

Supplementary Information

Phosphorus-doped hard carbon derived from waste PET bottles as a superior anode material for lithium-ion batteries

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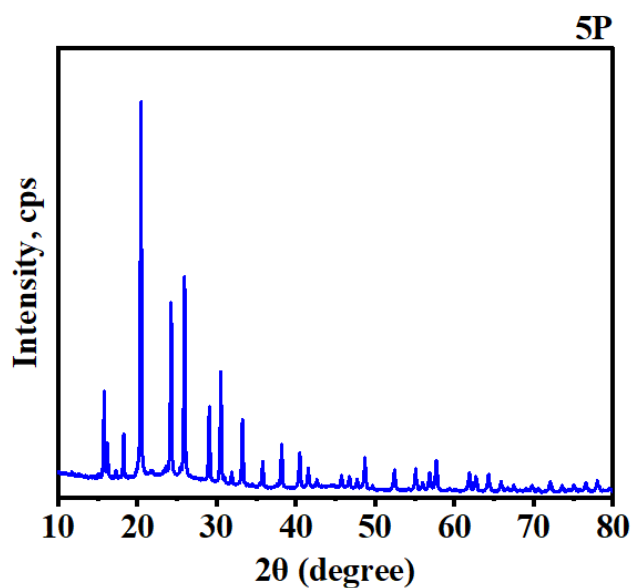


Figure S1. XRD pattern of the 5P sample.

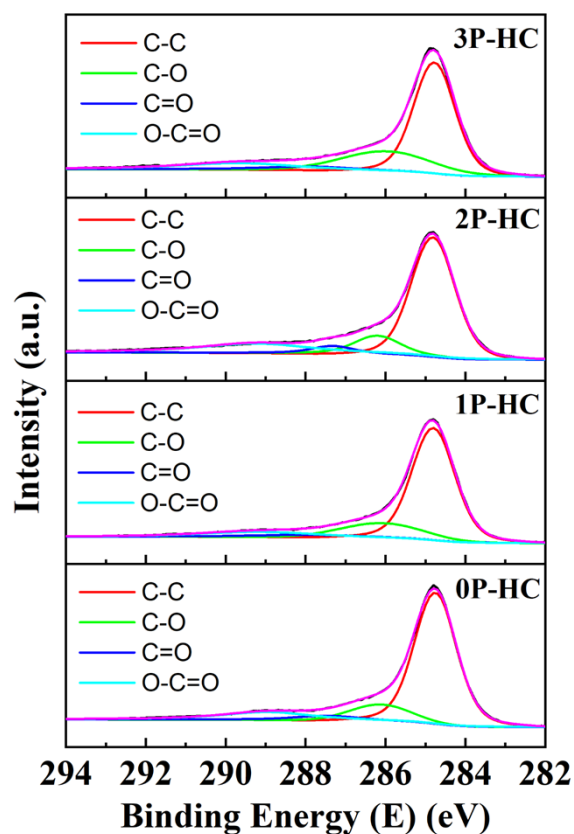


Figure S2. High-resolution C 1s XPS spectra of 0P-HC, 1P-HC, 2P-HC, and 3P-HC samples showing peak fitting for C–C, C–O, C=O, and O–C=O bonds.

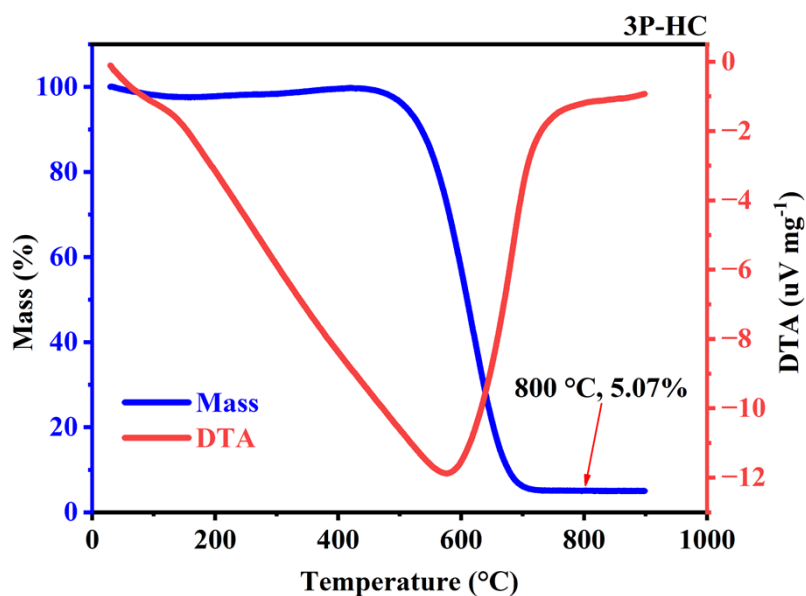


Figure S3. TGA of 3P-HC in air (ash determination)

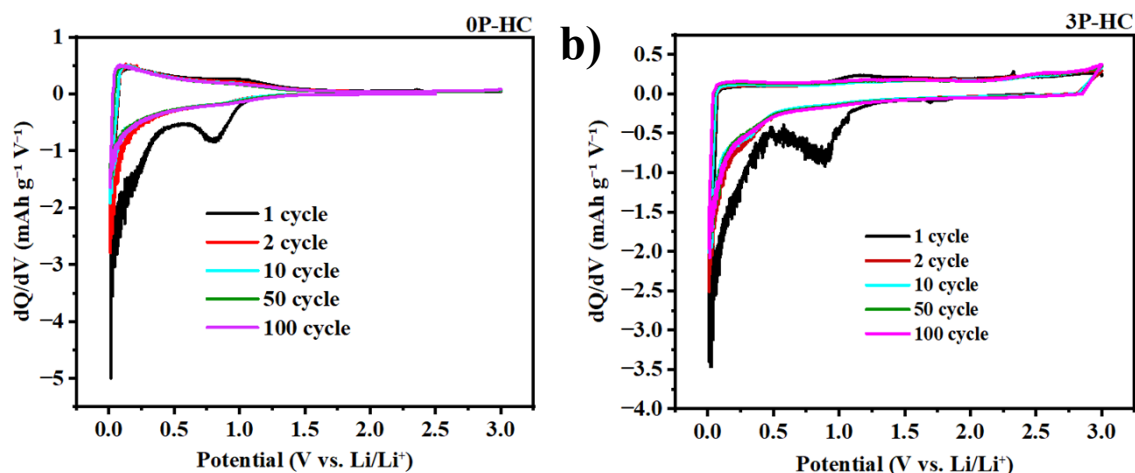


Figure S4. Differential capacity (dQ/dV) profiles of (a) 0P-HC and (b) 3P-HC electrodes at selected cycles obtained from galvanostatic charge–discharge measurements.

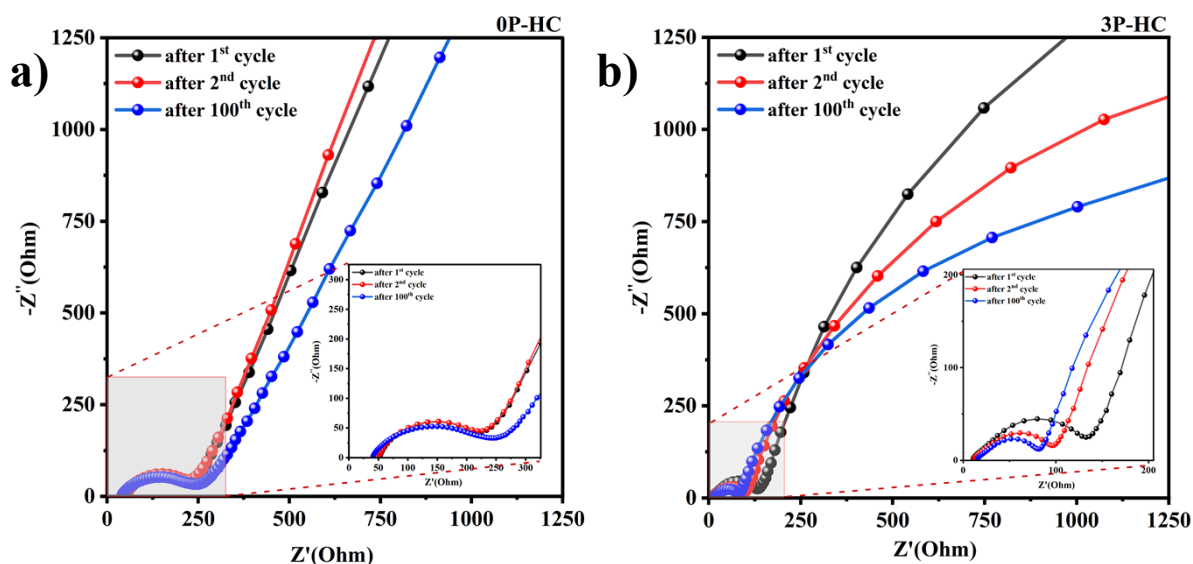


Figure S5. PEIS Nyquist plots of (a) 0P-HC and (b) 3P-HC electrodes recorded after 1st, 2nd, 100th cycles

Table S1. Electrical conductivity and resistivity of pristine and P-doped PET-derived hard carbon samples obtained from Hall measurements.

Sample	Conductivity (S/cm)	Resistivity ($\Omega \cdot \text{cm}$)
0P-HC	47.90	3.665
1P-HC	71.67	2.172
2P-HC	104.04	1.088
3P-HC	206.69	0.490
5P-HC	74.36	1.354