Supporting Information

Functionalized Graphene Sheets for Intracellular Controlled Release of Therapeutic Agents

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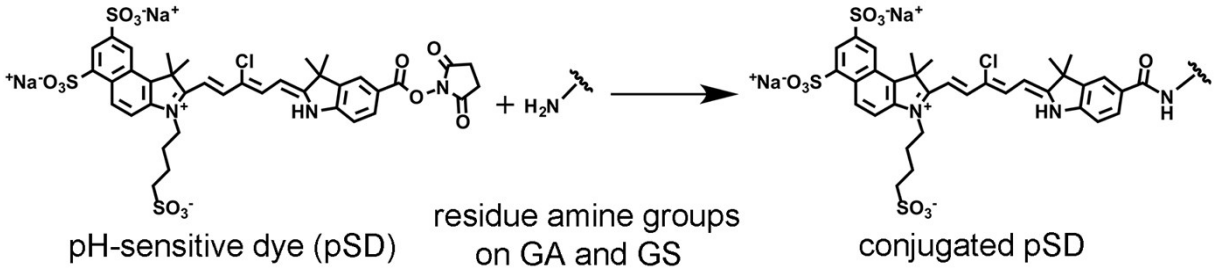
1. Detailed structure of pH-sensitive dye (pSD) and the detailed conjugation reaction

Scheme S1. The detailed structure of pSD and the detailed conjugation reaction.



2. UV-vis absorption and fluorescence spectra

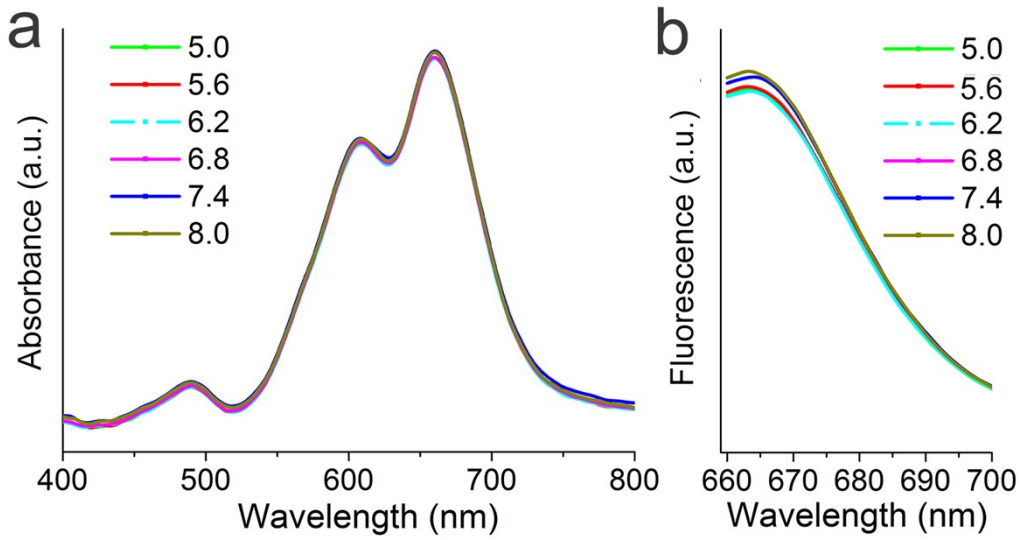


Figure S1. UV-vis absorption and fluorescence spectra (excitation: 635 nm) of GA_{IDCC} with pH ranging from 5.0 to 8.0.

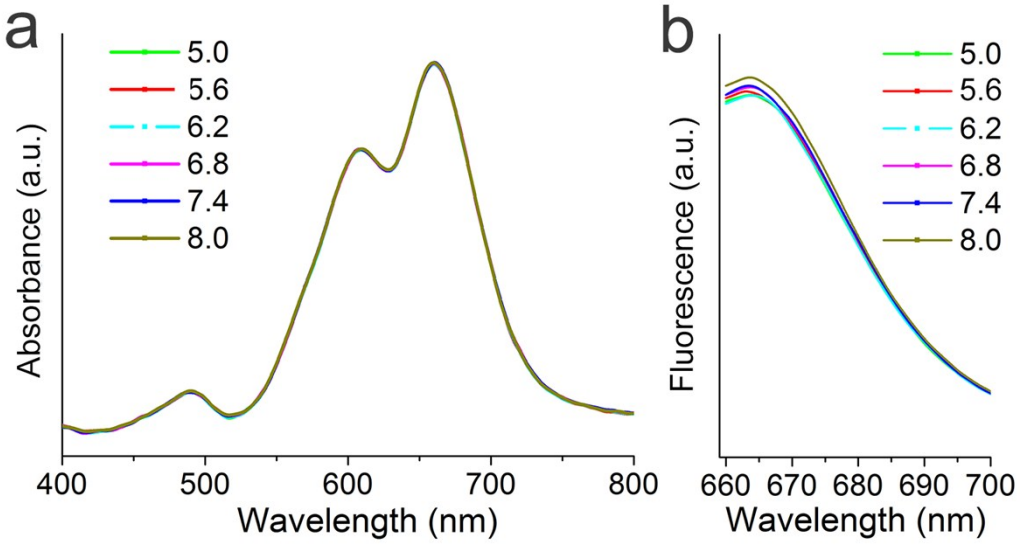


Figure S2. UV-vis absorption and fluorescence spectra (excitation: 635 nm) of GS_{IDCC} with pH ranging from 5.0 to 8.0.

3. Relative fluorescence intensity

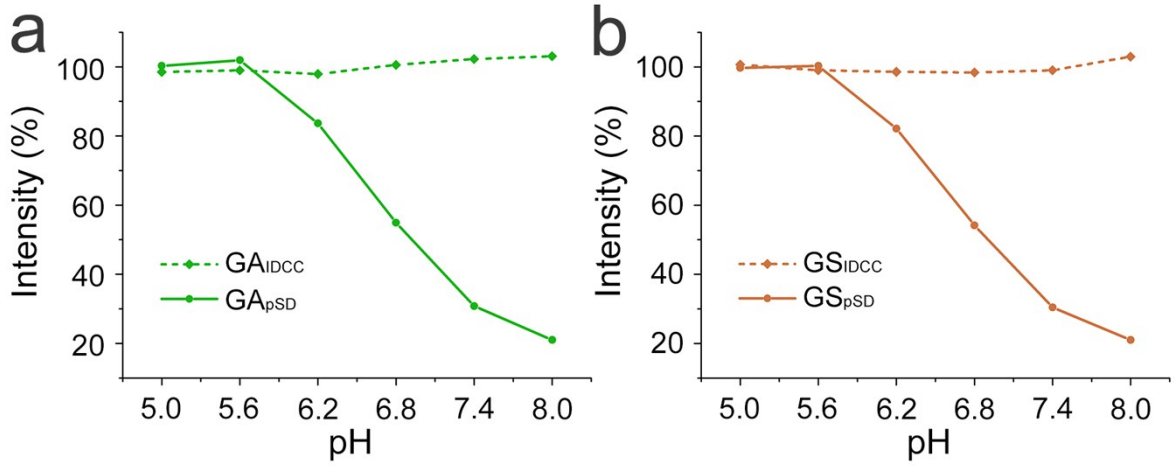


Figure S3. The relative fluorescence intensity (excitation: 640 nm, emission: 670 nm) of GA_{pSD} and GS_{pSD} compared with GA_{IDCC} and GS_{IDCC} with pH ranging from 5.0 to 8.0.

4. Protein adsorption

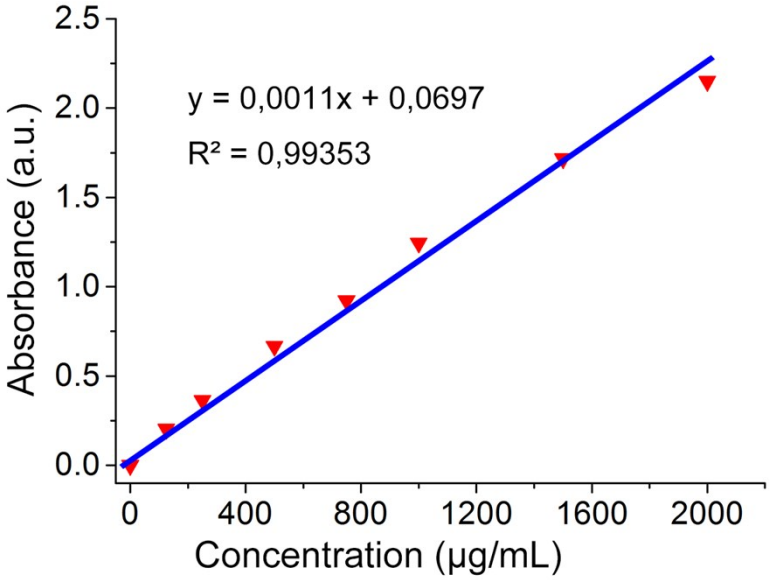


Figure S4. The calibration curve of bovine serum albumin (BSA) in PBS with the absorption at 562 nm.

As the absorption for the initial BSA concentration was 0.7082 and the value for the BSA concentration in the supernatant of GA and GS was 0.6759 ± 0.0182 and 0.7077 ± 0.0067, respectively. With Equation 2 we calculated the protein absorption capacity of GA as 0.058 ± 0.002 mg/mg and the value for GS was almost 0.

5. Solubility tests

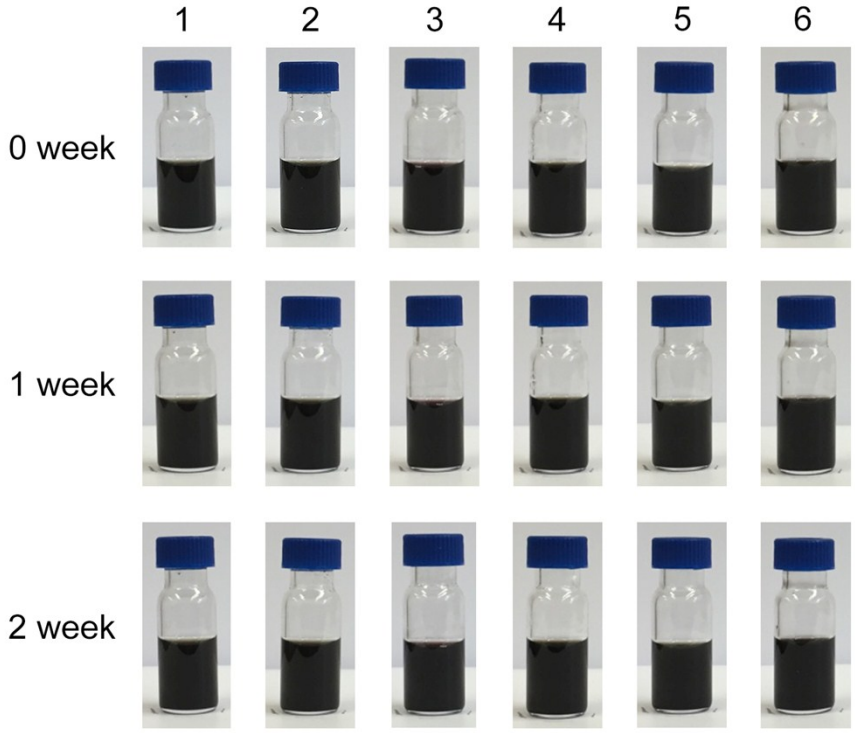


Figure S5. The solubility tests at 1st week, and 2nd week for GA dispersed in PBS (1), GA_p dispersed in PBS (2), GA dispersed in DMEM (3), GS dispersed in PBS (4), GS_p dispersed in PBS (5), GS dispersed in DMEM (6). The concentration of each sample was 1 mg/mL.

6. Characterization of GA_D and GS_D

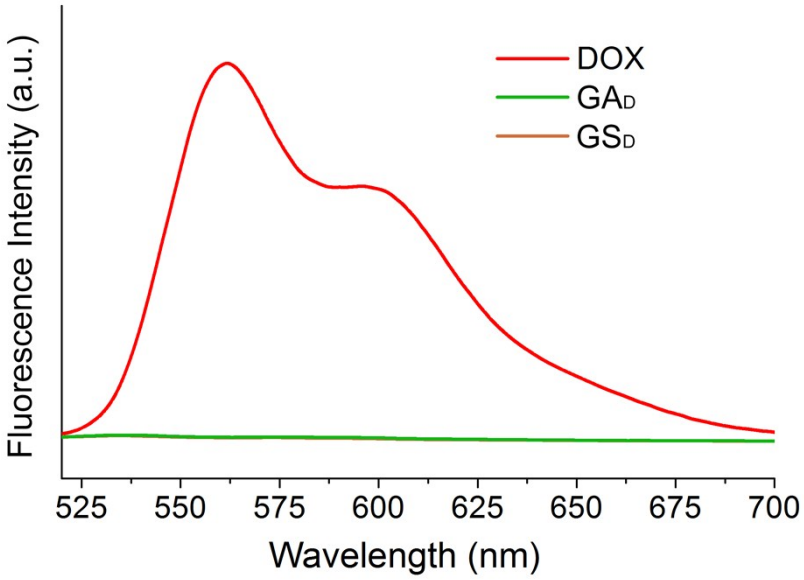


Figure S6. Fluorescence (excitation: 498 nm) of DOX, GS_D, and GA_D (10 μg/mL).

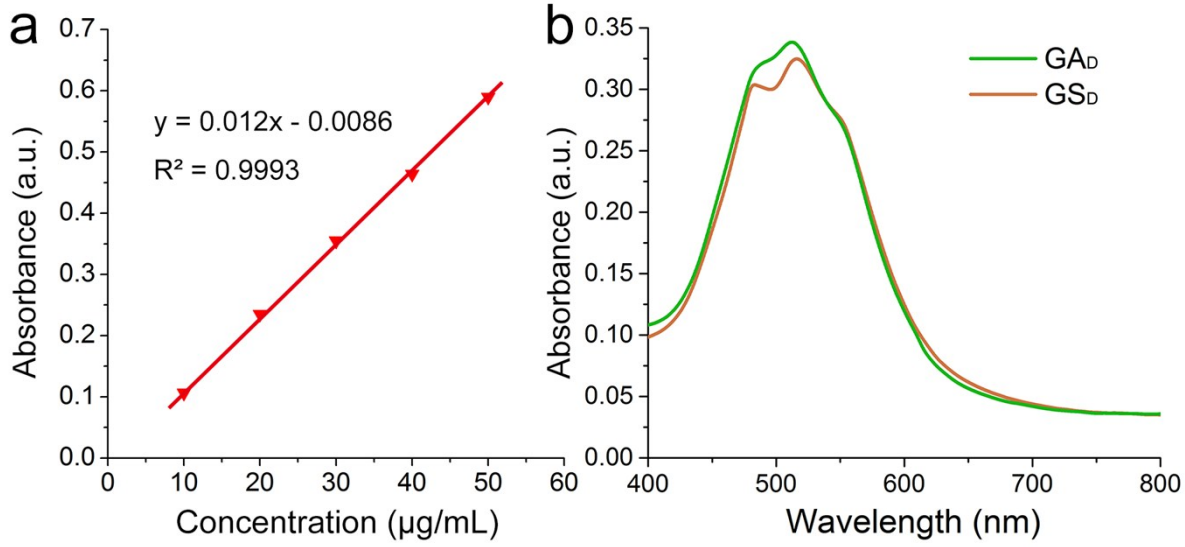


Figure S7. (a) The calibration curve of DOX in PBS with the absorption at 545 nm; (b) the absorption spectra of GA_D and GS_D (the concentration of GA and GS was 15 μg/mL), GA and GS (15 μg/mL) were employed as background, respectively.

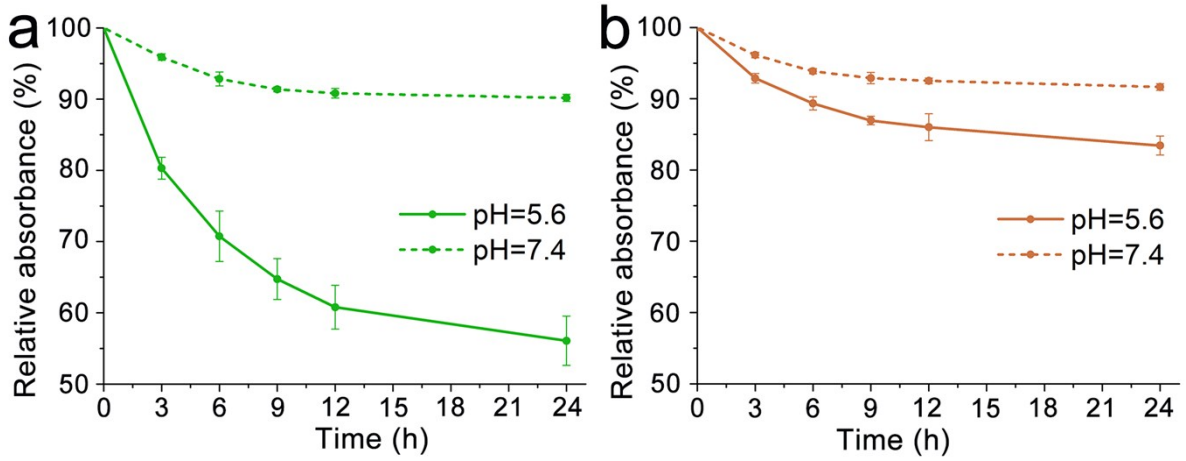


Figure S8. The time course of the relative absorbance (545 nm) change of GA_D (a) and GS_D (b) solution at 37 °C in various media. Means ± SD (n = 3). The absorbance at starting point is set as 100%.

7. Biocompatibility of GA and GS

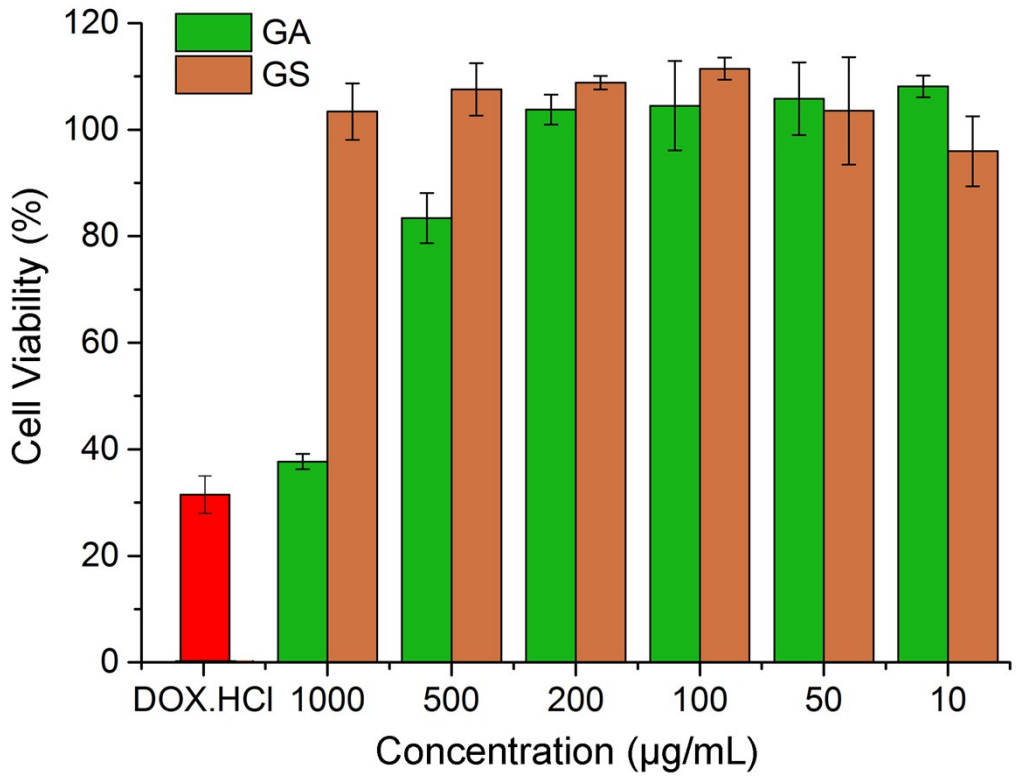


Figure S9. The cytotoxicity data of GS and GA obtained from the CCK8 assay of A549 cells after 48 h treatment. DOX.HCl (2 μg/mL) was applied as positive control.

8. CLSM experiments

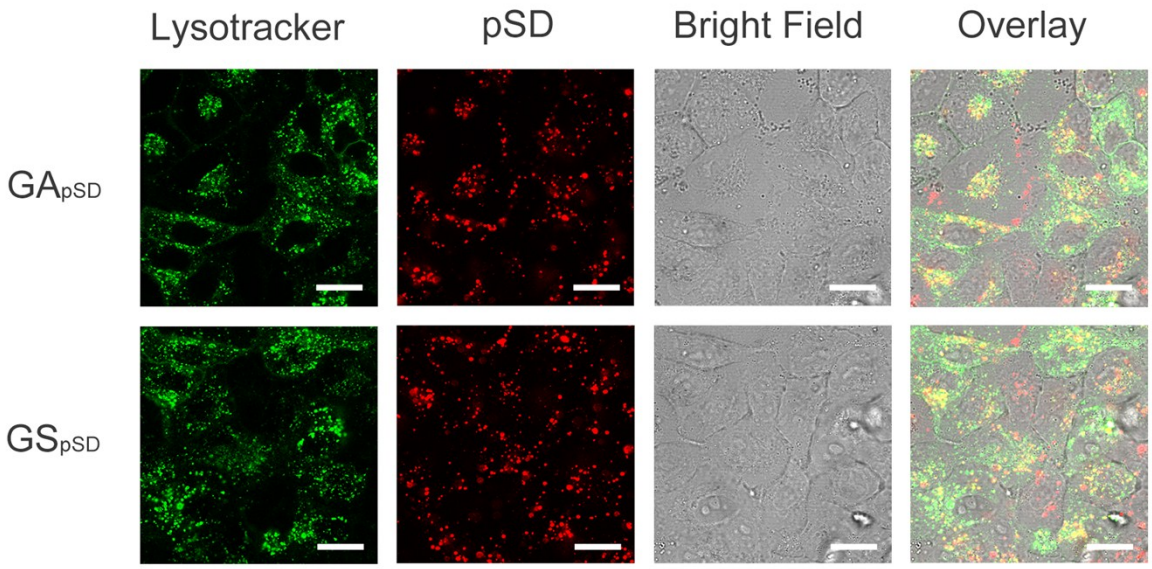


Figure S10. CLSM images of A549 cells incubated for 30 min with GA_{pSD} and GS_{pSD}, respectively. Images were taken after a washing step at 4 h. Scale bars correspond to 25 µm.

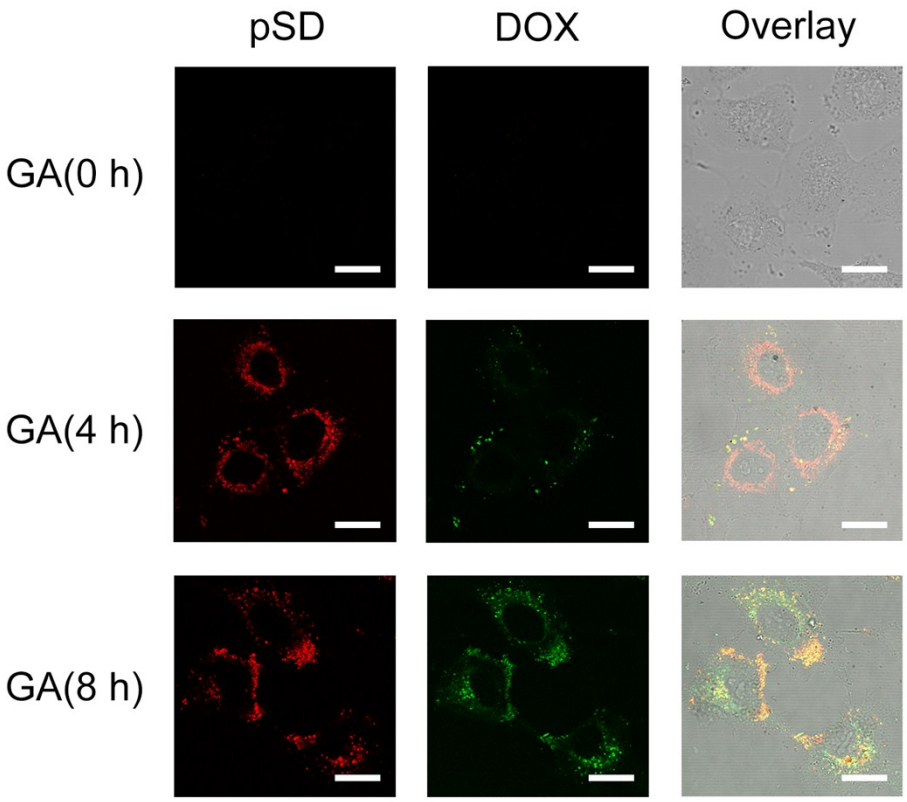


Figure S11. CLSM images of A549 cells incubated for 30 min with pSD-labeled GA_D. Images were taken after a washing step at 0 h, 4 h and 8 h, respectively. Scale bars correspond to 25 µm.

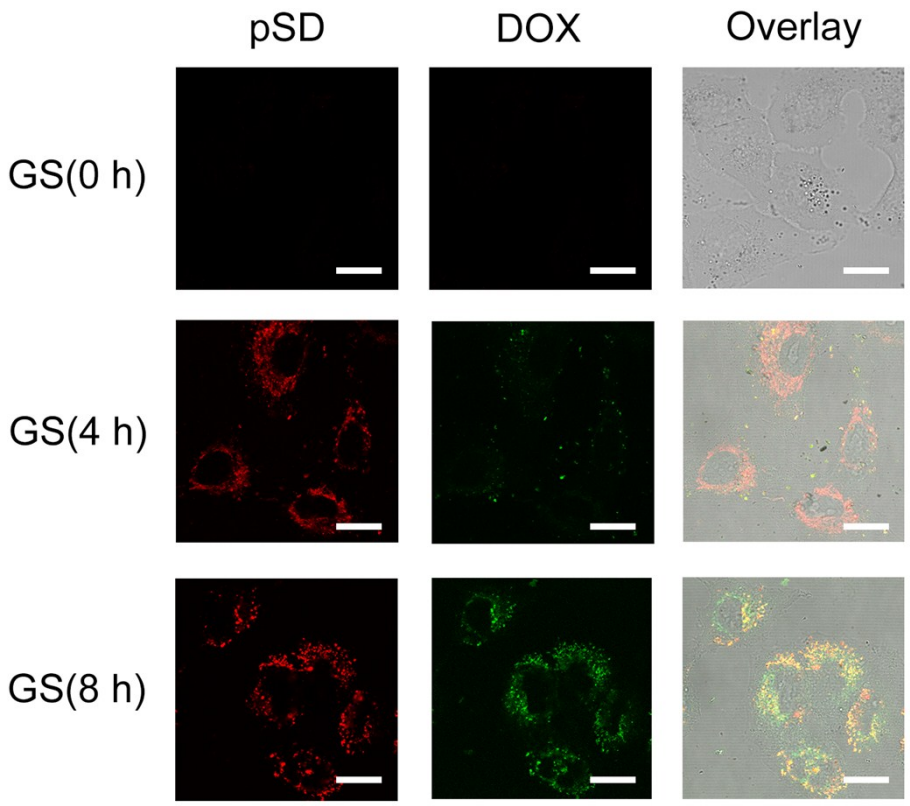


Figure S12. CLSM images of A549 cells incubated for 30 min with pSD-labelled GS_D. Images were taken after a washing step at 0 h, 4 h, and 8 h, respectively. Scale bars correspond to 25 µm.