# Supporting Information

## Excitation-independent dual-color carbon dots: surface-state controlling and solid-state lighting

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**Table S1** Fabrication of C-dots with orange/blue luminescence by different combinations of solvothermal reaction temperature and time. PP and FA represent p-phenylenediamine and formamide, respectively.

| Sample | Carbon source | Solvent | Reaction conditions | Luminescent color |
|---|---|---|---|---|
| No. 1 | PP (0.25 mmol) | FA (20 mL) | 160℃/1h | orange |
| No. 2 | PP (0.25 mmol) | FA (20 mL) | 160℃/2h | orange |
| No. 3 | PP (0.25 mmol) | FA (20 mL) | 160℃/3h | orange |
| No. 4 | PP (0.25 mmol) | FA (20 mL) | 160℃/4h | orange |
| No. 5 | PP (0.25 mmol) | FA (20 mL) | 160℃/6h | blue |
| No. 6 | PP (0.25 mmol) | FA (20 mL) | 160℃/18h | blue |
| No. 7 | PP (0.25 mmol) | FA (20 mL) | 180℃/1h | orange |
| No. 8 | PP (0.25 mmol) | FA (20 mL) | 180℃/2h | orange |
| No. 9 | PP (0.25 mmol) | FA (20 mL) | 180℃/3h | orange |
| No. 10 | PP (0.25 mmol) | FA (20 mL) | 180℃/4h | blue |
| No. 11 | PP (0.25 mmol) | FA (20 mL) | 180℃/24h | blue |
| No. 12 | PP (0.25 mmol) | FA (20 mL) | 200℃/0.5h | orange |
| No. 13 | PP (0.25 mmol) | FA (20 mL) | 200℃/1h | orange |
| No. 14 | PP (0.25 mmol) | FA (20 mL) | 200℃/1.5h | blue |
| No. 15 | PP (0.25 mmol) | FA (20 mL) | 200℃/4h | blue |
| No. 16 | PP (0.25 mmol) | FA (20 mL) | 220℃/1h | orange |
| No. 17 | PP (0.25 mmol) | FA (20 mL) | 240℃/1h | blue |
| No. 18 | PP (1 mmol) | FA (20 mL) | 180℃/1h | orange |
| No. 19 | PP (5 mmol) | FA (20 mL) | 180℃/1h | orange |
| No. 20 | PP (10 mmol) | FA (20 mL) | 180℃/1h | orange |
| No. 21 | PP (20 mmol) | FA (20 mL) | 180℃/1h | orange |

**Table S2** Photoelectric parameters of C/PiG-LED with C-dot film thickness of 1.5 mm and operating current of 350 mA at different working time intervals

| Working time interval (h) | Chromaticity coordinates | CCT (K) | CRI |
|---|---|---|---|
| 0 | (0.371, 0.376) | 4250 | 85.3 |
| 6 | (0.373, 0.375) | 4246 | 85.5 |
| 12 | (0.371, 0.377) | 4251 | 85.3 |
| 24 | (0.372, 0.376) | 4250 | 85.4 |
| 36 | (0.374, 0.375) | 4253 | 85.2 |
| 48 | (0.369, 0.374) | 4248 | 85.3 |
| 60 | (0.372, 0.377) | 4251 | 85.4 |
| 72 | (0.371, 0.373) | 4247 | 85.1 |

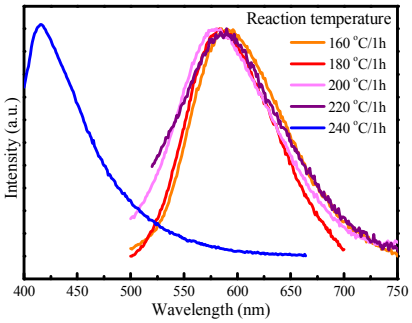


**Figure S1** PL spectra of C-dots obtained by solvothermal reaction at different temperatures for 1 h.

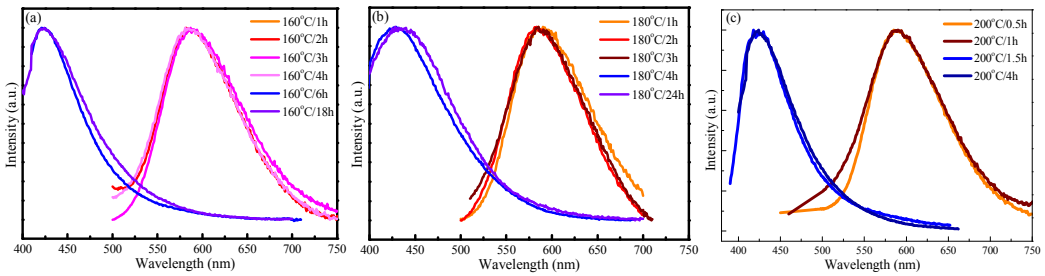


**Figure S2** PL spectra of C-dots obtained by solvothermal reaction at (a) 160 °C, (b) 180 °C and (c) 200 °C for different times.

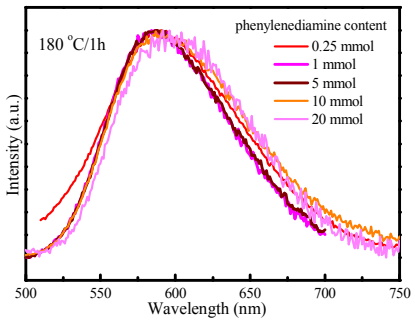


**Figure S3** PL spectra of C-dots obtained by solvothermal reaction at 180°C/1h with the addition of different phenylenediamine contents.

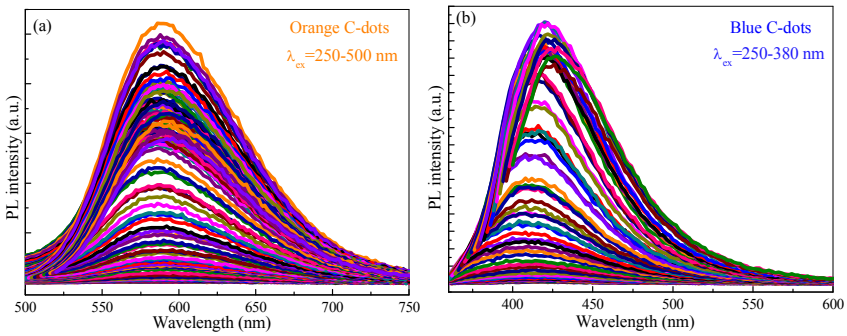


**Figure S4** PL spectra of (a) orange C-dots and (b) blue C-dots recorded under the excitation of different wavelength lights.

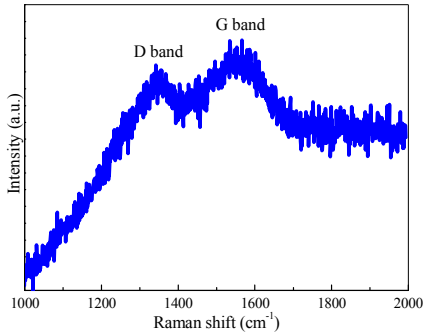


**Figure S5** Raman spectrum of orange C-dots recorded under the excitation of 532 nm laser.

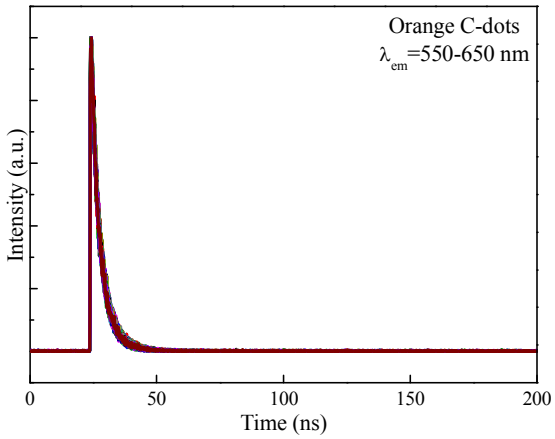


**Figure S6** Decay curves of orange C-dots by monitoring different emission wavelengths (550~650 nm) under the excitation of 475 nm picosecond laser.

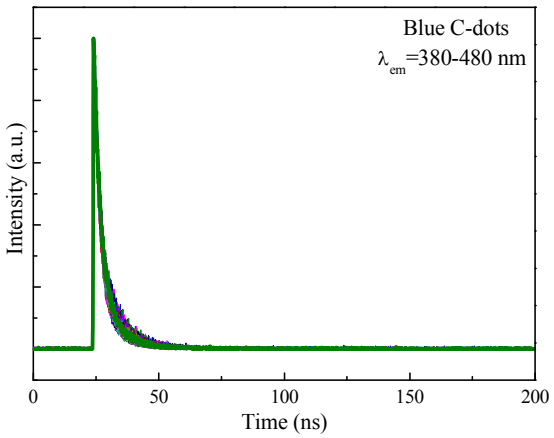


**Figure S7** Decay curves of blue C-dots by monitoring different emission wavelengths (380~480 nm) under the excitation of 375 nm picosecond laser.

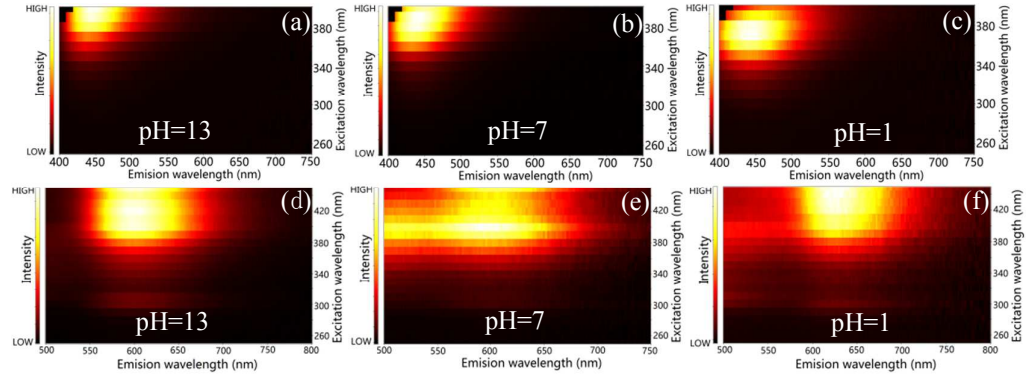


**Figure S8** pH-dependent excitation-emission mappings for (a-c) blue C-dots and (d-f) orange C-dots dispersed in aqueous solutions.

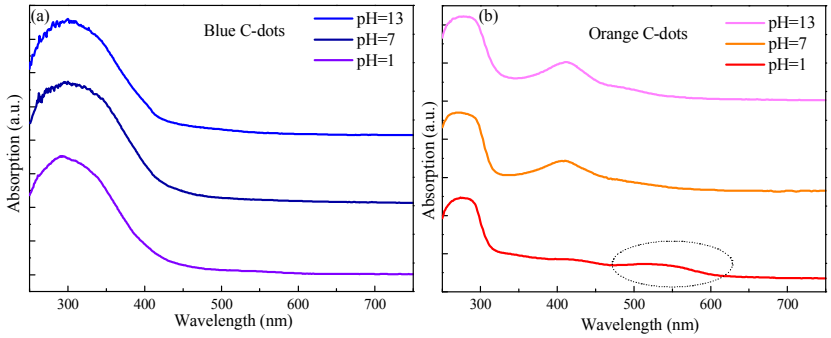


**Figure S9** pH-dependent absorption spectra for (a) blue C-dots and (b) orange C-dots dispersed in aqueous solutions.

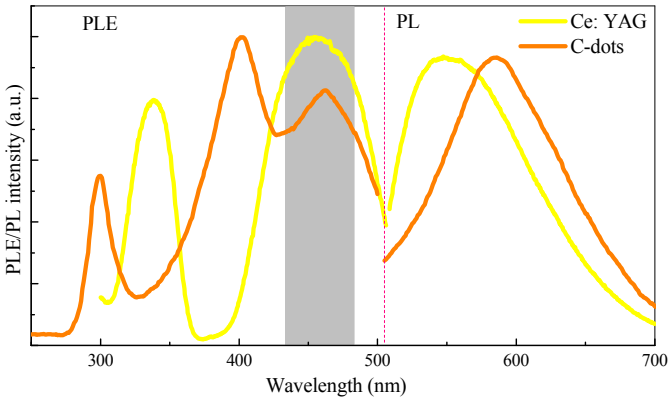


**Figure S10** Comparison of PLE/PL spectra for the commercial Ce: YAG phosphors and the investigated orange C-dots.

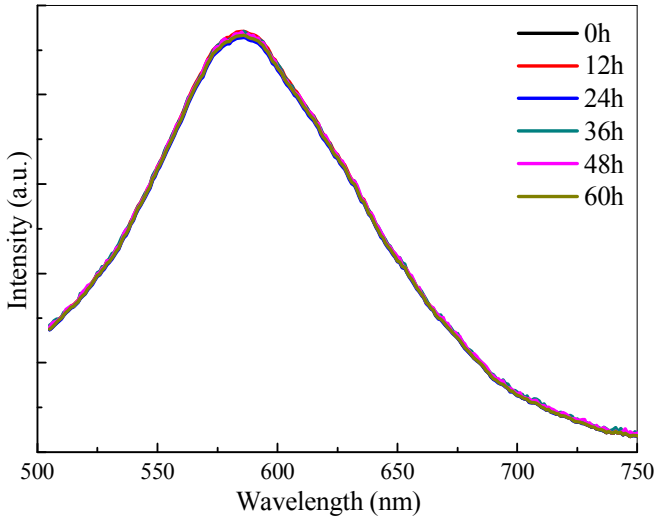


**Figure S11** Investigation on photostability of orange C-dot film: exposure time dependent PL spectra under the excitation of 465 nm blue light.

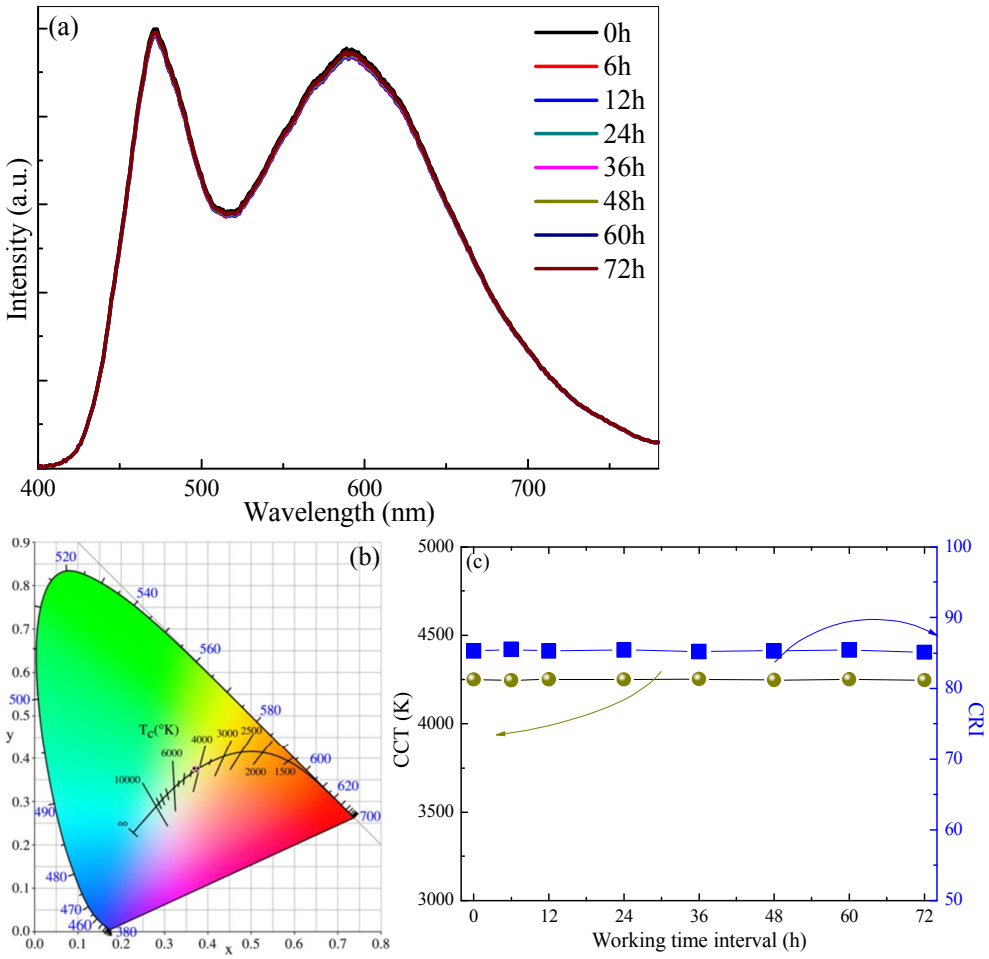


**Figure S12** (a) Electroluminescence spectra, (b) color coordinates, and (c) CCT/CRI for the C/PiG-LED with C-dot film thickness of 1.5 mm at different working time intervals.