Electronic Supplementary Information (ESI) for Polymer Chemistry.
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Facile Synthesis of Bowl-Shaped Nitrogen-Doped Carbon Hollow Particles Templated by Block Copolymer "Kippah Vesicles" for High Performance Supercapacitors

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Figures and Tables

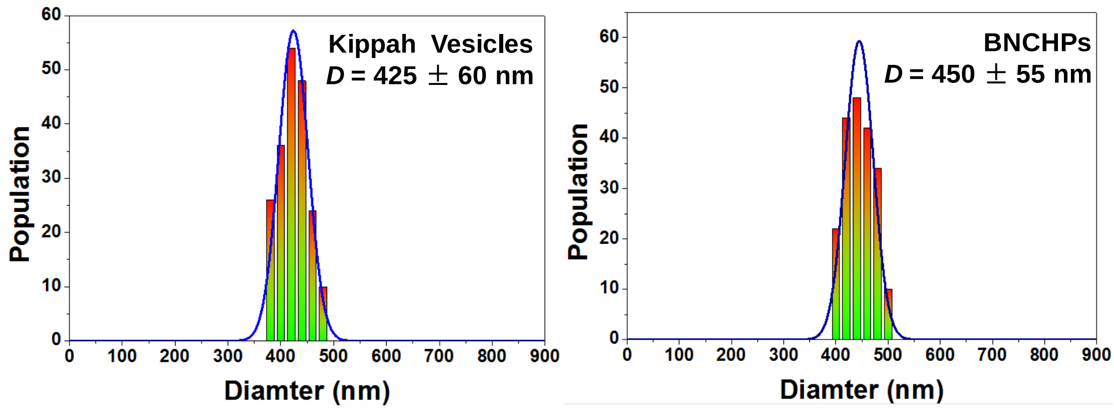

Figure S1. Size distribution plots of the kippah vesicles and the BNCHPs, based on the measurements of ca. 200 particles in the SEM images.

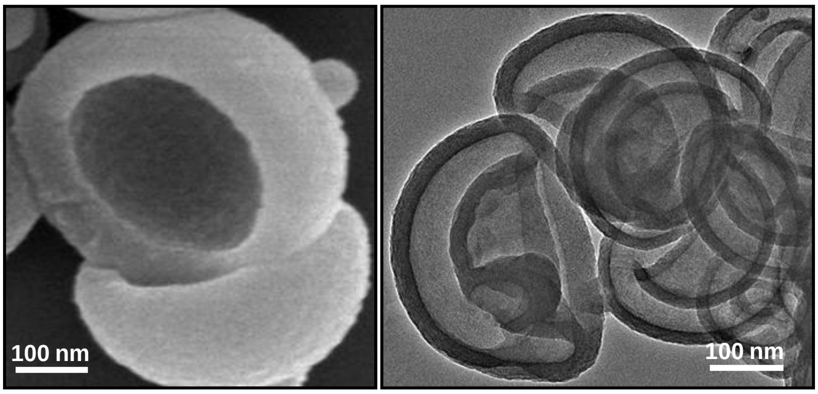

Figure S2. Additional SEM and TEM micrographs of the BNCHPs.

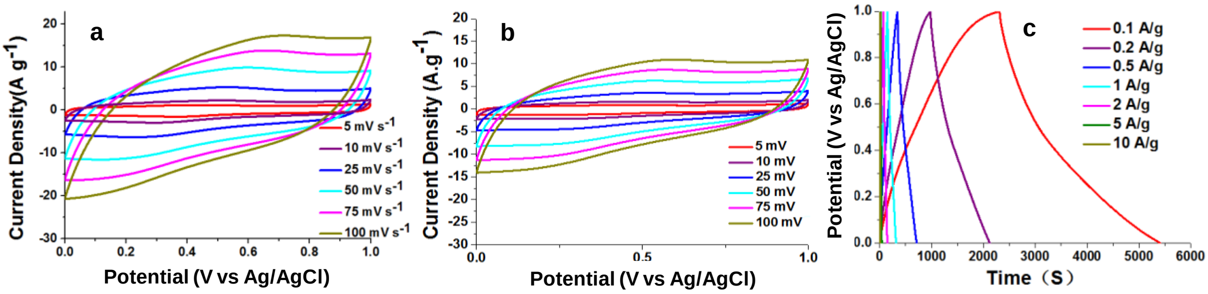

Figure S3. CV curves of BNCHPs (a) and NCHSs (b) as electrodes recorded at different scan rates in 1 M H_2SO_4 electrolyte solution. (c) Galvanostatic charge/discharge curves of NCHSs at different current densities in 1 M H_2SO_4 electrolyte.

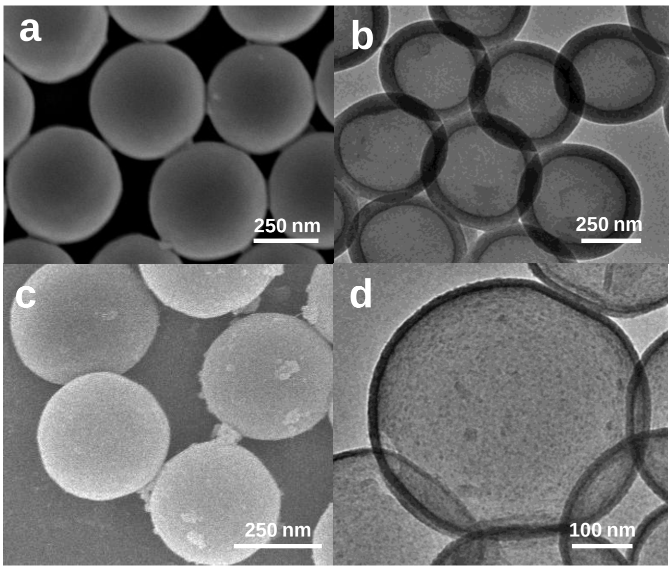

Figure S4. SEM and TEM images of PS hollow spheres (a,b) and NCHSs (c,d) prepared using the PS hollow spheres as the template under experimental conditions similar to those applied for the fabrication of BNCHPs. The key structural and chemical features of the NCHSs are given in Table S1 below.

Table S1. Comparison of key structural and chemical features of BNCHPs and NCHSs

Sample	Average Diameter [nm]	Shell Thickness [nm]	[a] N Content [%]	[a] C Content [%]	S_{BET} [$m^2\ g^{-1}$]	[b] Volumetric Density [$g\ cm^{-3}$]
BNCHPs	**450 ±55**	**23 ±1**	**3.7**	**84.6**	**370**	**1.07**
NCHSs	**470 ±35**	**21 ±2**	**3.8**	**83.0**	**360**	**0.64**

[a] The data were obtained by element analyses; [b] the volumetric densities were estimated according to a reported method in Refs. 10 and 14. Briefly, 80 wt% powdered active materials, 10 wt% carbon black, and 10 wt% polytetrafluoroethylene (PTFE) binder were mixed. The mixture became a gel after stirring. Then, a piece of black solid was obtained after the drying of the gel at room temperature. The volume of the black solid was measured by placing the solid into a graduated cylinder with water inside.

Table S2. Comparison of electrochemical performance of carbon materials in our work and in some reported literature

Sample names	Condition	Electrolyte	S_{BET} / $m^2 g^{-1}$	C_g / $F g^{-1}$	Literature
BNCHPs	0.1 A g^{-1}	1M H_2SO_4	370	385	This work
NCHSs	0.1 A g^{-1}	1M H_2SO_4	360	300	This work
Nitrogen-containing mesoporous carbon spheres	0.5 A g^{-1}	1M LiPF6	1460	160	Carbon 2007, 45, 1757 [1]
Nitrogen-doped porous carbonaceous nanofibers	1 A g^{-1}	6M KOH	562	202	ACS Nano 2012, 6, 7092 [2]
KOH-activated nitrogen-doped porous carbons	0.25 A g^{-1}	6M KOH	2970	259	Microporous Mesoporous Mater. 2010, 131, 89 [3]
Terephthalonitrile-derived nitrogen-rich carbon networks	0.2 A g^{-1}	1M H_2SO_4	1565	298	Energy Environ. Sci. 2012, 5, 9747 [4]
Nitrogen-doped graphene hydrogels	1 A g^{-1}	5M KOH	N/A	190	Nano Energy 2013, 2, 249 [5]
Melamine resin-functionalized GOs	0.5 A g^{-1}	1M $LiPF_6$	1040	210	ACS Nano 2013, 7, 9366 [6]
Hydrothermal reduction of graphene oxide dispersions	1 A g^{-1}	5M KOH	215	220	J. Phys. Chem. C.2011, 115, 17206 [7]
Three-dimensional graphene-based frameworks	1 mV	1M H_2SO_4	350	226	J. Am. Chem. Soc. 2012, 134, 19532 [8]

Table S3. Comparison of volumetric capacity of carbon materials in our work and in some reported literature

Sample names	Condition	Electrolyte	C_g / $F\ g^{-1}$	C_v / $F\ cm^{-3}$	Literature
BNCHPs	0.1 A g^{-1}	1M H_2SO_4	385	411	This work
NCHSs	0.1 A g^{-1}	1M H_2SO_4	300	192	This work
Graphene/polyaniline composite paper	2 mV	1M H_2SO_4	233	135	ACS Nano 2009, 3, 1745 [9]
Activated microwave exfoliated graphite oxide	1 A g^{-1}	EMIM TFSI/AN	154	177	Adv. Mater. 2013, 25, 4879 [10]
Nanoporous carbidederived Carbon films	20 mV	1.5 M TEABF4/acetonitrile	N/A	180	Energy Environ. Sci. 2011, 4, 135[11]
Reduced graphene oxide paper	0.5 A g^{-1}	6M KOH	255	196	Energy Environ. Sci. 2012, 5, 6391 [12]
Nitrogen-enriched carbon	0.05 A g^{-1}	6M KOH	198	280	Adv. Funct. Mater. 2009, 19, 1800 [13]
High density porous graphene macrofoams	0.1 A g^{-1}	6M KOH	238	376	Scientific Reports 2013, 3, 2975 [14]

$C_v = C_g \times \rho_v$, where ρ_v expresses the volumetric density (g cm^{-3}).

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