

Electronic supplementary information

Colorimetry and SERS Dual-mode Detection of Telomerase Activity: Combining Rapid Screening with High Sensitivity

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Since some of the sensitivities were given in cell number rather than in cell concentration, we did a simple calculation according to our experimental procedures to convert our sensitivity into cell number:

$$\text{Sensitivity} = \frac{\text{Total number of the original cells}}{\frac{\text{Volume of the cell extracts used in the telomeric elongation experiments}}{\text{Dilution of the cells extracts}} \times \frac{\text{Volume of the CHAPS lysis buffer}}{\text{Volume of the cell extracts}}} = \frac{1 \text{ ml} \times 10^6 \text{ cells/ml}}{40 \mu\text{l}} \div 10^6 \times 5 \mu\text{l} = \frac{1}{8} \text{ cells}$$

As a result, our SERS based method indeed has a much higher sensitivity compared with previously reported methods.

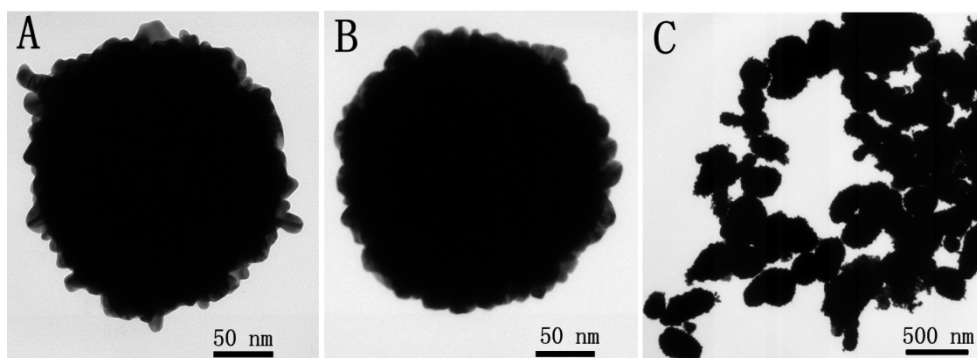


Figure S1. TEM images of an individual MB@Au nanoparticle (A, B) and a large scale image of the MB@Au NPs (C).

Some MB@Au NPs have tentacles on their surfaces, the tentacles are part of the gold shell. The coated gold shell is not smooth and sometime has protrusions. This phenomenon was also observed by other researchers.^{1, 2} Figure S1 shows the TEM image of two individual MB@Au nanoparticles from the same sample batch, the one in (A) has tentacles on its surface while the one in (B) has no obvious tentacles.

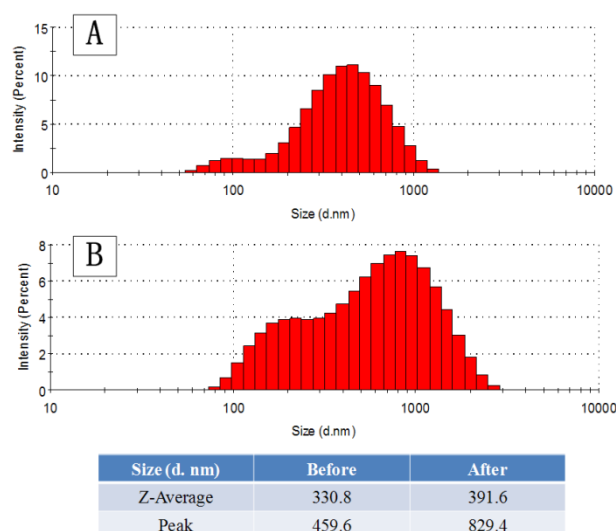


Figure S2. After telomeric elongation reaction, intensity dependent size distribution of the MB@Au@TS NPs before and after hybridization with the Au-Tag NPs. The table presents the average and peak hydrodynamic diameters of the MB@Au@TS NPs before and after the hybridization. The obvious increase in the hydrodynamic diameter of the MB@Au@TS NPs was caused by the hybridization with Au-Tag NPs, which in turn confirmed that Au-Tag NPs were indeed captured by the MB@Au@TS NPs.

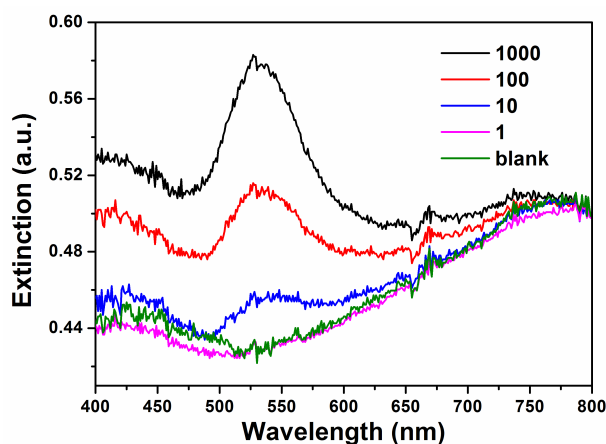


Figure S3. The extinction spectra of the final precipitates corresponding to different cell concentrations. The peak around 530 nm was attributed to the captured Au-Tag NPs, and the intensity of the 530 nm peak decreased gradually with the decrease in the cell concentration. Telomerase of 10 cells/mL resulted in a small bump in the spectrum, while the spectrum of 1 cell/mL was undistinguishable from the blank control. Thus the limit of detection (LOD) of colorimetry based detection was 10 cells/mL.

References

1. X. Zhou, W. Xu, Y. Wang, Q. Kuang, Y. Shi, L. Zhong and Q. Zhang, *The Journal of Physical Chemistry C*, 2010, **114**, 19607-19613.
2. H. Cong, R. Toftegaard, J. Arnbjerg and P. R. Ogilby, *Langmuir*, 2009, **26**, 4188-4195.