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Electronic Supplementary Material (ESI) for

Hierarchically aminated graphene honeycombs for electrochemical capacitive energy storage

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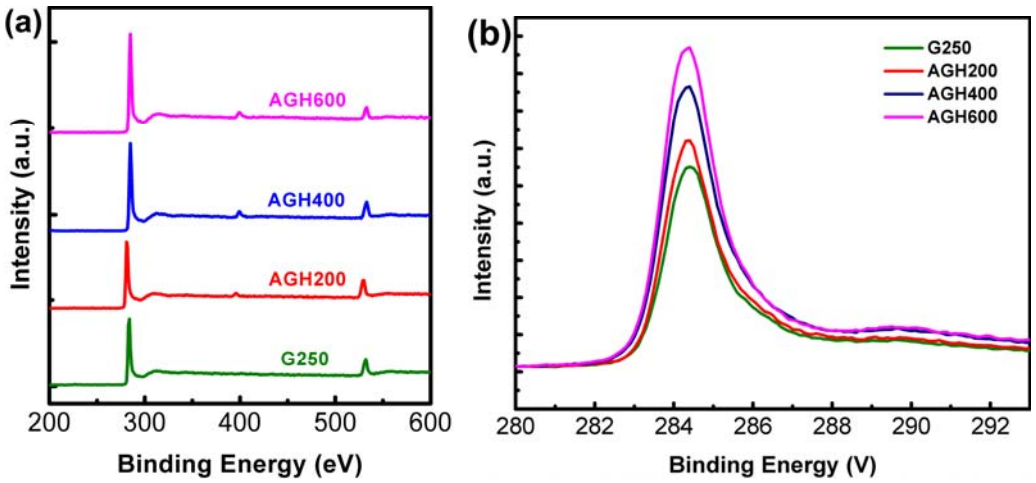

Fig. S1 (a) XPS survey spectrum and (b) C1s fine scan spectrum of G250 and AGHs

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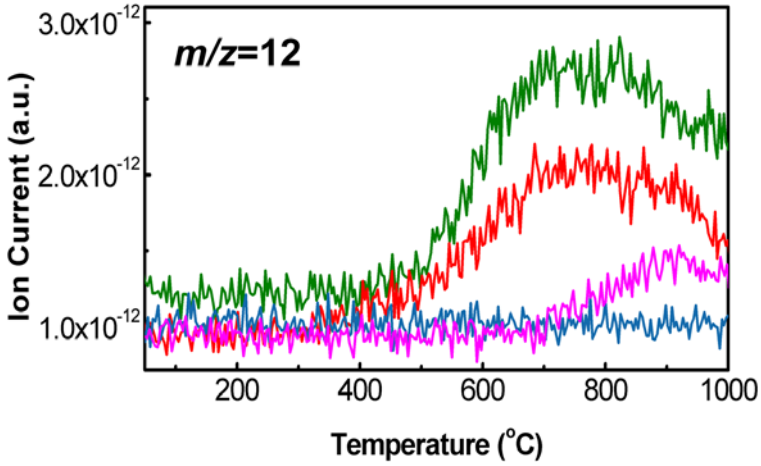

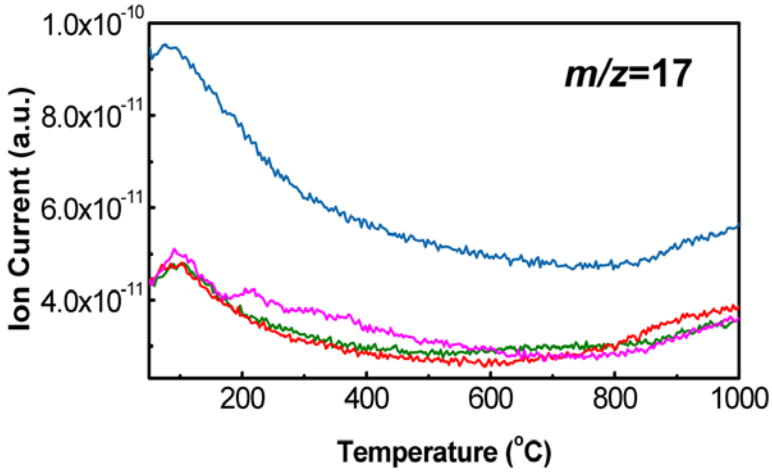

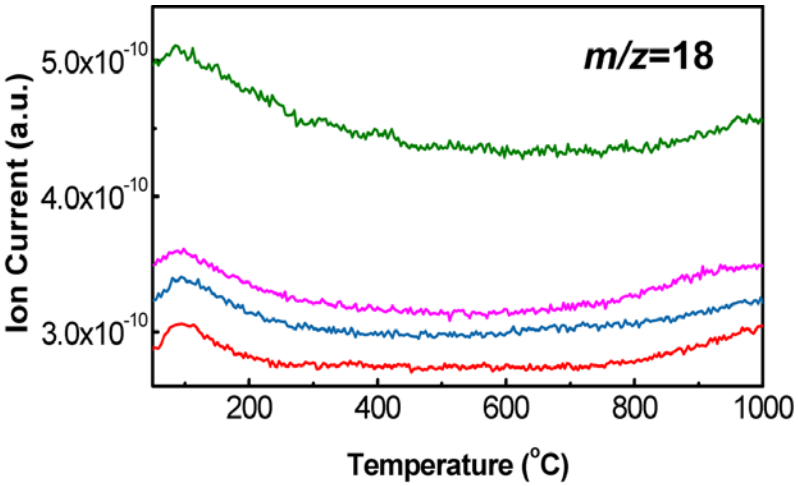

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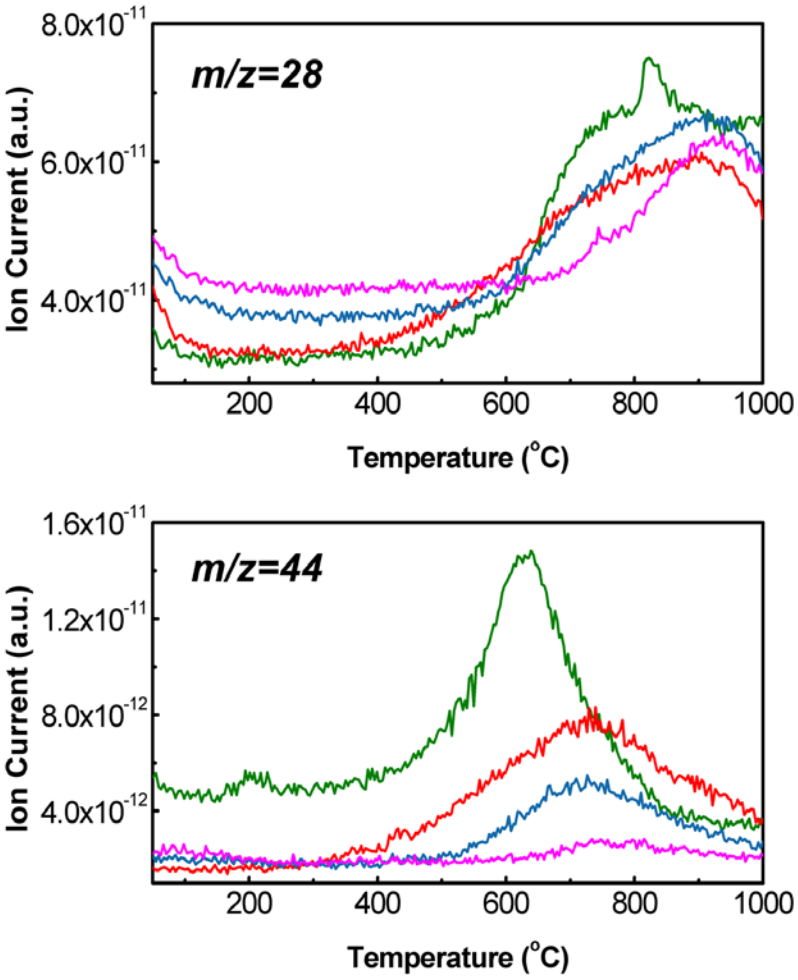

Fig. S2 MS curves of the sweep gases fragments from TG

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Table S1 Assignments of TG-MS peaks

m/z	Assignments	Evolving Temperature
12	Radical C evolved from re-graphitization or crystallization of amorphous sp^3 region in graphene	550-1000 ^oC
17	NH_3 from decomposition of nitrogen containing groups (especially for amine/amide species)	200-500 ^oC
	Radical OH fragments from H_2O (physically adsorbed water/ chemical dehydration)	a) ~100 ^oC; b) >800 ^oC
18	H_2O from evaporation of physically adsorbed water around 100 ^oC	~100 ^oC
	intermolecular dehydration between neighboring -OH, -COOH and $–NH_2$ pairs	>800 ^oC
28	CO from decomposition of thermally stable –C=O related carbonyl groups, individual –OH or epoxy sites at relatively higher temperature	650-1000 ^oC
44	CO_2 from desorption of C(O)O related species such as carboxyl, lactone and anhydride	200 ^oC

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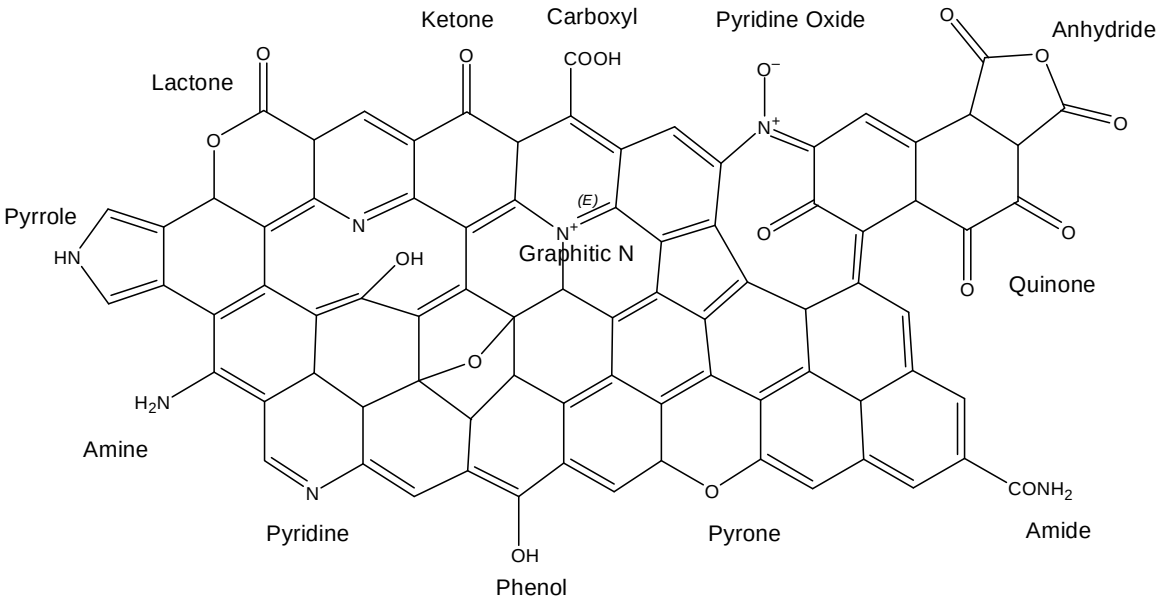

Fig. S3 Different forms of N and O functionalities in aminated carbon materials.

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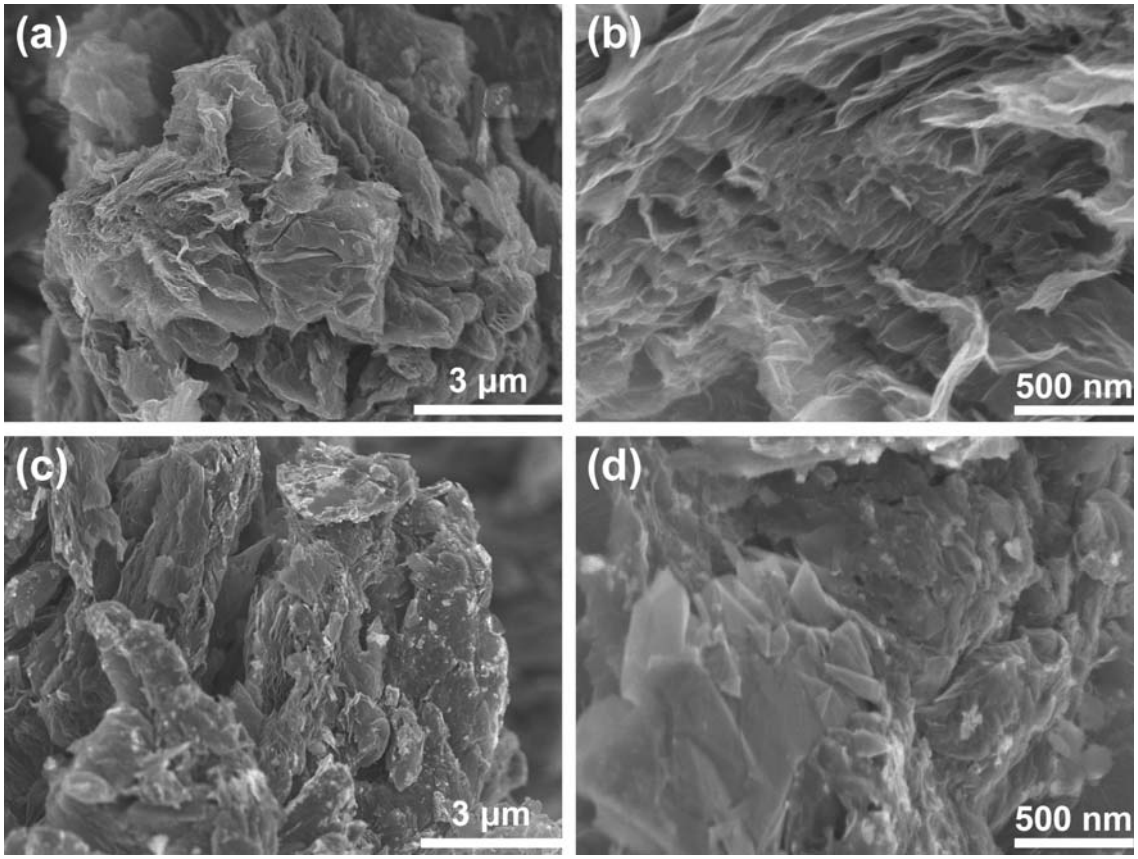

Fig. S4 Collapse of large pores in AGHs via high temperature amination: SEM images of (a,b) AGH400 and (c,d) AGH600.

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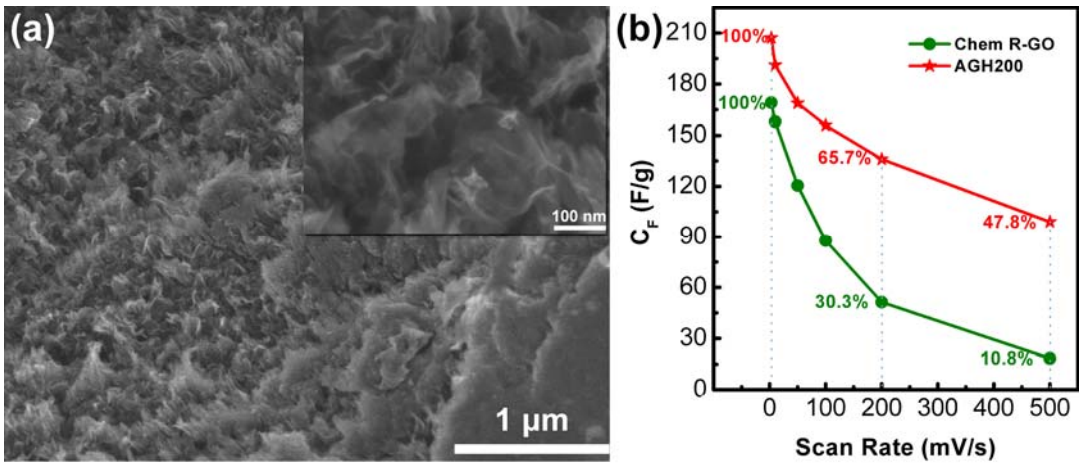

Fig. S5 Chemically reduced graphene oxide (CRG) by NH_2-NH_2: (a) SEM images of compact graphene agglomeration without exterior macropores; (b) Electrochemical performance as supercapacitor electrode.

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Table S2 Summary of supercapacitor performance based on carbon electrodes

Carbon type	BET surfae area (m^2/g)	Scanning rate or cycling rate	C_F (F/g)	C_s (F/m^2)	Reference
G250	293	3 mV/s	174	0.59	This work
AGH200	247	3 mV/s	207	0.84	This work
Activiated carbon	543	5 mV/s	184	0.34	[1]
LN[a]	746	0.2 A/g	264	0.35	[2]
LN+CNT	680	0.2 A/g	273	0.40	[2]
Activiated carbon	1400	0.2 A/g	119	0.085	[2]
Mesoporous carbons	702	0.2 A/g	112	0.16	[3]
B0.7-OMC	641	0.2 A/g	134.6	0.21	[3]
P0.7-OMC	550	0.2 A/g	154	0.28	[3]
N-activiated carbon	571	0.1 A/g	220	0.39	[4]
Graphene	202	10 mV/s	135	0.67	[5]
Graphene-CNT	612	10 mV/s	385	0.63	[5]
Graphene	705	20 mV/s	100	0.14	[6]
Graphene	382	1 mV/s	279	0.73	[7]
N-activiated carbon	635	0.1 A/g	210	0.33	[8]
Carbide derived carbons	600-2000	-	70-190	0.05-0.12	[9]
HOPG	-	-	-	0.5-0.7[b]	[10]
Graphite powder	4	-	1.4	0.35	[10]
Carbon aerogel	650	-	149.5	0.23	[10]
Nanodiamond	380	-	15.2	0.04	[11]
Carbon nanotube	200	-	18	0.09	[11]
Activiated carbon	1150-2300	-	27-100	0.005-0.041	[12]
SWCNTs	357	1 mA/cm^2	138	0.39	[13]
MWCNTs	19.7	1 mA/cm^2	2	0.10	[14]
Activiated MWCNTs	247	1 mA/cm^2	14	0.056	[14]

[a] Activiated carbon obtained after pyrolysis at 600 ^oC of the Lessonia Nigrescens seaweed

[b] Measured at the edge plane of highly oriented pyrolytic graphite.

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