Electronic Supplementary Material (ESI) for Green Chemistry.


# Electronic Supporting Information

## *for*

# Large-scale simultaneous synthesis of highly photoluminescent green amorphous carbon nanodots and yellow crystalline graphene quantum dots at room temperature

Meng Li Liu[a], Lin Yang[b], Rong Sheng Li[b], Bin Bin Chen[a], Hui Liu[b*], and Cheng Zhi Huang[*ab]

[a]Key Laboratory of Luminescent and Real-Time Analytical Chemistry (Southwest University), Ministry of Education, College of Chemistry and Chemical Engineering, Southwest University, Chongqing 400715, China.

[b]Chongqing Key Laboratory of Biomedical Analysis (Southwest University), Chongqing Science & Technology Commission, College of Pharmaceutical Science, Southwest University, Chongqing 400716, China.

[*]Corresponding author. Tel: (+86)-23-68254659. E-mail addresses: liuhui78@swu.edu.cn (H. Liu), chengzhi@swu.edu.cn (C. Z. Huang).

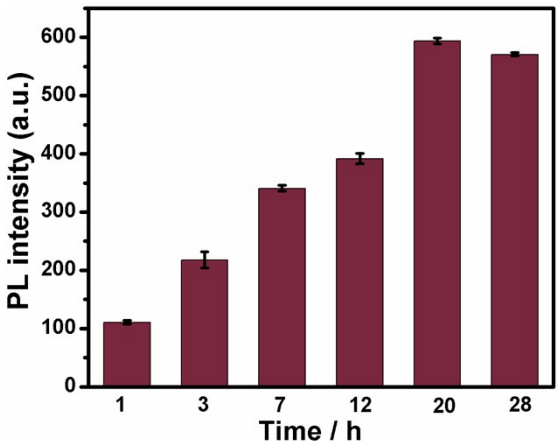


**Fig. S1** The effect of reaction time in the synthesis of the CDs. EX: 400 nm.

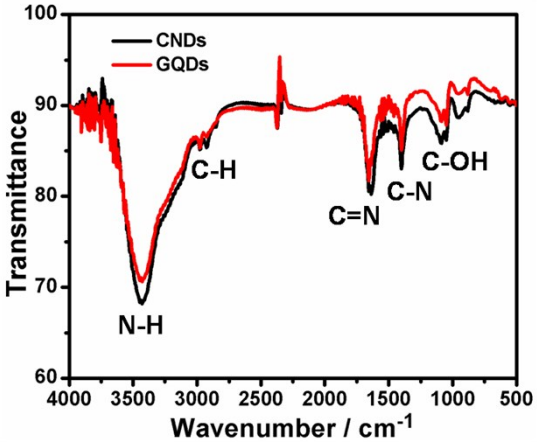


**Fig. S2** FT-IR spectra of the CNDs and GQDs.

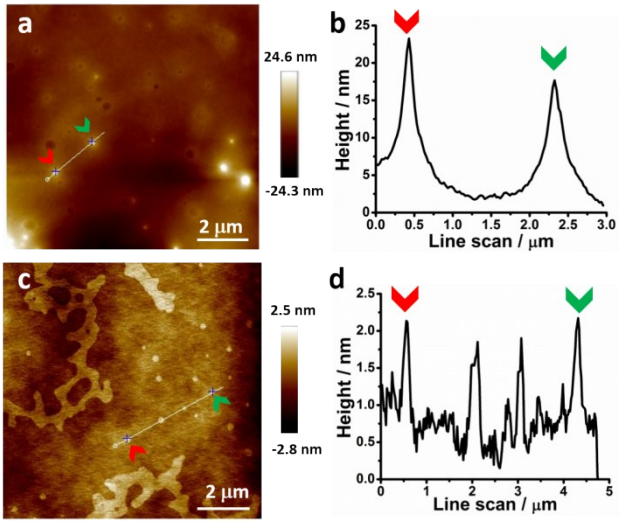


**Fig. S3** AFM images of the (a) CNDs and (c) GQDs; (b) measured height profile along the white line in (a); (d) measured height profile along the white line in (c).

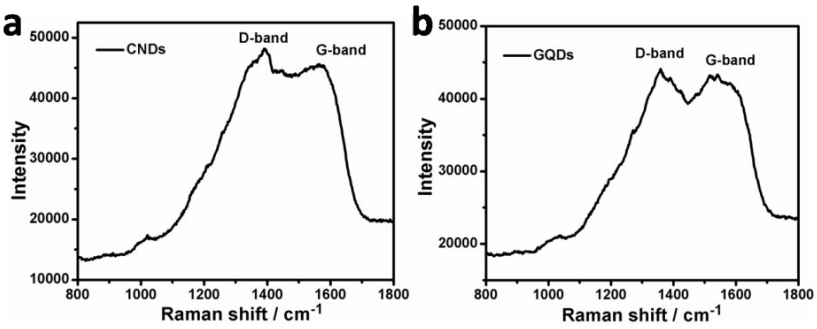


**Fig. S4** Raman spectra of the (a) CNDs and (b) GQDs.

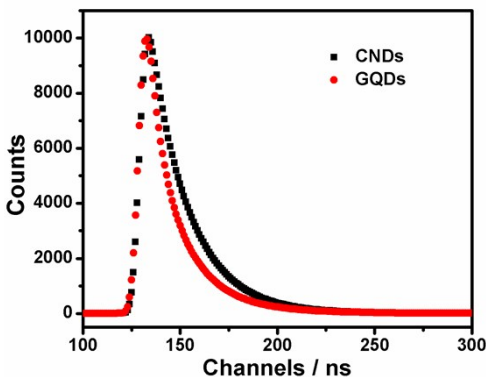


**Fig. S5** The fluorescence lifetime intensity decays of the CNDs and GQDs. The fluorescence lifetimes of CNDs are 1.94 ns (1.70%), 76.88 ns (0.18%) and 4.40 ns (98.12%), while fluorescence lifetimes of GQDs are 1.09 ns (13.58%), 3.62 ns (73.02%) and 7.85 ns (13.40%). Therefore, the average fluorescence lifetimes of the CNDs and GQDs are calculated as 4.49 ns and 3.84 ns, respectively.

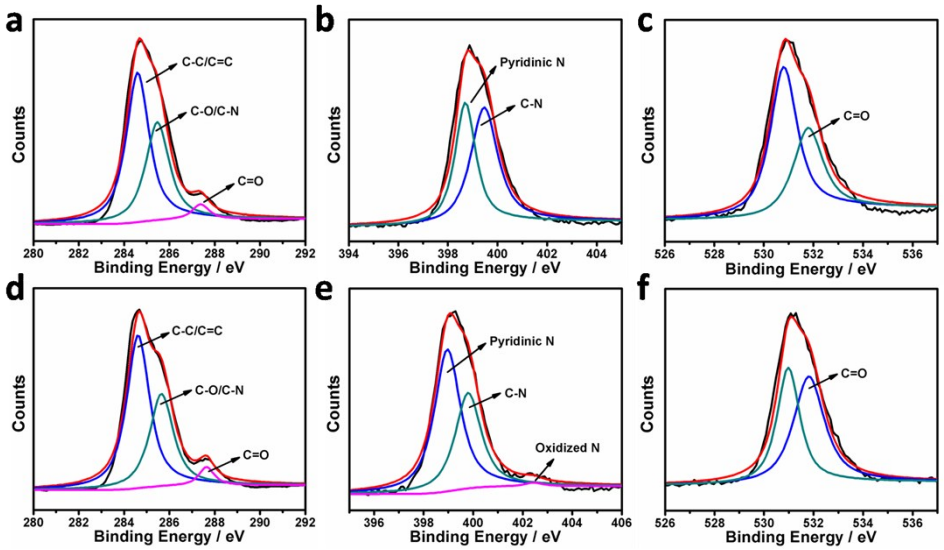


**Fig. S6** The high-resolution XPS spectra of the CNDs and GQDs. (a) C1s; (b) N1s and (c) O1s spectra of CNDs. (d) C1s; (e) N1s and (f) O1s spectra of GQDs.

**Table S1** XPS data analyses of the C1s spectra of two kinds of CDs samples.

| Sample | C-C/C=C | C-O/C-N | C=O |
|---|---|---|---|
| CNDs | 57.0% | 38.8% | 4.2% |
| GQDs | 58.5% | 36.8% | 4.7% |

**Table S2** XPS data analyses of the O1s spectra of two kinds of CDs samples.

| Sample | C=O |
|---|---|
| CNDs | 37.5% |
| GQDs | 55.3% |

**Table S3** XPS data analyses of the N1s spectra of two kinds of CDs samples.

| Sample | Pyridinic N | C-N | Oxidized N |
|---|---|---|---|
| CNDs | 44.8% | 55.2% | / |
| GQDs | 59.1% | 39.8% | 1.1% |

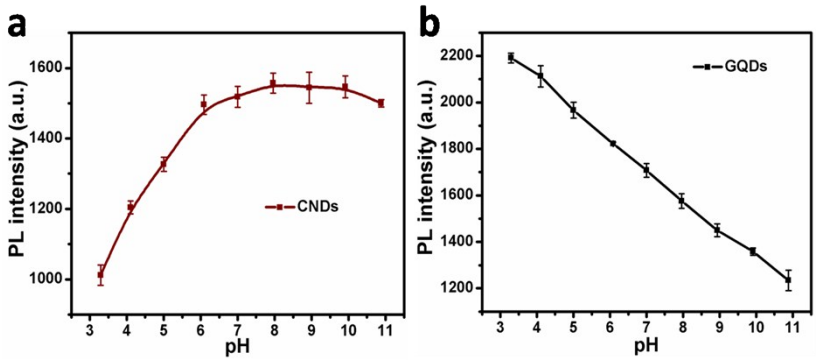


**Fig. S7** Variation in the PL intensities of CNDs and GQDs with the different pH value. (a) CNDs; (b) GQDs. $\lambda_{EX,\ CNDs}$: 400 nm; $\lambda_{EX,\ GQDs}$: 410 nm; $c_{CNDs}$, 5 μg/ml; $c_{GQDs}$, 15 μg/ml.

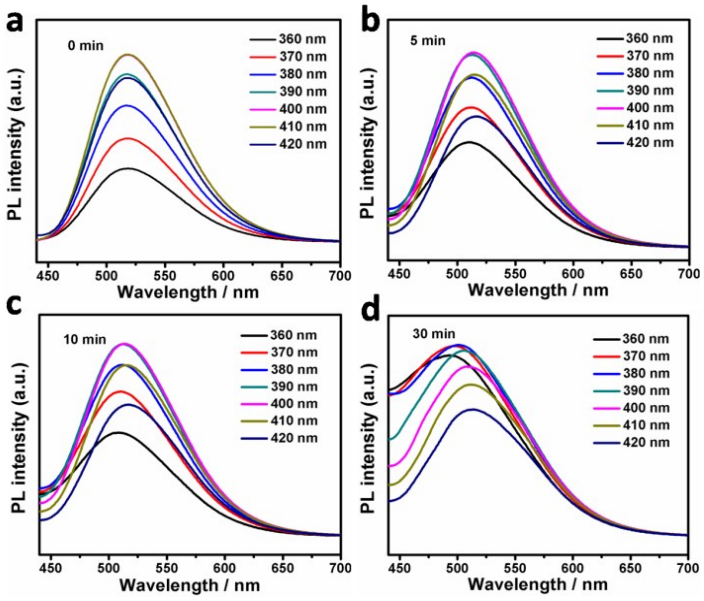


**Fig. S8** The emission spectra of CNDs with different exposure times. (a) 0 min; (b) 5 min; (c) 10 min and (d) 30 min. The powder of Xe lamp is 140 W. EX: 400 nm; $c_{CNDs}$: 10 μg/ml.

**Table S4** Elemental analysis of CNDs with different exposure times.

| Exposure time (min) | Carbon atom (%) | Nitrogen atom (%) | Oxygen atom (%) |
|---|---|---|---|
| 0 | 72.40 | 17.00 | 10.60 |
| 5 | 72.90 | 13.15 | 13.95 |
| 10 | 70.16 | 13.82 | 16.02 |
| 30 | 66.69 | 17.26 | 16.05 |

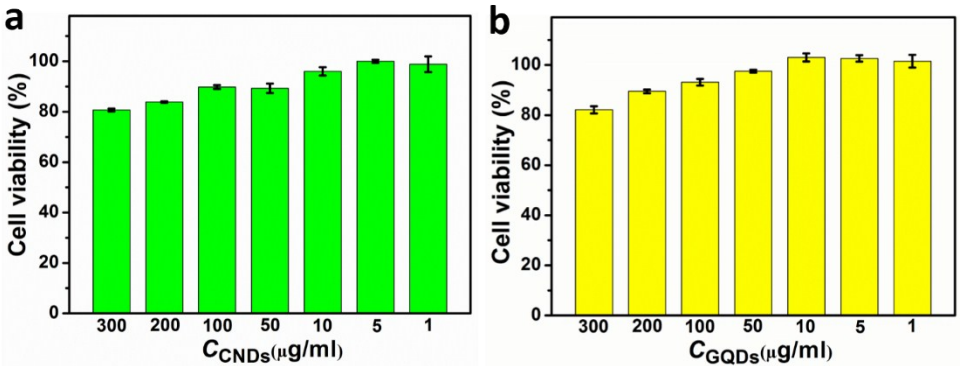


**Fig. S9** Cytotoxicity test of the (a) CNDs and (b) GQDs. The process of cytotoxicity test is as following: The 1.0× $10^5$ cells per mL human epidermoid cancer cells (HEp-2) in Roswell Park Memorial Institute 1640 (RPMI 1640) medium supplemented with 2%

fetal bovine serum are added to each well of a 96-well plate (100 μL per well). The cells are firstly cultured for 24 h in an incubator (37 $^{o}$C, 5% $CO_2$) and for another 24 h after the culture medium being replaced with RPMI 1640 (100 μL) which contains different doses of CNDs/GQDs (10 μL). Then, following by removal of the culture medium, a mixture of 10 μL Cell Counting Kit-8 (CCK-8) solution and 90 μL RPMI 1640 medium is added to each well. The optical density (OD) of the mixture is measured at 450 nm with a Microplate Reader Model after 30 min. The cell viability is estimated according to the following equation:

$$\text{Cell viability [\%]} = (OD_{\text{treated}} / OD_{\text{control}}) \times 100\%$$

wherein, $OD_{\text{control}}$ and $OD_{\text{treated}}$ are obtained in the absence and presence of the CNDs/GQDs, respectively.

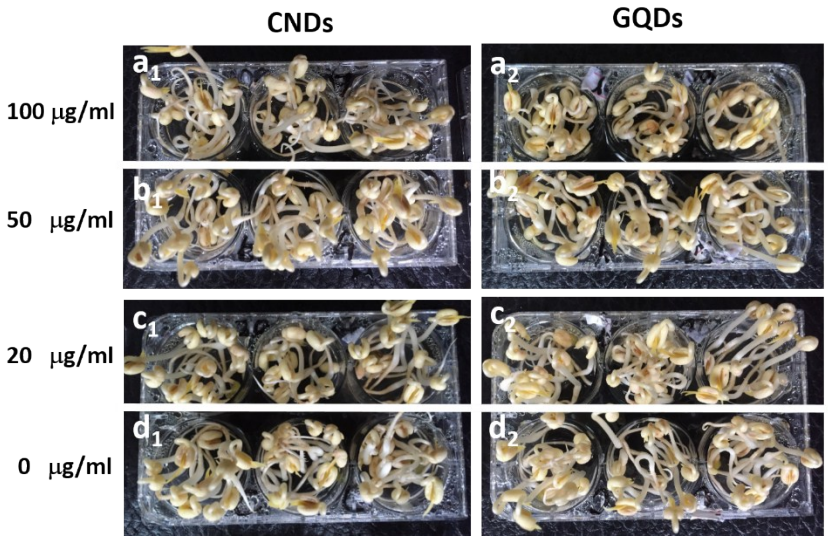


**Fig. S10** Images of bean sprouts treated with different concentration of ($a_1$-$d_1$) CNDs and ($a_2$-$d_2$) GQDs solutions. Concentrations of CNDs/GQDs in vertical direction (from top to bottom) are 100, 50, 20, 0 μg/mL, respectively.

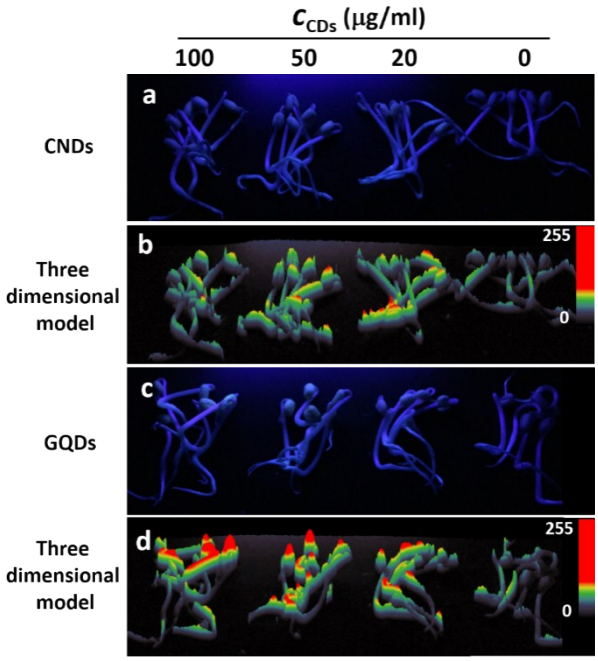


**Fig. S11** Fluorescence images of bean sprouts treated with different concentrations of (a) CNDs and (c) GQDs solutions under the 365 nm UV lights lamp. (b) and (d) are the corresponding three dimensional models of (a) and (c), respectively. Concentrations of CNDs /GQDs in the horizontal direction (from left to right) are 100, 50, 20, 0 μg/ml, respectively.