Electronic Supplementary Information

Removal of ions from saline water using N, P co-doped 3D hierarchical carbon architectures via capacitive deionization

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Figure S1. TEM images of (a) P-3DHCA, (b) N-3DHCA and (c) 3DHCA.
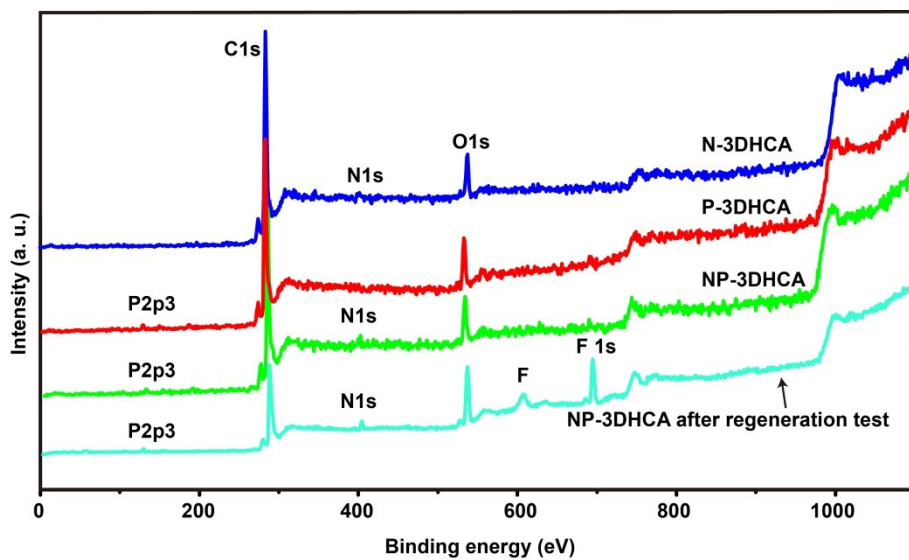
Figure S2. Full XPS spectra of various samples.
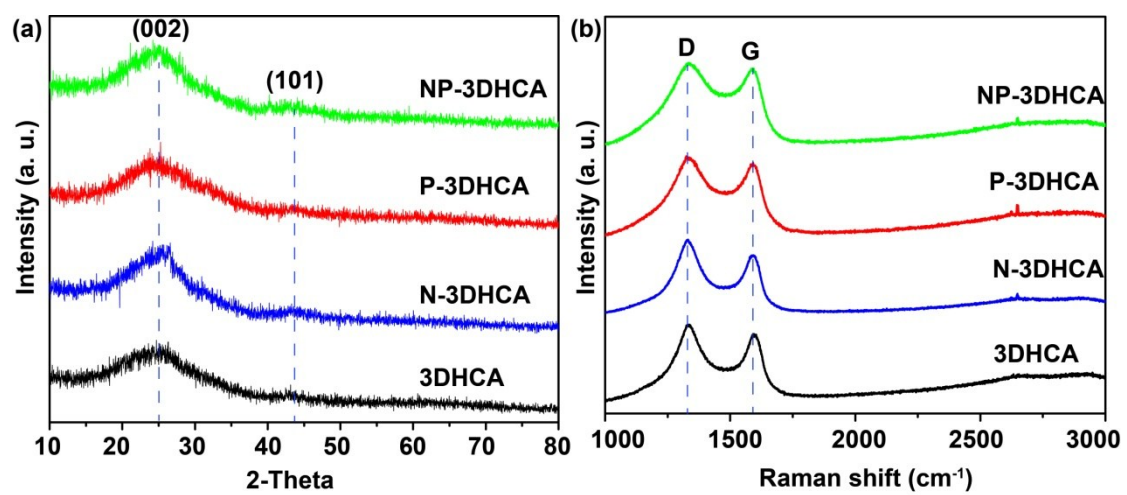
Figure S3. (a) XRD and (b) Raman spectra of NP-3DHCA, P-3DHCA, N-3DHCA and 3DHCA.
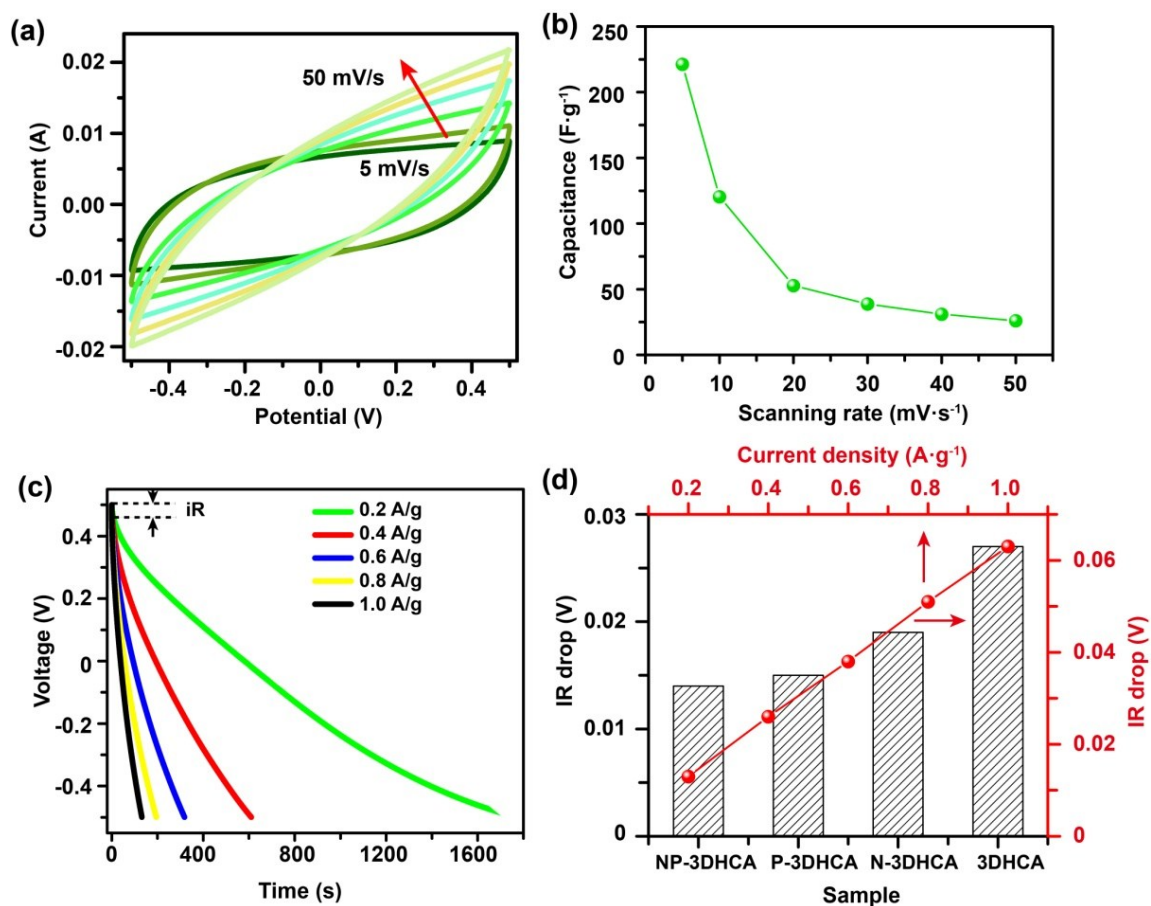
Figure S4. (a) CV curves of NP-3DHCA at different scanning rate; (b) Capacitance of NP-3DHCA at different scanning rate; (c) Galvanostatic discharge curve of NP-3DHCA at different current density; (d) IR drop of different samples (the red) and IR drop of NP-3DHCA at different current density (the black).
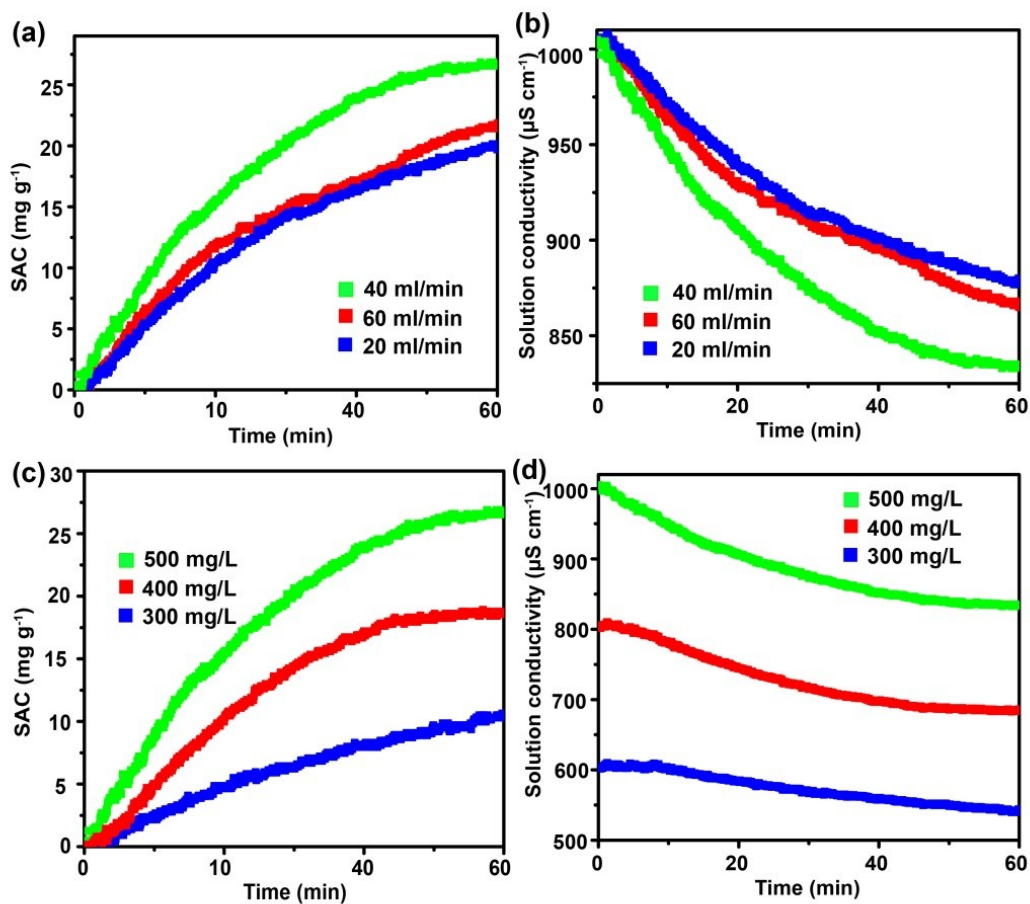
Figure S5. (a) Plots of SAC vs. time and (b) plots of solution conductivity vs. time for NP-3DHCA with different flow rates at 1.2 V and 500 mg/L. (c) Plots of SAC vs. time and (d) plots of solution conductivity vs. time for NP-3DHCA with different initial concentration at 1.2 V and 40 ml/min.

Table S1. Comparison of I_D/I_G between this work and the reported electrode materials.

Electrode	I_D/I_G	Reference
NP-3DHCA	1.1	This work
3D graphene sphere	1.05	S1
N doping hierarchical porous carbon	1.2	S2
N-doped hollow multiyolk@shell carbon	1.0	S3
BMZIF-derived nanoporous carbon	1.11	S4
3D hierarchical graphene	1.16	S5

Table S2. SAC Comparison between reported carbon materials and this work.

Carbon materials	SAC	Reference
3D hierarchical carbon architectures	26.8 mg/g	This work
Carbon aerogels	10.5 mg/g	S6
Carbide-derived carbon	15 mg/g	S7
N-doped carbon/graphene	17.5 mg/g	S8
Mesoporous carbon	21 mg/g	S9
Macro-/micropores –dominated carbon	16.3 mg/g	S10
N-doped activated carbon fiber networks	16.6 mg/g	S11
Activated carbon derived from polyaniline	14.9 mg/g	S12
Porous carbon nanosheets	15.6 mg/g	S13
N-doped hollow mesoporous carbon spheres	16.6 mg/g	S14
3D nanoporous graphene	18.4 mg/g	S15

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