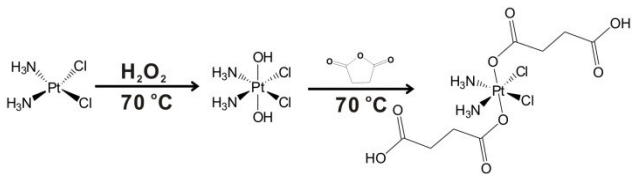
Supporting Information

Platinum (IV) Prodrug Conjugated Pd@Au Nanoplates for Chemotherapy and Photothermal therapy

Saige Shi,[a,b] Xiaolan Chen,[a,] Jingping Wei,[a] Yizhuan Huang,[a] Jian Weng,[b,*] and Nanfeng Zheng [a,*]*

[a]State Key Laboratory for Physical Chemistry of Solid Surfaces, Collaborative Innovation Center of Chemistry for Energy Materials, and Engineering Research Center for Nano-Preparation Technology of Fujian Province, College of Chemistry and Chemical Engineering, Xiamen University, Xiamen 361005, China. E-mail: chenxl@xmu.edu.cn; nfzheng@xmu.edu.cn.

[b]Research Center of Biomedical Engineering, Department of Biomaterials, College of Materials, Xiamen University, Xiamen 361005, China. E-mail: jweng@xmu.edu.cn.



Scheme S1. Synthesis process of intermediate product (c,c,t-$Pt(NH_3)_2Cl_2(OH)_2$) and Pt(IV) prodrug (c,c,t-$Pt(NH_3)_2Cl_2(OOCCH_2CH_2CO_2H)_2$).

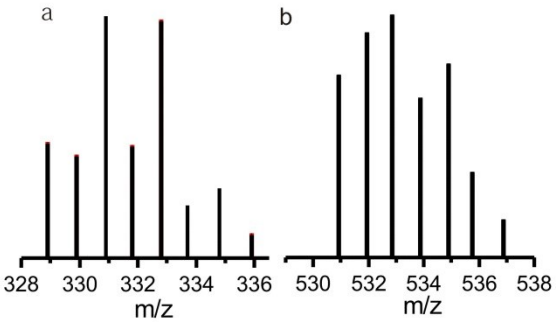


Fig.S1 Characterization of intermediate product c,c,t-$Pt(NH_3)_2Cl_2(OH)_2$ and Pt(IV) prodrug. ESI-MS data of intermediate product (a) and Pt(IV) drug (b) in the negative ion mode. Formula of intermediate product: $[H_8O_2N_2Cl_2Pt]^-$, m/z = 333.8; Formula of Pt(IV) drug: $[C_8H_{16}N_2O_8Cl_2Pt]^-$, m/z = 532.920.

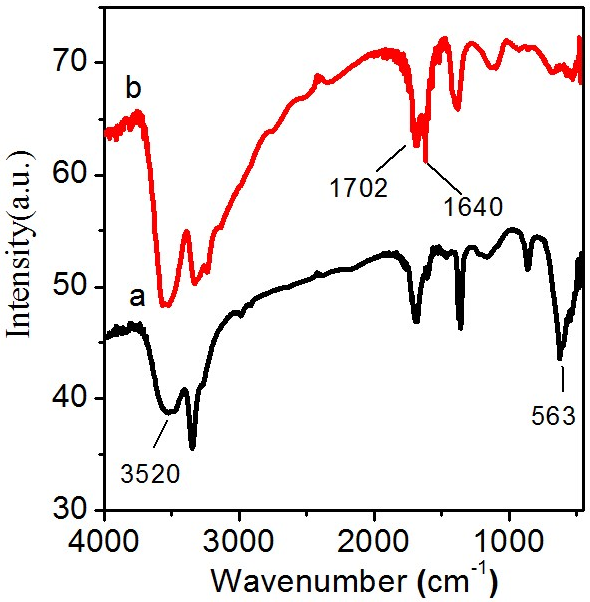


Fig.S2 The FT-IR spectra of intermediate product c,c,t-$Pt(NH_3)_2Cl_2(OH)_2$, a) and Pt(IV) prodrug c,c,t-$Pt(NH_3)_2Cl_2(OOCCH_2CH_2CO_2H)_2$, b). The strong band on 1702 cm^{-1} is the feature peak for free carboxyl group, indicative of the carboxylic structure of Pt(IV) drug. For c,c,t-$Pt(NH_3)_2Cl_2(OH)_2$, characteristic PtO-H and Pt-O stretching bands located at 3520 cm^{-1} and 563 cm^{-1}, respectively.

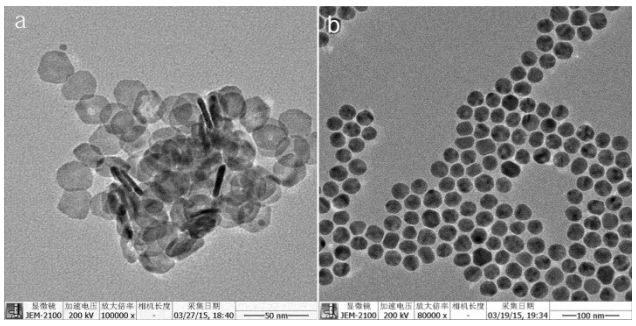


Fig.S3 (a) Typical TEM images of ≈30 nm Pd@Au with thickness of 4 nm and (b) 30 nm Au nanoparticles.

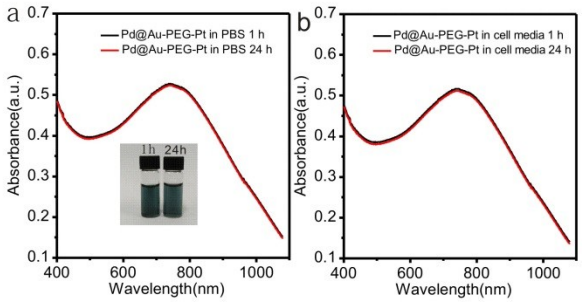


Fig.S4 Absorption spectra of Pd@Au–PEG-Pt nanocomposite in PBS and cell media for 1 h and 24 h, respectively. Insert: photos of Pd@Au–PEG-Pt nanocomposite in PBS for 1 h and 24 h.

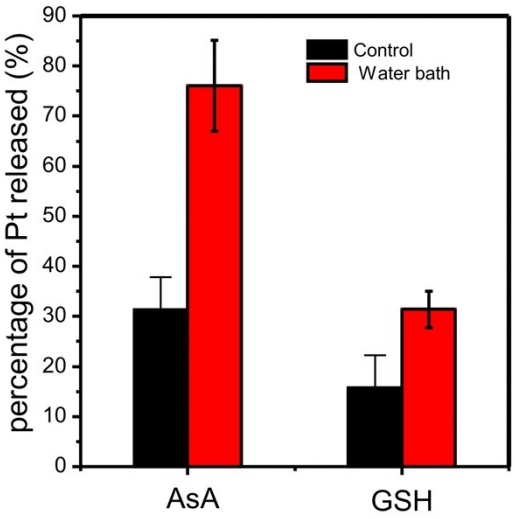


Fig.S5 Chemical reduction of Pt(II) from the Pd@Au–PEG-Pt by 0.1 mM AsA or 0.6 mM GSH without or incubation in 39 °C water bath for 60 min, respectively.

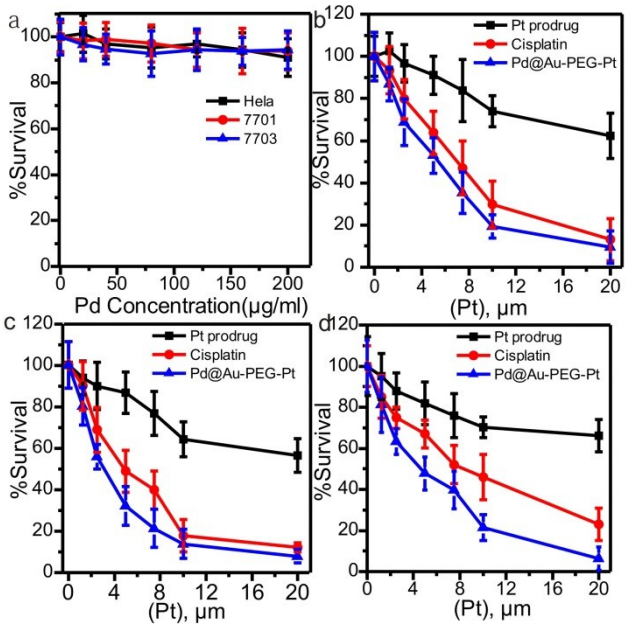


Fig.S6 Viability of different cell lines incubated for 48 h with different concentrations of Pd@Au–PEG-NH_2 (a), Pd@Au–PEG-Pt, free Pt(IV) prodrug and cisplatin (b, HeLa; c, 7703 and d, 7701).

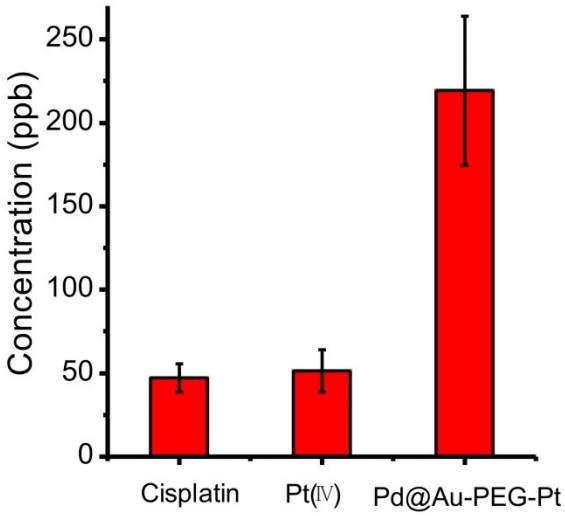


Fig.S7 The uptake of free cisplatin, Pt(IV) prodrug and Pd@Au–PEG-Pt by HeLa cells after 24 h incubation.

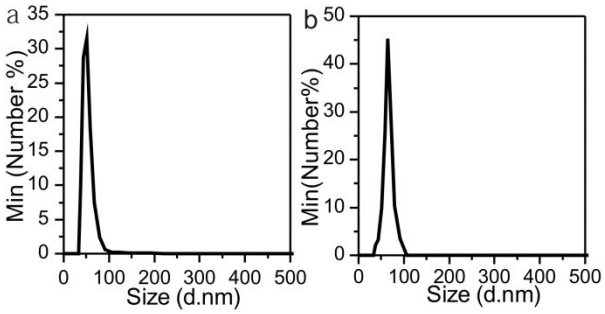


Fig.S8 Size distribution of Pd@Au–PEG-Pt (52 nm) and Au-PEG-Pt (64 nm) nanoparticles in water.

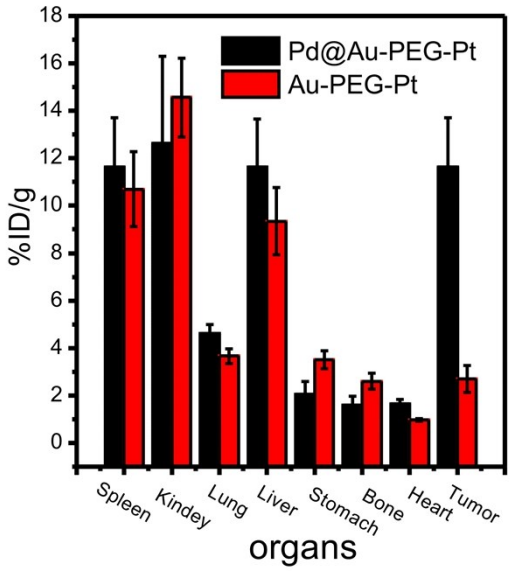


Fig.**S9** The biodistribution of Pd@Au-PEG-Pt and Au-PEG-Pt at different organs at 24 h post injection by measuring the Pt amount. The tissue distribution results by measuring Pt amounts are much lower than that by measing Au or Pd amounts since some Pt(IV) on Pd@Au-PEG-Pt are reduced by AsA or GSH to Pt(II) that might be cleared from body through renal excretion route (the accumulation amount in kindey is ~13%ID/g, much higher than that result presented in Fig.4b (~6%ID/g)).

Table S1. Zeta potentials of Pd@Au–PEG, Pd@Au–PEG-Pt, Au-PEG and Au-PEG-Pt, respectively (PEG and Pt stand for HS-PEG-NH_2 and Pt(IV) prodrug, respectively).

Zeta potential （mV）	Pd@Au–PEG	Pd@Au-PEG-Pt	Au-PEG	Au-PEG-Pt
	3.12	-4.28	4.96	-2.59