Supporting Information

Pure gold nanocages by galvanic replacement reaction of magnesium nanoparticles

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1. Experimental Section

Synthesis of gold nancages. Mg NPs were prepared by ablating Mg targets (purity quotient 99.99%) in argon (99.99%, Kunteng Gas,Tianjin, China) using a millisecond pulsed Nd:YAG laser (1064 nm) and then blew into 5 ml chloroauric acid aqueous solution with argon gas (see Figure S1). The laser power density, working current, pulse width and irradiation time for all laser ablation experiments were set as 10^6 W/cm^2, 200 A, 2 ms and 5 min, respectively. The concentration of chloroauric acid aqueous solution was set as 0.005, 0.01, 0.025 or 0.05 mM with fixed pH value at 7.40. Besides, in another group of experiments, the pH values of chloroauric acid aqueous solution were varied as 7.40, 8.56 and 9.45 by adding NaOH while keeping the concentration of $AuCl_4^-$ at 0.05 mM,. After 1 h reaction, the products were dropped onto TEM copper grids for observation.

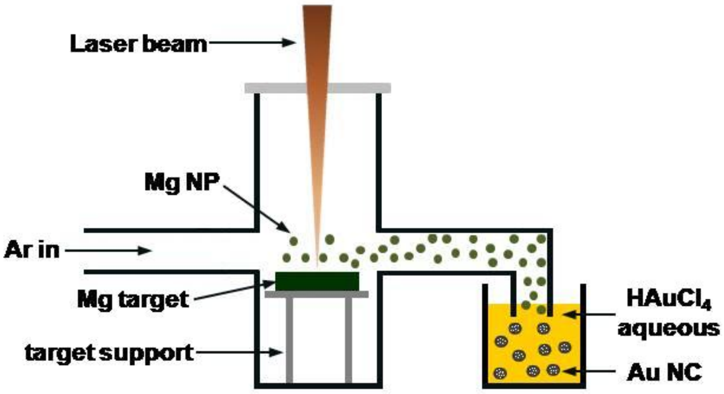


Figure S1. Experimental set-up for the ingtergrated gas-liquid process.

In-situ loading DOX on gold nanocages. 120 ul free DOX aqueous solution with a concentration of 1.0 mg/mL was mixed with 6 ml aqueous soluiton of chloroauric acid with a concentration of 0.05 mM, and the mixture was then reacted with Mg NPs. After stirred and incubated for 24 h, the products were dialyzed with a dialysis bag in water, and deionized water was refreshed every six hour. Dialysis was repeated for 4 times until the DOX abosrpotion peak of the dialyzate disappeared.

Ex-situ loading DOX on gold nanocages. 120 ul free DOX aqueous solution with a concentration of 1.0mg/mL was added to 6ml aqueous solution of gold NCs. After stirred and incubated for 24 h, the products were dialyzed with a dialysis bag in water, and deionized water was refreshed every six hour. Dialysis was repeated for 4 times until the DOX abosrpotion peak of the dialyzate disappeared.

Measurements and analysis. The morphology and structure were determined by a JEM-2100F transmission electron microscope equipped with a field-mission gun and an EDS unit. Absorption spectra were recorded in a Hitachi U-4100 UV/Vis spectrometer.

2. The experimental set-up and product of the separated-liquid-gas process

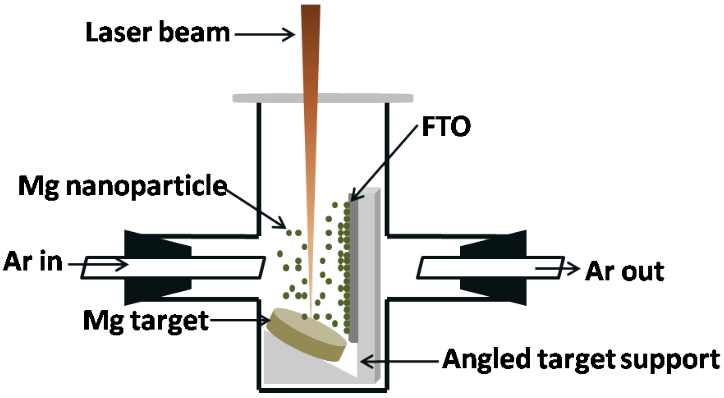


Figure S2. Experimental set-up for the separated-liquid-gas process.

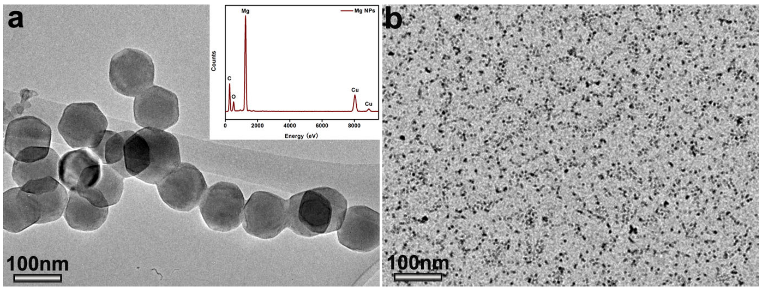


Figure S3. (a) TEM image of Mg raw nanoparticles obtained by the SLG process, and the inset is a EDS spectrum. (b) TEM image of final product (Au nanoparticles) by the SLG process.

3. The experimental results of DOX loading.

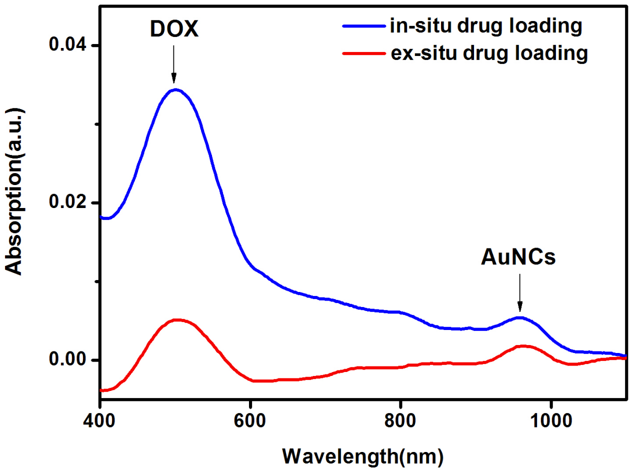


Figure S4 Absorption spectra of DOX loading within Au nanocages in situ (blue) and ex situ (red).

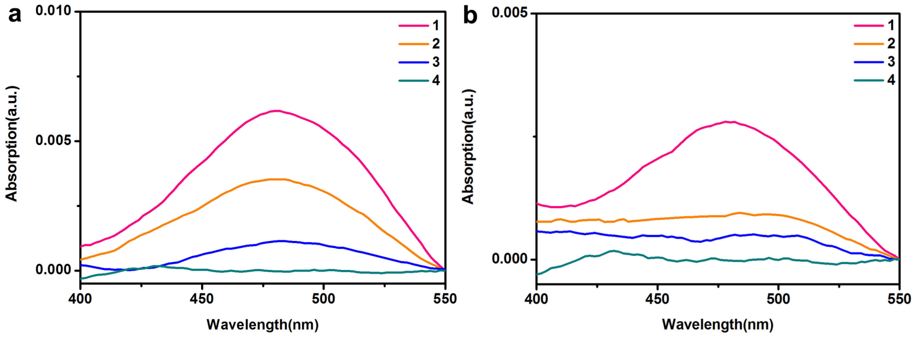
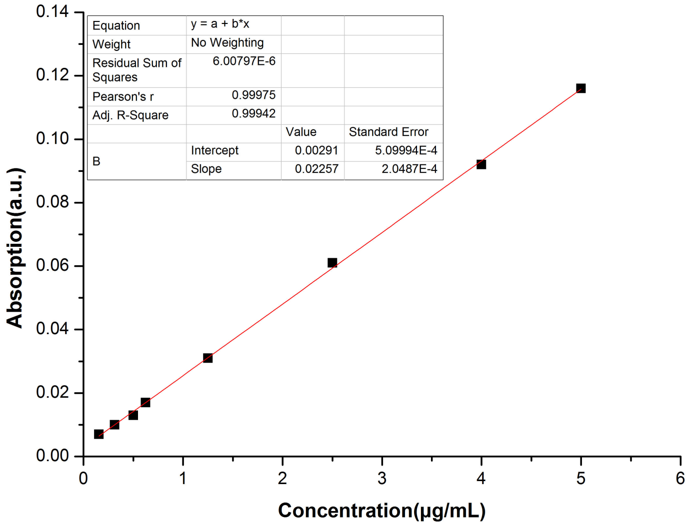


Figure S5 Absorption spectra of dialyzate of (a) ex-situ drug loading and (b)in-situ drug loading at different dialysis round.



Equation	y = a + b*x		
Weight	No Weighting		
Residual Sum of Squares	6.00797E-6		
Pearson's r	0.99975		
Adj. R-Square	0.99942		
		Value	Standard Error
B	Intercept	0.00291	5.09994E-4
	Slope	0.02257	2.0487E-4

Figure S6. The absorption-concentration relationship of DOX.