**Electronic Supplementary Information**

# Gold Nanostars for Cancer Cells-Targeted SERS-Imaging and NIR Light-Triggered Plasmonic Photothermal Therapy (PPTT) in the First and Second Biological Windows

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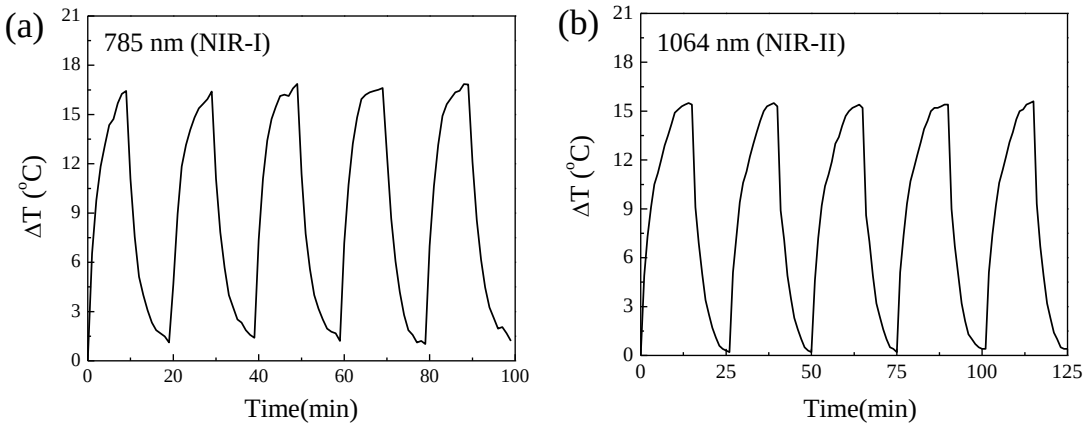


**Fig. S1** Photothermal stabilities of Au NSs under the irradiations of NIR-I 785 nm laser (a) and NIR-II 1064 nm laser (b).

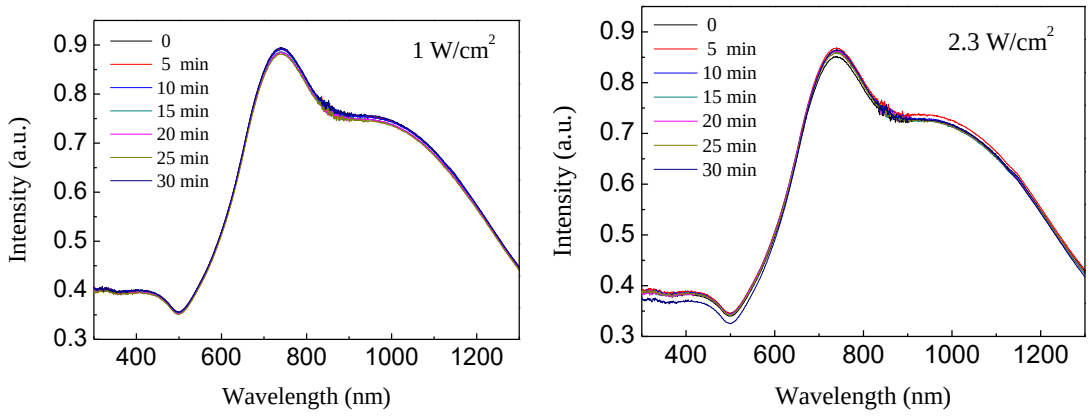


**Fig. S2** Absorption characterization of the physical stabilities of Au NSs under the irradiations of NIR-I 785 nm laser with different powers, 1 W/cm$^2$ (a) and 2.3 W/cm$^2$ (b).

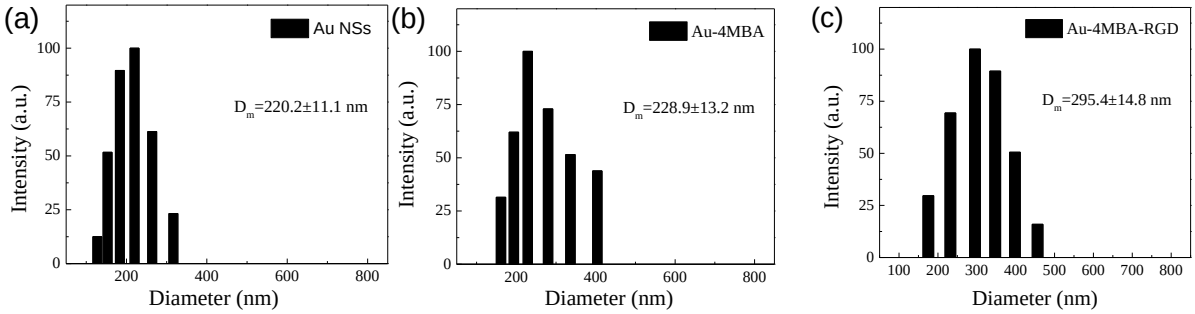


**Fig. S3** Hydrodynamic diameters of Au NSs, Au-4MBA and Au-4MBA-RGD characterized by DLS, respectively.

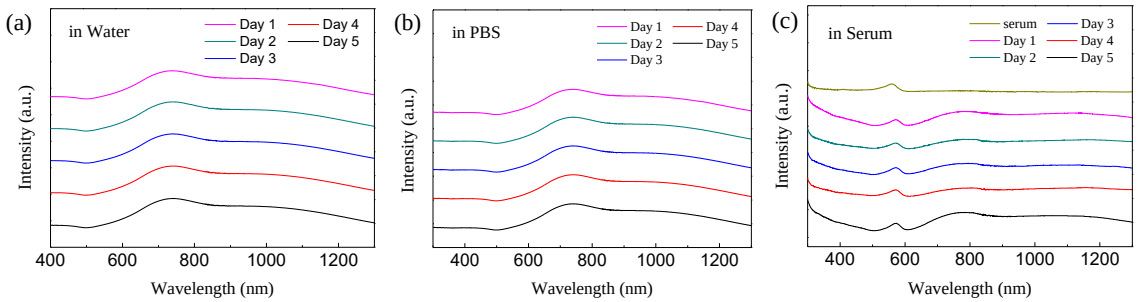


**Fig. S4** Absorption characterization of the physical stabilities of the multifunctional Au NSs in water (a), PBS (b)and serum (c) for five days.

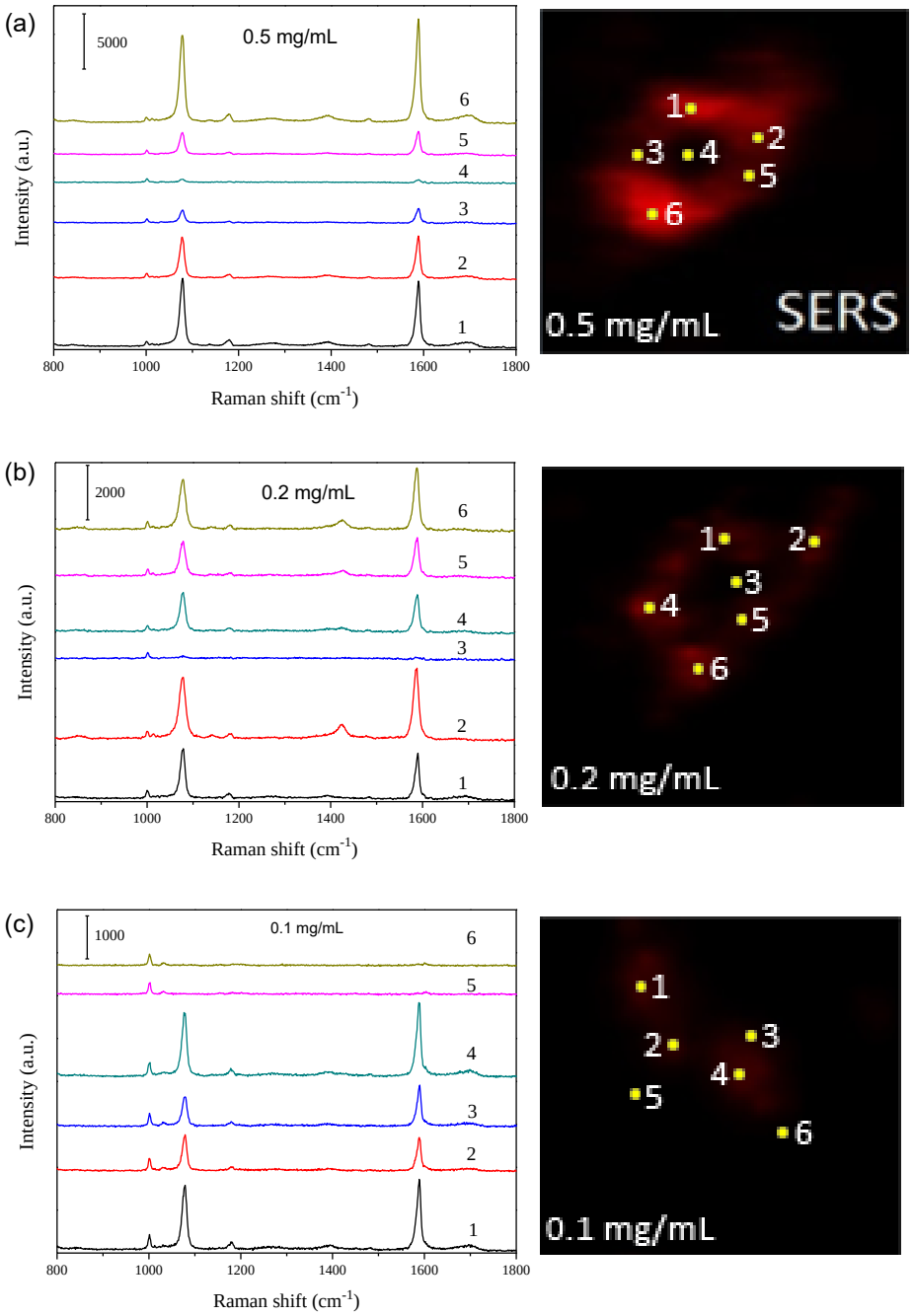


**Fig. S5** Representative SERS spectra collected at different spots corresponding to the SERS images shown in Fig.4. It should be noted that the characteristic Raman band from 1062-1088 $cm^{-1}$ (i.e. spectral area) was selected to create SERS images. So the intensity (or scale bar) shown in Fig. 4 is significantly greater than the peak intensity shown in Fig. S5.

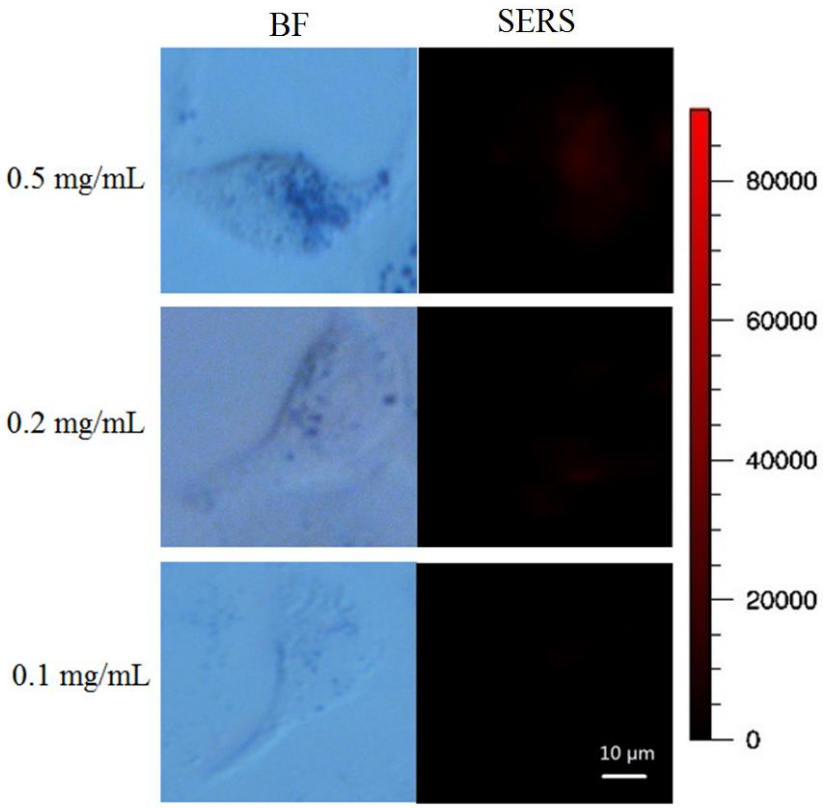


**Fig. S6** Bright-field (BF) images and the corresponding SERS images of HOK cells incubated with 0.5, 0.2 and 0.1 mg/mL multifunctional Au NSs.

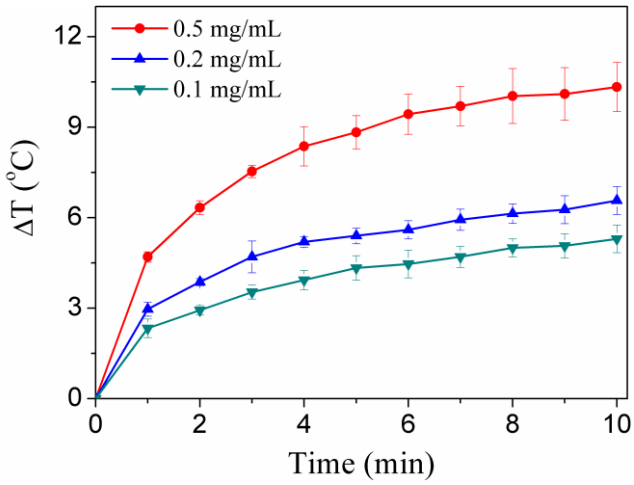


**Fig. S7** Photothermal curves of equivoluminal 0.5, 0.2, and 0.1 mg/mL multifunctional Au NSs under the irradiation of NIR-I laser (785 nm).

**Table S1.** Zeta potential of the Au NSs after each surface modification for preparing multifunctional Au NSs

| Materials | Zeta potential (mV) |
|---|---|
| Au NSs | 48.68 ± 0.25 |
| Au NSs-4MBA | 40.14 ± 0.21 |
| Au NSs-4MBA (EDC/NHS) | 27.57 ± 0.16 |
| Au NSs-4MBA-RGD | -29.82 ± 0.26 |