

Table S1. Textural parameters of CNTs, CNTs@P-PI and CNTs@Fe-N-C-700 (7 wt% Fe).

	BET surface area (m ² /g)	t-Plot Microporous surface area (m ² /g)
Pristine CNTs	148.1	16.34
CNTs@P-PI	82.4	-
CNTs@Fe-N-C-700 (7 wt% Fe)	162.7	63.45

Table S2. Relative content of different N species to total N parameters for CNTs@Fe-N-C with different Fe loading based on XPS and elemental analysis

	Fe loading		
	7 wt%	18 wt%	25 wt%
Pyridinic N (%)	26%	29%	38%
Pyrrolic N (%)	31%	14%	13%
Graphitic N (%)	43%	56%	49%

Table S3. Mössbauer parameters for CNTs@Fe-N-C-700 catalysts with different iron loadings at room temperature.

	Isomer shift δ (mm/s)			Quadrupole splitting ΔE (mm/s)			Line width (mm/s)			Rel area A (%)		
	Fe loading (wt%)											
	7	18	25	7	18	25	7	18	25	7	18	25
D 1	0.38	0.37	0.37	1.27	1.26	1.43	1.04	1.12	1.14	40.96 4	19.51	13.55
Sext 1	0.28	0.27	0.27	0.07	0.02	0.02	0.30	0.29	0.25	23.36	29.83	32.67
Sext 2	0.66	0.66	0.66	0.14	0.16	0.08	0.33	0.38	0.291	35.69	50.65	53.77

^a D 1: FeN₄, 3d⁶, low spin;¹⁻³

Sext 1: Fe₃O₄, Fe³⁺ in A-sites;⁴

Sext 2: Fe₃O₄, Fe³⁺+Fe²⁺ in B-sites.⁴

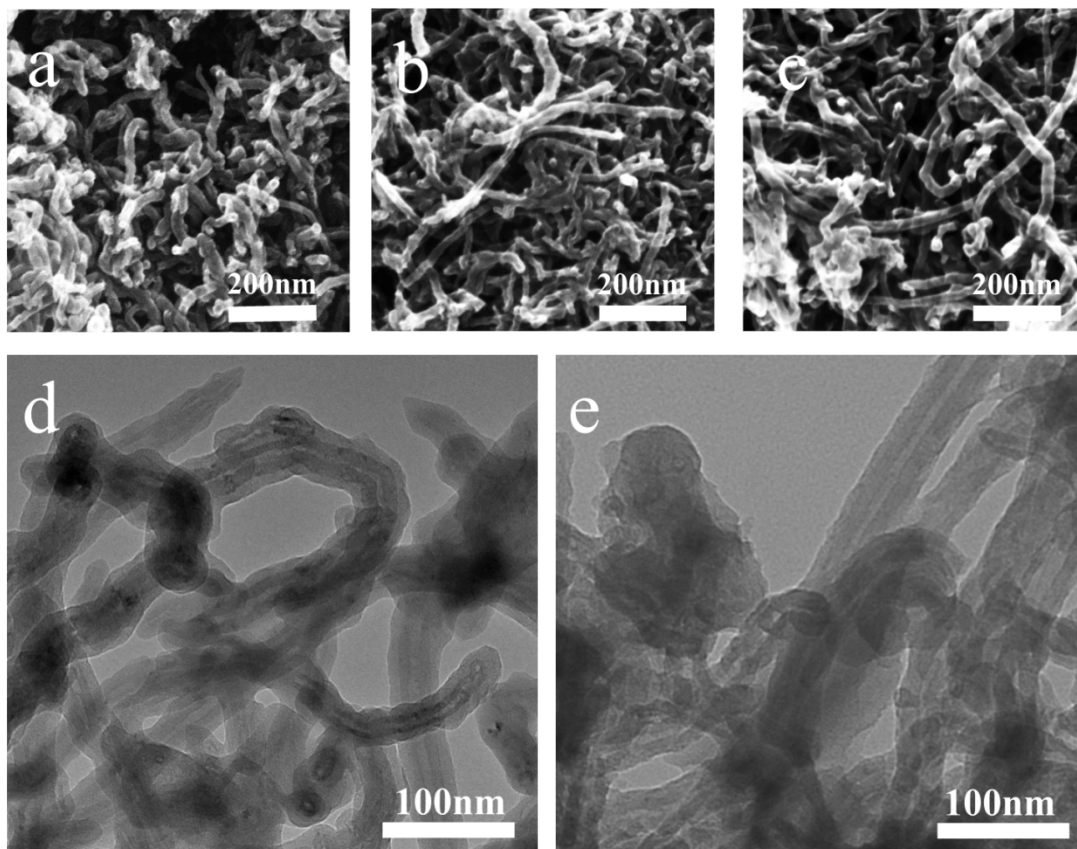


Fig. S1 SEM images of (a) pristine carboxyl CNTs; (b) CNTs@P-PI; (c) CNTs@Fe-N-C 700 (Fe 7 wt%).

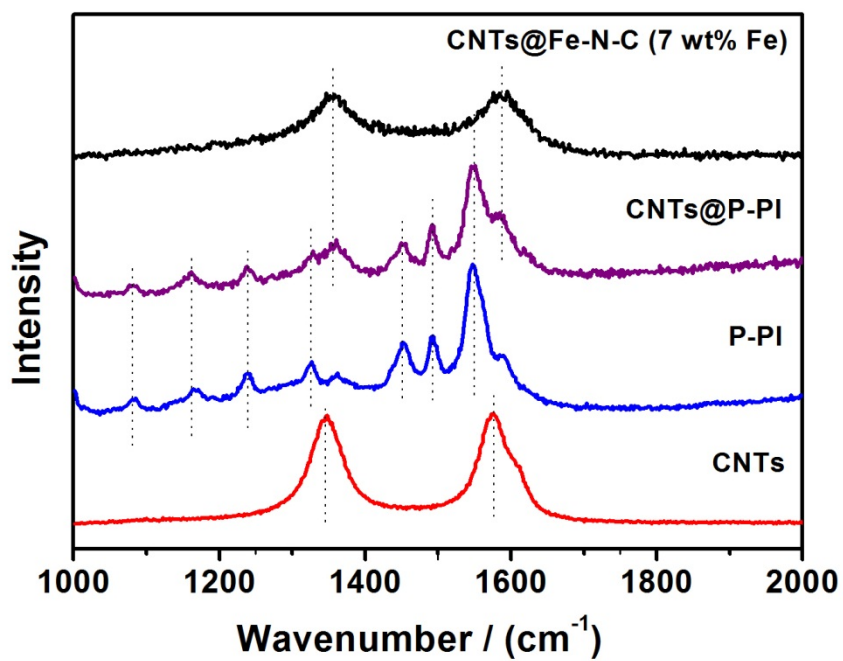


Fig. S2 Raman spectra of pristine carboxyl CNTs (CNTs), pure polymer (P-PI), CNTs@P-PI, and CNTs@Fe-N-C 700 (Fe 7 wt%).

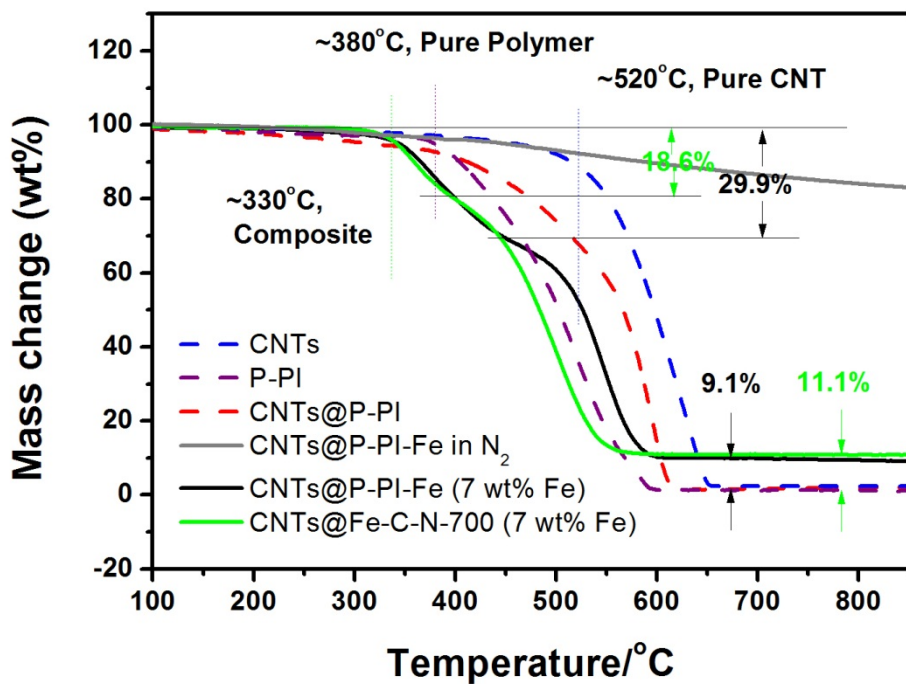


Fig. S3 Thermo gravity analysis results of pristine carboxyl CNTs, pure polymer (P-PI), CNTs@P-PI, CNTs@P-PI-Fe (after loading FeCl₃) and CNTs@Fe-N-C-700 (Fe 7 wt%).

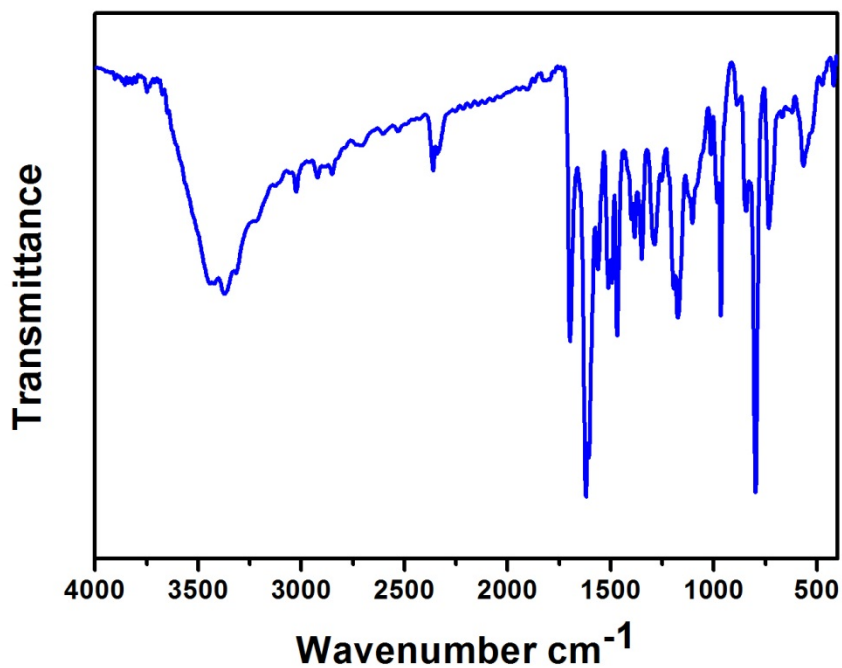


Fig. S4 FT-IR spectrum of P-PI.

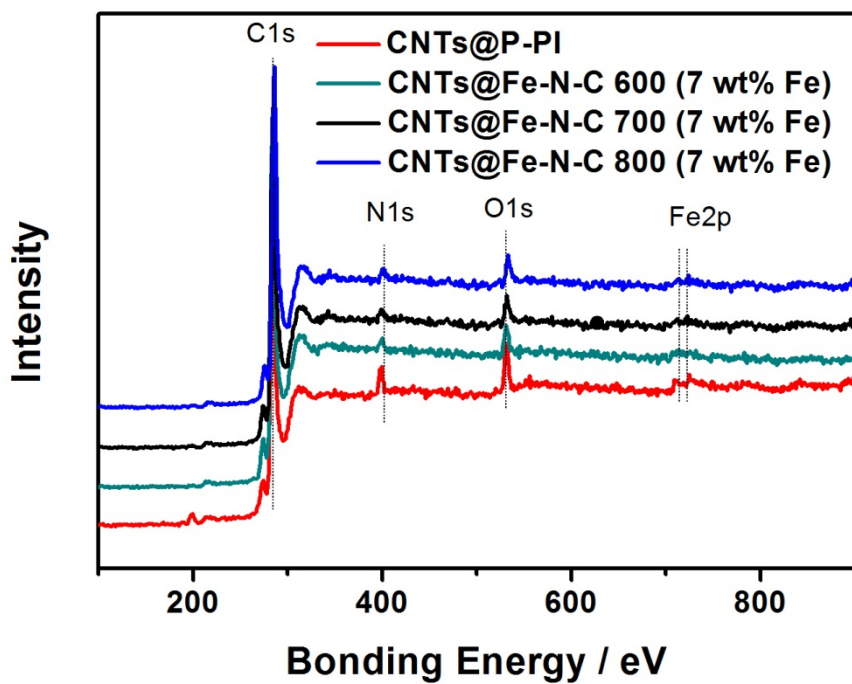


Fig. S5 XPS survey of CNTs@P-PI-Fe, CNTs@Fe-N-C-600 (Fe 7 wt%), CNTs@Fe-N-C-700 (Fe 7 wt%) and CNTs@Fe-N-C-800 (Fe 7 wt%).

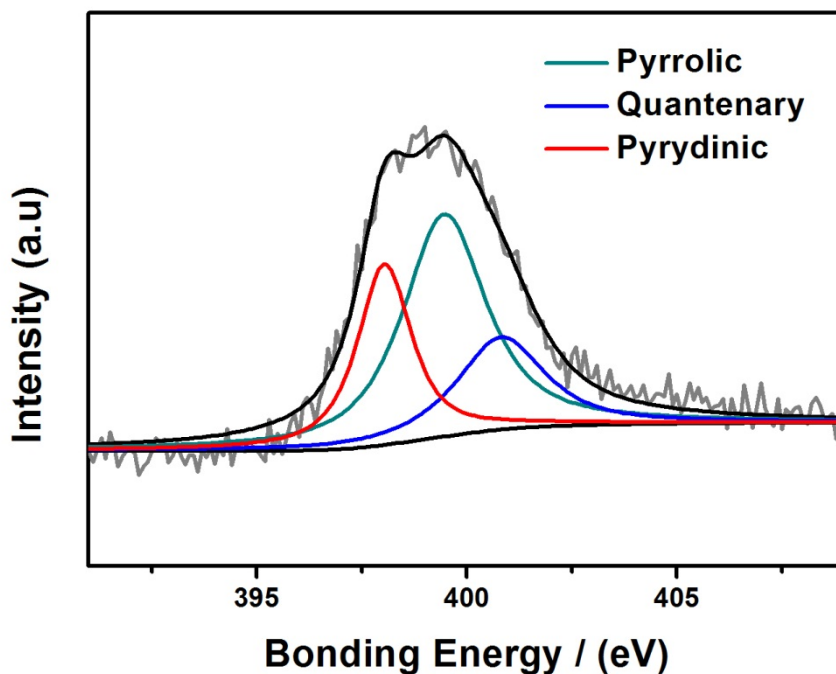


Fig. S6 N1s XPS spectra of CNTs@Fe-N-C-600 (Fe 7 wt%).

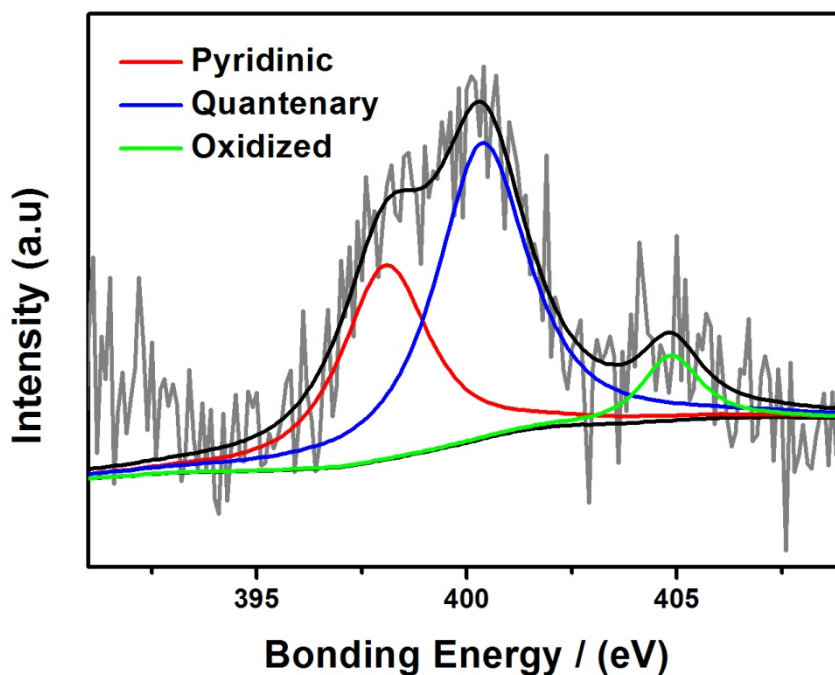


Fig. S7 N1s XPS spectra of CNTs@Fe-N-C-800 (Fe 7 wt%).

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3. M. Ferrandon, A. J. Kropf, D. J. Myers, K. Artyushkova, U. Kramm, P. Bogdanoff, G. Wu, C. M. Johnston and P. Zelenay, *The Journal of Physical Chemistry C*, 2012, **116**, 16001-16013.
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