

Supplementary Information

Enhanced anticancer activity of graphene oxide quantum dots @ Cu nanocomposites *via* cation- π interactions

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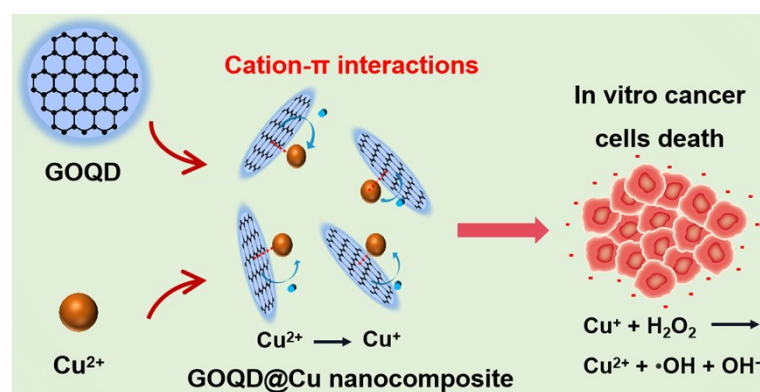


Fig. S1. Schematic illustration for the formation of GOQD@Cu nanocomposite via the cation- π interaction to inhibit the activity of cancer cells.

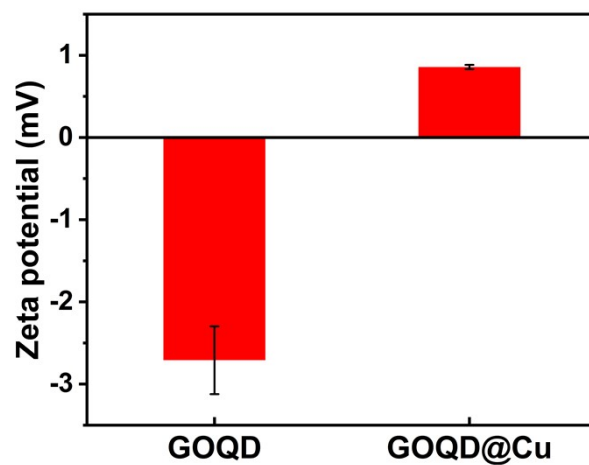


Fig. S2 Zeta potential of the GOQD and GOQD@Cu nanocomposites.

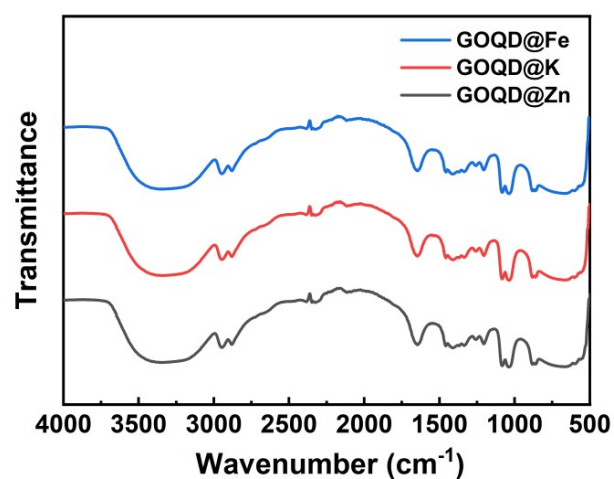


Fig. S3 FTIR characterization of GOQD@Fe, GOQD@Zn and GOQD@K nanocomposites.

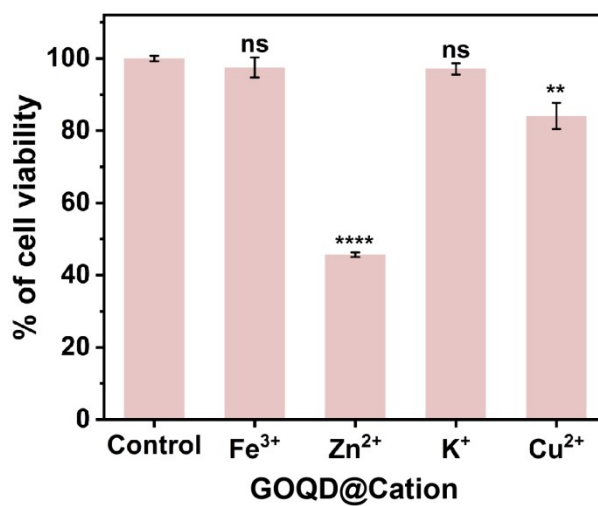


Fig. S4. In vitro cytotoxicity of GOQD@Fe, GOQD@Zn, GOQD@K and GOQD@Cu nanocomposites to 293T cells (The concentration of GOQD was 40 $\mu\text{g/mL}$ and the cation concentration was 15 $\mu\text{g/mL}$). Data were expressed by mean $\pm$ SD and analyzed using two-tailed unpaired *t*-test. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ and **** $p < 0.0001$ vs. Control group. All data were tested at least three times in parallel.

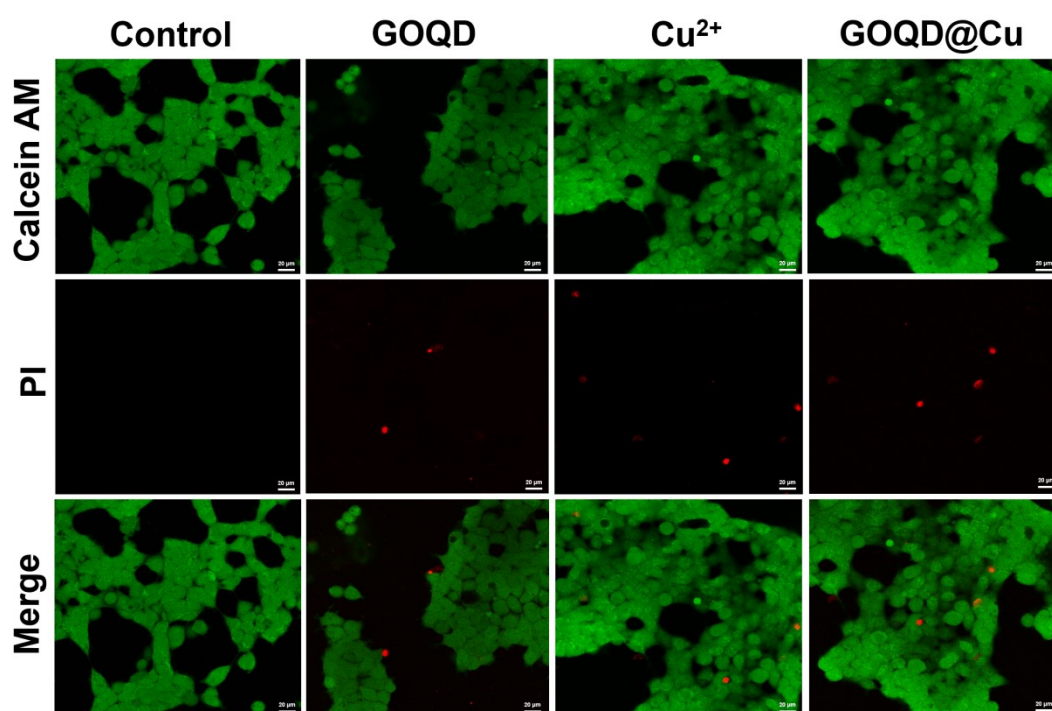


Fig. S5 CLSM images of 293T cells stained with Calcein-AM (green fluorescence) and PI (red fluorescence) after treatment of GOQD, Cu^{2+} and GOQD@Cu nanocomposites, scale bar: 20 μm .

Table S1. In vitro cytotoxicity of CuSO_4 to HeLa cells at different concentration.

Cu^{2+} concentration ($\mu\text{g/mL}$)	Cell viability (%)
Control	100.0 ± 3.4
5	82.1 ± 0.3
10	80.5 ± 4.0
15	78.4 ± 1.8
20	72.1 ± 4.2
25	42.4 ± 1.3
30	31.4 ± 4.0

Table S2. In vitro cytotoxicity of GOQD to HeLa cells at different concentration.

GOQD concentration ($\mu\text{g/mL}$)	Cell viability (%)
Control	100.0 ± 4.3
20	98.1 ± 3.9
40	97.2 ± 6.4
60	90.3 ± 3.5
80	89.4 ± 7.7
100	89.0 ± 5.8

Table S3. In vitro cytotoxicity of GOQD@Cu nanocomposites to HeLa cells
(GOQD concentration: $40 \mu\text{g/mL}$).

Cu^{2+} concentration ($\mu\text{g/mL}$)	Cell viability (%)
Control	100.0 ± 3.4
5	67.7 ± 2.1
10	58.3 ± 3.0
15	50.7 ± 3.6
20	46.6 ± 3.4
25	26.9 ± 1.0
30	23.4 ± 0.7