Electronic supplementary information (ESI) for

Fe_2O_3@Au Core@Shell Nanoparticle-Graphene Nanocomposites as Theranostic Agents for Bioimaging and Chemo-Photothermal Synergistic Therapy

Hongda Chen,[a] Fuyao Liu, [a,b] Zhen Lei,[a,b] Lina Ma[,a] and Zhenxin Wang*[,a]*

[a]*State Key Laboratory of Electroanalytical Chemistry, Changchun Institute of Applied Chemistry, Chinese Academy of Sciences, Changchun, 130022, P. R. China*

[b]*University of Chinese Academy of Sciences, Beijing, 100039, P. R. China*

E-mail: malina@ciac.ac.cn (LM) and wangzx@ciac.ac.cn (ZW).

Table S1 The Zeta potentials and hydrodynamic diameters of as-prepared nanocomposites.

Nanocomposites	Zeta potential (mv)	hydrodynamic diameter (nm)
NH_2-PEG-Fe_2O_3@Au NPs	12.9	129.4
rGO-COOH	-29.5	616.0
rGO-Fe_2O_3@Au NPs	-21.1	611.7

The PEG can significantly improve the colloidal stability and dispersibility of nanocomposites, resulting in that hydrodynamic diameter of rGO-Fe_2O_3@Au NPs is slightly smaller than that of rGO-COOH.

Table S2 Comparison of calculated f_{add} from f_{chem} and f_{PTT} with $f_{chem\text{-}PTT}$.

Concentration (μg mL^{-1})	f_{add}	$f_{chem\text{-}PTT}$
10	0.786	0.756
20	0.566	0.482
30	0.313	0.254
40	0.123	0.111
50	0.04	0.03

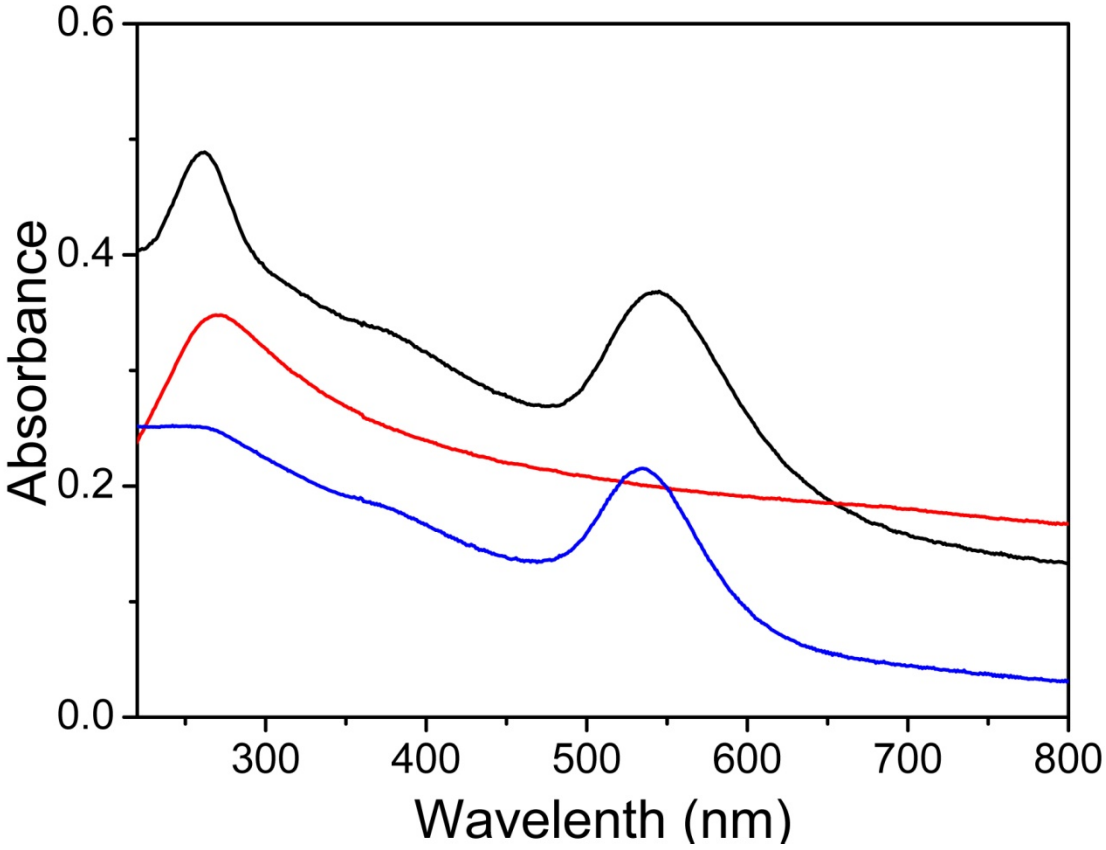

Fig. S1 UV-visible spectra of NH_2-PEG-Fe_2O_3@Au NPs (blue line), rGO-COOH (red line) and rGO-Fe_2O_3@Au NPs (black line), respectively.

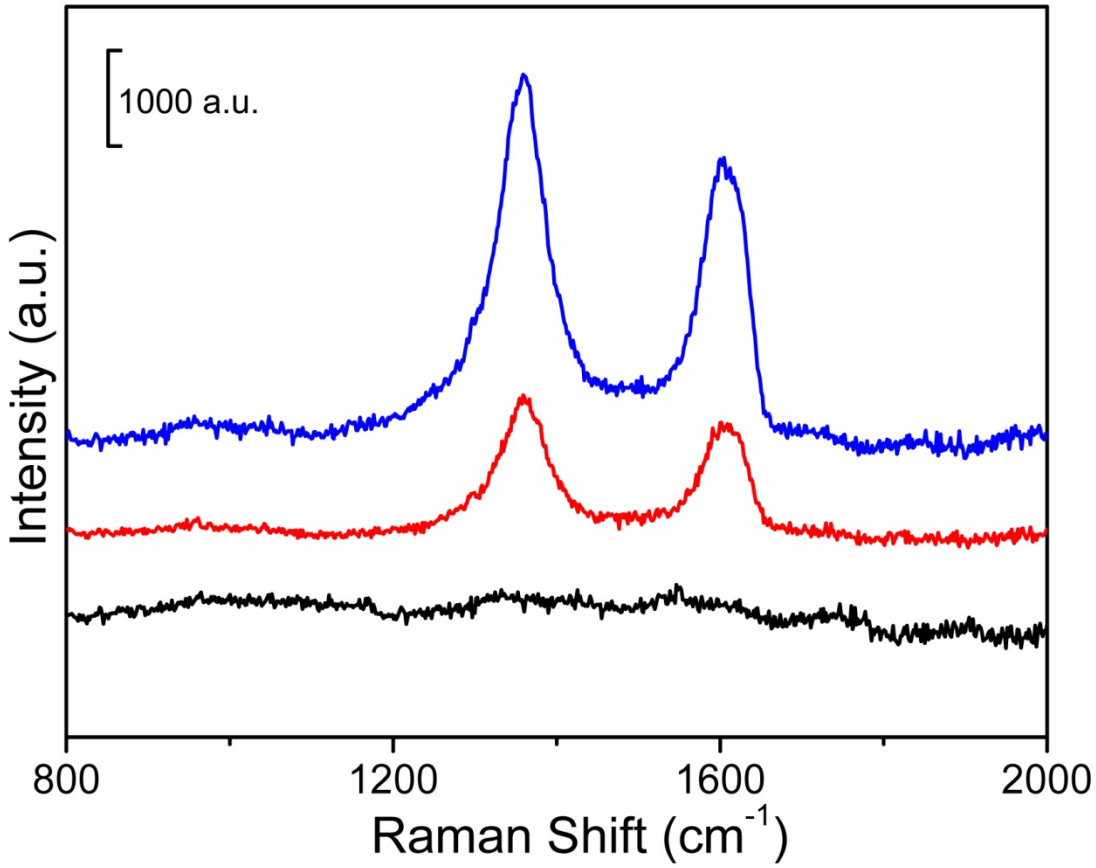

Fig. S2 Raman spectra of NH_2-PEG-Fe_2O_3@Au NPs (black line), rGO-COOH (red line) and rGO-Fe_2O_3@Au NPs (blue line), respectively.

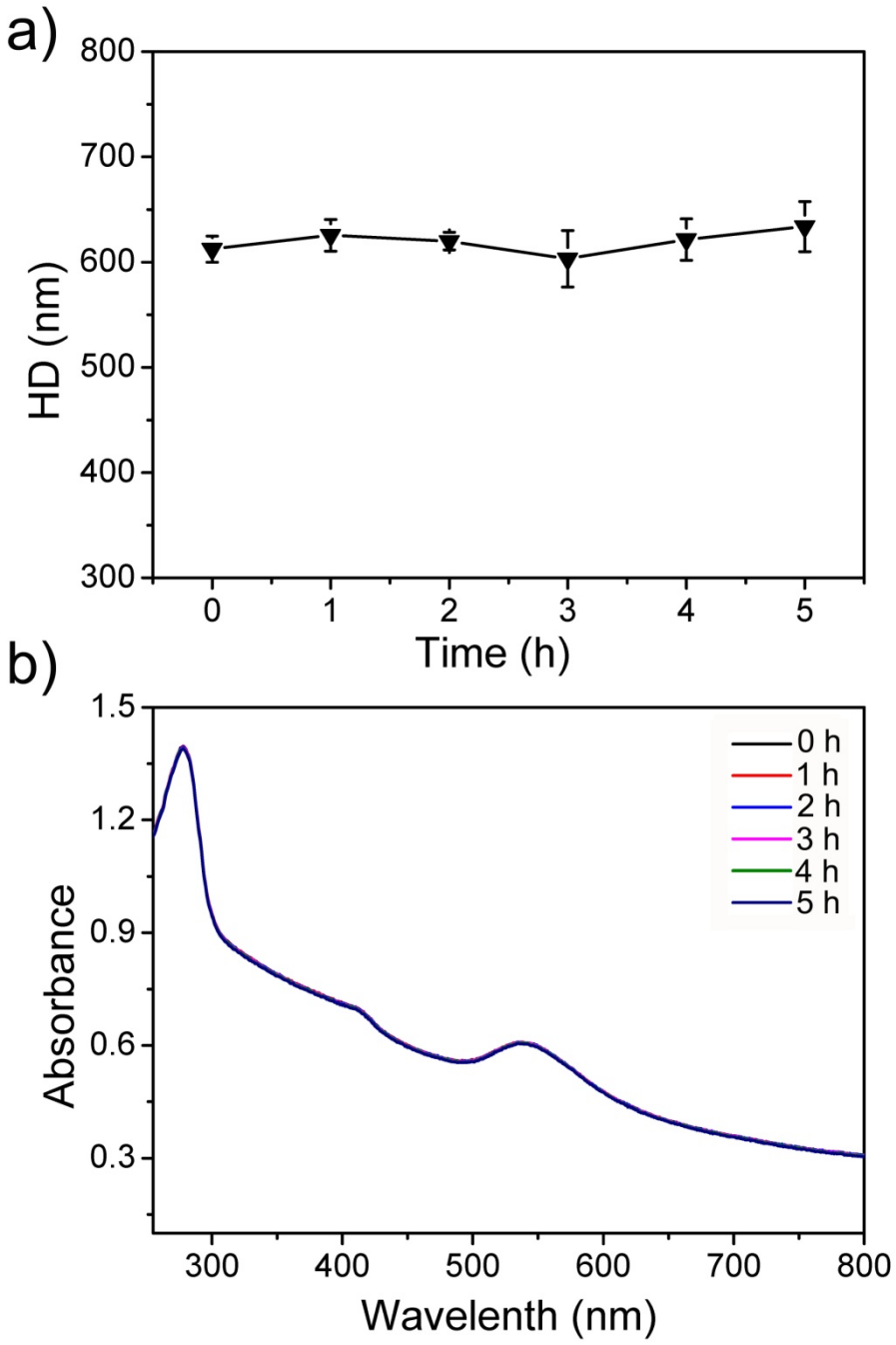

Fig. S3 (a) Hydrodynamic size and (b) UV-visible spectrum of rGO-Fe_2O_3@Au NPs which were incubated in fresh DMEM supplemented with 10% (v/v) FBS for 5 h.

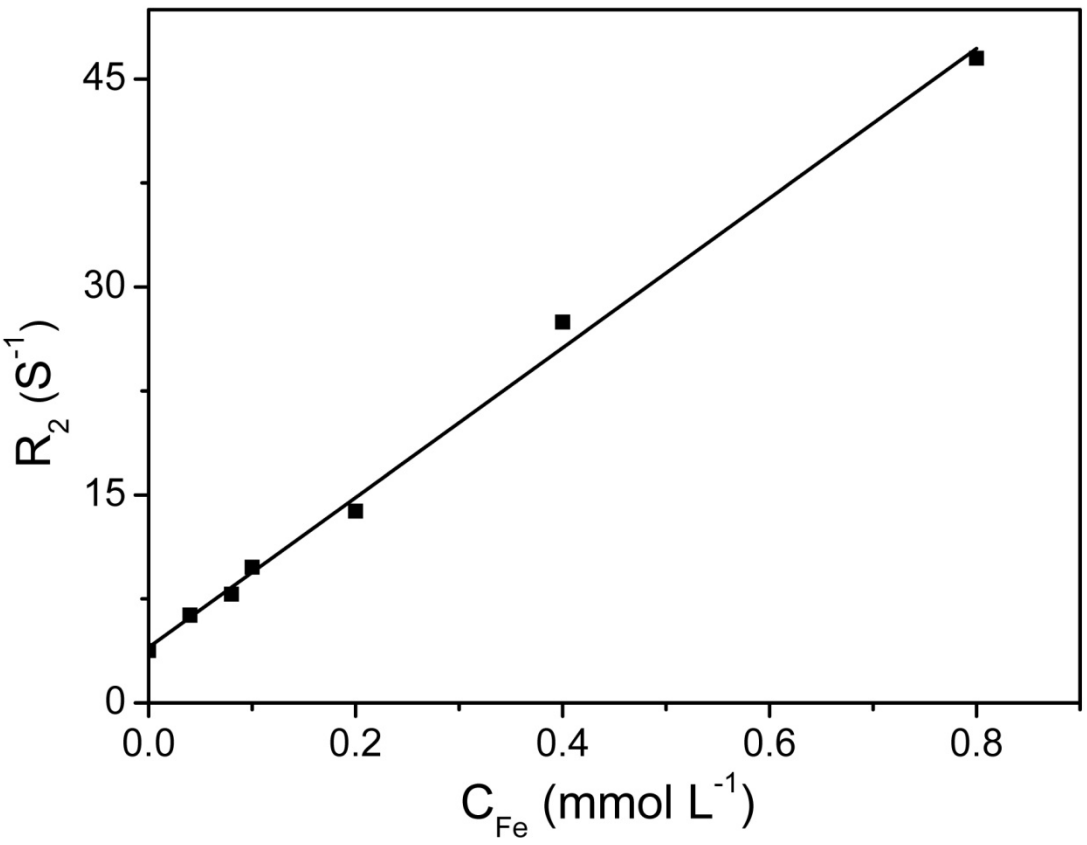

Fig. S4 R_2 relaxivity of rGO-Fe_2O_3@Au NPs as a function of the molar concentration of Fe^{3+} in the solution.

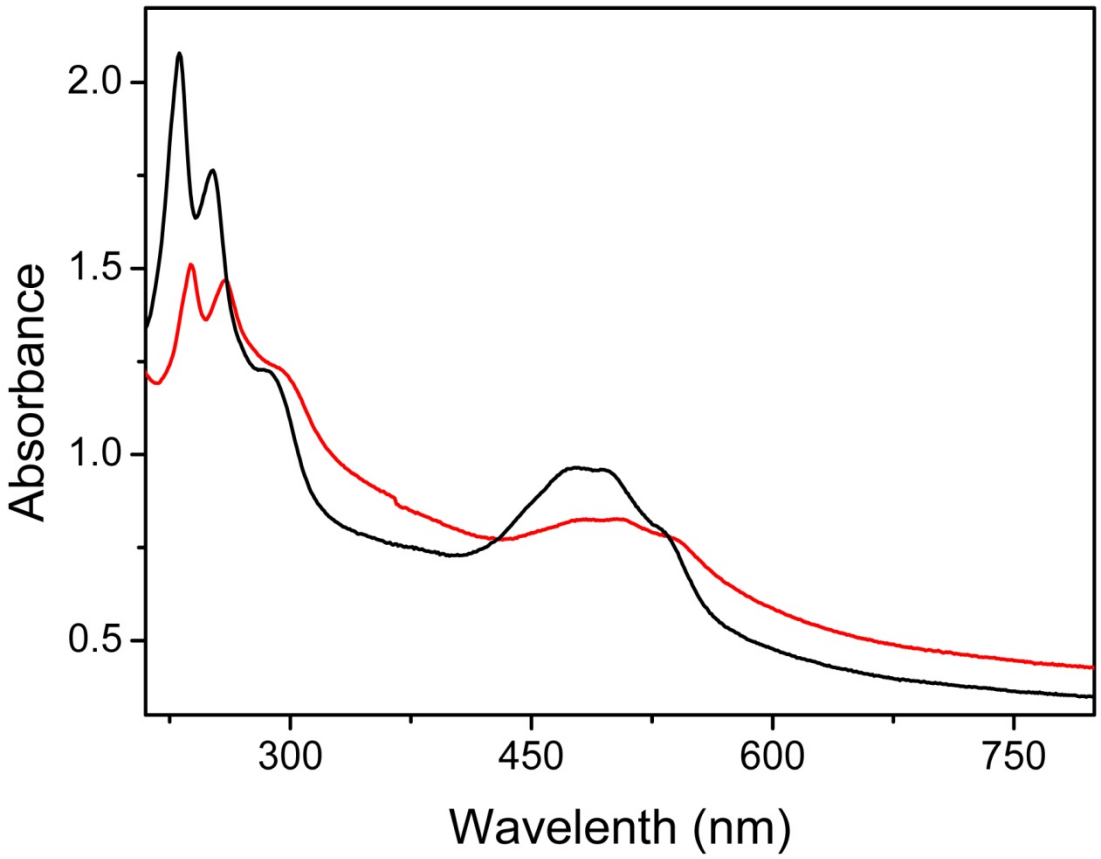

Fig. S5 UV-visible spectra of DOX (black line) and DOX-rGO-Fe_2O_3@Au NPs (red line), respectively.

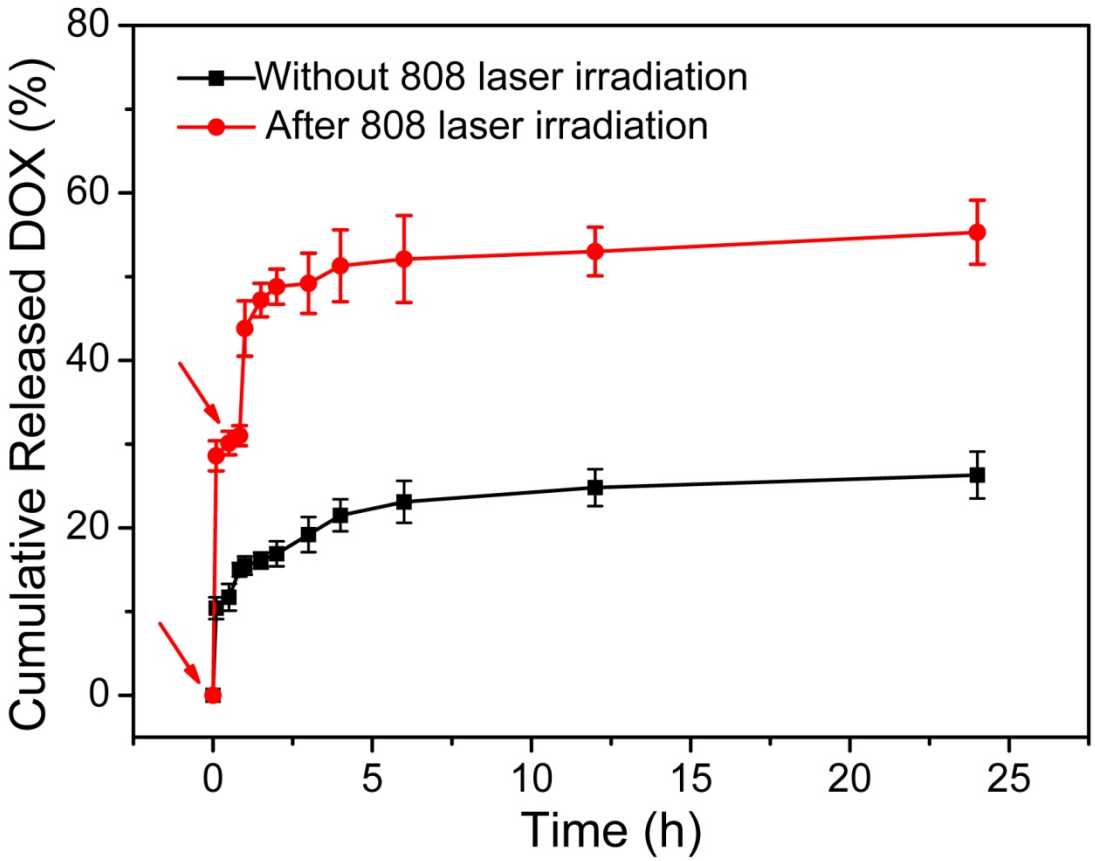

Fig. S6 DOX release from rGO-Fe_2O_3@Au NPs over time in PBS. In the NIR-triggered release of DOX from rGO-Fe_2O_3@Au NPs, which were irradiated with an 808 nm NIR laser (2 W cm^{-2}) for 5 min at time points indicated by arrows. Error bars mean standard deviations (n = 5).

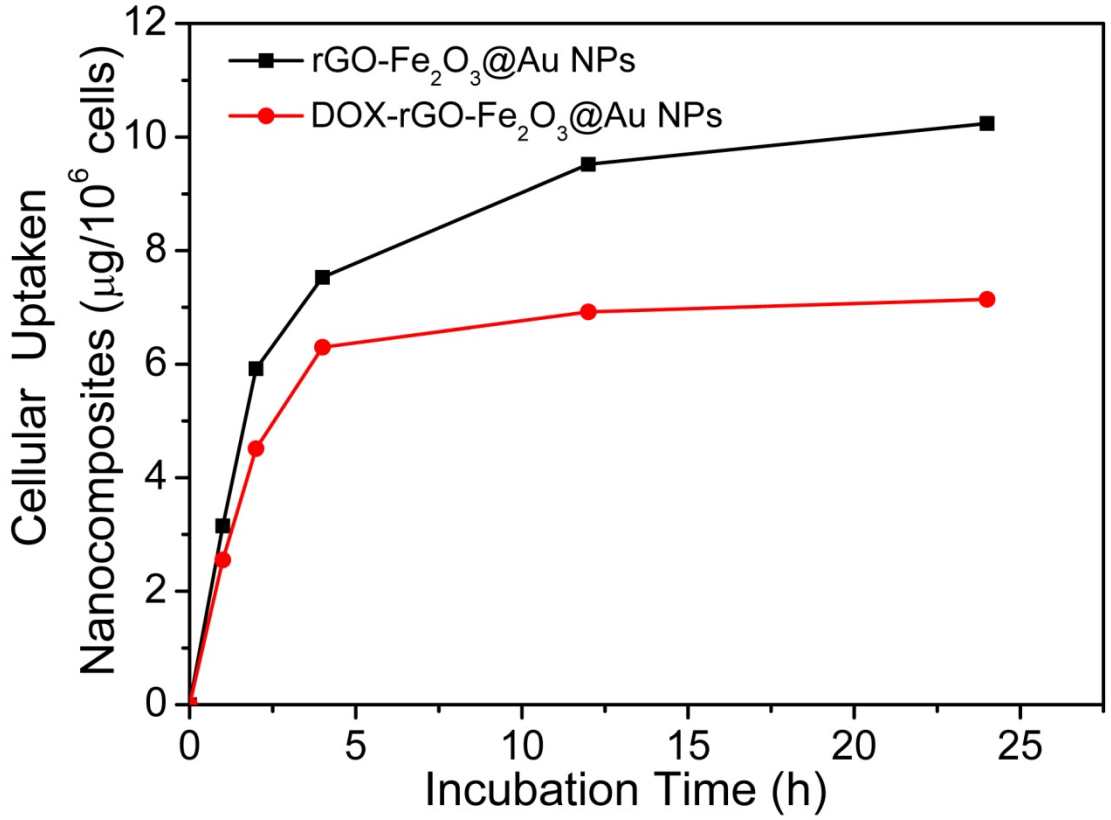

Fig. S7 Cellular Uptake of DOX-rGO-Fe_2O_3@Au NPs or rGO-Fe_2O_3@Au NPs. The concentrations of DOX-rGO-Fe_2O_3@Au NPs and rGO-Fe_2O_3@Au NPs are 50 μg mL^{-1} at a rGO concentration in cell culture medium, respectively.

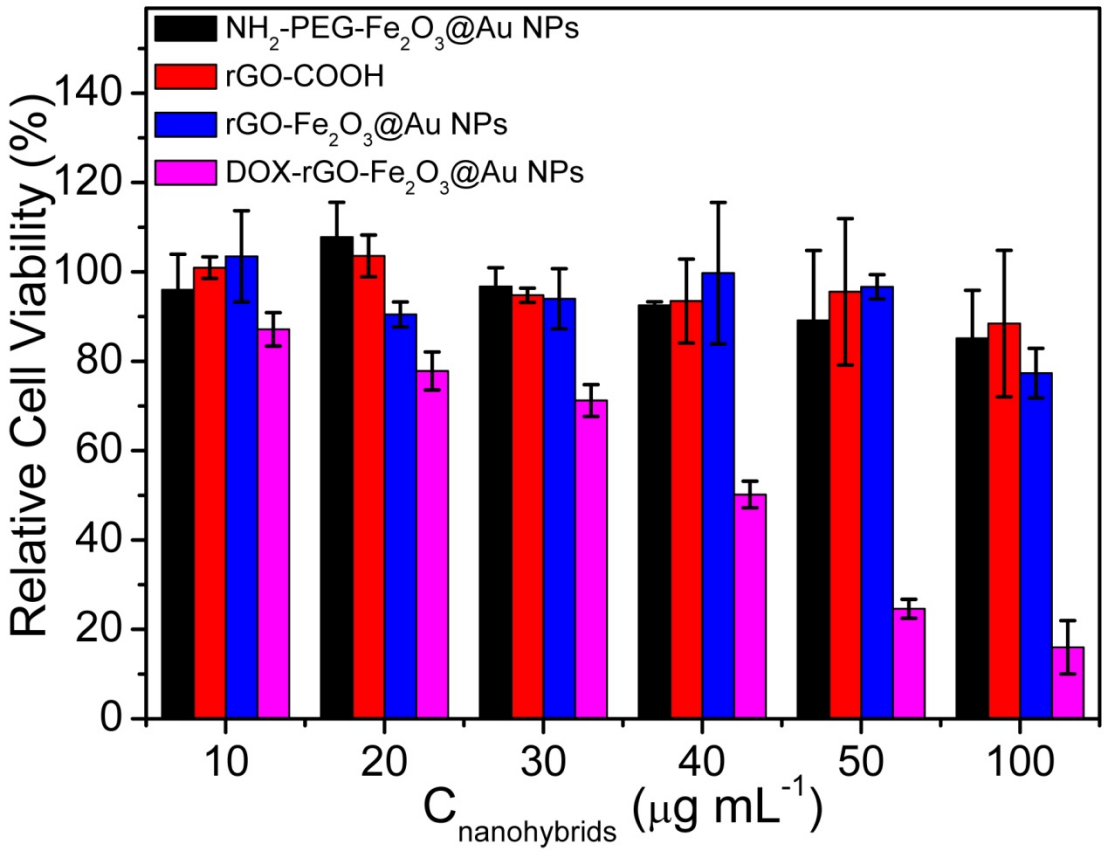

Fig. S8 The viabilities HeLa cells which incubated with different concentrations of nanomaterials for 24 h, respectively. The concentrations of rGO-COOH, rGO-Fe_2O_3@Au NPs and DOX-rGO-Fe_2O_3@Au NPs are defined by rGO content, and the concentration of NH_2-PEG-Fe_2O_3@Au NPs is defined by Fe_2O_3@Au NPs content, respectively. The error bars mean standard deviations (n = 5).

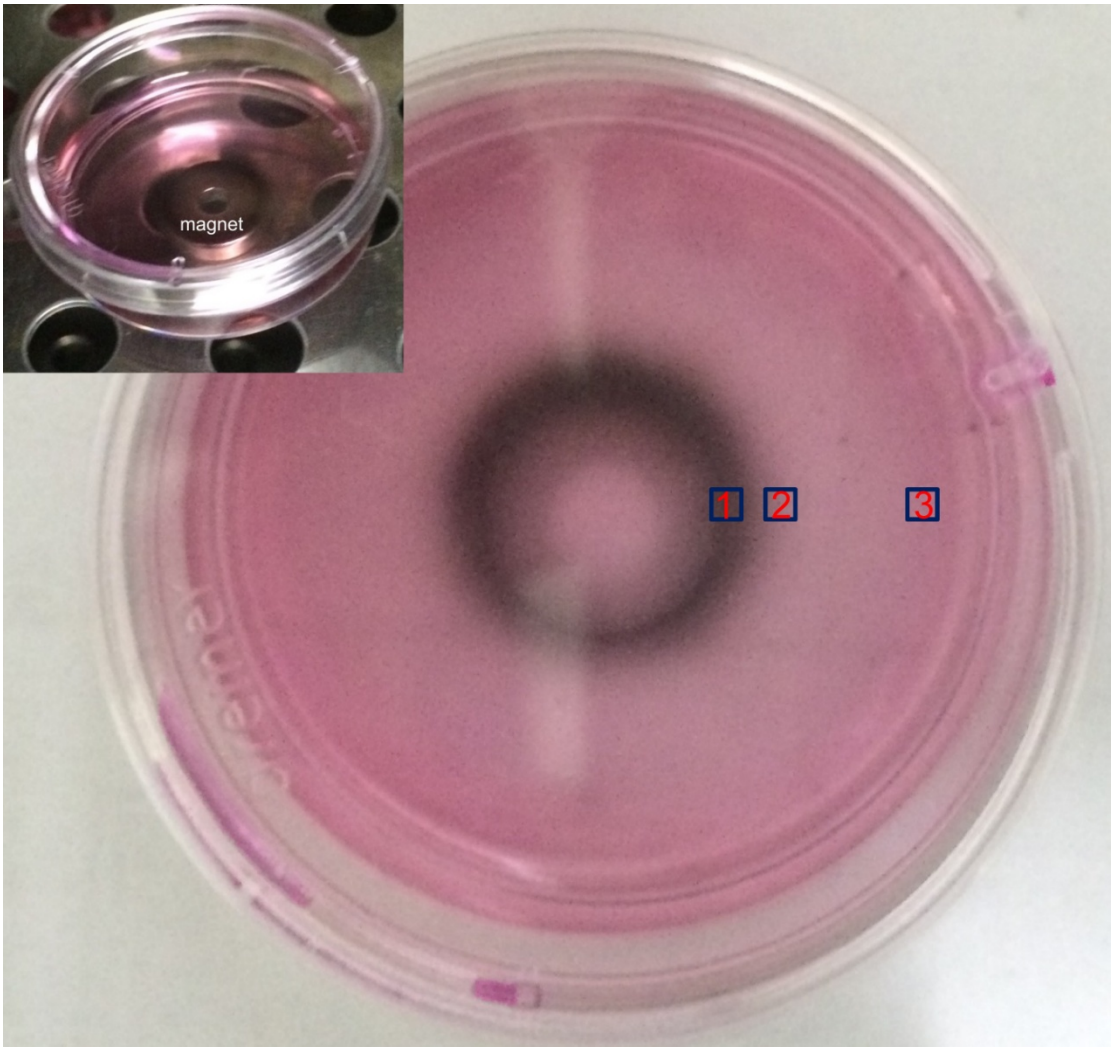

Fig. S9 Digital photos of HeLa cells incubated with DOX-rGO-Fe_2O_3@Au NPs and a magnet. Position 1, right above the magnet; position 2, at the edge of the magnet; and position 3, far from the magnet.