Supplementary Information for

Point of care biosensor for uric acid based on the target induce changing of photothermal effect of Gold nanostars using thermometer as readout

Meifang Chen[1,6], Xiuqing Chen[1,6], Siyuan You[5], Linchen Xu[5], Zhenyu Lin[4]*, Xianghui Li[2,3]*, Qunfang Xie[1,6]*

1. Department of General Practice, The Center of Health Management, The First Affiliated Hospital of Fujian Medical University, Fuzhou, Fujian 350005, China

2. Department of Clinical Laboratory, School of Medical Technology and Engineering, Fujian Medical University, Fuzhou, Fujian, 350004, PR China.

3. Key Laboratory of Clinical Laboratory Technology for Precision Medicine (Fujian Medical University), Fujian Province University, Fuzhou, Fujian, 350004, PR China.

4. Ministry of Education Key Laboratory for Analysis Science of Food Safety and Biology, Fujian Provincial Key Laboratory of Analysis and Detection for Food Safety, College of Chemistry, Fuzhou University, Fuzhou, Fujian, 350116, PR China.

5. School of basic medical sciences, Fujian Medical University, Fuzhou, Fujian, 350004, PR China.

6. Department of General Practice, National Regional Medical Center, Binhai Campus of the First Affiliated Hospital, Fujian Medical University, Fuzhou, Fujian 350212, China

Corresponding author: Xianghui Li, Zhenyu Lin, Qunfang Xie

E-mail: lixianghui1987@126.com (Xianghui Li)

zylin@fzu.edu.cn (Zhenyu Lin)

xqf504@163.com (Qunfang Xie)

Tel&Fax: 86-591-22866135

Table of Content

1. Experimental section

1.1 Instruments and equipment.

Transmission electron microscopy (TEM) images were acquired on a Tecnai G2 F20 S-TWIN microscope. UV-vis absorption spectra were acquired by Microplate spectrophotometer (Multiskan GO, Thermo Scientific, USA). The portable digital thermometer used for the tests in this work was CIE 305P. The commercial hand-held NIR laser pointer (808 nm, 1.5 W) was purchased from Changchun Laser Technology Co., Ltd. (Changchun, China).

2.2 Synthesis of AuNSs

Gold seeds was firstly prepared by using sodium citrate reduction method. The mixture of $HAuCl_4$ solution (1%, 1 mL) and ultrapure water (99 mL) was heated along with stirring and refluxing. Then, trisodium citrate solution (38.8 mM, 10 mL) was rapidly added to the above mixture, followed by further stirring and refluxing at 120°C for 20 minutes. When the color of solution gradually changed to wine red, the reaction solution was cooled down to room temperature. Then, the above gold seed solution (750 μL) was added to an aqueous solution (38.5 mL) containing hydroxylamine hydrochloride (40 mM, 750 μL) and HEPES (100 mM, 18.75 mL, pH = 8.5). The solution was mixed evenly by stirring at 1450 rpm. Subsequently, $HAuCl_4$ solution (1 mM, 5 mL) was added dropwise, followed by continued stirring at 700 rpm for 15 minutes. The color of solution gradually turned to blue, whose UV-vis absorption wavelength was around 800 nm. After the reaction is completed, centrifuge three times at 8°C (4000 rpm, 10 minutes). Finally, the solution is

redispersed in HEPES and stored at 4°C for later use.

1.3 Serum sample preparation

To verify the practical application potential of this photothermal biosensor, the UA levels of serum samples from patients at the First Affiliated Hospital of Fujian Medical University (Fujian, China) were tested. The serum samples were firstly centrifuged (4000 rpm/min, 10 min) to obtain supernatant, and then stored at -20°C before utilization. Serum samples were diluted 100-fold for the detection of the concentration of UA according to this photothermal biosensor testing procedures as mentioned above.

2. Supplementary figures

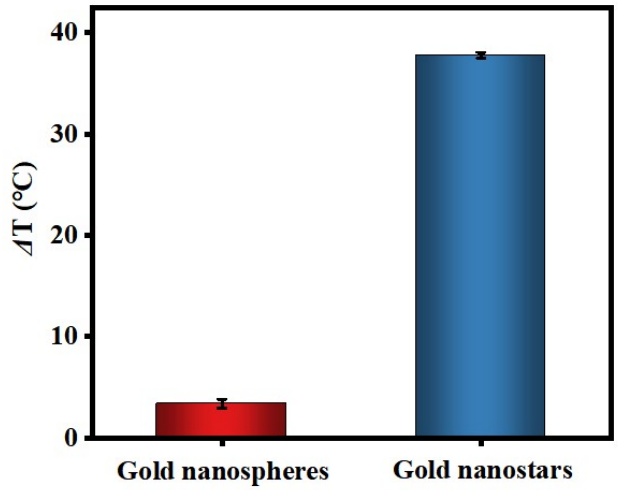

Figure S1 Comparison of photothermal effects between spherical and star shaped gold nanoparticles.