Supporting Information

for

Soybean-derived blue photoluminescent carbon dots

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Additional experimental data
**Figure S1:** EDX spectrum of HTC-CDs.

**Figure S2:** XPS survey spectra of LA-CDs-x%.
**Figure S3**: Deconvoluted high resolution spectra of N1s: (a) LA-CDs-5%, (b) LA-CDs-10% NH$_4$OH, (c) LA-CDs-15%, (d) LA-CDs-20%, and (e) LA-CDs-30%; (f) FTIR spectra of LA-CDs-x%.
Figure S4: PL spectra of LA-CDs-x%: (a) x = 5, (b) x = 10, (c) x = 15, (d) x = 20, and (e) x = 30; (f) UV–visible absorption spectra of LA-CDs-x%.
Figure S5: PL spectra of laser-ablated Teflon in deionized water.

Figure S6: PL spectra of annealed soybean at different temperatures with the flow of argon gas for 2 h.
**Table S1:** Element fractions in the soybean-derived carbon nanoparticles calculated from the XPS spectra.

|         | C 1s | N 1s | O 1s |
|---------|------|------|------|
| HTC-CDs | 73.6 | 10.3 | 16.1 |
| Annealed-CDs | 60.0 | 0   | 40.0 |
| LA-CDs-10% | 51.1 | 4.4  | 44.5 |

**Table S2:** Element fractions in LA-CDs-x% calculated from the XPS spectra.

| Element | LA-CDs-5% | LA-CDs-10% | LA-CDs-15% | LA-CDs-20% | LA-CDs-30% |
|---------|-----------|------------|------------|------------|------------|
| Position (eV) | atom % | Position (eV) | atom % | Position (eV) | atom % | Position (eV) | atom % |
| C       | 285.4    | 42.6       | 286.4      | 51.1       | 287.2      | 54.7       | 285.2 | 38.9       | 287.9 | 60.1       |
| N       | 400.1    | 3.8        | 400.8      | 4.4        | 401.4      | 7.8        | 400.3 | 4.7        | 402.1 | 5.2        |
| O       | 532.7    | 53.6       | 533.1      | 44.5       | 533.4      | 37.5       | 532.4 | 56.4       | 534.6 | 34.7       |

**Table S3:** Area ratios of bond structures in LA-CDs-x% calculated from the XPS spectra.

| Name/Area Ratio% | Graphitic | Pyrrolic | Amine | Pyridinic |
|------------------|-----------|----------|-------|----------|
| LA-CDs-5%        | 8.3       | 49.4     | 30.9  | 8.4      |
| LA-CDs-10%       | 19.0      | 44.0     | 25.1  | 11.9     |
| LA-CDs-15%       | 12.3      | 19.8     | 44.1  | 23.8     |
| LA-CDs-20%       | 10.1      | 55.9     | 19.5  | 14.5     |
| LA-CDs-30%       | 11.4      | 39.4     | 31.9  | 17.3     |

Absolute Quantum yield (QY) measurement with integrating sphere: The QY was measured and calculated on Fluoromax-4 using integrating sphere according to the following equation as below:

\[
QY = \frac{\text{Number of emitted photos}}{\text{Number of absorbed photos}} = \frac{P_b - P_a}{L_b - L_a}
\]

\(L_b = \text{Total number of incident photons, } L_a = \text{Total photos not absorbed by sample.}\)

\(P_a = \text{“Dark signal” in the emission wavelength area, } P_b = \text{Total number of photons emitted in emission wavelength area.}\)