

Electronic Supplementary Information (ESI) for
**Preparation and application of thionin-bridged graphene-gold
nanoparticle nanohybrids**

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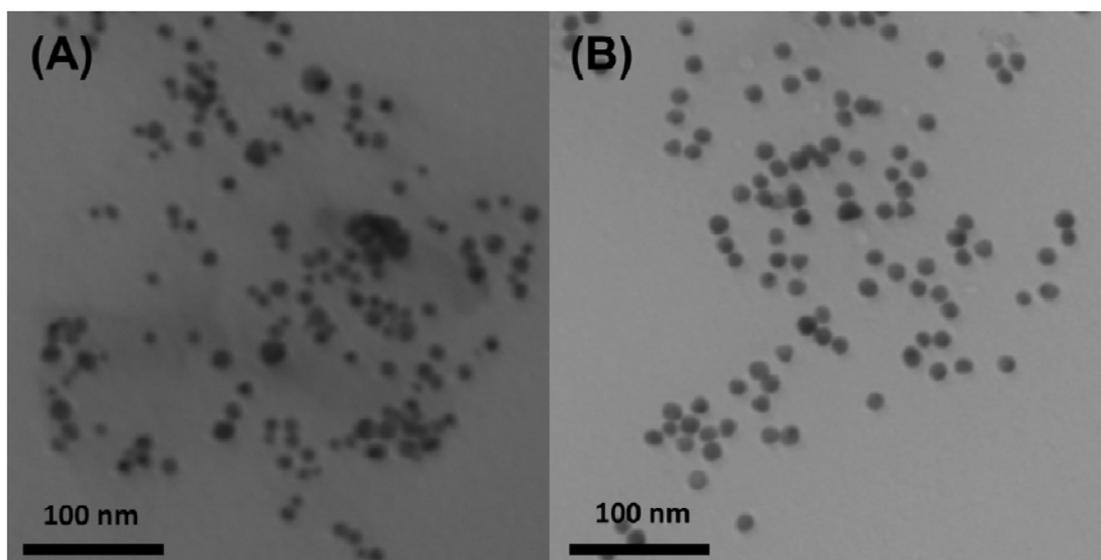


Fig. S1 TEM images of AuNP-MPA (A) and AuNP-MUA (B) decorated TH-rGO sheets via EDC/NHS conjugation.

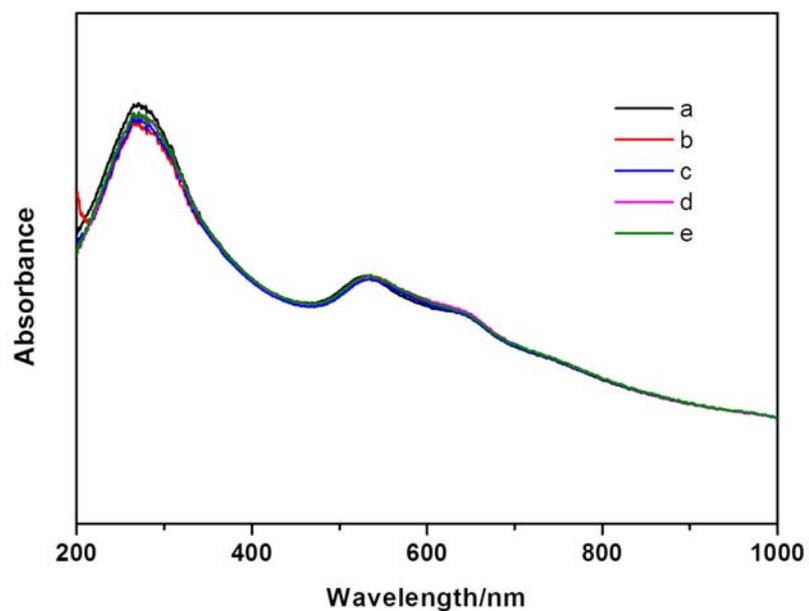


Fig. S2 The UV-vis-NIR spectra of as-prepared AuNP-TH-rGO before (curve a) and after treated with 10 mM hydrochloric acid (curve b), 10 mM NaOH (curve c), 0.5 M NaCl saline (curve d) and sonication for 10 min (curve e), respectively.

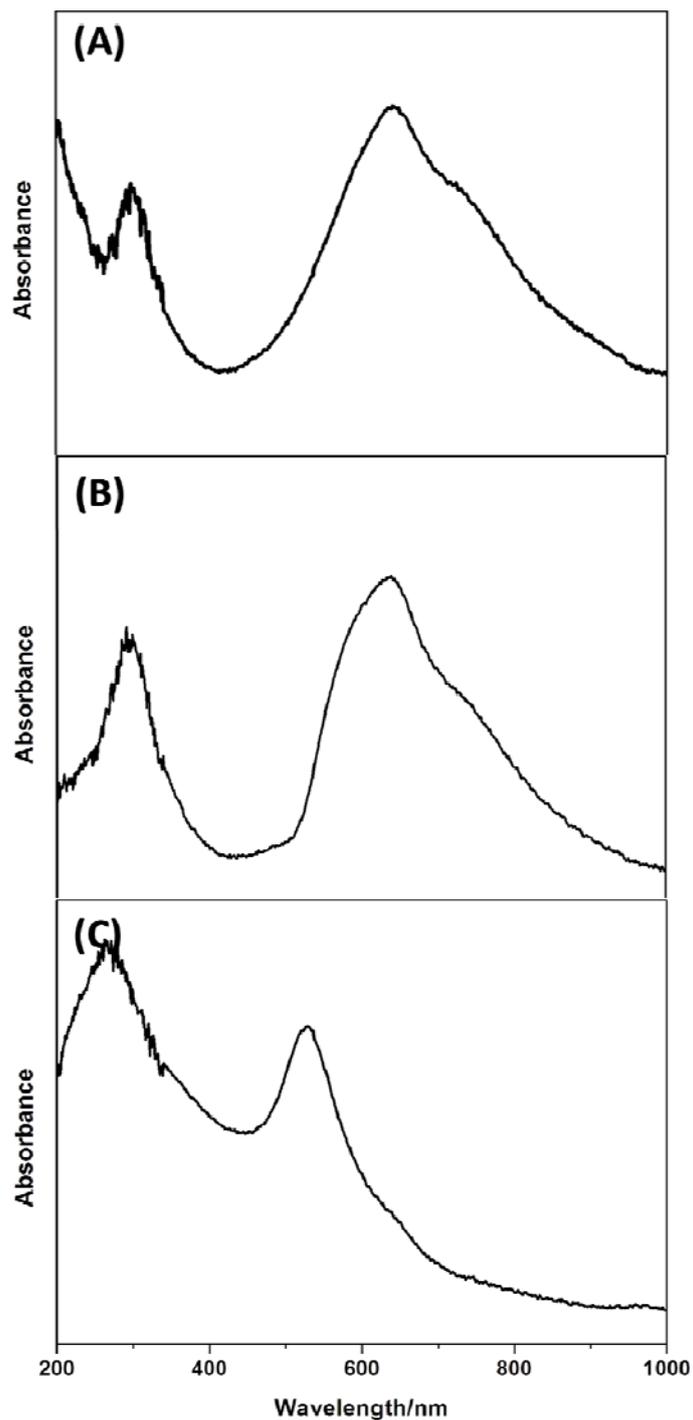


Fig. S3 Difference spectra of rGO, TH-rGO and Au-TH-rGO.

The absorption of Au-TH-rGO is subtracted by the absorption of rGO and AuNP-CALNN (A), the absorption of TH-rGO is subtracted by the absorption of rGO (B), and the absorption of Au-TH-rGO is subtracted by the absorption of TH-rGO (C), respectively.

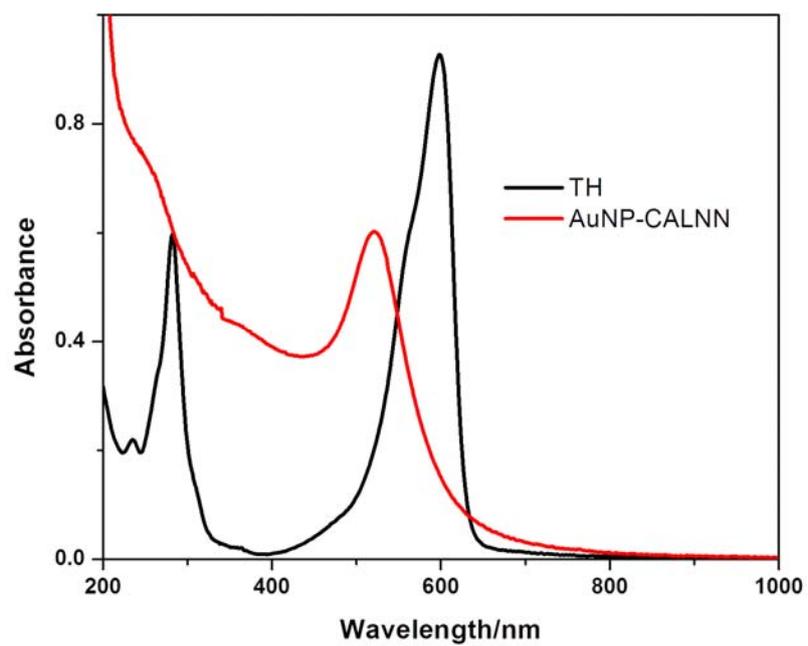


Fig. S4 UV-vis-NIR spectra of AuNP-CALNN and TH.

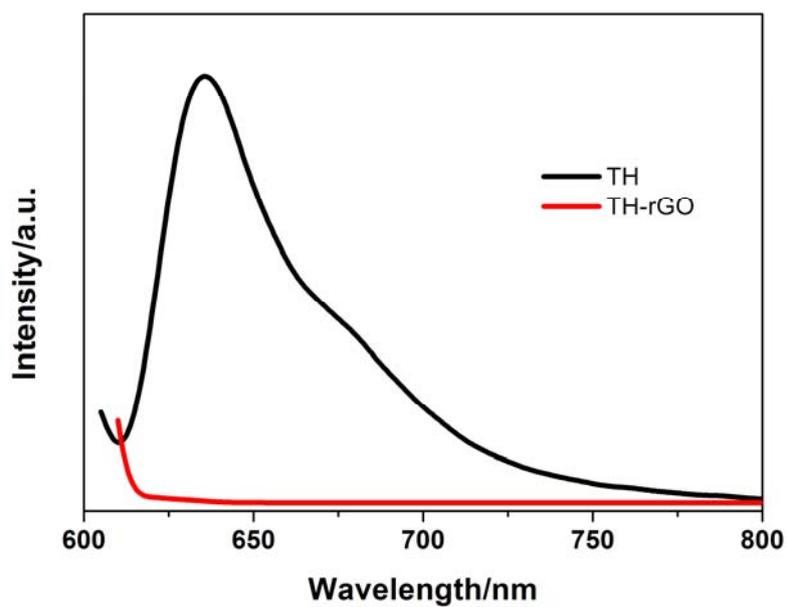


Fig. S5 Fluorescence spectra of TH and TH-rGO aqueous solutions with an excitation wavelength of 598 nm.

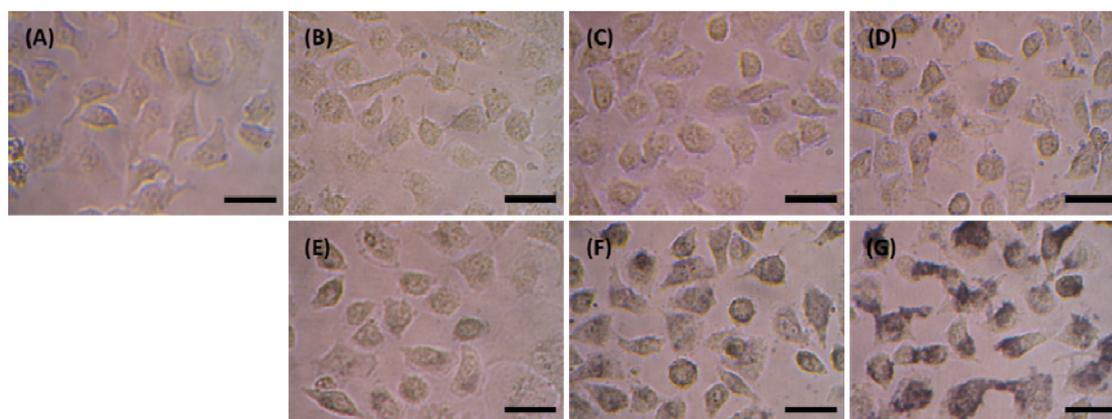


Fig. S6 Bright-field microscopic images of control cells (A), cells incubated with AuNP-TH-rGO only (B, C and D) and PLL-AuNP-TH-rGO (E, F and G). The concentrations of AuNP-TH-rGO are 3 (B and E), 10 (C and F) and 20 $\mu\text{g mL}^{-1}$ (D and G), respectively. The scale bar is 50 μm .

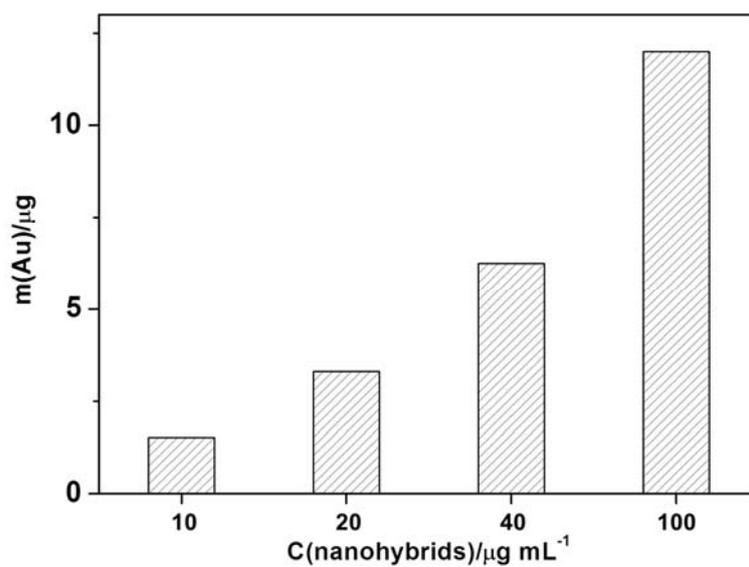


Fig. S7 The amount of cellular uptaken Au determined by ICP-OES as a function of the concentration of PLL-AuNP-TH-rGO in cell culture medium.

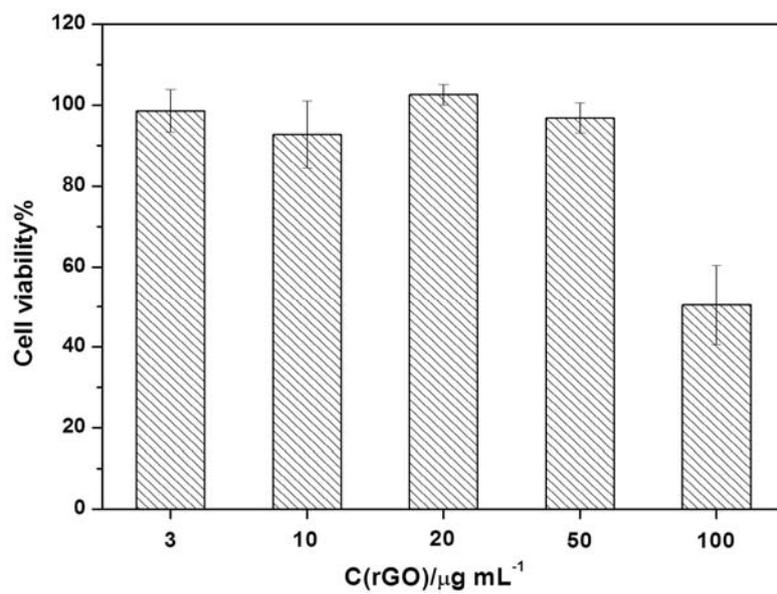


Fig. S8 The viability profile of cells which incubated with different concentrations of PLL-rGO for 24 h.

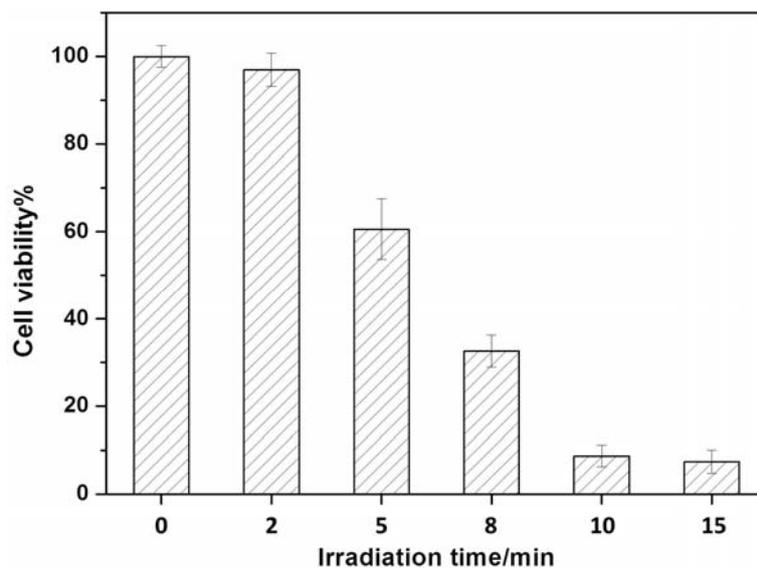


Fig. S9 The viability profile of cells which incubated with PLL-AuNP-TH-rGO after NIR irradiation for different time. The concentration of AuNP-TH-rGO is $40 \mu\text{g mL}^{-1}$.

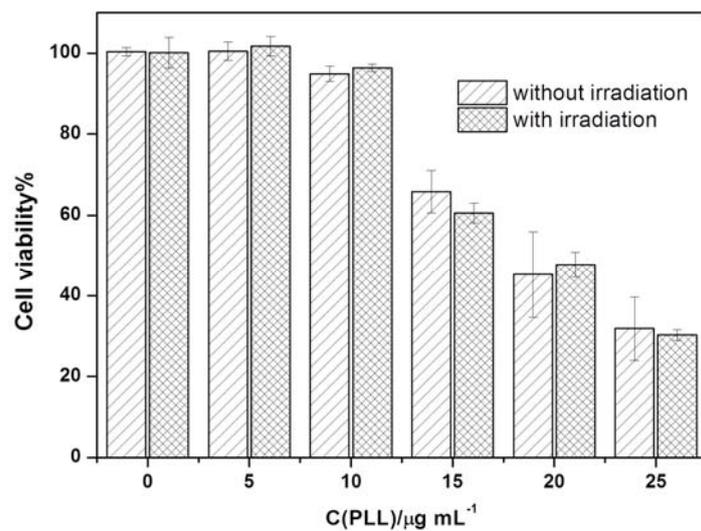


Fig. S10 The viability profile of cells which incubated with different concentrations of PLL for 48 h with or without NIR irradiation.