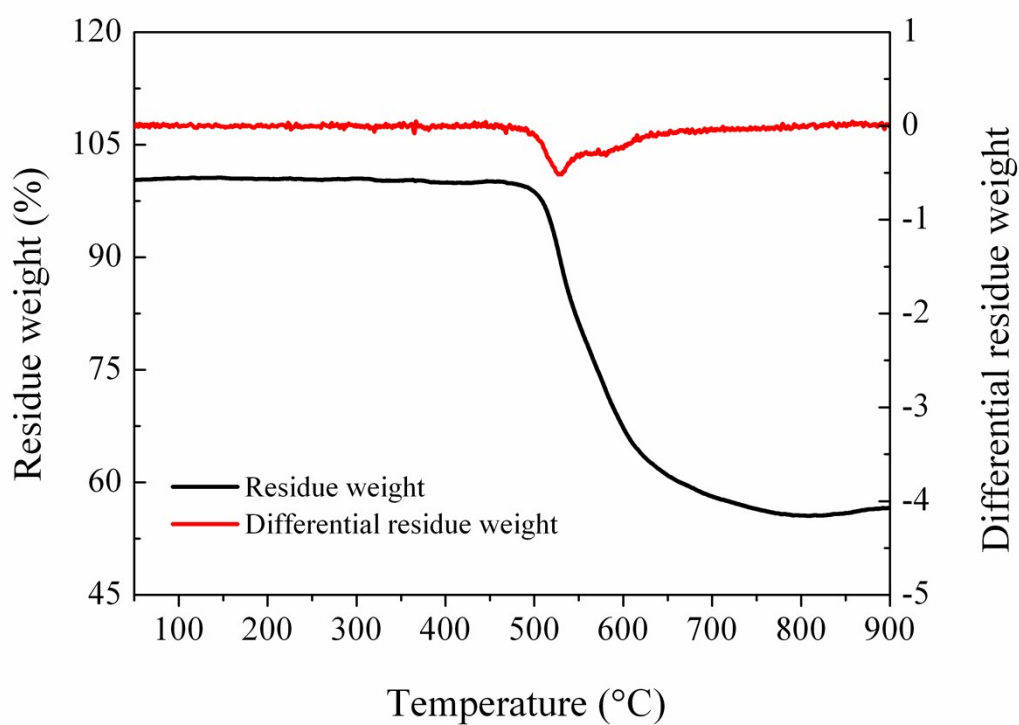


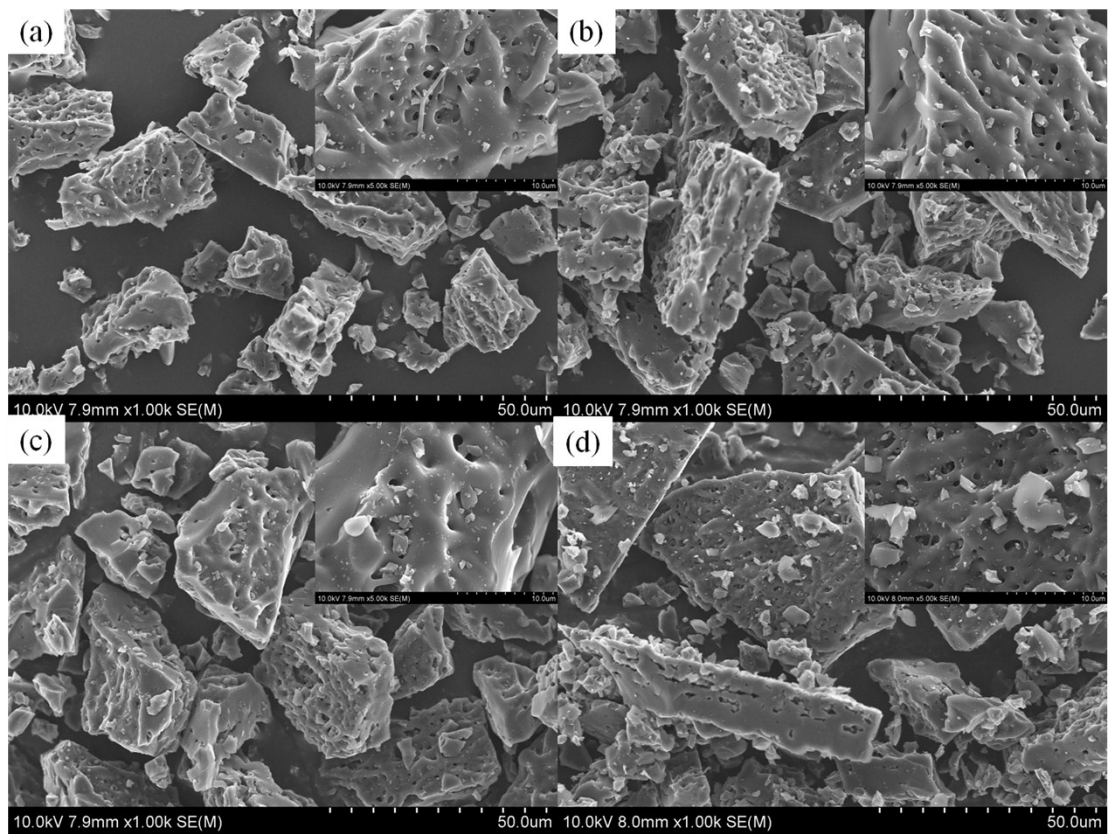
**Supplementary Information  
for**

**Porous N-doped Hard-Carbon Derived from Waste Separators for  
Efficient Lithium-Ion and Sodium-Ion Batteries**

Yong Wang,<sup>a</sup> Yong Li,<sup>b,a</sup> Samuel S. Mao,<sup>d</sup> Daixin Ye,<sup>e\*</sup> Wen Liu,<sup>a</sup> Rui Guo,<sup>a</sup> Zhenhe Feng,<sup>a</sup> Jilie Kong,<sup>b</sup>  
Jingying Xie<sup>a,c\*</sup>



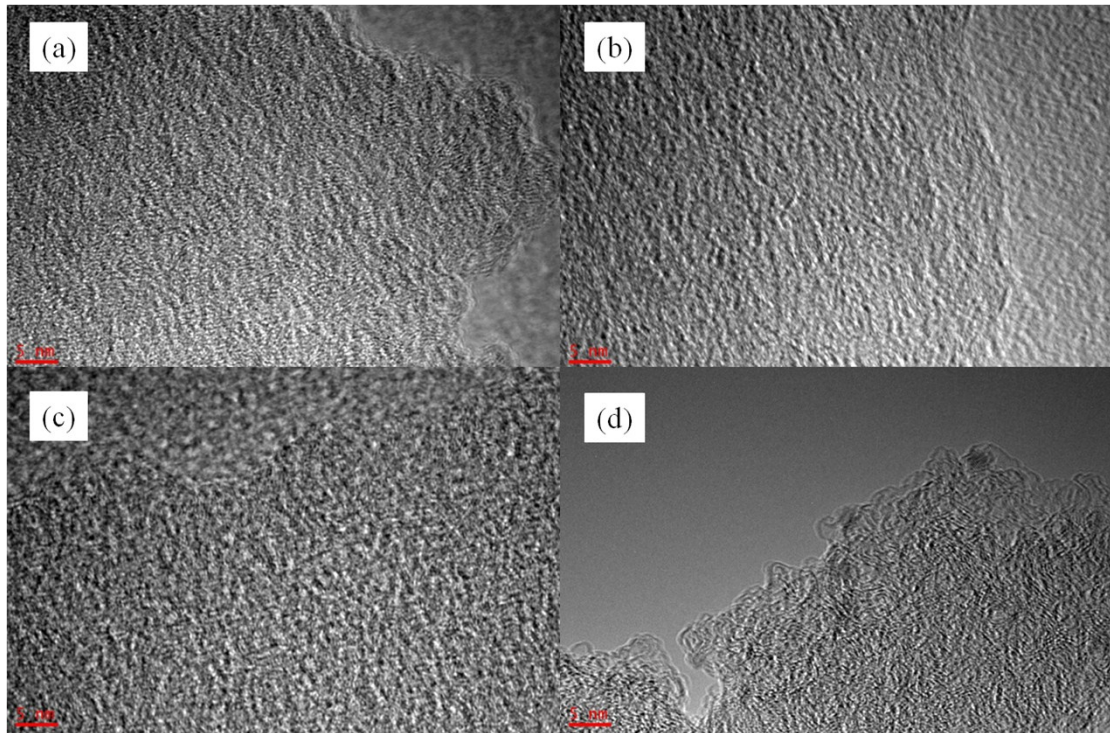
Supplementary Figure 1: TG curve of the precursor.



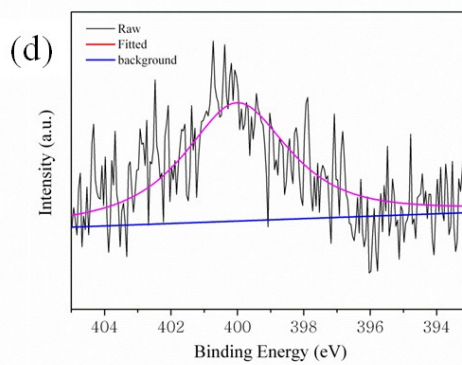
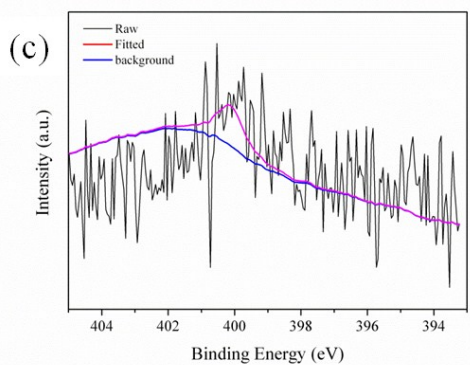
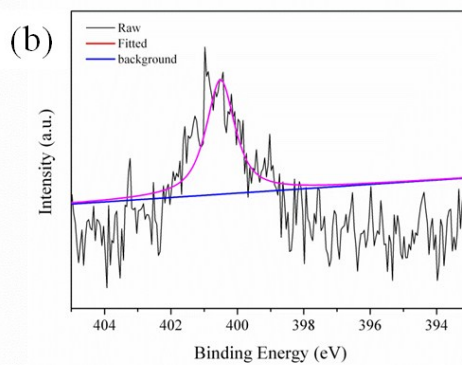
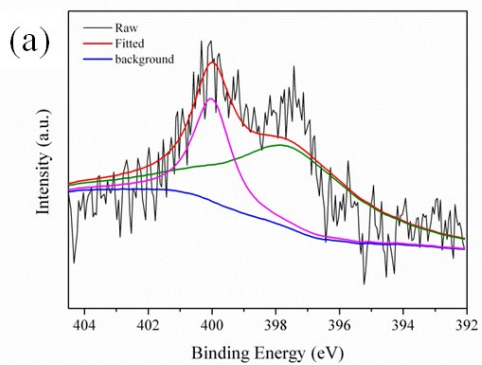
Supplementary Figure 2: SEM images of HC-800 (a); HC-1000 (b); HC-1100 (c) and HC-1300(d)

Supplementary Table 1: BET surface area and pore volume of the samples tested by N<sub>2</sub> adsorption/desorption

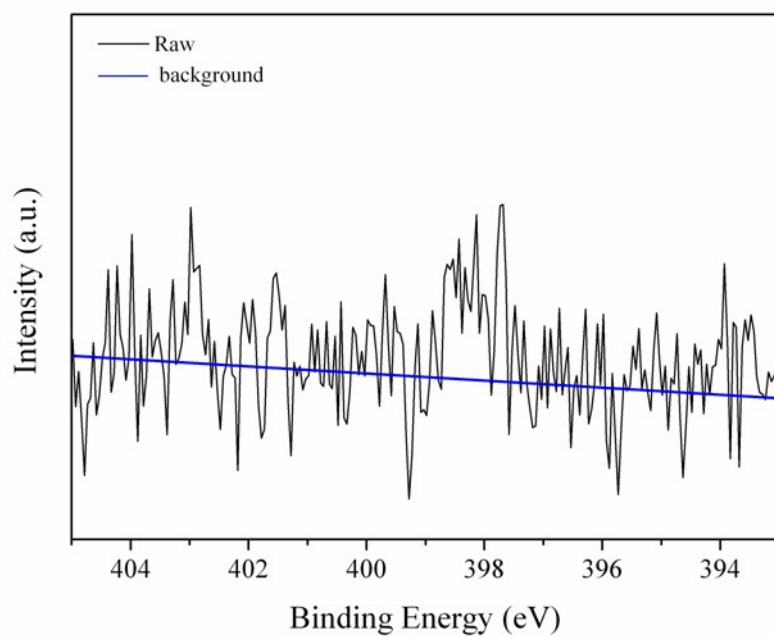
Sample	Surface Area (m <sup>2</sup> g <sup>-1</sup> )	Pore Volume (cm <sup>3</sup> g <sup>-1</sup> )
HC-800	405.4966	0.195817
HC-900	398.3485	0.193779
HC-1000	213.2200	0.130613
HC-1100	8.1924	0.057399
HC-1300	1.3459	0.015570
Commercial HC	0.1762	0.002274



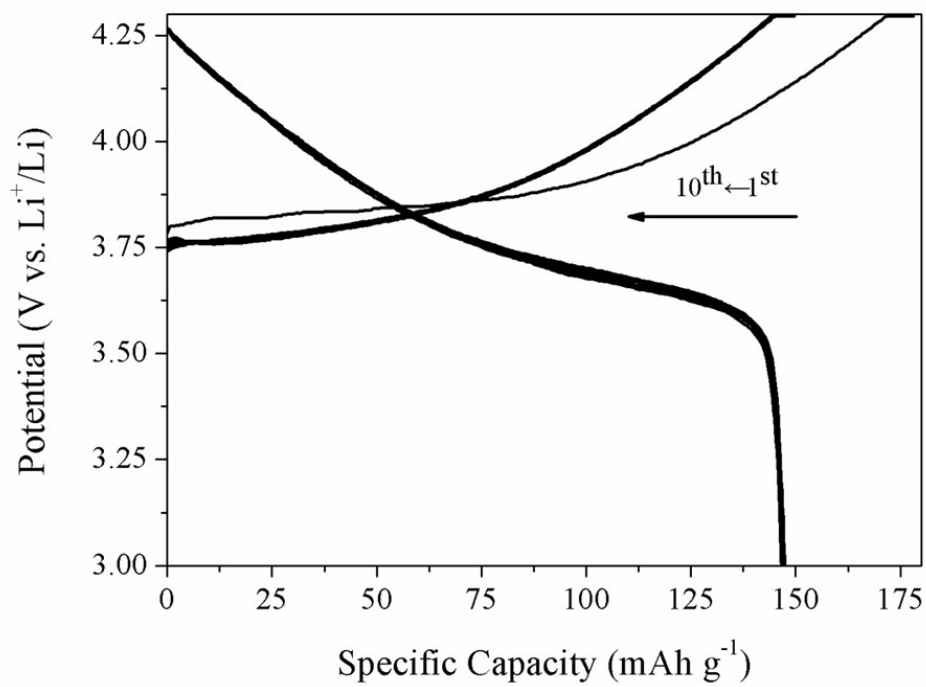
Supplementary Figure 3: TEM images of HC-800 (a); HC-1000 (b); HC-1100 (c) and HC-1300(d)



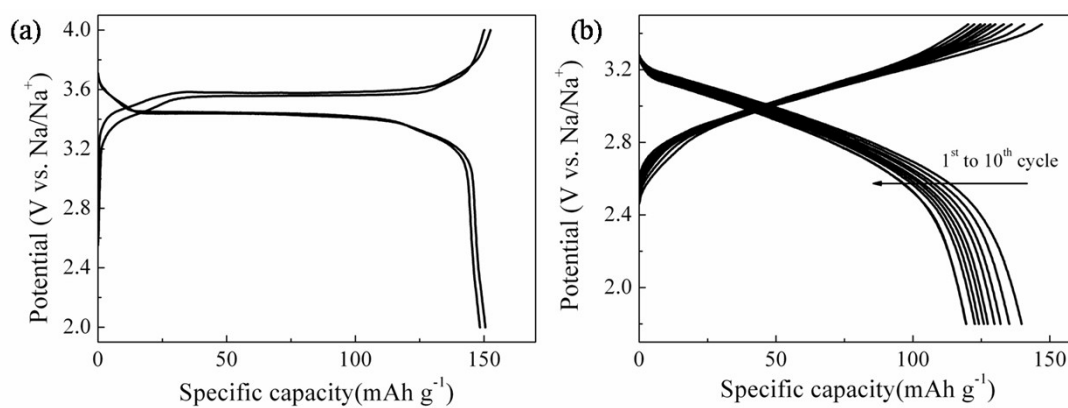
Supplementary Figure 4: N 1s spectra of HC-800 (a); HC-1000 (b); HC-1100 (c) and HC-1300(d)



Supplementary Figure 5: N 1s spectrum of commercial hard carbon.



Supplementary Figure 6: Charge-discharge curves of first 10 cycles of  $\text{LiNi}_{1/3}\text{Co}_{1/3}\text{Mn}_{1/3}\text{O}_2//\text{Li}$  half cell



Supplementary Figure 7: Charge-discharge curves of (a) first 2 cycles of  $\text{Na}_{2-\delta}\text{MnHCF//Na}$  half cell and (b) first 10 cycles of  $\text{Na}_{2-\delta}\text{MnHCF//HC-900}$  full cell.