Electronic Supplementary Information (ESI)

Green and size-controllable synthesis of photoluminescent carbon nanoparticles from waste plastic bags

Yaoping Hu,[a] Jing Yang,[a,b] Jiangwei Tian,[a] Li Jia,[a] and Jun-Sheng Yu*[a]
[a] State Key Laboratory of Analytical Chemistry for Life Science, School of Chemistry and Chemical Engineering, Nanjing University, Nanjing 210093, P.R. China
[b] School of Pharmacy, Nanjing Medical University, Nanjing 210029, P.R. China

Fig. S1 The photograph of the WPBs used in the first case for the synthesis of CNPs.

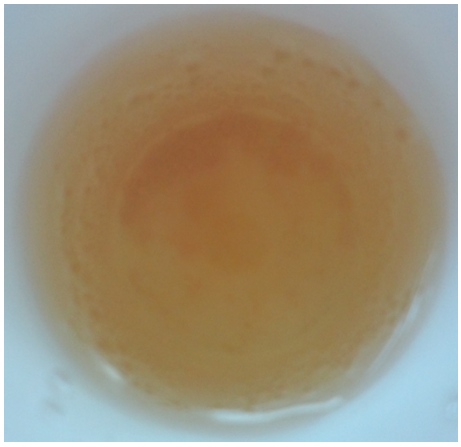

Fig. S2 The products of WPBs which were hydrothermally treated in 5.0 wt% H_2O_2 solution at 180 °C for 12 h. Note that many bubbles generated and adhered to the wall of the autoclave.

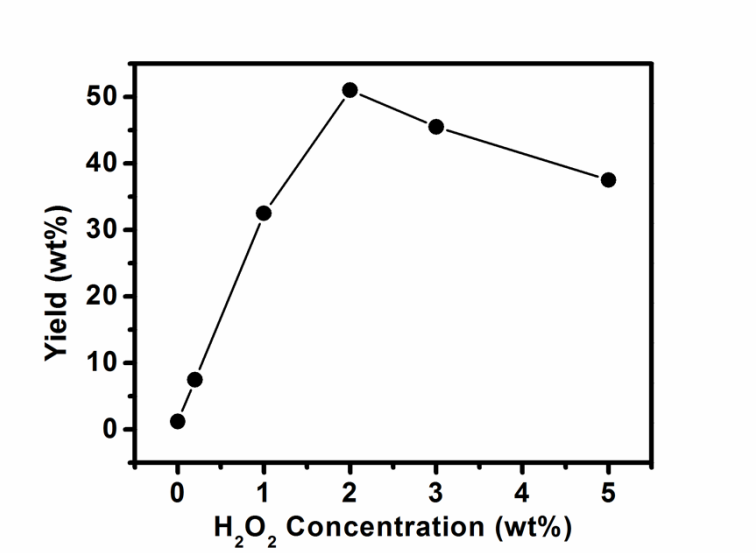

Fig. S3 The yields of CNPs synthesized in different concentrations of H_2O_2 solution. ($Yield_{(CNPs)} = Weight_{(CNPs)} / Weight_{(WPBs)}$)

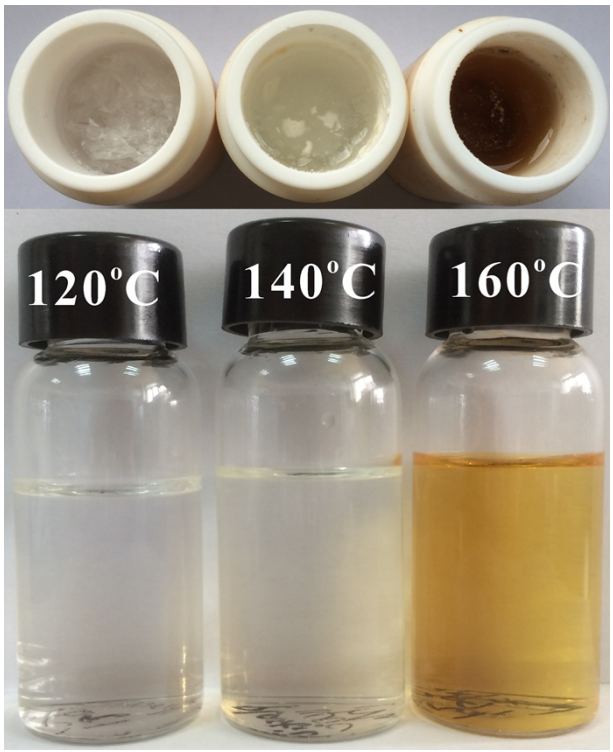

Fig. S4 The products of WPBs which were hydrothermally treated in 2.0 wt% H_2O_2 solution at different temperature (from left to right: 120, 140, 160 °C) for 12 h, and the corresponding centrifuged solutions.

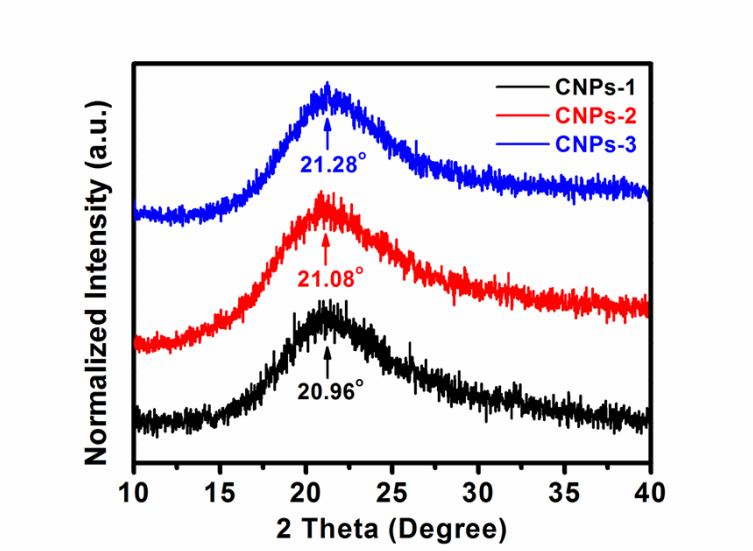

Fig. S5 XRD patterns of CNPs-1, CNPs-2, and CNPs-3.

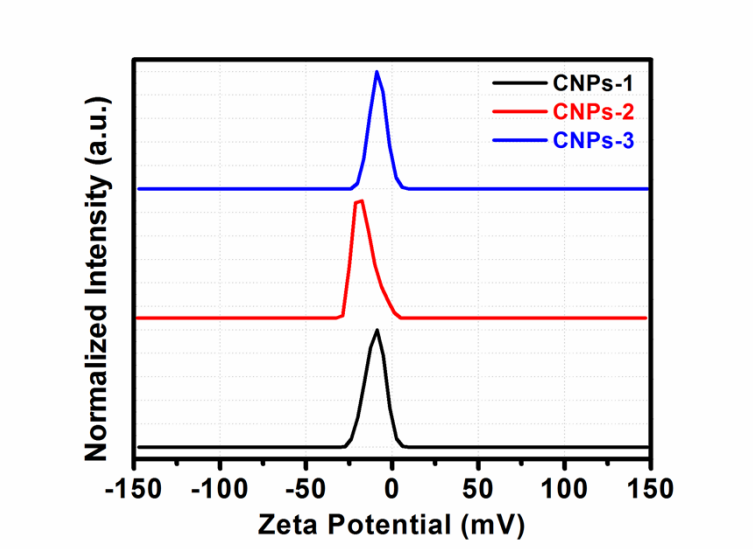

Fig. S6 Zeta Potentials of CNPs-1, CNPs-2, and CNPs-3.

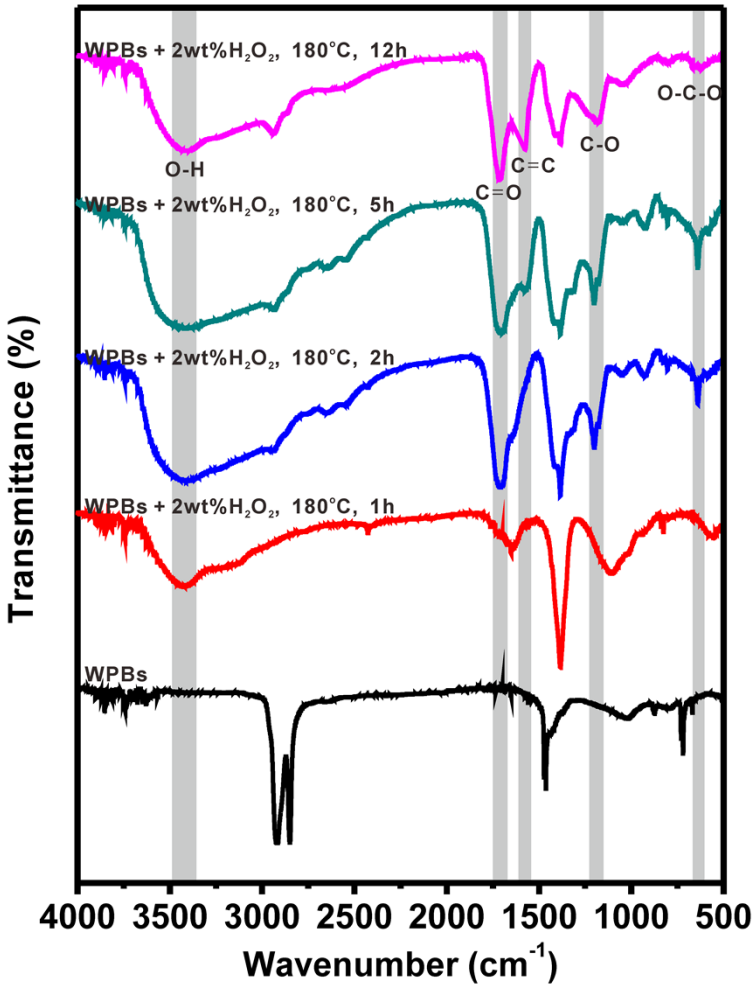

Fig. S7 FTIR spectra of WPBs, intermediate products obtained at different reaction time (1, 2, 5 h), and the final CNPs.

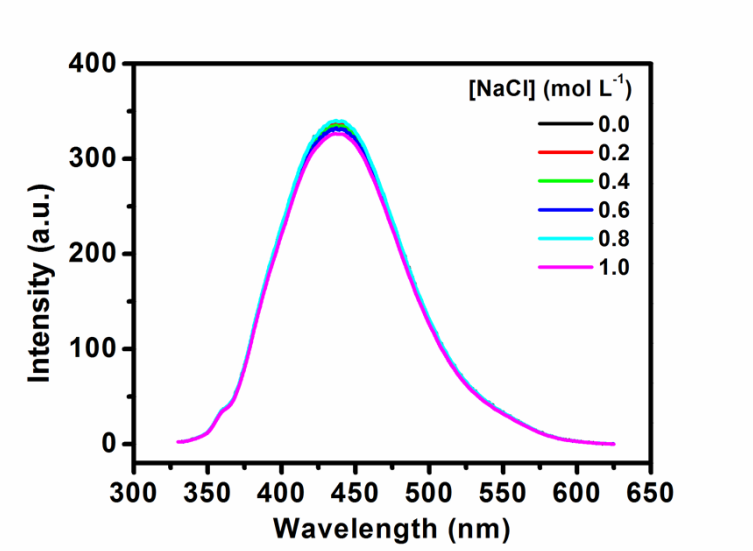

Fig. S8 Effect of concentration of NaCl on the PL intensity of CNPs-2.

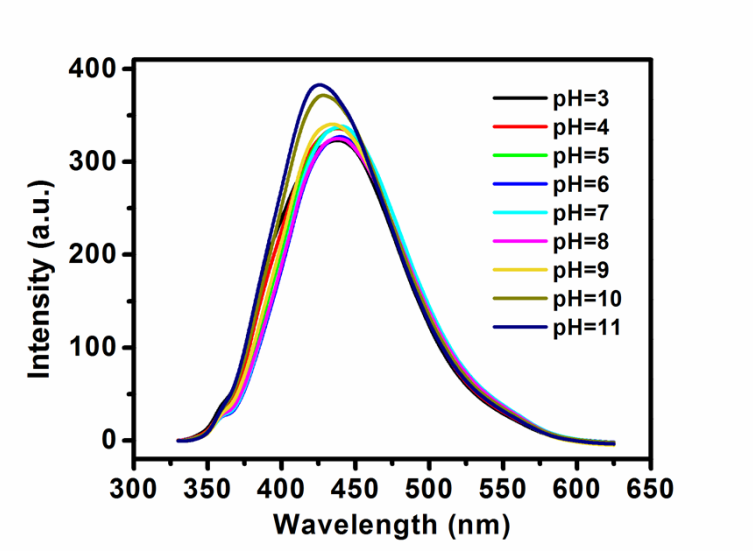

Fig. S9 Effect of pH on the PL intensity of CNPs-2.

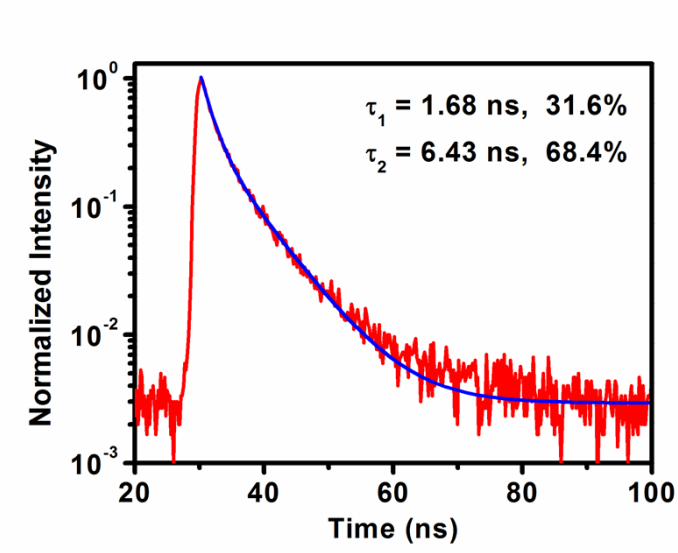

Fig. S10 Fluorescence lifetime of CNPs-2.

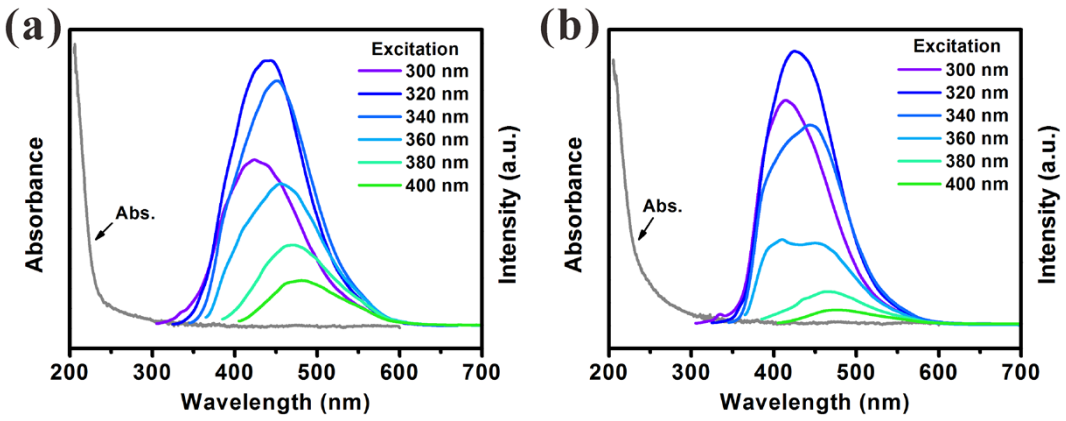

Fig. S11 UV-vis absorption and PL spectra of (a) CNPs-1 and (b) CNPs-3.

Table S1 Elemental analysis of the starting WPBs, production yield and quantum yield of the CNPs.

WPBs	Elemental analysis		CNPs	
	C (wt%)	H (wt%)	Production Yield (wt%)	Quantum Yield (%)
(a) syringe-packing plastic bag	87.17	13.02	48.1	2.25
(b) food fresh-keeping plastic bag *	29.62	3.32	10.7	1.18
(c) garbage plastic bag	79.96	13.04	49.5	2.38
(d) soap-packing plastic bag	79.05	12.98	26.8	4.49
(e) stationery-carrying plastic bag	81.73	13.80	52.3	2.03
(f) toilet roll-packing plastic bag	87.48	13.30	34.8	1.66

* Food fresh-keeping plastic bag is made of polyvinylidene chloride

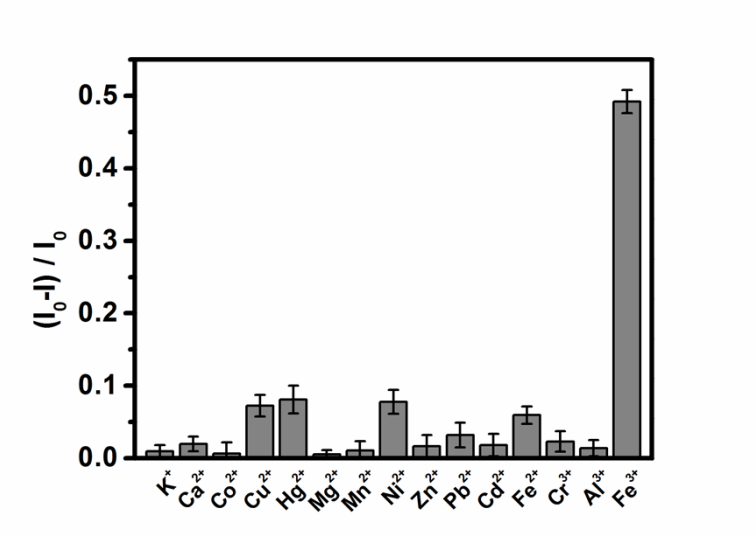

Fig. S12 Selectivity of CNPs-2 toward Fe^{3+}. All the concentrations of the metal ions were 400 μM. All experiments were performed in a pH 7.0 solution; excitation wavelength = 320 nm.

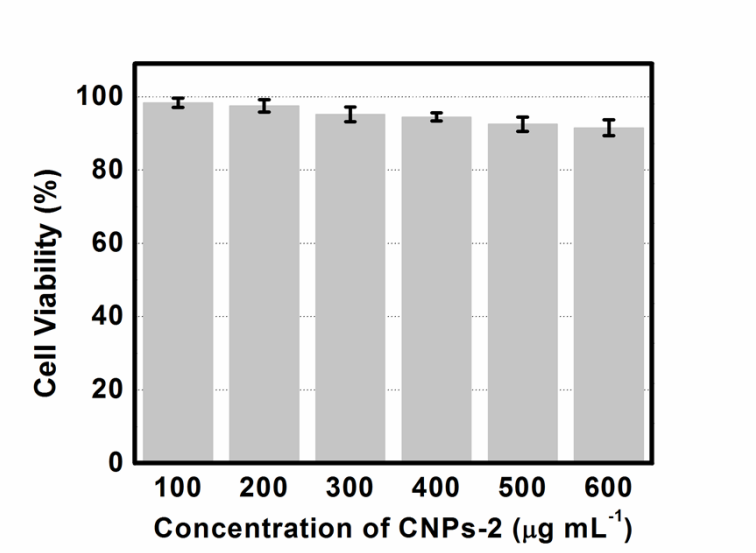

Fig. S13 Cell viability values (%) estimated by MTT assay in Hela cells, which are incubated with serial concentrations of CNPs-2 for 48 h at 37 °C.

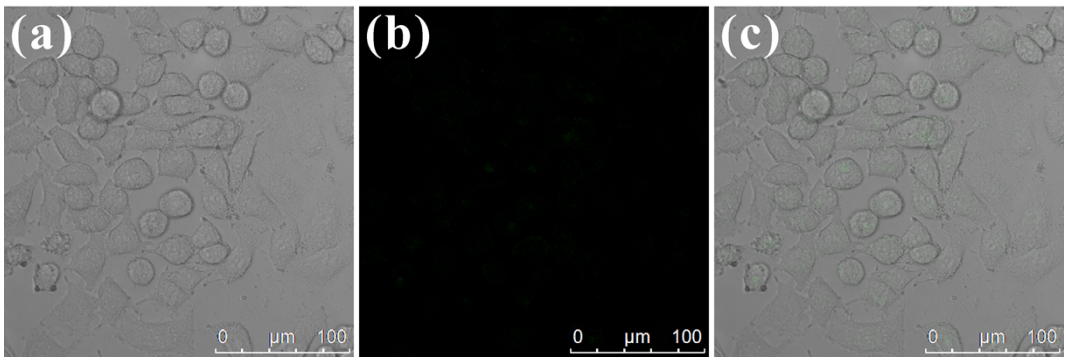

Fig. S14 (a) A Bright-field microphotograph of Hela cells. (b) A confocal fluorescence microphotograph of Hela cells in the absence of CNPs (λ_{ex} = 405 nm). (c) An overlay image of (a) and (b).