Supporting Information

A unique Si-doped carbon nanocatalyst for peroxymonosulfate (PMS) activation: Insights into the singlet oxygen generation mechanism and the abnormal salt effect

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[Figures S1 ~ S16]

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† Electronic supplementary information (ESI) available.

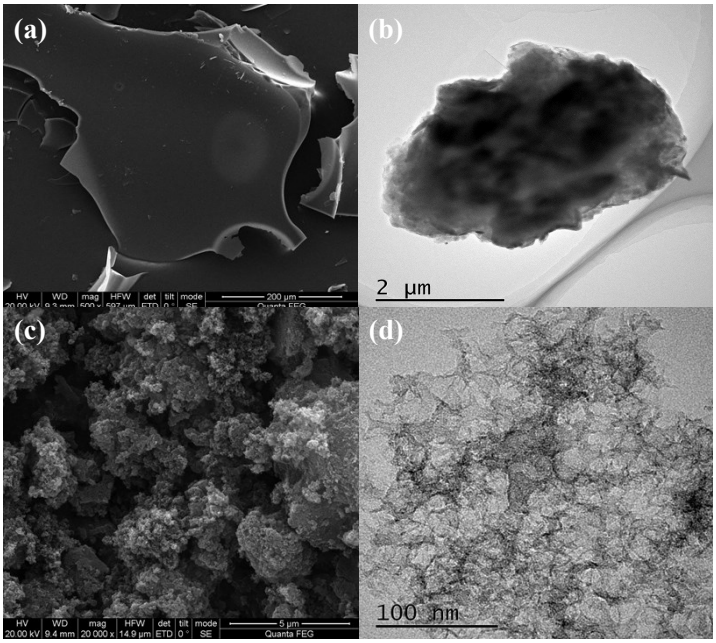

Fig. S1 (a) SEM and TEM images of the (a,b) N/C and (c,d) Si/C samples at different magnifications.

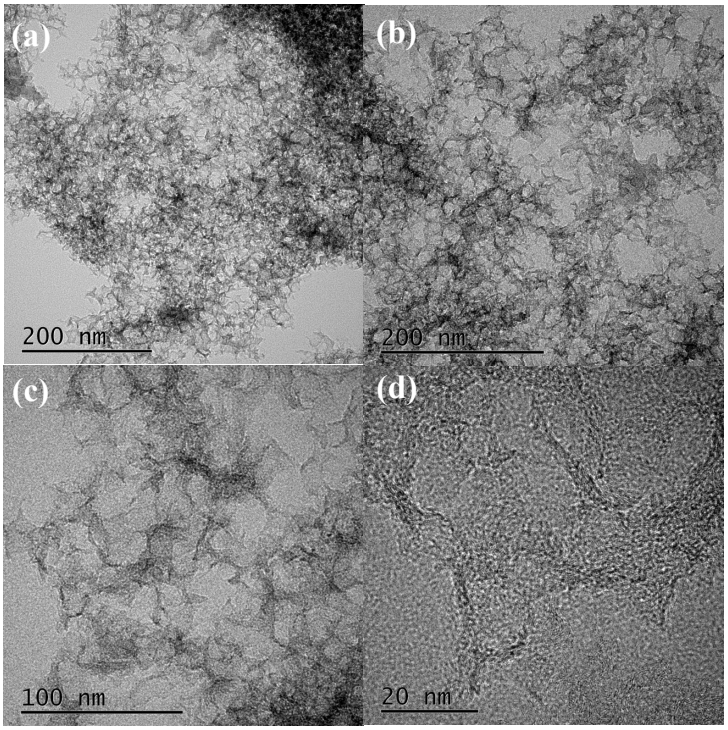

Fig. S2 HRTEM images of Si-N/C at different magnifications.

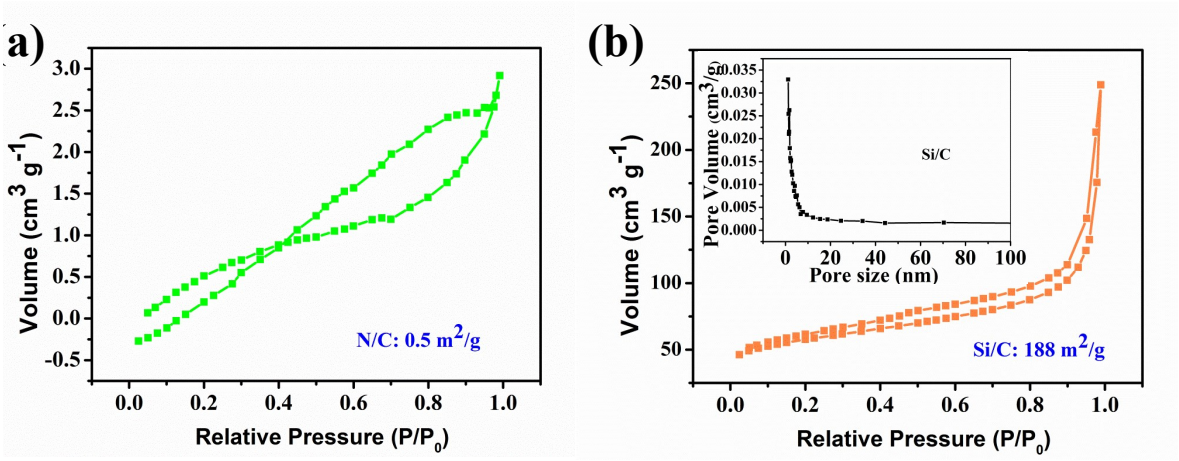

Fig. S3 Nitrogen sorption isotherm (inset: pore size distribution) of (a) N/C and (b) Si/C.

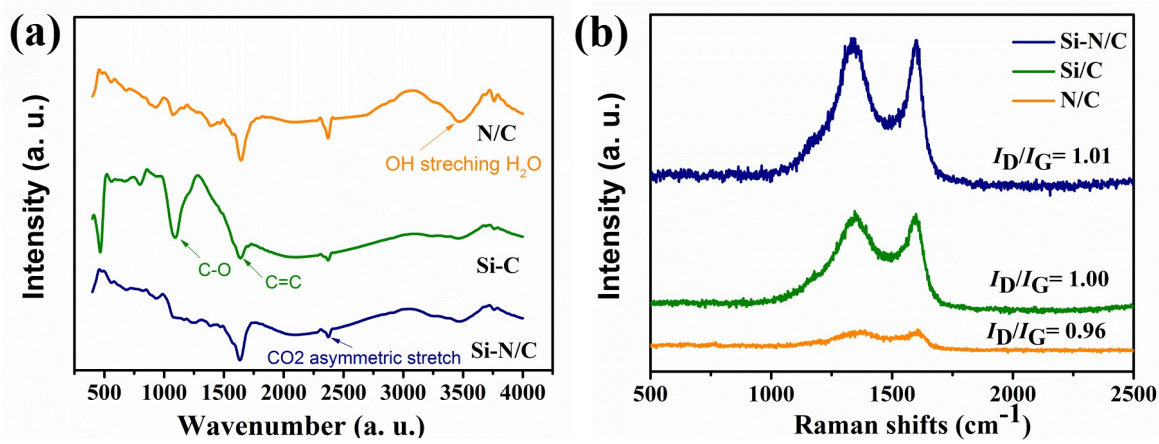

Fig. S4 Comparisons of FT-IR and Raman spectra of all the samples.

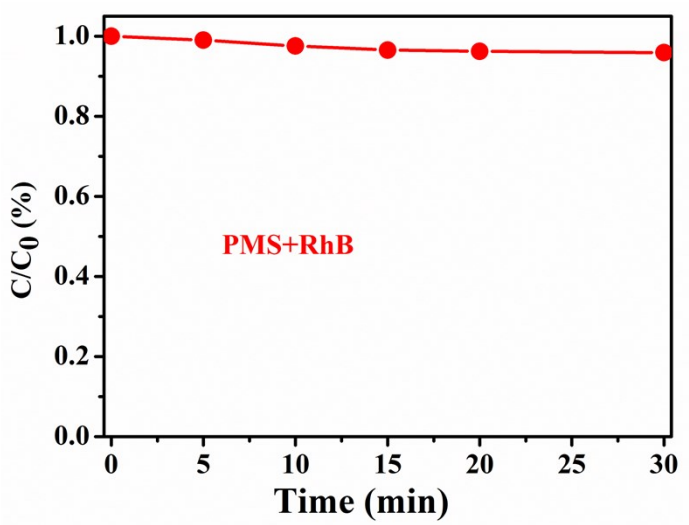

Fig. S5 Time courses of RhB concentrations in the PMS system without catalysts. The experimental conditions were: [RhB] = 20 mg/L; [PMS] = 2 mM; [catalyst] = 0.2 g/L;

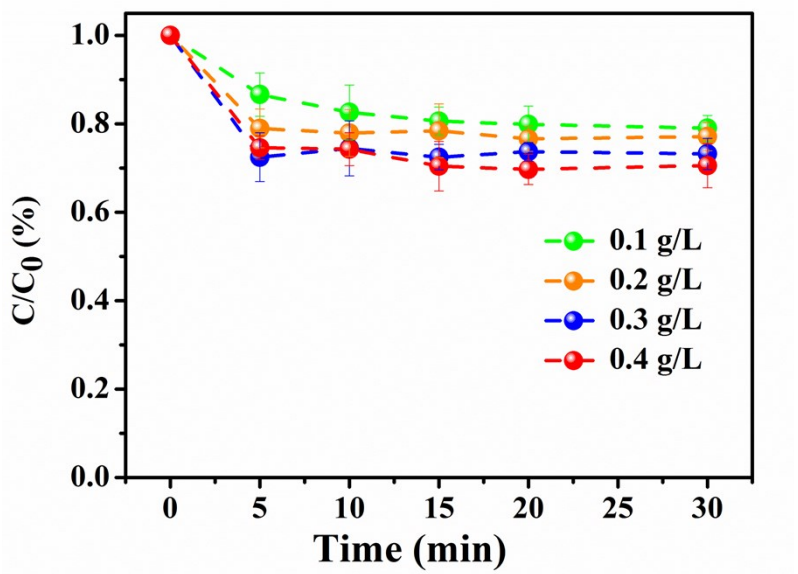

Fig. S6 Contribution of adsorption to the reduction in the pollutant concentration: Effect of Si-N/C dose. The experimental conditions were: [RhB] = 20 mg/L.

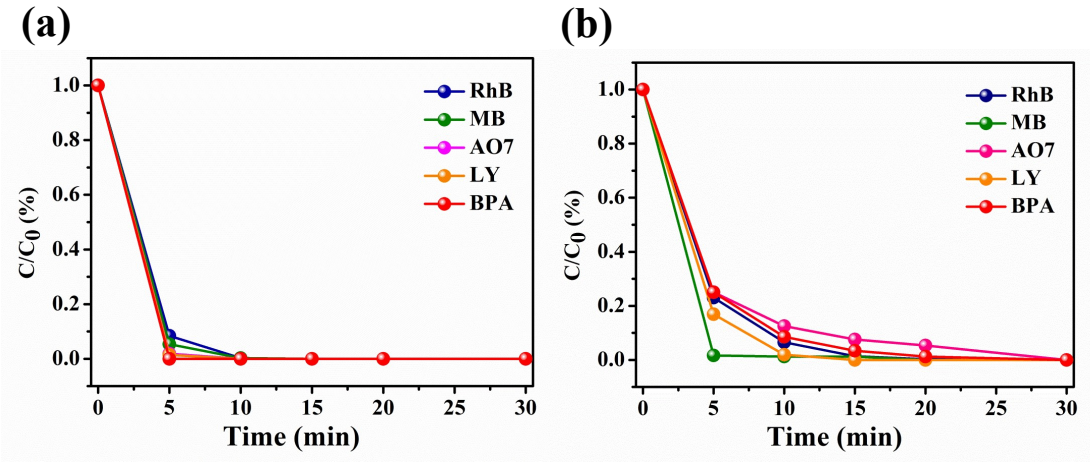

Fig. S7 Variations in the concentrations of RhB, MB, AO7, LY, and BPA in the Si-N/C@PMS system with different initial pollutant concentration: (a) 20 mg/L and (b) 60 mg/L. The experimental conditions were: [PMS] = 2 mM; [catalyst] = 0.2 g/L; and initial pH = 7.0.

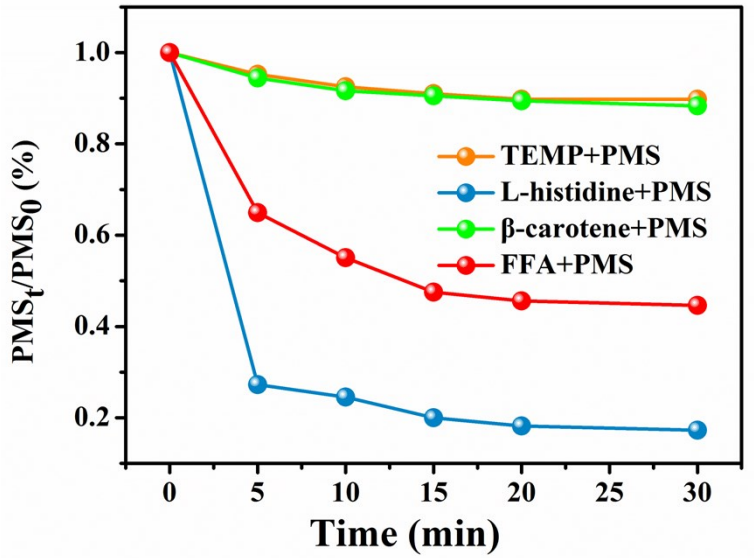

Fig. S8 Decomposition of PMS as a result of direct reaction between PMS and the different scavengers. The experimental conditions were: [PMS] = 2 mM; [FFA] = 20 mM; [His] = 50 mM; [TEMP] = 10 mM; and [β-carotene] = 0.5 mM.

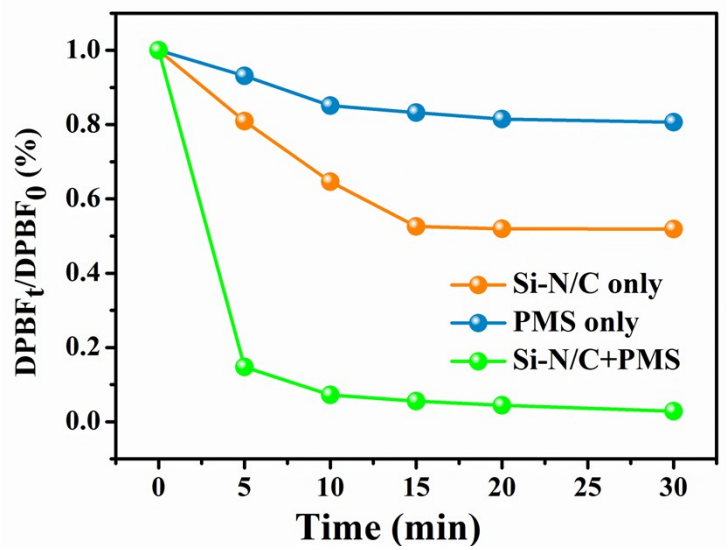

Fig. S9 The change of chemical probe concentration (DPBF) along with time under different conditions (Note: the experiment is performed in pure MeOH due to the insoluble property of DPBF in water)

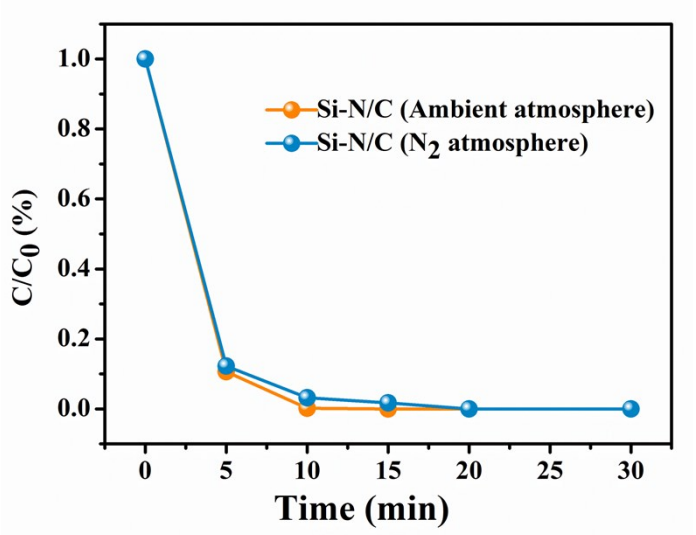

Fig. S10 (a) Time courses of RhB concentrations in the Si-N/C@PMS system with different atmosphere. The experimental conditions were: [RhB] = 20 mg/L; [PMS] = 2 mM; [Si-N/C] = 0.2 g/L;.

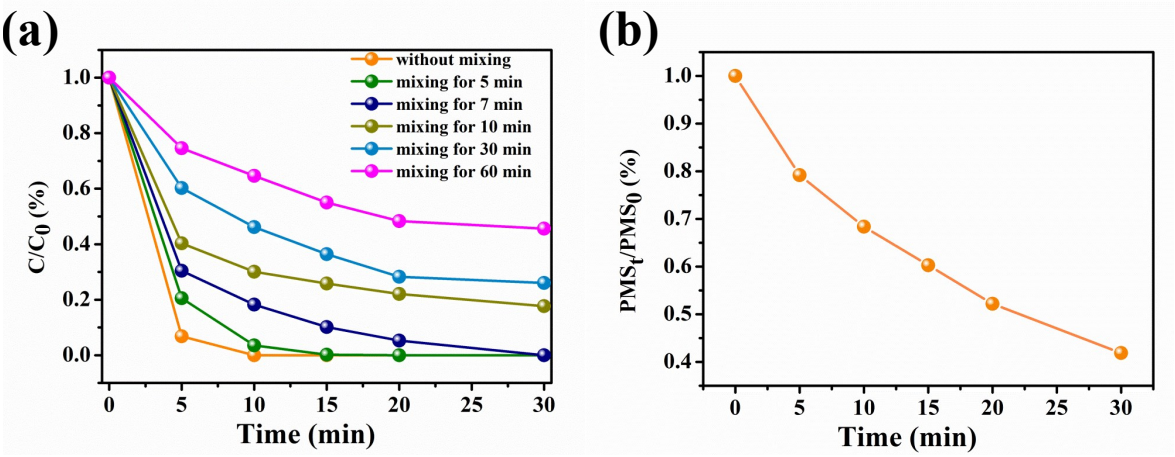

Fig. S11 (a) Effect of the mixing time between the catalyst and the PMS on the degradation performance and (b) the change in PMS concentration as a function of time in the absence of RhB. The experimental conditions were: [RhB] = 20 mg/L; [PMS] = 2 mM; [catalyst] = 0.2 g/L;

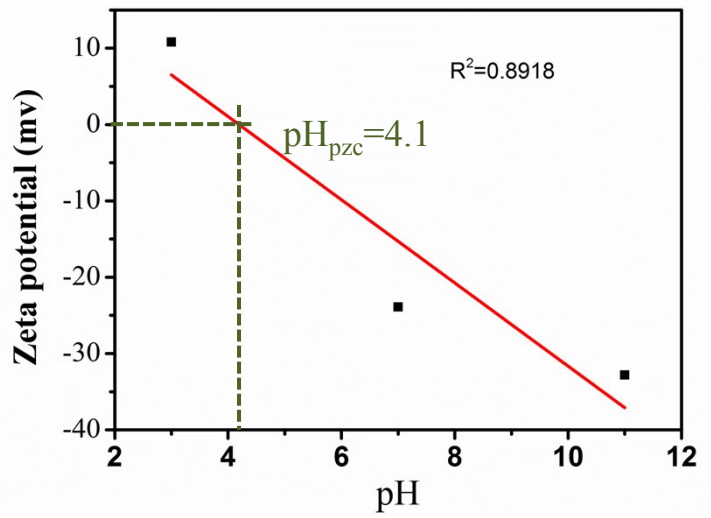

Fig. S12 Zeta potential of Si-N/C.

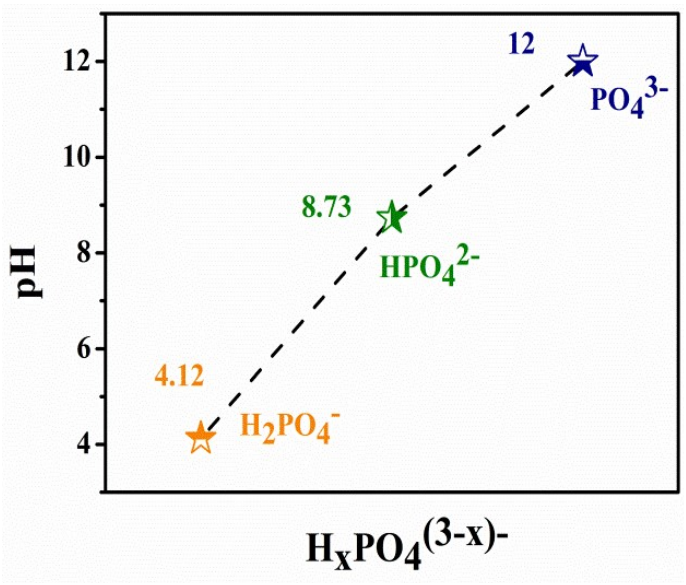

Fig. S13 Variations in the solution pH upon the addition of $H_2PO_4^-$, HPO_4^{2-}, and PO_4^{3-}.

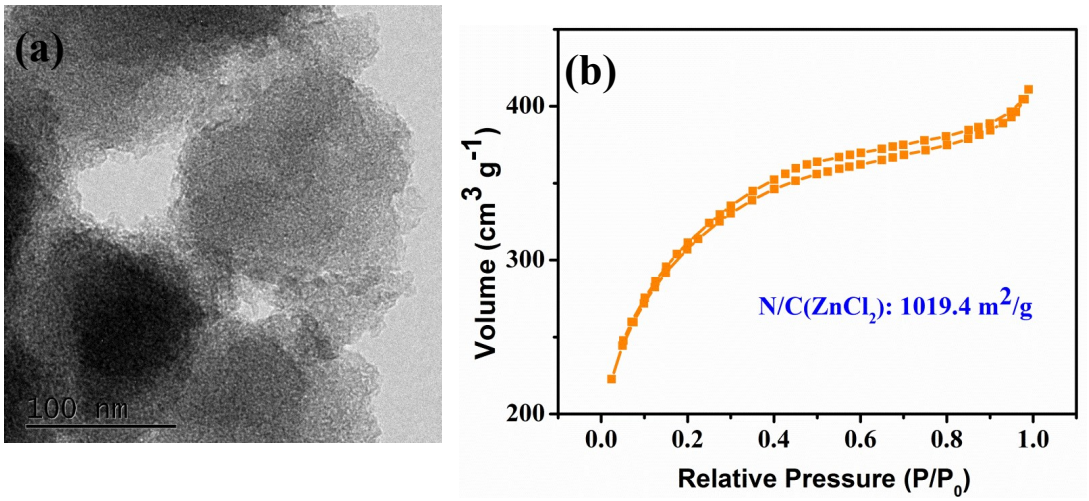

Fig. S14 The TEM image and nitrogen sorption isotherm of N/C($ZnCl_2$).

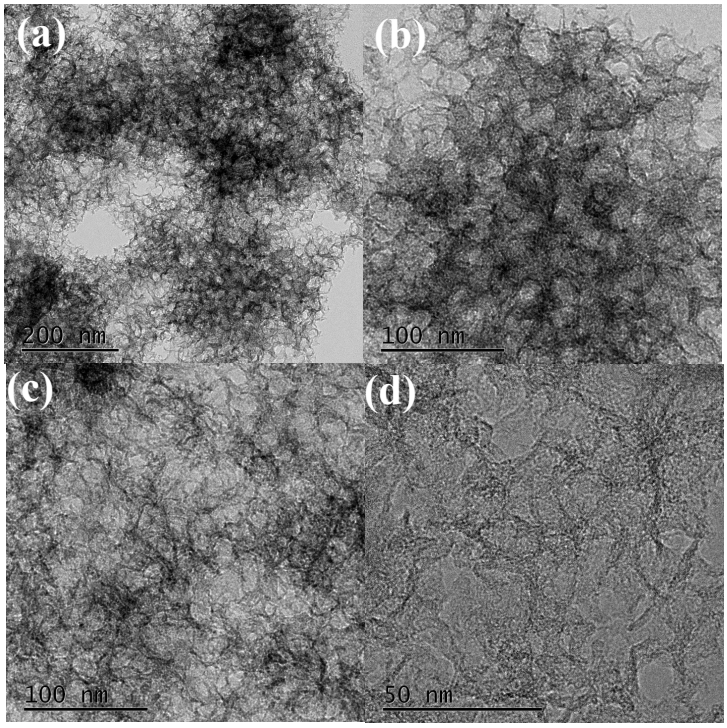

Fig. S15 The TEM images of Si-N/C(HF etching) at different magnifications.

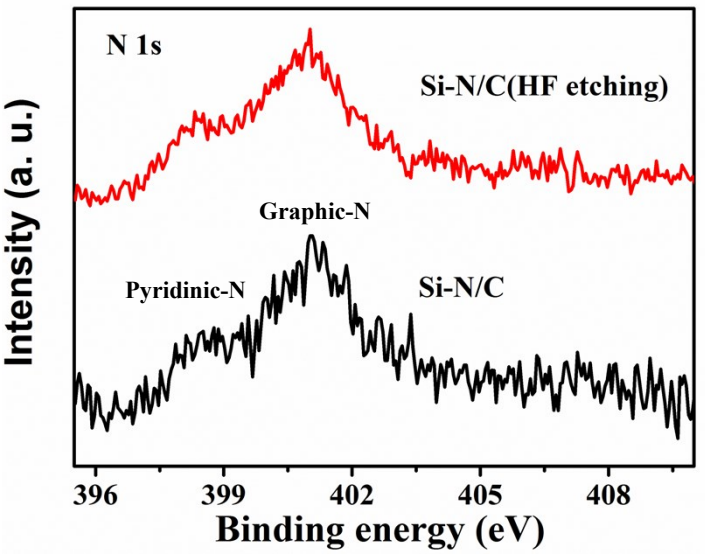

Fig. S16 The N 1s XPS spectra of Si-N/C before and after HF etching.