Electronic Supplementary Material (ESI) for Nanoscale.

Chiral Evolution of Carbon Dots and the Tuning on Laccase Activity

Supporting information

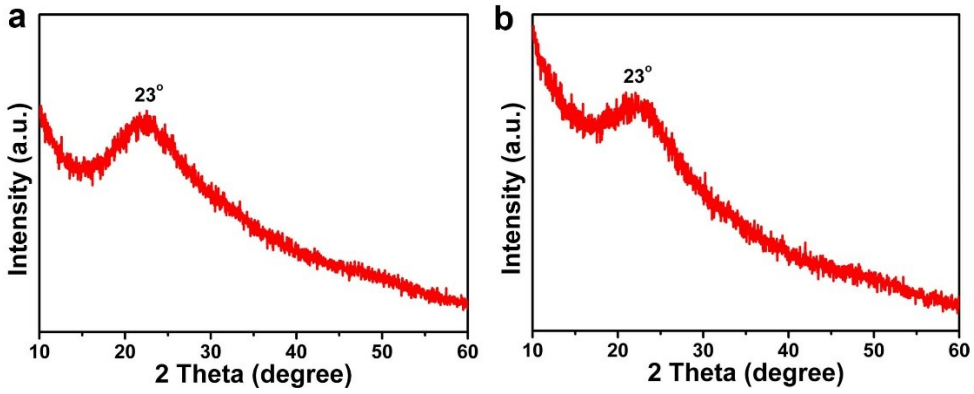

Fig. S1 XRD patterns of L-CDs (a) and D-CDs (b).

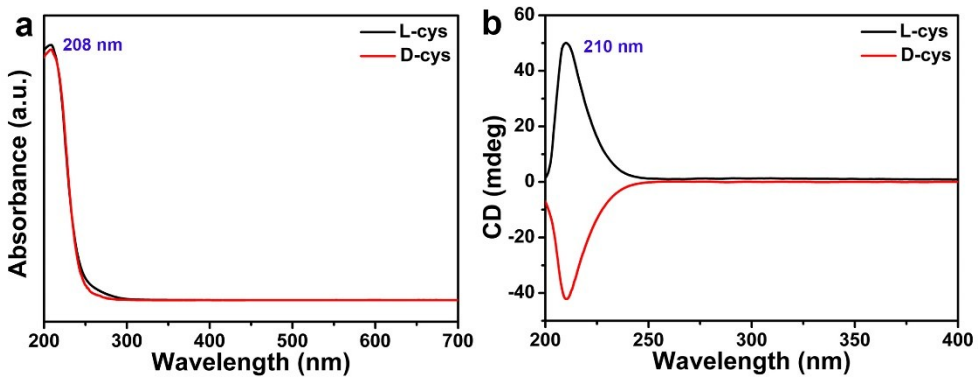

Fig. S2 (a) UV-vis absorption of L- (black line) and D-cys (red line). (b) CD spectra of L- (black line) and D-cys (red line).

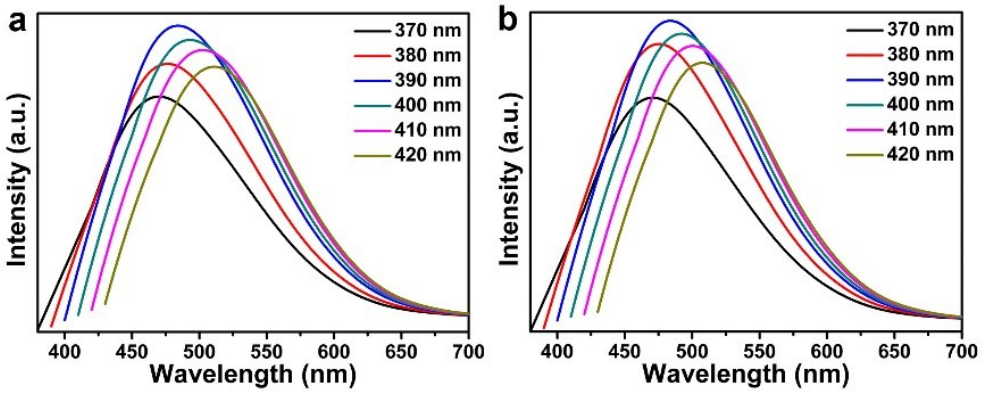

Fig. S3 PL spectra of L-CDs (a) and D-CDs (b) with different excitation wavelengths

from 370 nm to 420 nm with the increment of 10 nm.

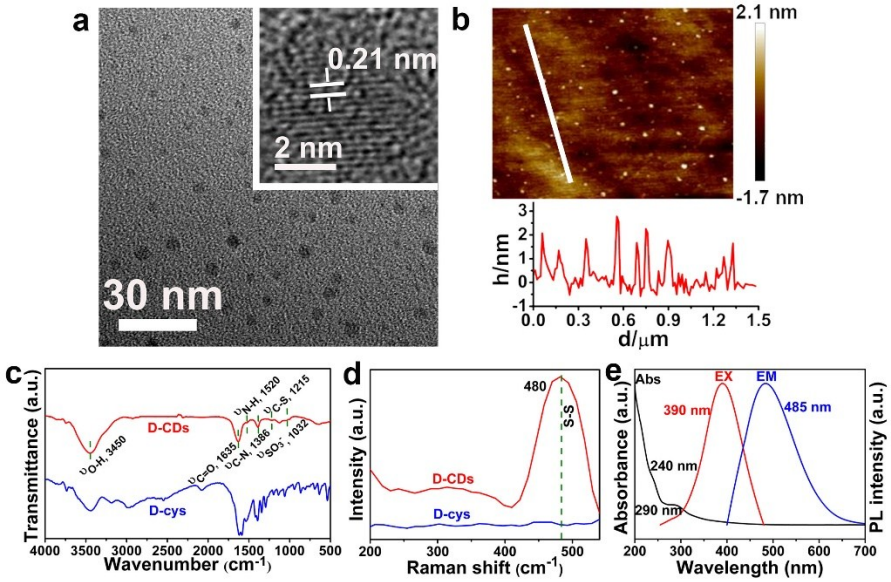

Fig. S4 (a) TEM image of D-CDs (the HRTEM image of a single particle in inset); (b) AFM image of D-CDs; (c) FT-IR spectra of D-CDs and D-cys; (d) Raman spectra of D-CDs (red line) and D-cys (blue line); (e) UV-vis absorption, PL excitation and emission spectra of D-CDs.

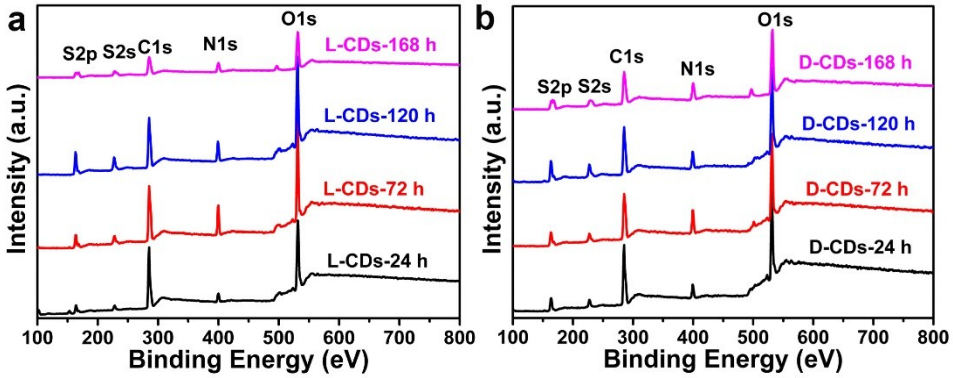

Fig. S5 (a) Full scan XPS survey spectra of L-CDs prepared with 24, 72, 120 and 168 h (black, red, blue and magenta lines, respectively); (b) Full scan XPS survey spectra of D-CDs prepared with 24, 72, 120 h and 168 h (black, red, blue and magenta lines, respectively).

Table S1. Elemental compositions of chiral CDs prepared with different time.

Sample	C % (atom %)	N % (atom %)	O % (atom %)	S % (atom %)
L-CDs-24 h	64.50	6.21	24.78	4.51
L-CDs-72 h	54.51	14.20	24.80	6.49
L-CDs-120 h	53.52	10.73	25.28	10.47
L-CDs-168 h	46.21	13.38	30.76	9.65
D-CDs-24 h	60.96	7.71	24.81	6.52
D-CDs-72 h	53.70	13.66	25.26	7.38
D-CDs-120 h	52.75	10.78	25.34	11.13
D-CDs-168 h	47.84	13.43	29.28	9.45

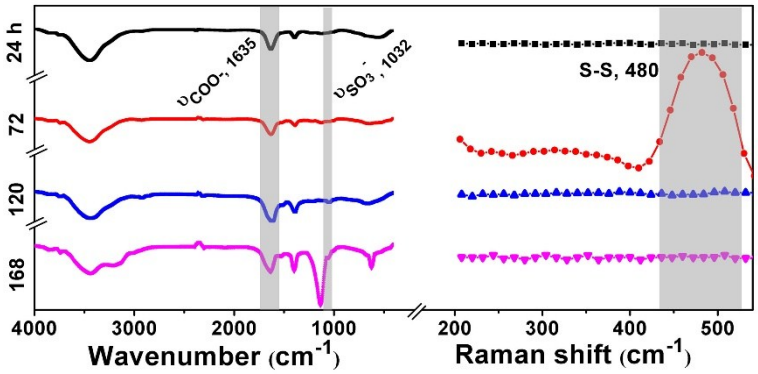

Fig. S6. FT-IR (left) and Raman spectra (right) of D-CDs prepared with 24 (black lines), 72 (red lines), 120 (blue lines) and 168 h (magenta lines), respectively.

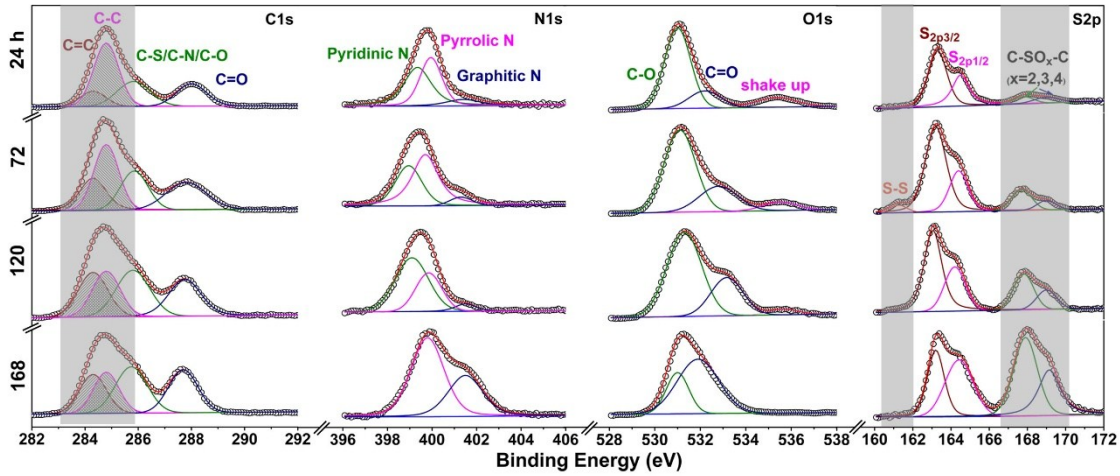

Fig. S7 High-resolution XPS spectra of D-CDs in the order of C 1s, N1s, O1s and S2p from left to right prepared with 24, 72, 120 and 168 h.

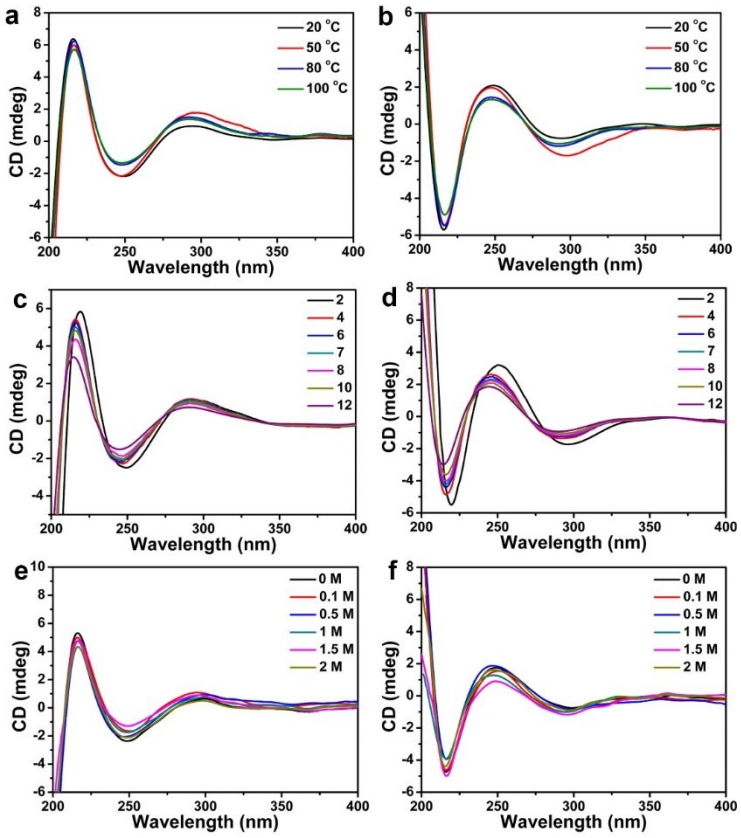

Fig. S8 CD spectra of L-CDs (a) and D-CDs (b) in different temperature (from 20 to 100 °C); CD spectra of L-CDs (c) and D-CDs (d) in different pH value (from 2 to 12); CD spectra of L-CDs (e) and D-CDs (f) in different ionic strength (from 0 to 2 M).

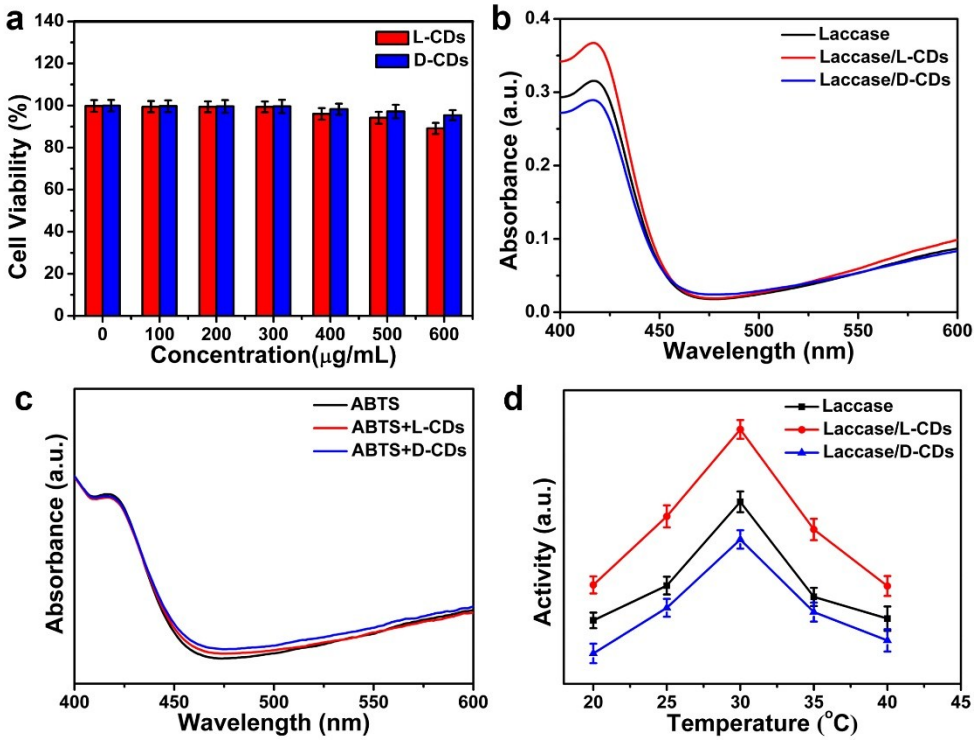

Fig. S9 (a) Viability of HeLa cells after 48 h of incubation with different concentrations of L-CDs (red trace), and D-CDs (blue trace). (b) The UV-vis absorbance spectra of ABTS after adding laccase (black trace), laccase/L-CDs (red trace) and laccase/D-CDs (blue trace) for 3 min in a water bath at 30 °C. (c) The UV-vis absorbance spectrum of ABTS at its initial concentration (black line) and ABTS added with L-CDs (red line) and D-CDs (blue line) for reacting 3 minutes in water bath at 30 °C. (d) Activity of free laccase (black trace), laccase/L-CDs (red trace) and laccase/D-CDs (blue trace) as a function of incubation temperature.

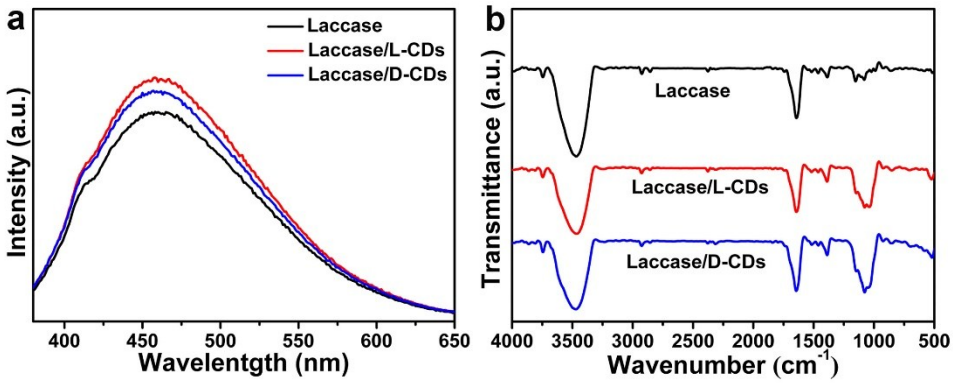

Fig. S10 (a) PL spectra of free laccase (black line), laccase/L-CDs (red line) and laccase/D-CDs (blue line) with excitation wavelength of 360 nm; (b) FT-IR spectra of free laccase (black line), laccase/L-CDs (red line) and laccase/D-CDs (blue line).

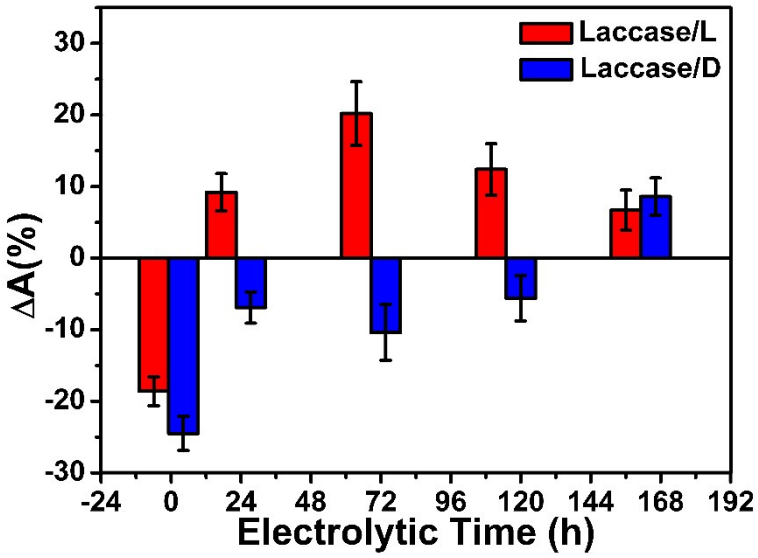

Fig. S11 Histogram of enzyme specific activity vs the different as-obtained samples prepared with 0, 24, 72, 120 and 168 h (The concentration of laccase and L- or D-CDs is 0.5 and 0.075 mg/mL, respectively).

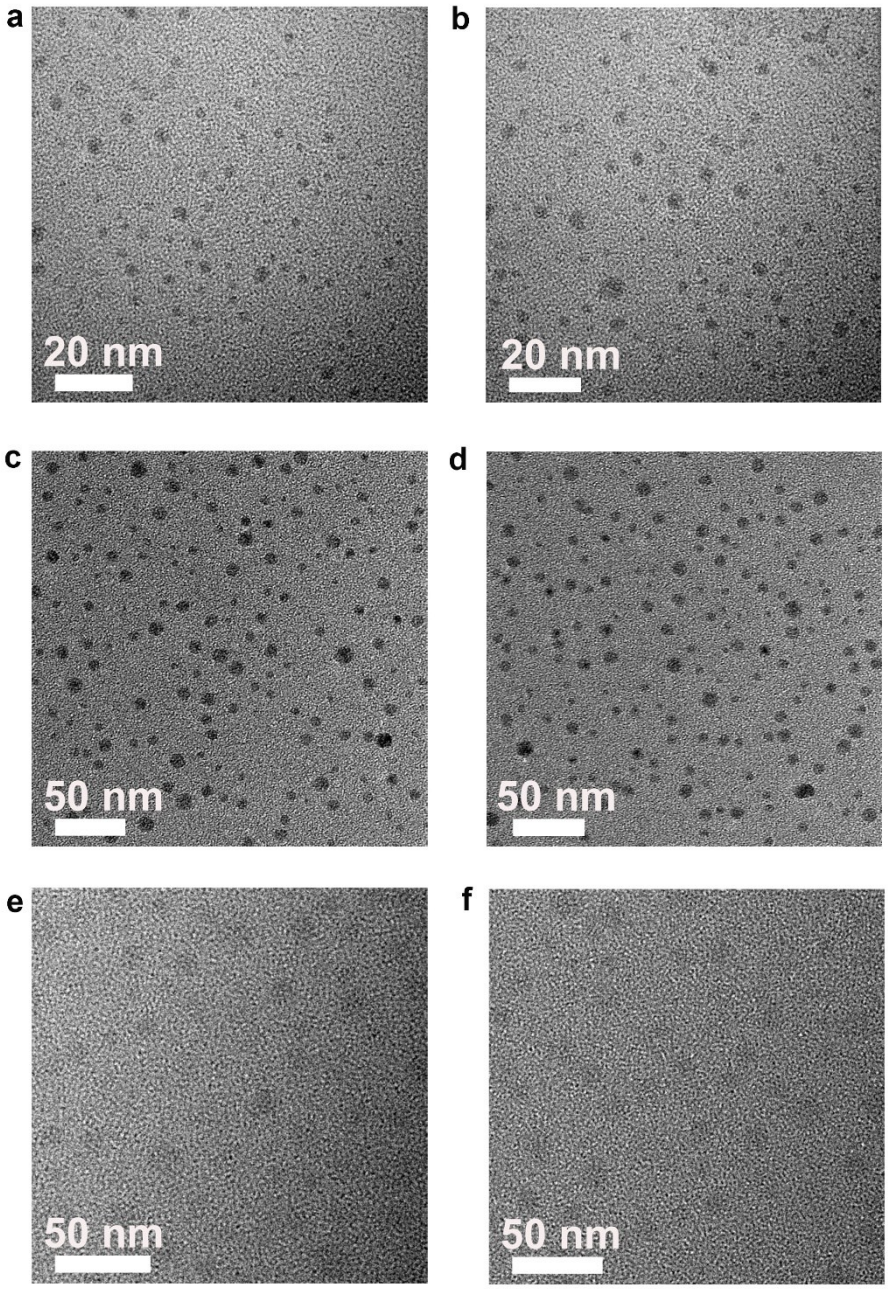

Fig. S12 TEM image of L-CDs (a) and D-CDs (b) prepared for 24 h with diameter of about 2-4 nm. TEM image of L-CDs (c) and D-CDs (d) prepared for 120 h with diameter of about 7-10 nm. TEM image of L-CDs (e) and D-CDs (f) prepared for 168 h with diameter of about 13-15 nm.