

Submitted to **Journal of
Materials Chemistry**

Electronic Supplementary Material (ESI) for

**Hierarchically aminated graphene honeycombs for
electrochemical capacitive energy storage**

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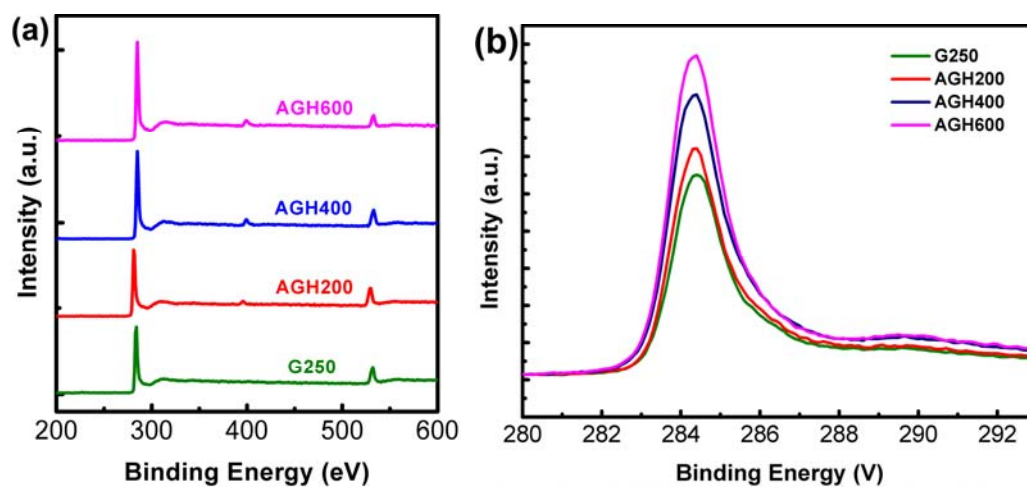
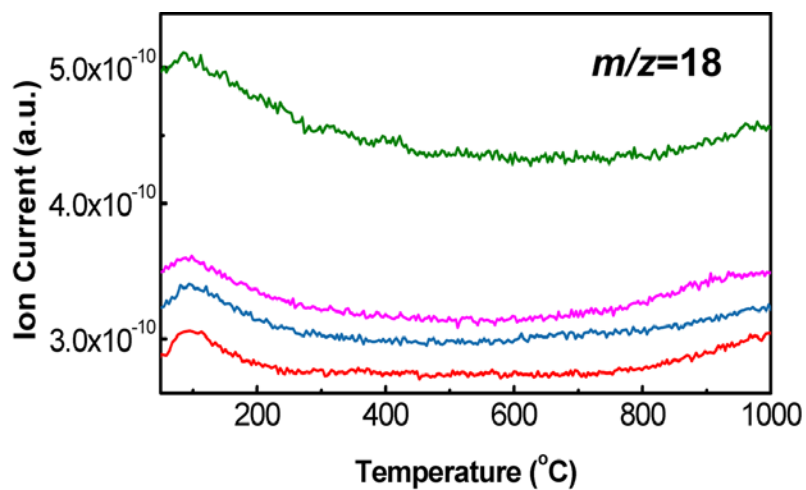
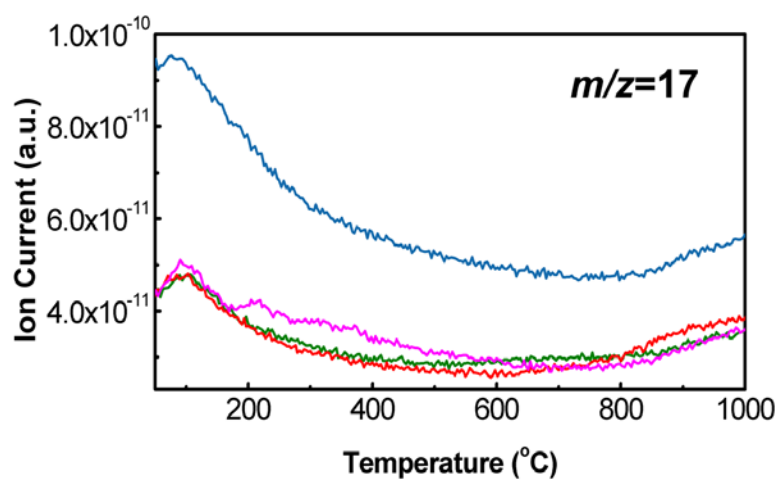
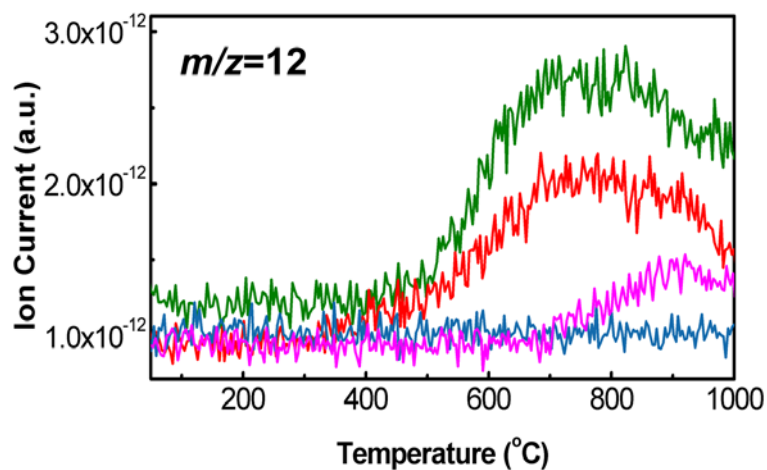


Fig. S1 (a) XPS survey spectrum and (b) C1s fine scan spectrum of G250 and AGHs



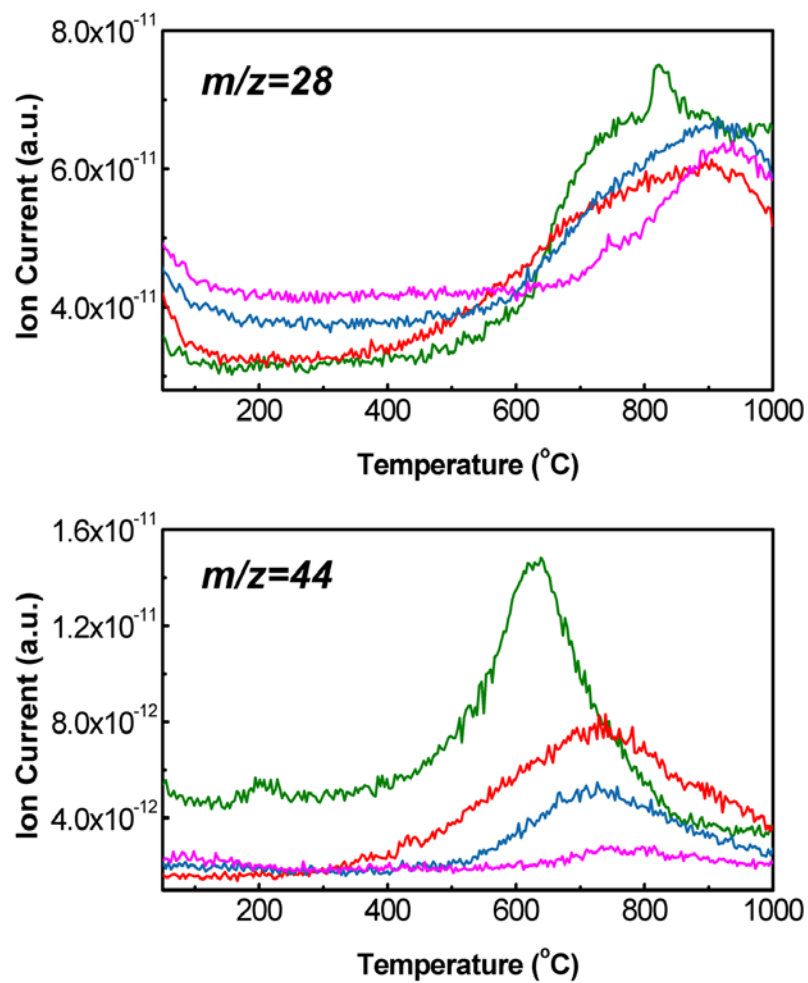


Fig. S2 MS curves of the sweep gases fragments from TG

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 °C
17	NH ₃ from decomposition of nitrogen containing groups (especially for amine/amide species) Radical OH fragments from H ₂ O (physically adsorbed water/chemical dehydration)	200-500 °C a) ~100 °C; b) >800 °C
18	H ₂ O from evaporation of physically adsorbed water around 100 °C intermolecular dehydration between neighboring -OH, -COOH and -NH ₂ pairs	~100 °C >800 °C
28	CO from decomposition of thermally stable -C=O related carbonyl groups, individual -OH or epoxy sites at relatively higher temperature	650-1000 °C
44	CO ₂ from desorption of C(O)O related species such as carboxyl, lactone and anhydride	200 °C

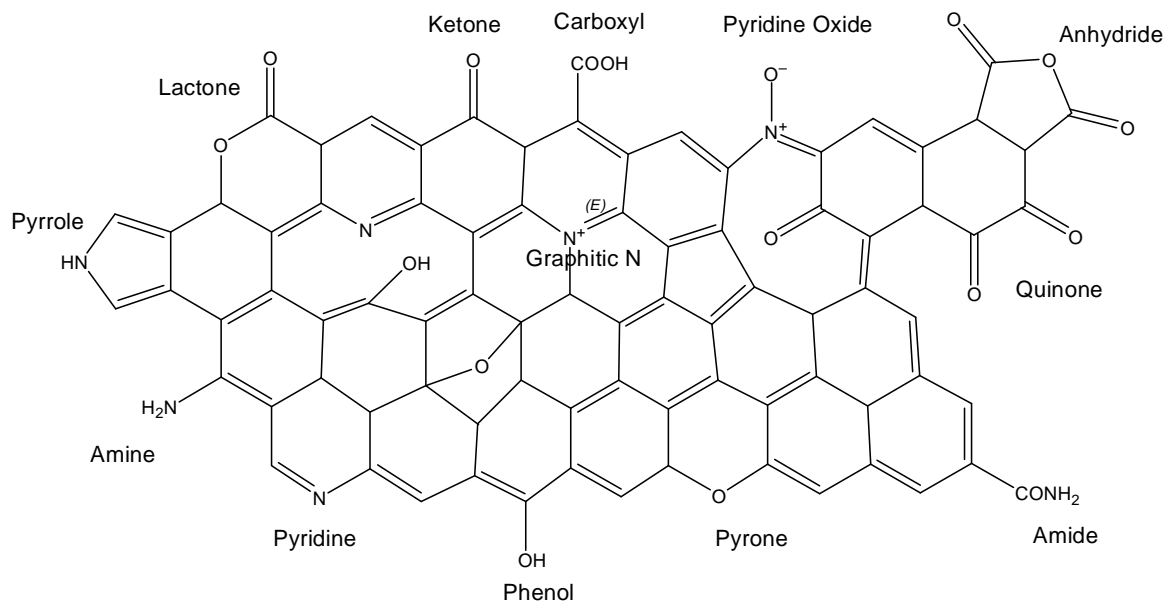


Fig. S3 Different forms of N and O functionalities in aminated carbon materials.

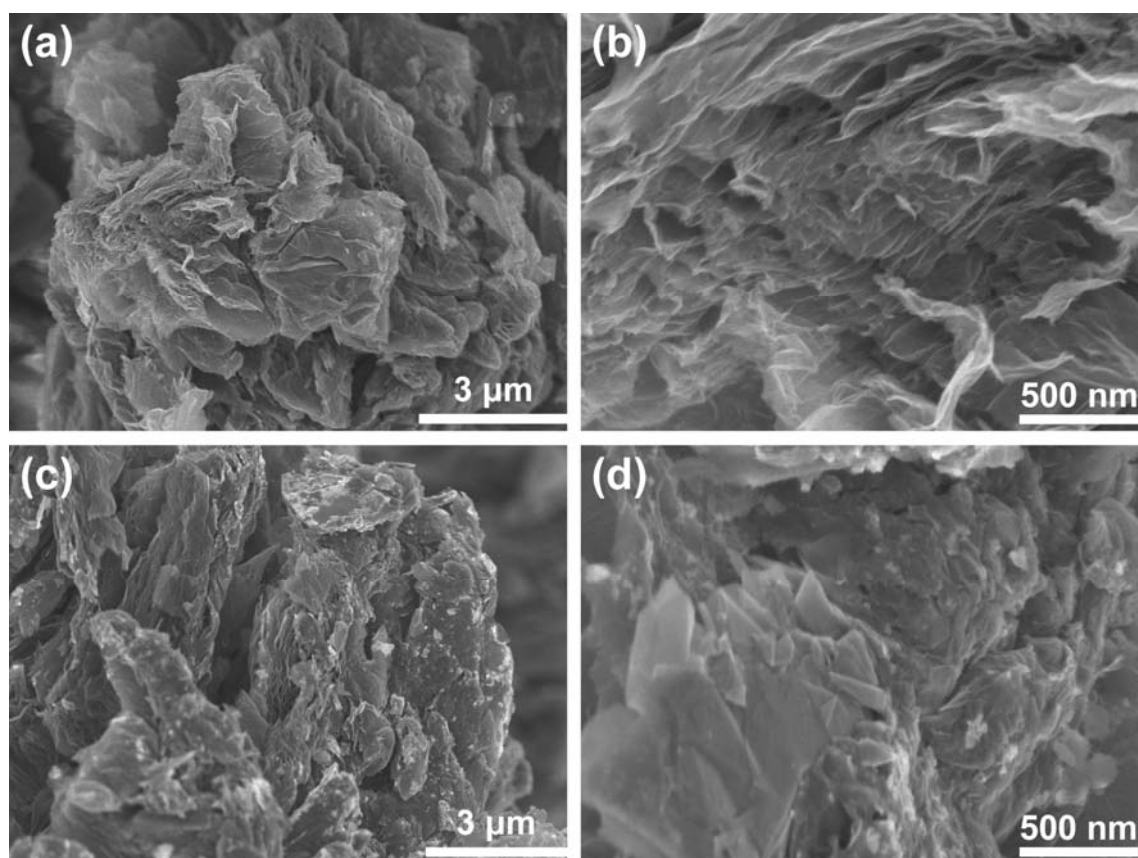


Fig. S4 Collapse of large pores in AGHs via high temperature amination: SEM images of (a,b) AGH400 and (c,d) AGH600.

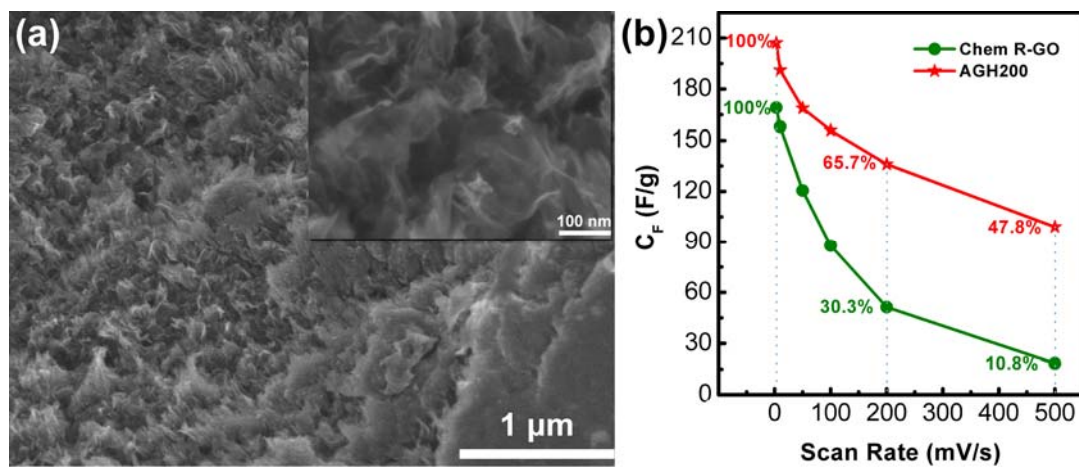


Fig. S5 Chemically reduced graphene oxide (CRG) by $\text{NH}_2\text{-NH}_2$: (a) SEM images of compact graphene agglomeration without exterior macropores; (b) Electrochemical performance as supercapacitor electrode.

Table S2 Summary of supercapacitor performance based on carbon electrodes

Carbon type	BET surface 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
Activated 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]
Activated 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-activated 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-activated 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]
Activated 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]
Activated MWCNTs	247	1 mA/cm ²	14	0.056	[14]

^a Activated carbon obtained after pyrolysis at 600 °C of the *Lessonia Nigrescens* seaweed

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

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