† Electronic supplementary information (ESI)

# Preparation of N-doped yellow carbon dots and N, P co-doped red carbon dots for bioimaging and photodynamic therapy of tumor

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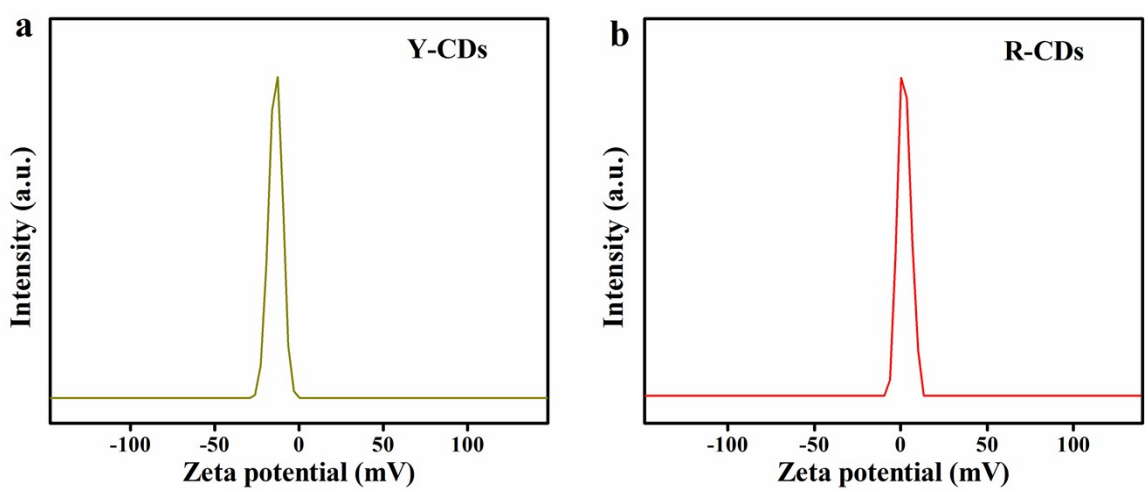


**Fig. S1** The Zeta potential of Y-CDs (a) and R-CDs (b).

**Table S1** XPS data analysis of the C 1s spectra of Y-CDs (top) and R-CDs (bottom).

| | Type | Content (%) |
|---|---|---|
| Y-CDs | C＝C/C–C | 59.9 |
| | C–N/ C–O | 34.8 |
| | C＝O | 5.3 |

| | Type | Content (%) |
|---|---|---|
| R-CDs | C＝C/C–C | 69.2 |
| | C–N/ C–O/C–P | 27.6 |
| | C＝O | 3.2 |

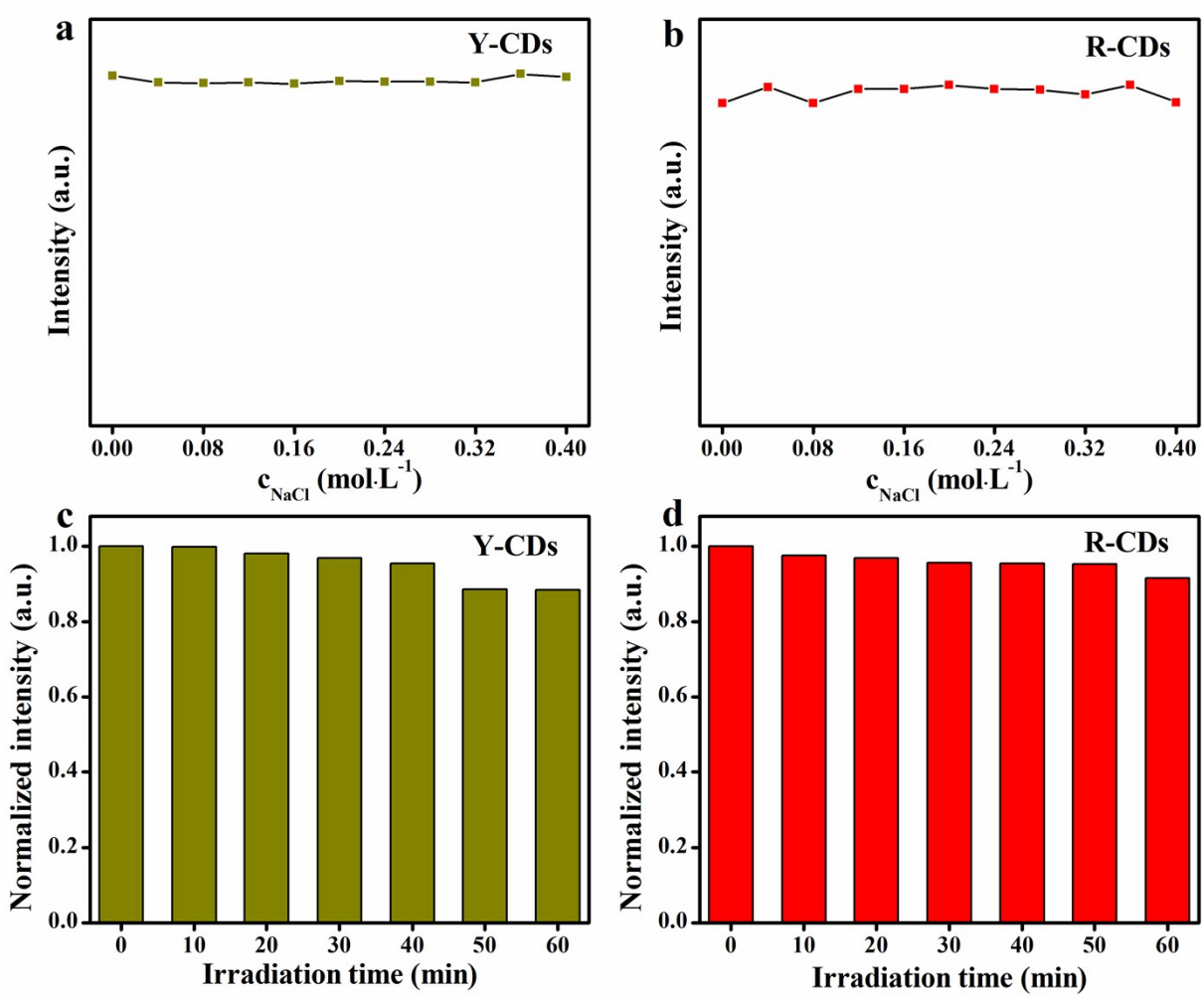


**Fig. S2** Fluorescence intensity of Y-CDs (a) and R-CDs (b) dispersed in different concentrations of NaCl (0 ~ 0.4 mol $L^{-1}$); Fluorescence intensity of Y-CDs (c) and R-CDs (d) at different irradiation times under UV lamp.

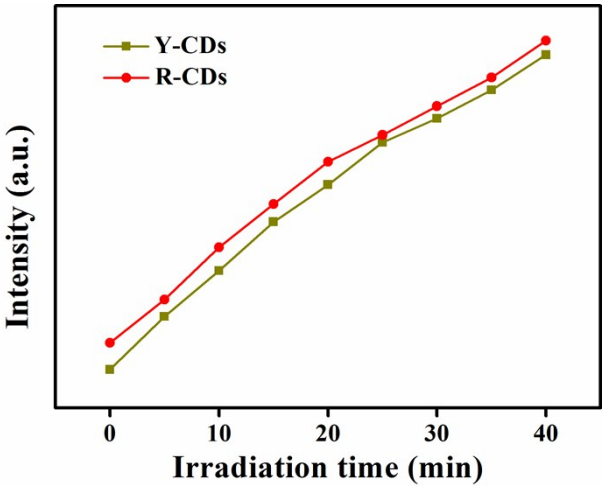


**Fig. S3** Time-dependent fluorescence intensity ($\lambda_{ex}/\lambda_{em}$ = 504/525 nm) irradiated with white light (100 mW $cm^{-2}$).

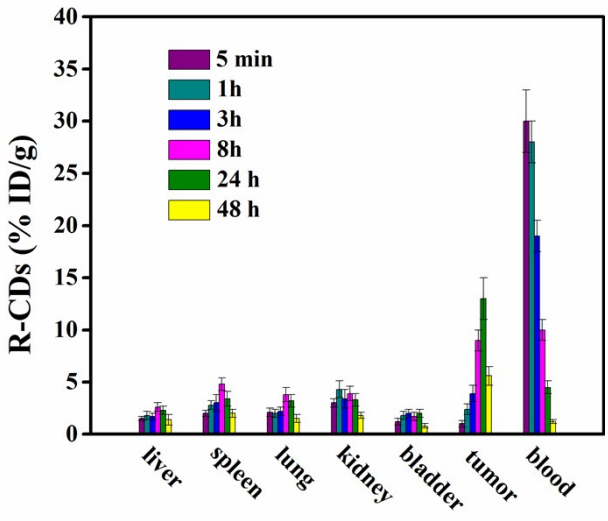


**Fig. S4** Biodistribution of the R-CDs NRs in tumor-bearing mice. Data are expressed as means ± s.d. (n = 3)).

Biodistribution study of the R-CDs was carried out on the mice bearing tumors by intravenous injection of the R-CDs and then extracted the R-CDs from organs and blood. The distribution and the concentration of the R-CDs in the blood, tumor and organs including liver, spleen, lung, kidney and bladder were quantified by ultraviolet–visible spectroscopy after extraction by water. The R-CDs exhibited low uptake by the organs as evidenced by the low % $IDg^{-1}$ (percent injected dose per gram tissue), which prove the biosafety of the R-CDs.