absorption spectra of TMB–H_2O_2 mixed solution in the presence of 70 μL AuNPs. Experimental conditions: 300 μL of 5 mM TMB, 200 μL of 20 mM H_2O_2, 5 M acetate buffer (pH 4.0).

Effect of reaction temperature on the absorbance (655 nm).

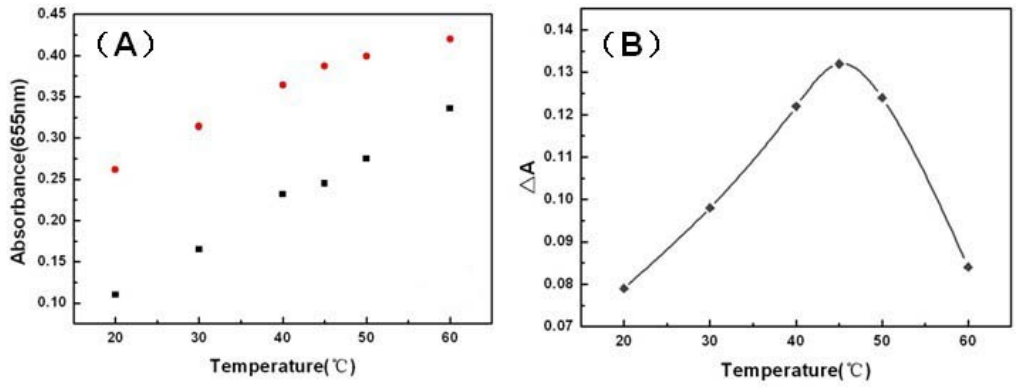

Fig. S4 (A) Temperature response for H_2O_2 detection in the absence (●) and presence (■) of the as-prepared (+)AuNPs; (B) temperature curve for H_2O_2 detection where △A= A(AuNPs, 655 nm) –A(blank, 655 nm).

Specificity of (+)AuNPs as peroxidiase mimic

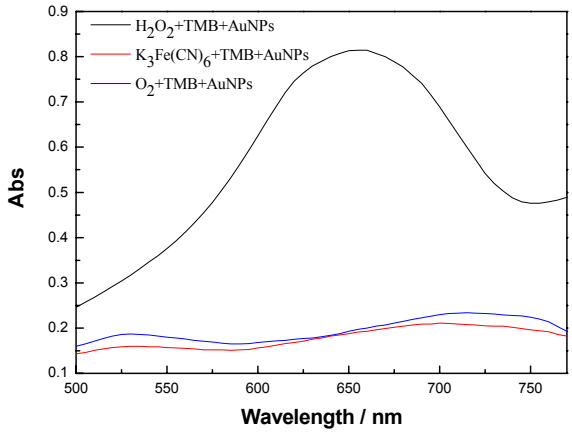

Fig. S5 Absorption spectra of different substrate (H_2O_2, $K_3Fe(CN)_6$ and dissolved O_2) in the presence of the same amount of TMB and (+)AuNPs.

Specificity of the proposed method for detection of glucose

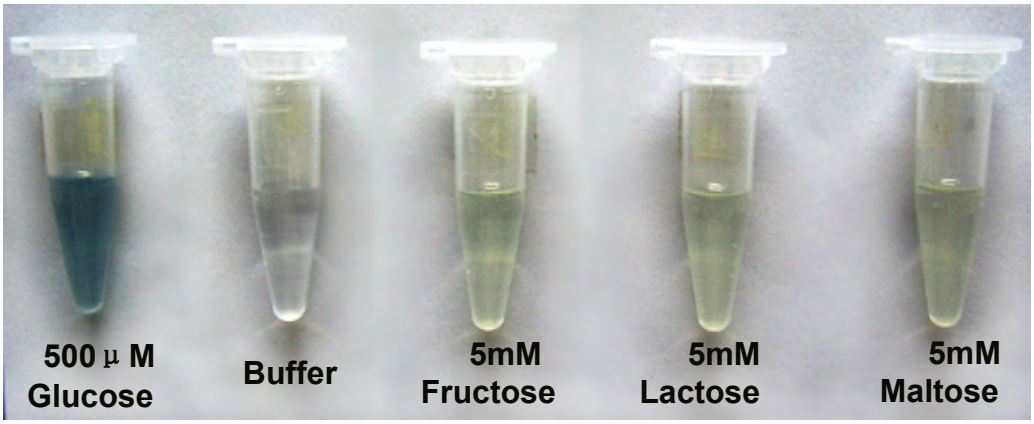

Fig. S6 Typical photographs for glucose detection with the colorimetric method developed using GOD and (+)AuNPs (from left to right: 500 μmol/L glucose, buffer, 5 mmol/L fructose, 5 mmol/L lactose, and 5 mmol/L maltose).

References

1. T. Niidome, K. Nakashima, H. Takahashi and Y. Niidome, *Chem. Commun*. 2004, 1978-1979.

2. Bela Neiman, Eli Grushka and Ovadia Lev, *Anal. Chem*. 2001, **73**, 5220-5227.