

Supplementary Information

Broadened Optical Absorption, Enhanced Photoelectric Conversion and Ultrafast Carrier Dynamics of N, P Co-Doped Carbon Dots

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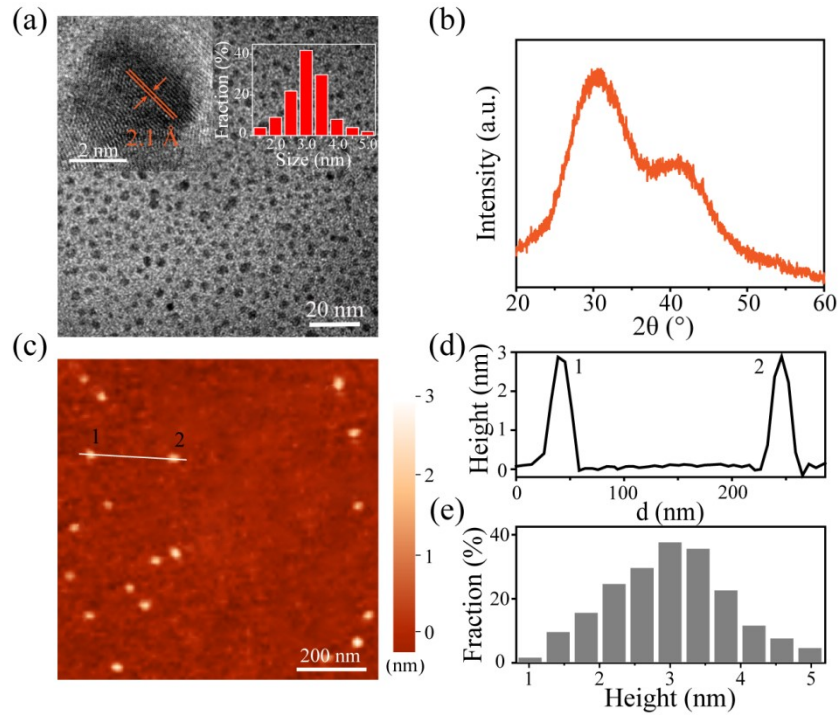


Figure S1. (a) TEM image of N-CDs. Inset shows the HRTEM image displaying the crystalline lattice planes of an individual N-CDs (left) and the size distribution histogram (right). (b) XRD patterns of N-CDs. (c) AFM image, (d) height profile along the white line and (e) height distribution of N-CDs.

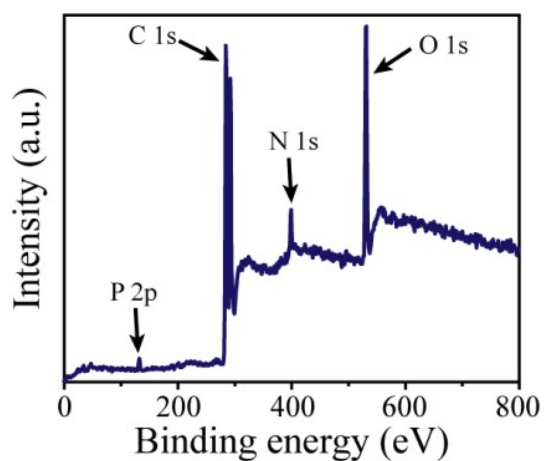


Figure S2. XPS spectrum of N, P-CDs (50 % H₃PO₄).

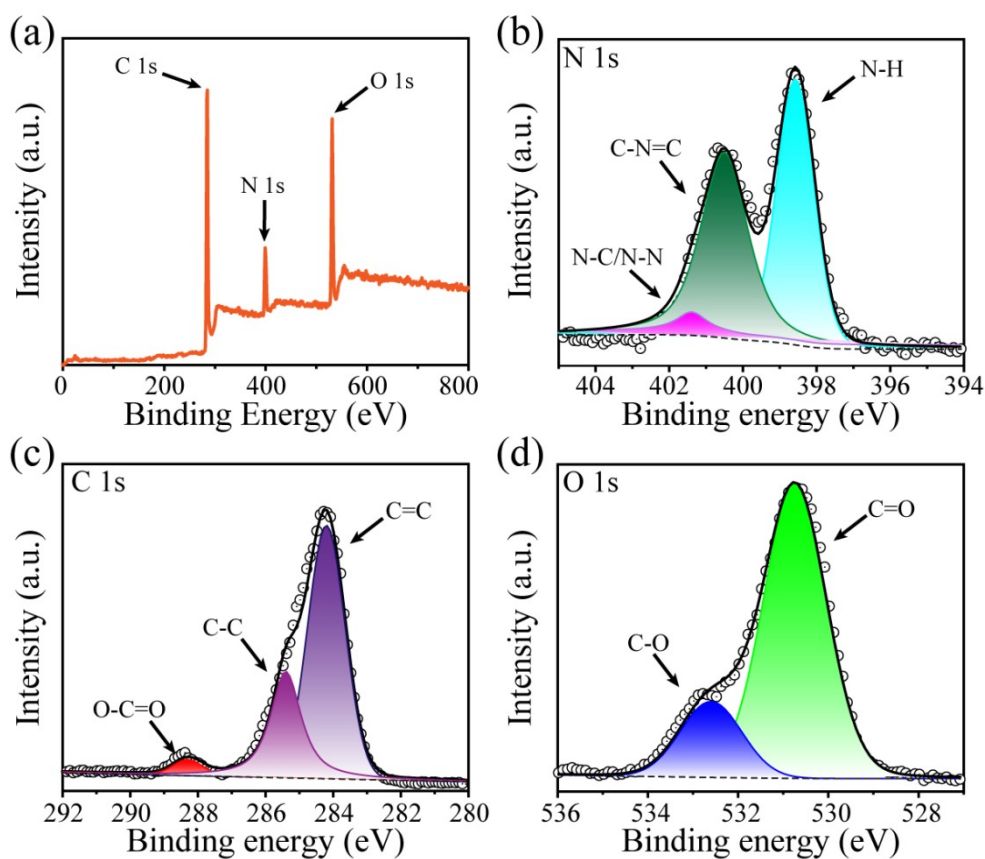


Figure S3. (a) Full XPS spectrum of N-CDs. High-resolution XPS spectra of (b) N 1s, (c) C 1s and (d) O 1s of N-CDs.

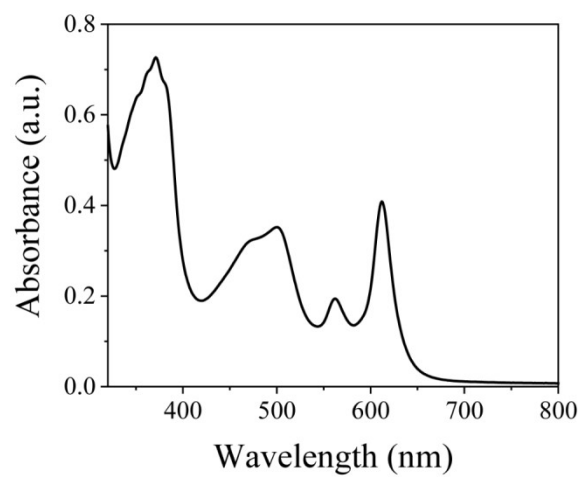


Figure S4. UV-vis spectrum of N, P-CDs (100% H₃PO₄).

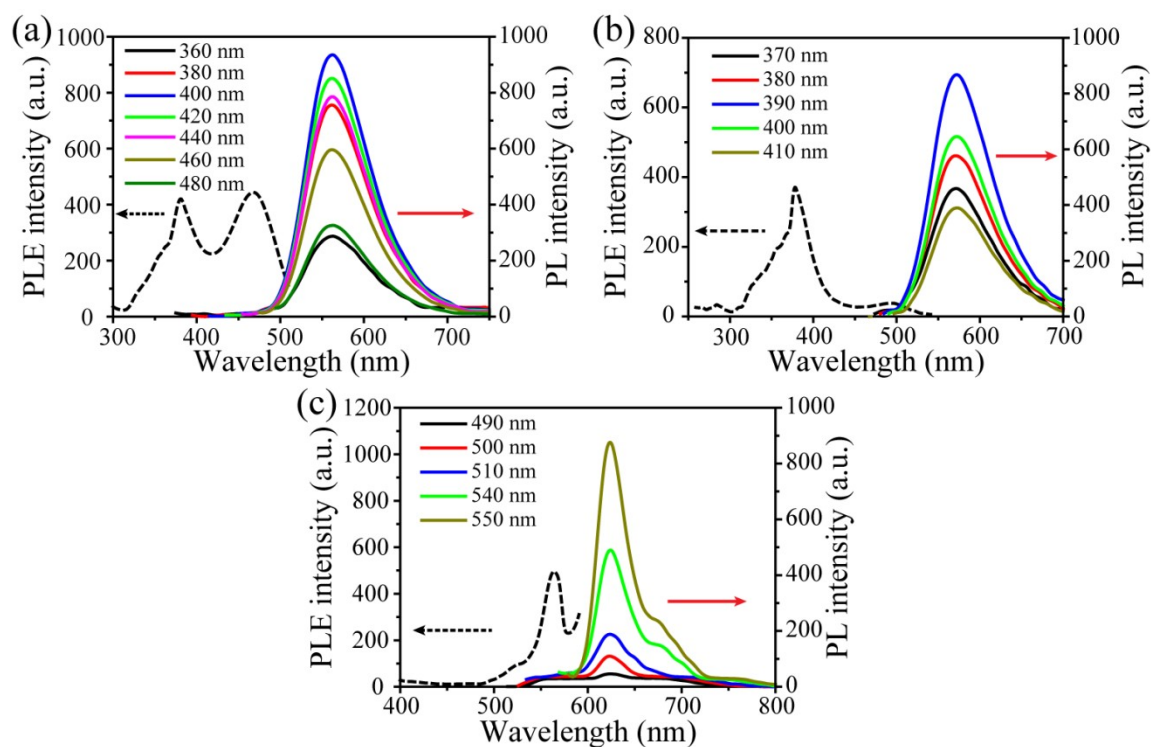


Figure S5. Excitation spectra (dashed line) and emission spectra (solid line) of (a) N-CDs, (b) N, P-CDs (5% H₃PO₄) and (c) N, P-CDs (15% H₃PO₄) under different excitation wavelengths.

Table S1. The PL quantum yields (QY) of N-CDs with different excitation wavelengths.

Wavelength (nm)	360	380	400	420	440	460	480
QY (%)	6.5	7.0	6.1	5.8	6.1	6.4	7.0

Table S2. The PL quantum yields of N, P-CDs (50% H₃PO₄) with different excitation wavelengths.

Wavelength (nm)	490	500	510	520	530	540	550
QY (%)	8.6	10.5	11.6	12.0	11.4	11.6	10.4

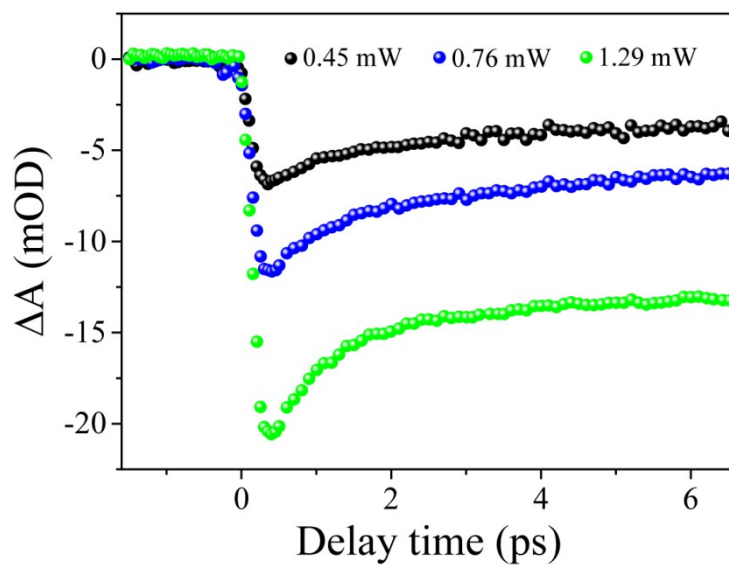
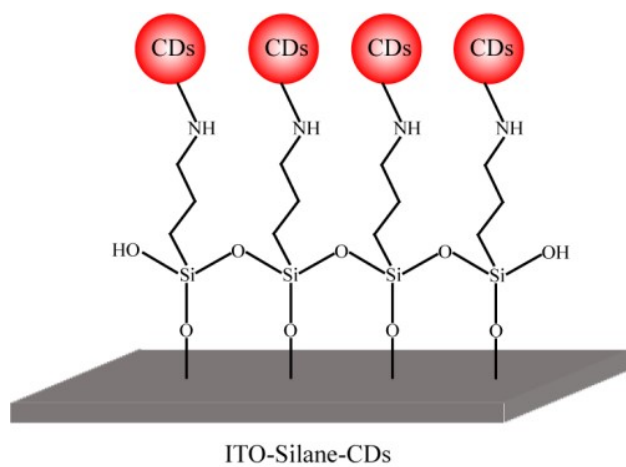


Figure S6. Kinetic traces around 600 nm of N, P-CDs (50 % H₃PO₄) with different excitation power.



Scheme S1. Schematic illustration of ITO-Silane-CDs.

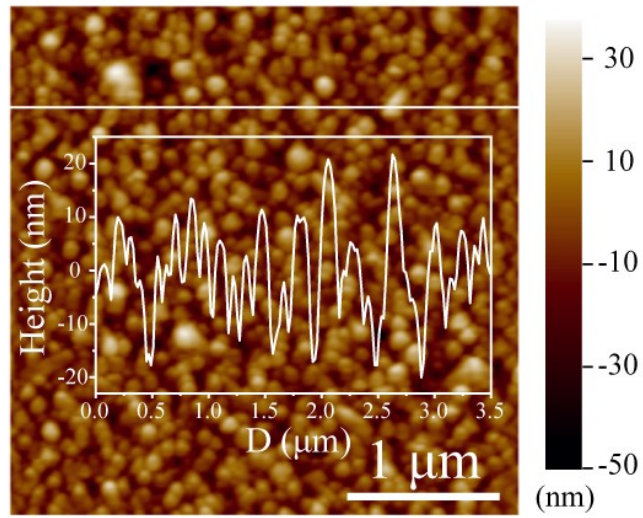


Figure S7. AFM image of bare ITO.