Electronic Supplementary Information (ESI)

Oxygen-driven, high-efficiency production of nitrogen-doped carbon dots from alkanolamines and their application for two-photon cellular imaging

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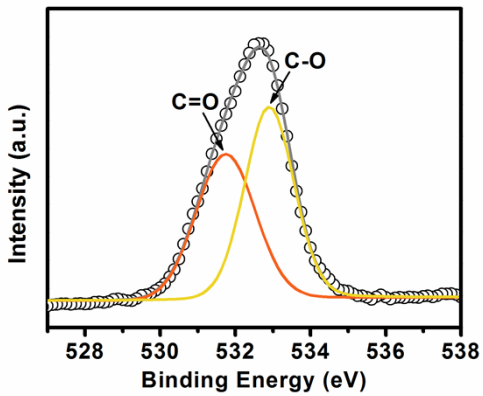

Fig. S1 O_{1s} spectrum of the N-C-dots.

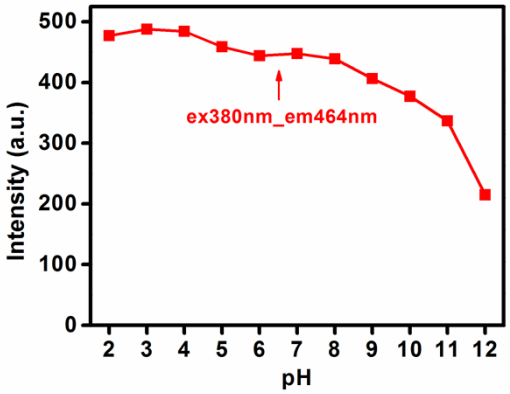

Fig. S2 Effect of pH on the PL intensity of the N-C-dots.

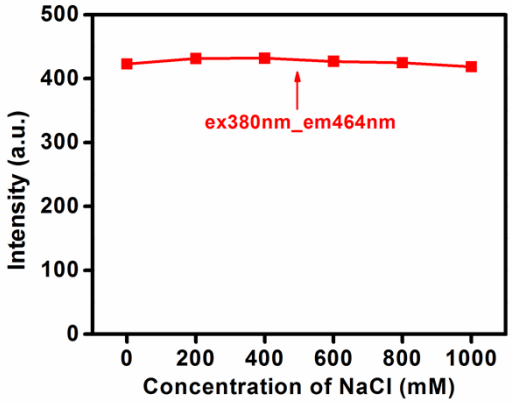

Fig. S3 Effect of concentration of NaCl on the PL intensity of the N-C-dots.

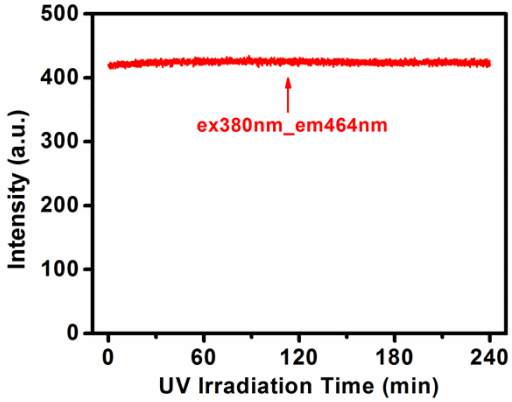

Fig. S4 Effect of UV exposure time on the PL intensity of the N-C-dots.

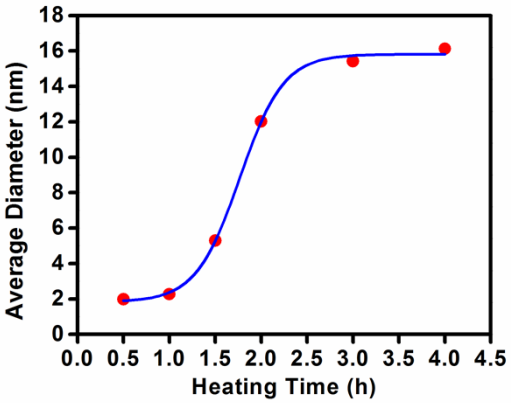

Fig. S5 Average diameter of the N-C-dots depends on heating time.

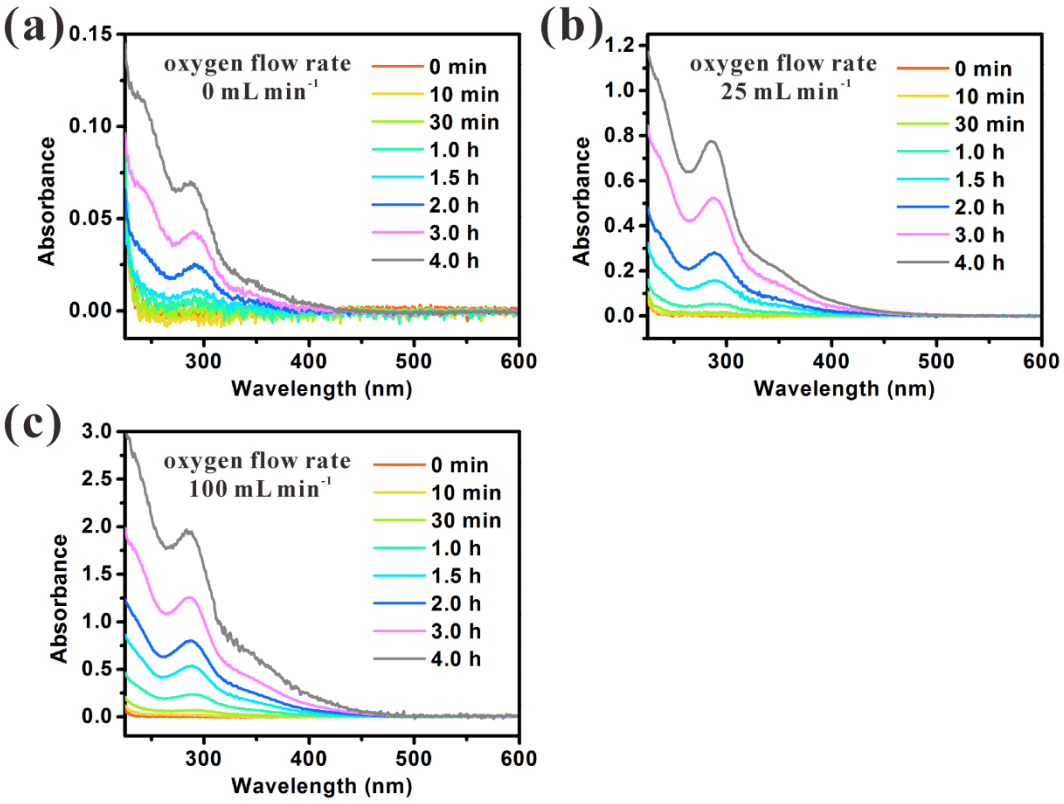

Fig. S6 Temporal evolutions of UV-vis absorption spectra of N-C-dots prepared from MEA at 170 °C in the oxygen flow rates of (a) 0, (b) 25, and (c) 100 mL min^{-1}.

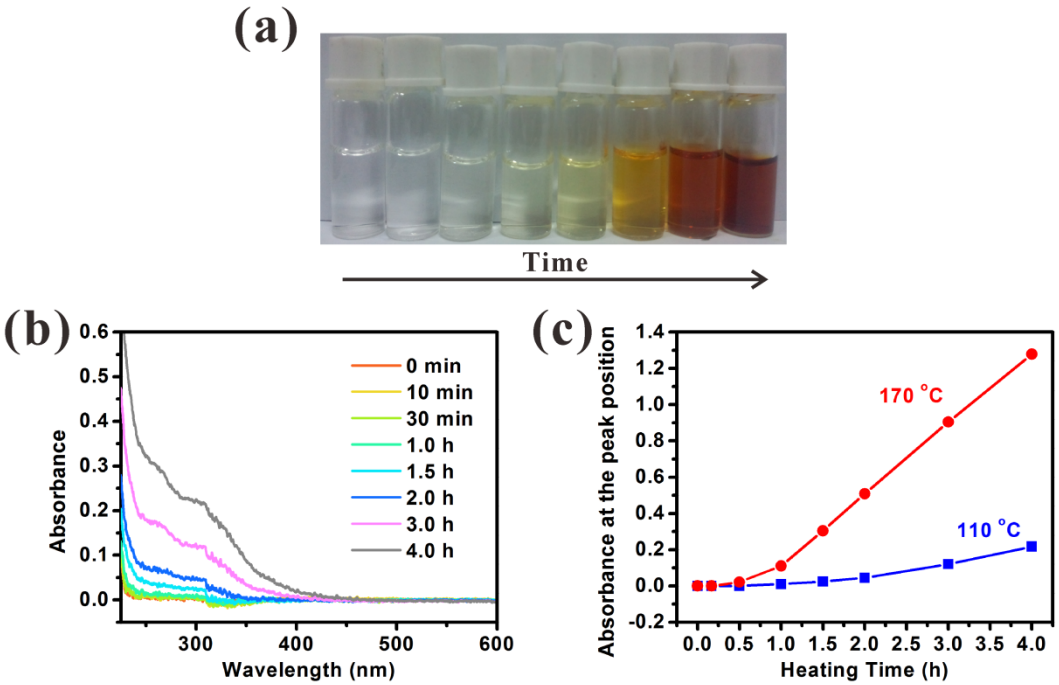

Fig. S7 (a) Photographs of the N-C-dots prepared at 110 °C with different reaction time (from left to right: 0, 10, 30 min, 1.0, 1.5, 2.0, 3.0, and 4.0 h). (b) UV-vis absorption spectra of the N-C-dots prepared at 110 °C with different reaction time. (c) Time dependence of the absorbance at the peak position. For the N-C-dots prepared at 170 °C, the peak position is ~280 nm; for the N-C-dots prepared at 110 °C, the peak position is ~305 nm. The oxygen flow rate was 50 mL min^{-1} in all cases.

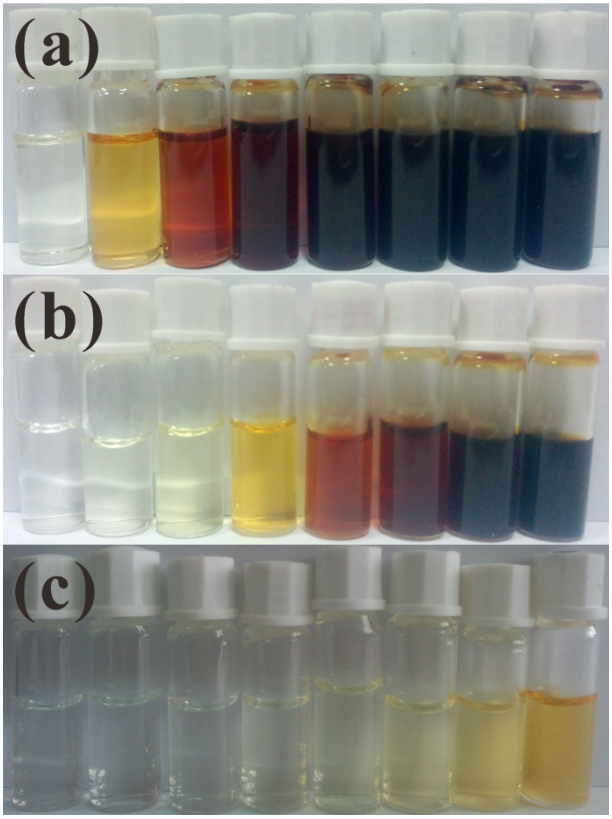

Fig. S8 Photographs of the N-C-dots prepared from TEA (a), MEA (b), and DEA (c) at 170 °C in the oxygen flow rate of 50 mL min^{-1} with different reaction time (from left to right: 0, 10, 30 min, 1.0, 1.5, 2.0, 3.0, and 4.0 h). It is obvious that the rate of color variation is TEA > MEA > DEA, which indicates that the production rate of N-C-dots from MEA, DEA, and TEA in the same synthetic conditions is TEA > MEA > DEA.

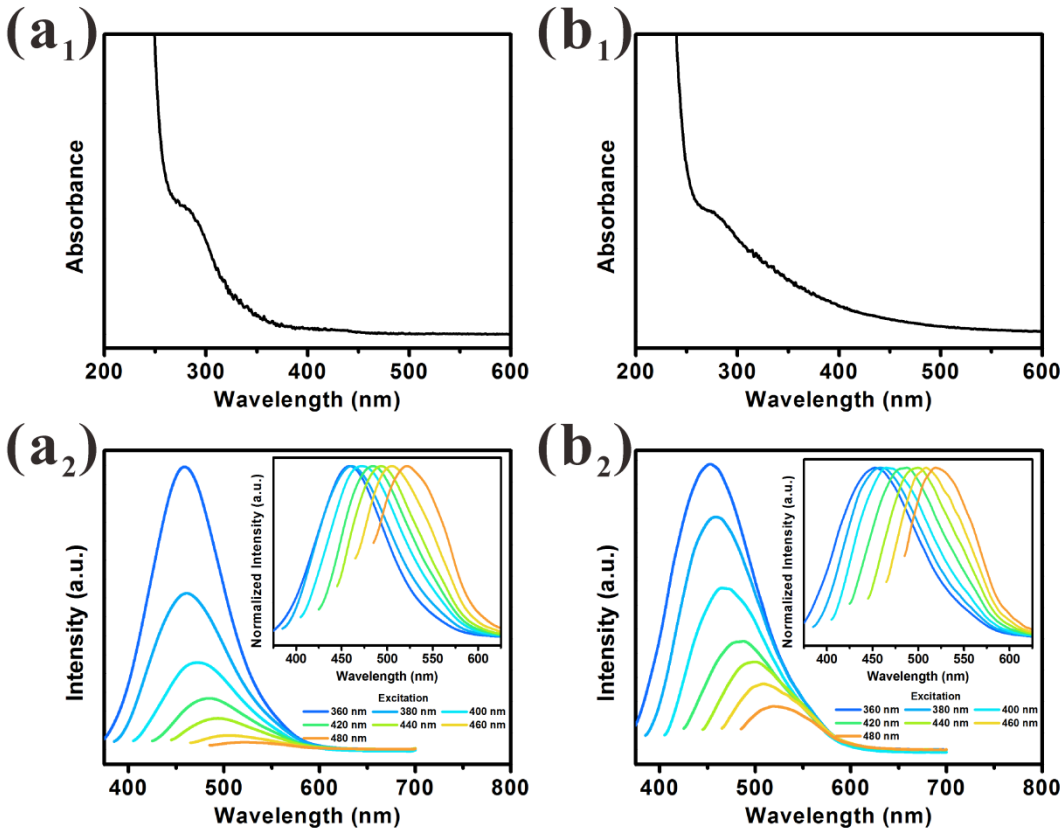

Fig. S9 (a_1) UV-vis absorption, (a_2) PL spectra of the N-C-dots prepared from DEA at 170 °C in the oxygen flow rate of 50 mL min^{-1} for 4 h. (b_1) UV-vis absorption, (b_2) PL spectra of the N-C-dots prepared from TEA at 170 °C in the oxygen flow rate of 50 mL min^{-1} for 4 h.

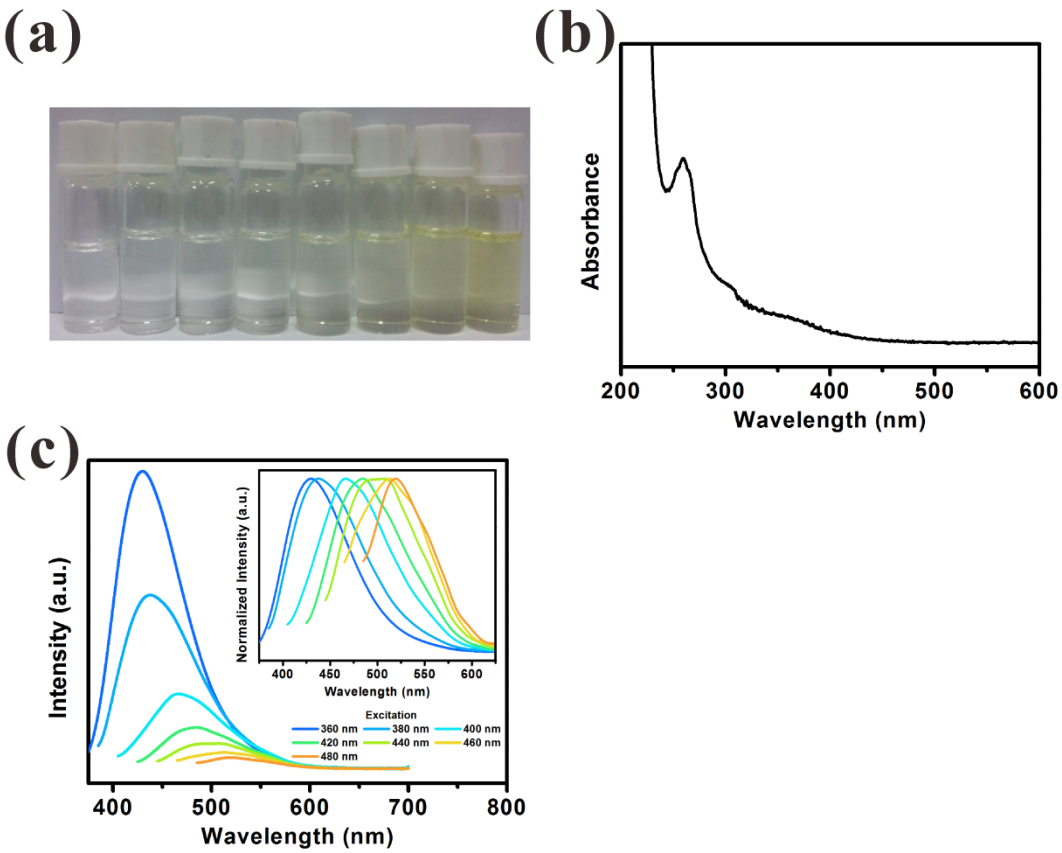

Fig. S10 (a) Photographs of the N-C-dots prepared from ethylenediamine at 116 °C (the boiling point) in the oxygen flow rate of 100 mL min^{-1} with different reaction time (from left to right: 0, 10, 30 min, 1.0, 1.5, 2.0, 3.0, and 4.0 h). The slow rate of color variation is indicative of the slow production rate of N-C-dots from ethylenediamine. (b) UV-vis absorption, (c) PL spectra of the N-C-dots prepared from ethylenediamine at 116 °C in the oxygen flow rate of 100 mL min^{-1} for 4 h.

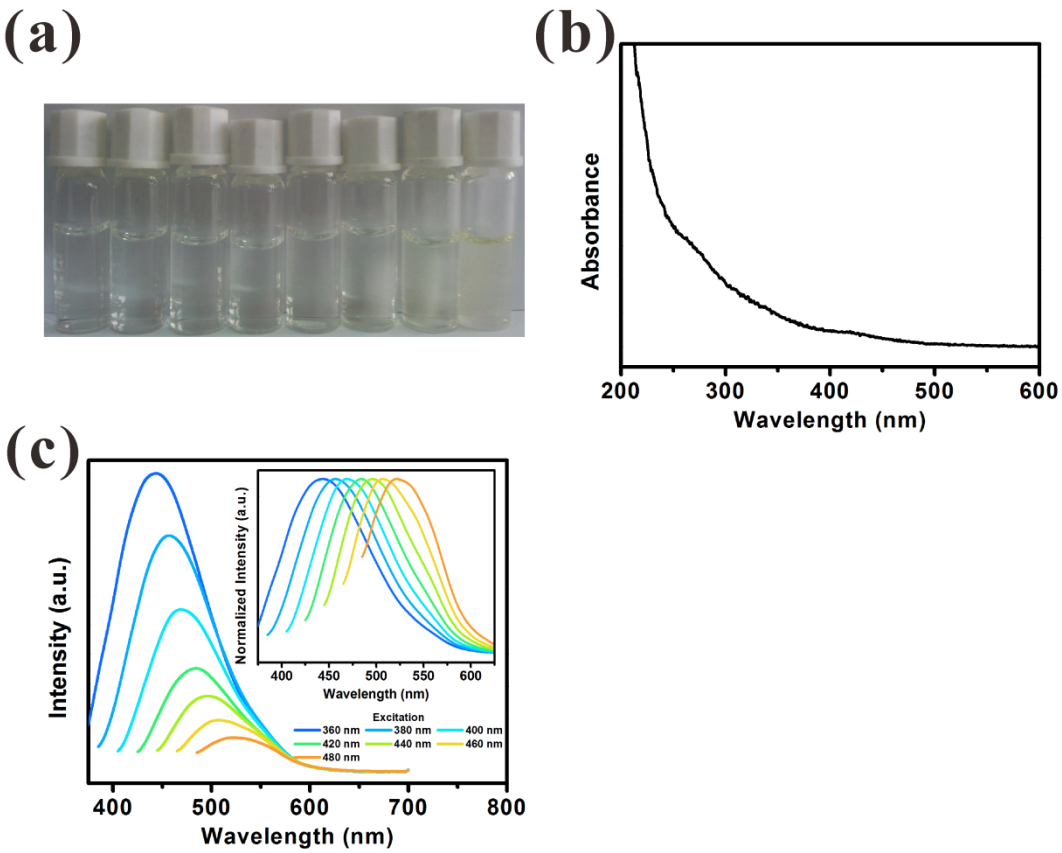

Fig. S11 (a) Photographs of the C-dots prepared from ethylene glycol at 197 °C (the boiling point) in the oxygen flow rate of 100 mL min^{-1} with different reaction time (from left to right: 0, 10, 30 min, 1.0, 1.5, 2.0, 3.0, and 4.0 h). The slow rate of color variation is indicative of the slow production rate of C-dots from ethylene glycol. (b) UV-vis absorption, (c) PL spectra of the C-dots prepared from ethylene glycol at 197 °C in the oxygen flow rate of 100 mL min^{-1} for 4 h.

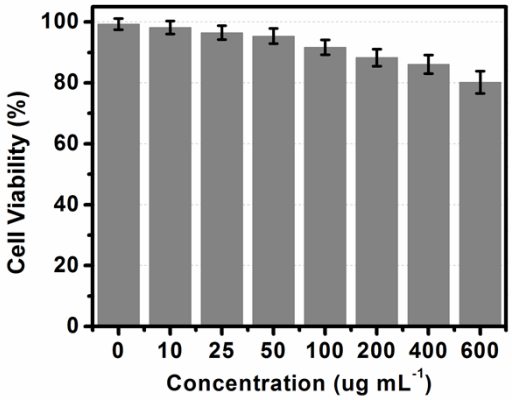

Fig. S12 Cell viability values (%) estimated by MTT assay in Hela cells, which are incubated with serial concentrations of the N-C-dots for 48 h at 37 °C.