Seedless Synthetic Branched Gold Nanoshell for Chemo-thermal Antitumor Therapy

Supplementary information

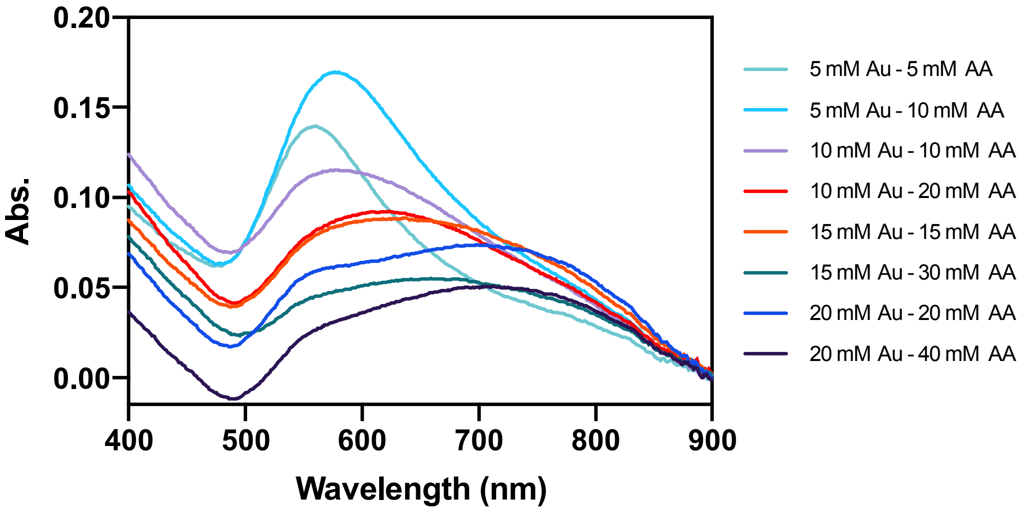


Figure S1. Absorption peaks of prepared BGNS with different concentration ratios of the chloroauric acid and the ascorbic acid.

In vitro hemolysis assay

Hemolysis assay was designed to assess the biocompatibility of DOX-lips@BGNS. Red blood cells (RBCs) derived from rabbit blood were dispersed in PBS solution (2 v%). Then, 0.5 mL RBCs solution was mixed with 0.5 mL DOX-lips@BGNS solutions (10, 50, and 200 μg/mL). For the positive control group, 0.5 mL RBCs solution was mixed with 0.5 mL deionized water and freeze-thaw cycling 3 times. 0.5 mL RBCs solution and 0.5 mL PBS solution were mixed as the negative control group. The mixtures were incubated at 37 °C for 30 min and then centrifuged to measure the optical density (OD) of the supernatants at 570 nm. The hemolysis ratio was calculated as follows:

$$hemolysis\ ratio\ (\%) = \frac{OD_{sample} - OD_{negative}}{OD_{positive} - OD_{negative}} \times 100\%$$

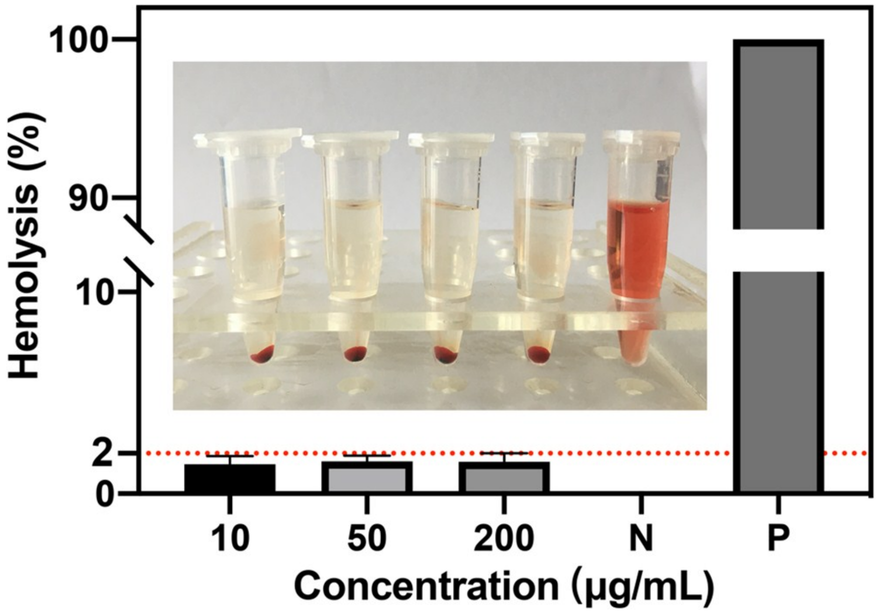


Figure S2. Hemolysis assay of the as-prepared DOX-lips@BGNS (10, 50, 200 μg/mL, dispersed in PBS solution) with inset photograph of visual results. N: negative control, P: positive control.

Calculation of photothermal conversion efficiency (η)

Photothermal conversion efficiency (η) was calsulated as follows:

$$\eta = \frac{hA\Delta T_{max} - Q_{dis}}{I(1 - 10^{-A_{\lambda}})} \qquad (1)$$

Where η is the conversion efficiency from the 808 nm laser energy to thermal energy, h is the heat transfer coefficient of AgPd NPs, A is the area cross section of irradiation, ΔT_{max} is the steady-state maximum temperature change, Q_{dis} is the heat associated with the light absorbance of the solvent, which was measured using solvent without NPs, I is the incident laser power, A_{λ} is the absorbance of AgPd NPs at 808 nm. In order to get hA, the variable θ was introduced.

$$\theta = \frac{T - T_{amb}}{\Delta T_{max}} \qquad (2)$$

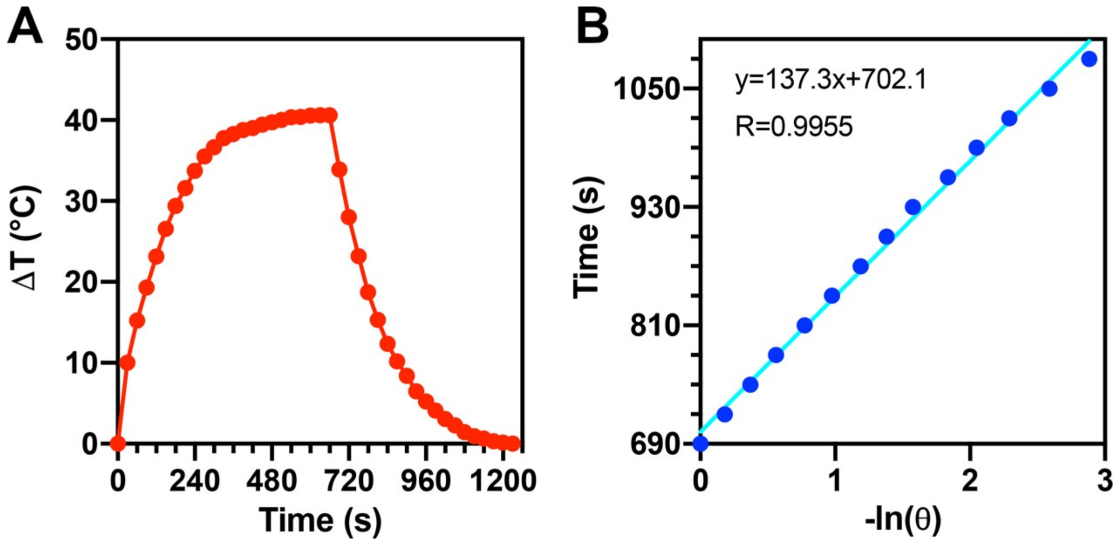
Where T is the solution temperature, T_{amb} is the ambient room temperature. The value of hA can be derived from the following:

$$hA = \frac{mC_p}{\tau} \qquad (3)$$

Where m and C_p is the mass and heat capacity of water, respectively. During the cooling process, the thermal time constant τ can be calculated as follows:

$$t = -\tau ln(\theta) \qquad (4)$$

It is obvious that the photothermal conversion efficiency of AgPd NPs can be easily calculated when the thermal time constant τ are obtained.



S3. (A) Temperature change of DOX-lips@BGNS. (B) Linear time data versus −ln(θ).