Electronic Supplementary Material (ESI) for Nanoscale.


# Supplementary Information

# Color tunable room temperature phosphorescent carbon dots based nanocomposites obtainable from multiple carbon sources via a molten salt method

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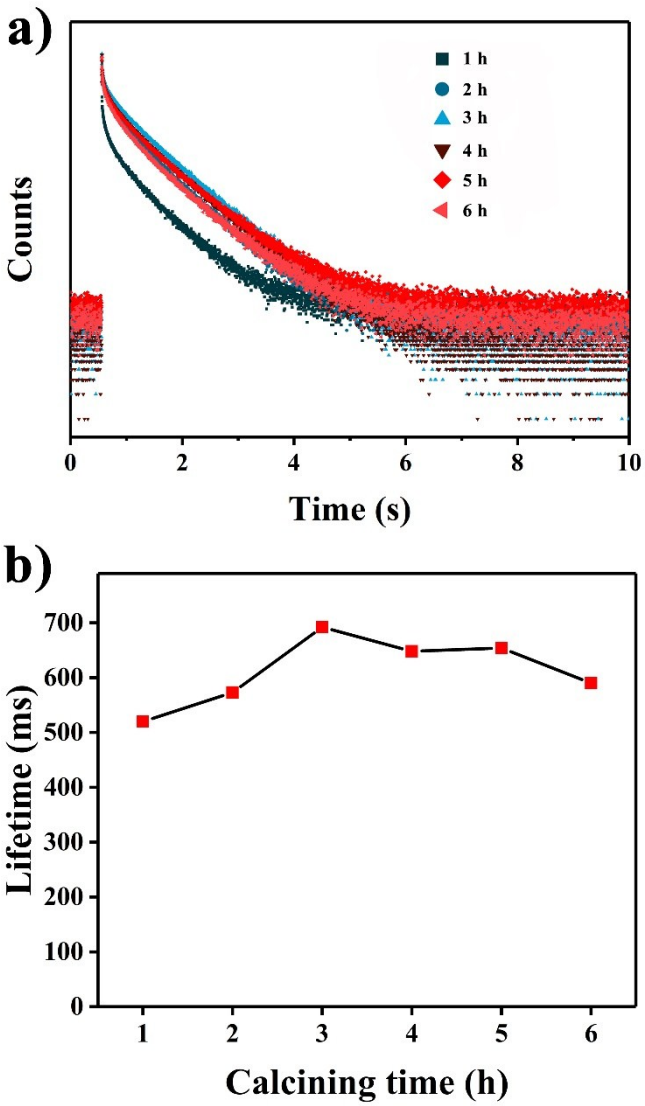


**Figure S1.** Corresponding lifetimes of the CDs@MS nanocomposites under different calcining time at the same synthesis temperature of 350 °C (1h: 520 ms; 2h: 573 ms; 3h: 701 ms; 4h: 648 ms; 5h: 654 ms; 6h: 590 ms).

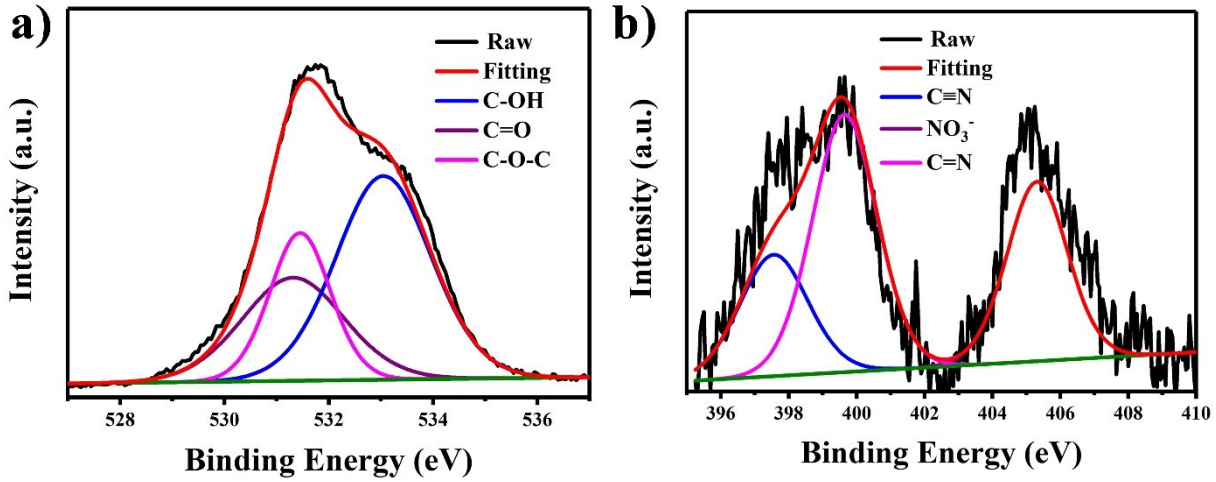


**Figure S2.** The high-resolution XPS spectra of O 1s and N 1s, respectively.

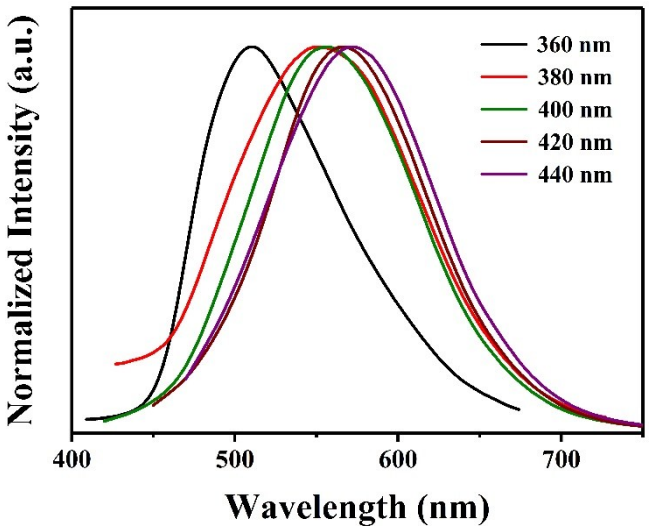


**Figure S3.** Normalized phosphorescence spectra of the CDs@MS nanocomposites under different excitation wavelengths.

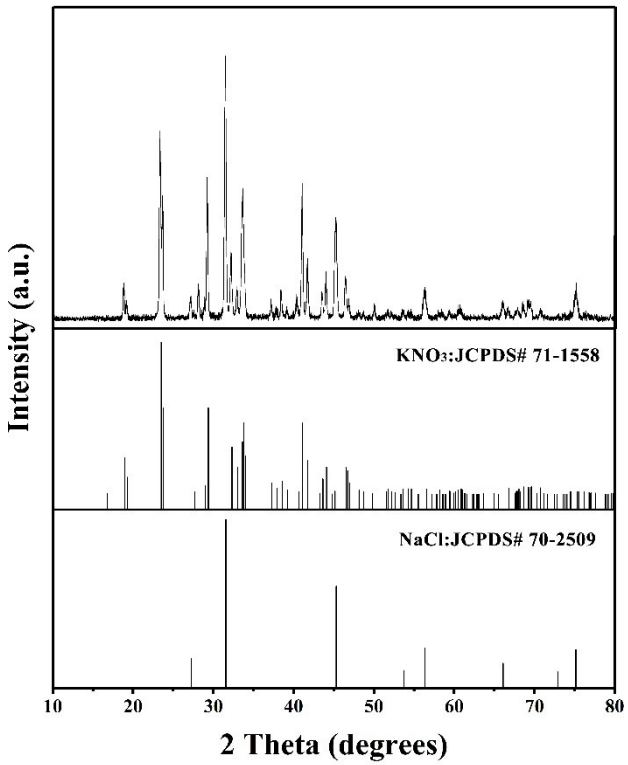


**Figure S4.** PXRD patterns of the CDs@MS nanocomposites from 1,2,4-triaminobenzene and inorganic salts ($KNO_3$ and NaCl) calcinated at 350 °C for 3 h.

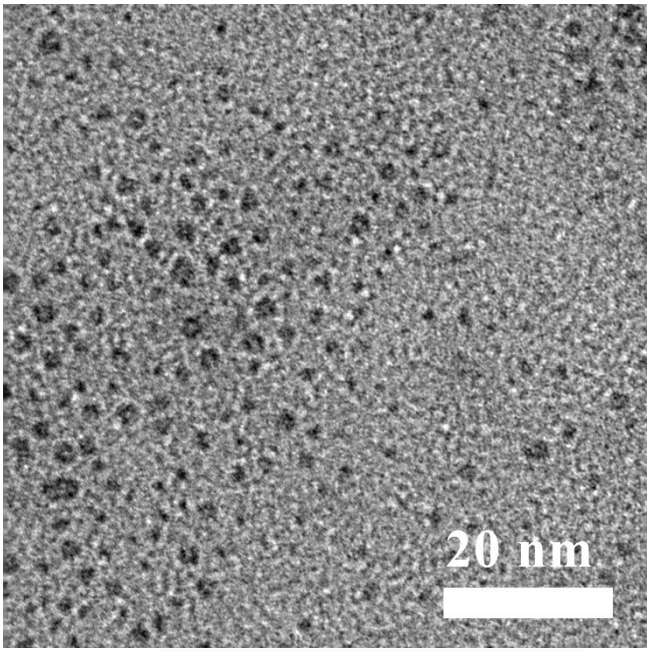


**Figure S5.** TEM image of CDs. (The CDs@MS nanocomposites were dissolved in water, and the salts were removed by a 500Da dialysis bag for 48 h. The morphology of the corresponding CDs nanoparticles in the dialysis bag were characterized by the transmission electron microscope (TEM), the resultant CDs were orderly arranged and possessed almost the average size of approximately 2.5 nm, which was in accordance with the result in Figure 4b.)

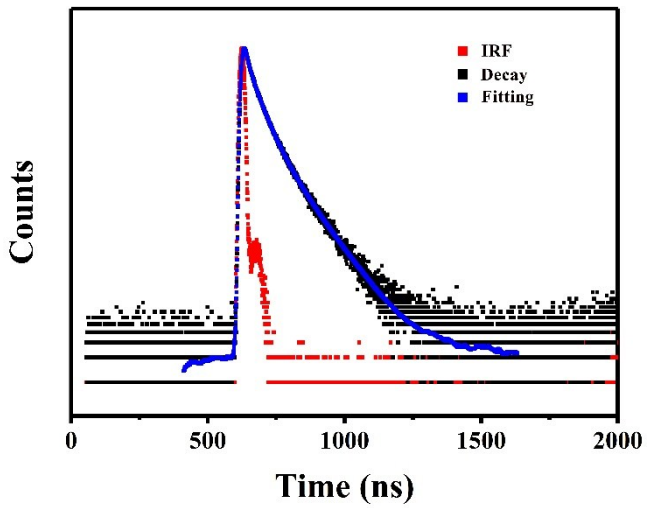


**Figure S6.** Fluorescence decay curve of the CDs@MS water dispersion.

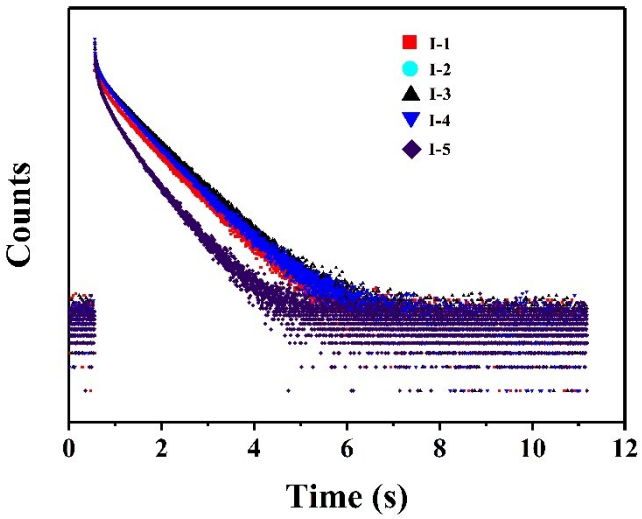


**Figure S7.** RTP decay spectra of the CDs@MS nanocomposites synthesized from 1,2,4-triaminobenzene via MS method by different inorganic salts systems calcinated at 350 °C for 3 h. (I-1: inorganic salts systems: $KNO_3$ and NaCl, lifetime: 701 ms; I -2: inorganic salts systems: $KNO_3$ and KCl, lifetime: --; I -3: inorganic salts systems: $NaNO_3$ and NaCl, lifetime: 685 ms; I-4: inorganic salts systems: $NaNO_3$, lifetime: 469 ms; I -5: inorganic salts systems: $NaNO_3$ and KCl, lifetime: 692 ms.)

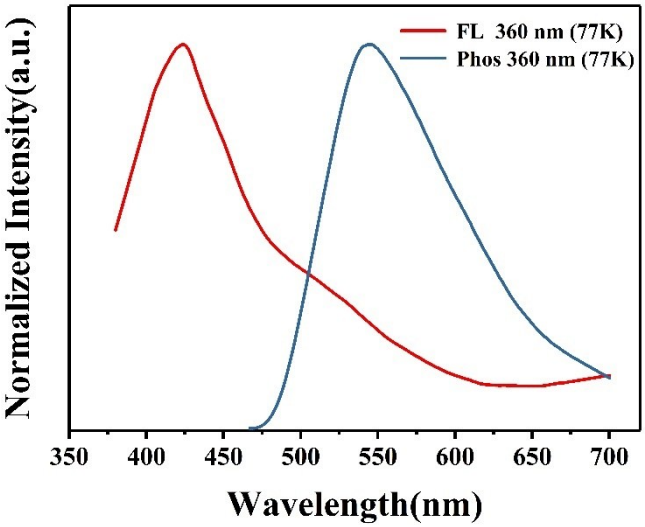


**Figure S8.** Low temperature (77 K) FL and phosphorescence spectra of the CDs-based nanomaterials from 1,2,4-triaminobenzene and inorganic salts ($KNO_3$ and KCl) calcinated at 350 °C for 3 h.

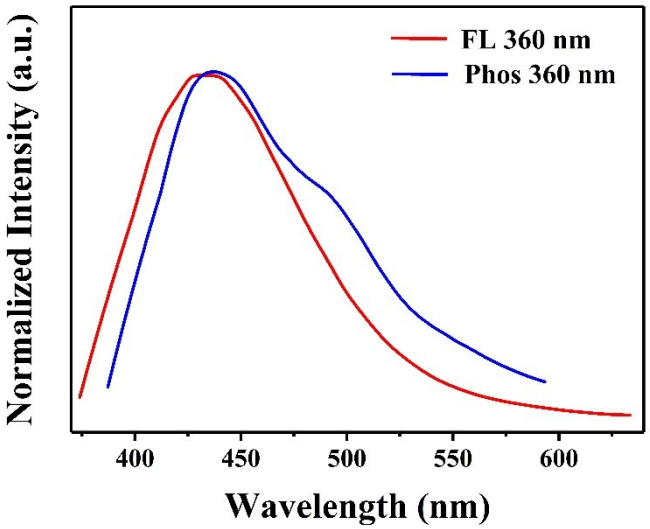


**Figure S9.** Low temperature (77 K) FL and phosphorescence spectra of the CDs-based nanomaterials from 1,2,4-triaminobenzene and inorganic salts ($KNO_3$ and LiCl) calcinated at 350 °C for 3 h.

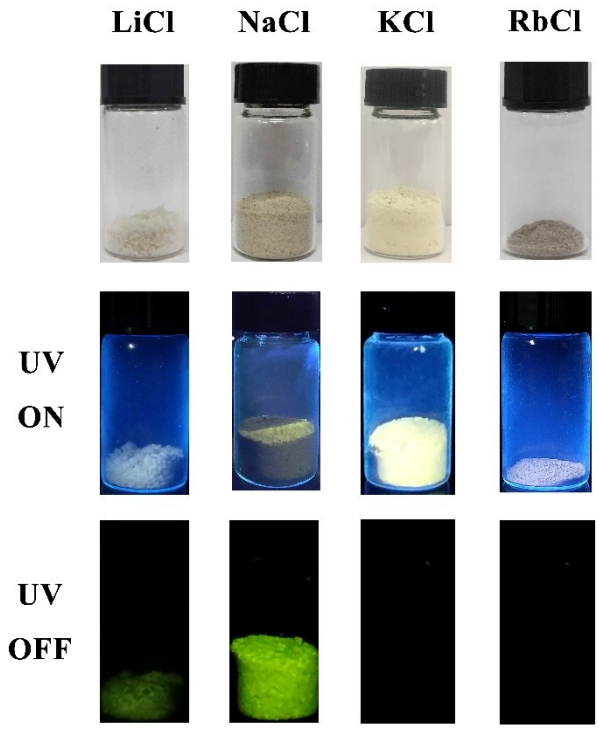


**Figure S10.** Photographs of CDs@MS nanocomposites synthesized from 1,2,4-triaminobenzene via MS method by different inorganic salts systems calcinated at 350 °C for 3 h under daylight, 365 nm UV lamp ON and OFF, respectively.

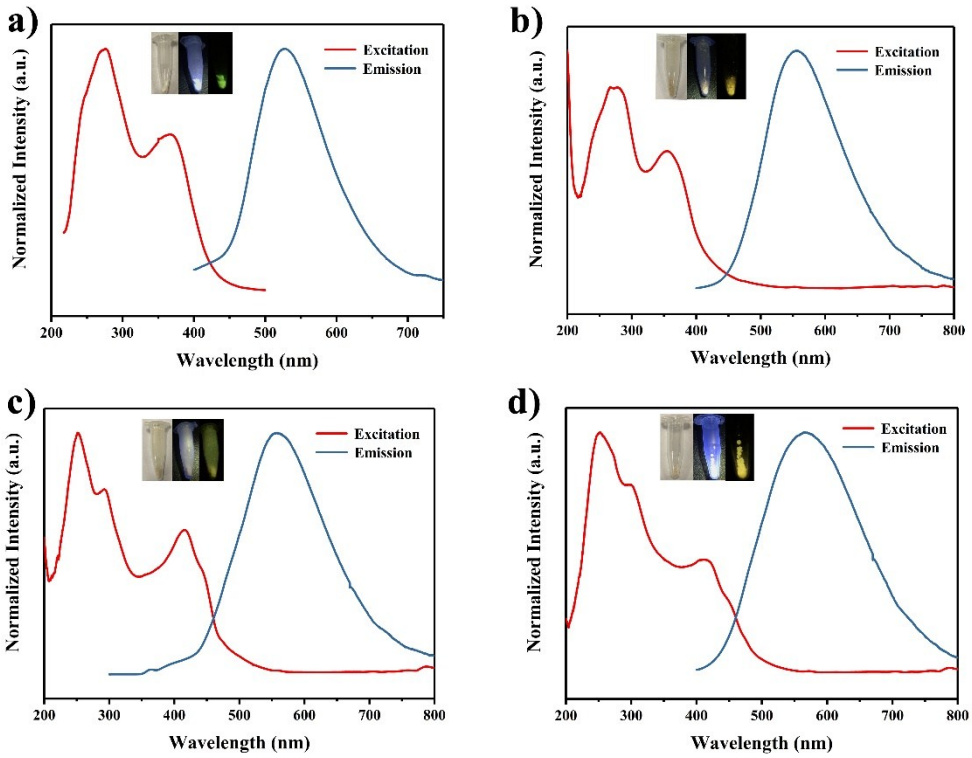


**Figure S11.** Phosphorescence spectra of the CDs@MS nanomaterials synthesized from 1,2,4-triaminobenzene via MS method by doping $KNO_3$ with a) $MgCl_2$, b) $CaCl_2$, c) $SrCl_2$ and d) $BaCl_2$, respectively. Insets: Images of the CDs@MS nanocomposites under daylight, corresponding UV lamp ON and OFF.

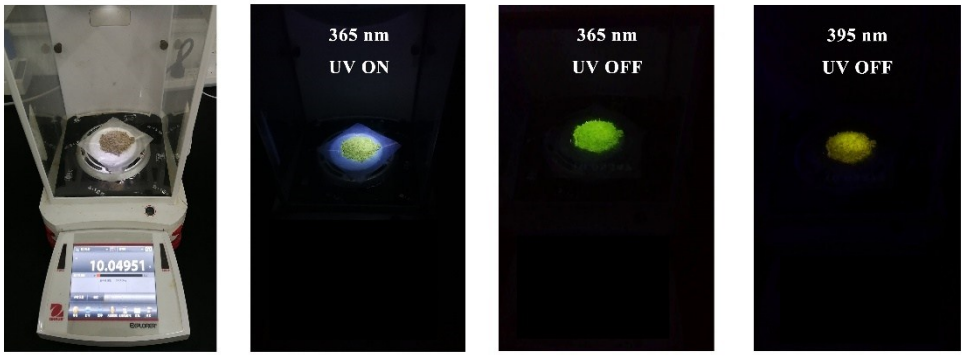


**Figure S12**. Schematic illustration of large-scale preparation of the CDs@MS nanocomposites from 1,2,4-triaminobenzene and inorganic salts ($KNO_3$ and NaCl) calcinated at 350 °C for 3 h.

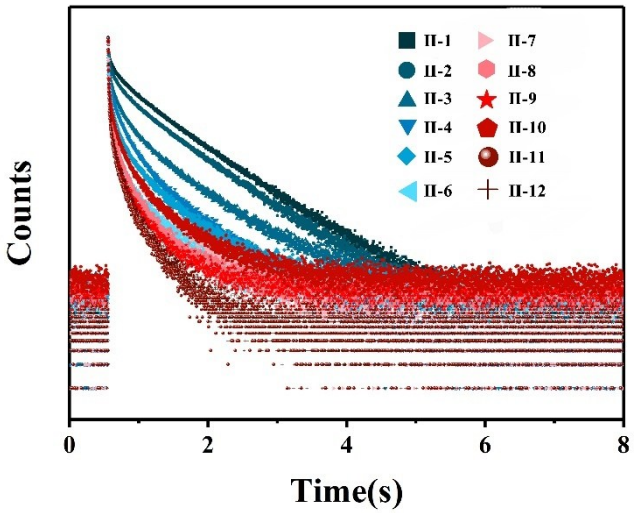


**Figure S13.** RTP decay spectra of the CDs@MS nanocomposites synthesized by different precursors via MSM from same inorganic salts ($KNO_3$ and NaCl) calcinated at 350 °C for 3 h. (Ⅱ-1:carbon source:1,2,4-triaminobenzene, lifetime: 701 ms; Ⅱ-2:carbon source: p-phenylenediamine, lifetime: 619 ms; Ⅱ-3:carbon source: ethylenediaminetetraacetic acid, lifetime: 496 ms; Ⅱ-4:carbon source: benzimidazole, lifetime: 432 ms; Ⅱ-5:carbon source: m-phenylenediamine, lifetime: 428 ms; Ⅱ-6:carbon source: L-lysine, lifetime: 380 ms; Ⅱ-7:carbon source: chitosan, lifetime: 351 ms; Ⅱ-8:carbon source: 4-aminobenzoic acid, lifetime: 335 ms; Ⅱ-9:carbon source: citric acid, lifetime: 224 ms; Ⅱ-10:carbon source: glucose, lifetime: 210 ms; Ⅱ-11:carbon source: ascorbic acid, lifetime: 206 ms; Ⅱ-12:carbon source: dopamine hydrochloride, lifetime: 203 ms.)

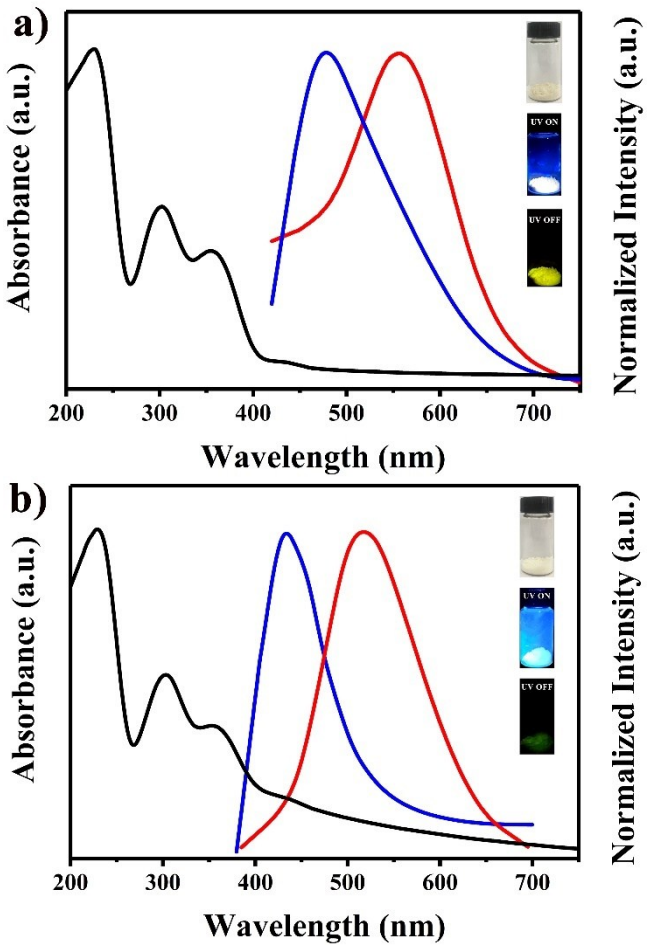


**Figure S14.** The UV-vis absorbance (black line), FL emission (deep blue line) and phosphorescence emission (red line) of the a) CDs-Ⅱ-9 nanocomposites excited under 400 nm and b) CDs-Ⅱ-3 nanocomposites excited under 365 nm. Insets: Images of the CDs@MS nanocomposites under daylight, corresponding UV lamp ON and OFF.

**Table S1.** Comparison of RTP property from different CDs-based RTP materials.

| CDs-based RTP materials | Phosphorescent emission wavelength (nm) | Phosphorescent lifetime (ms) | Reference |
|---|---|---|---|
| CDs@zeolite | 430 | 350 | 22 |
| m-CDs-PVA | 506 | 456 | 24 |
| CQDs/PU | 450-500 | 8.7 | 26 |
| PCDs | 494 | 658.11 | 27 |
| CDs/PVA | 500 | 380 | 34 |
| CDs-LDH | 525 | 386.8 | 37 |
| ACDs/PVA | 450 | 450 | 38 |
| P-CDs | 538 | 1390 | 39 |
| URTP CDs | 535 | 1460 | 40 |
| CDs@MS | 566 | 886 | this work |