Electronic Supplementary Information

Graphene-Based Ordered Mesoporous Carbon Hybrids with Large Surface Areas for Supercapacitor

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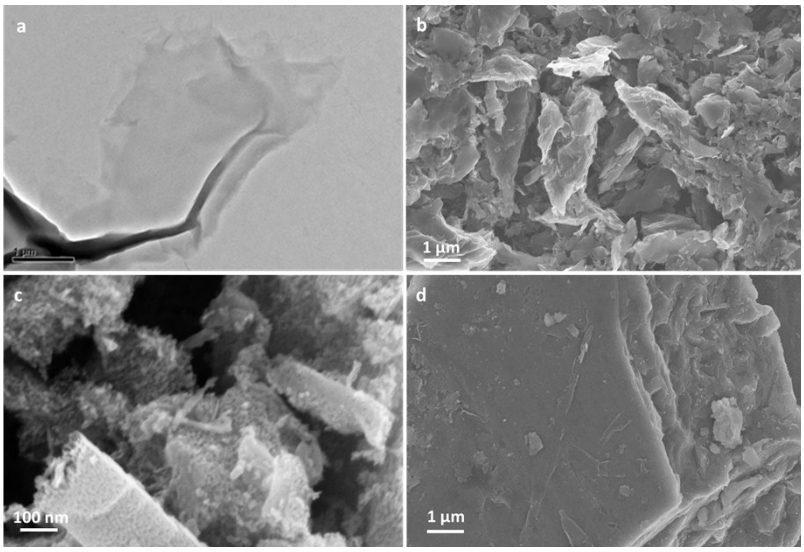

Fig. S1 (a) TEM image of GO, (b,c) SEM images of OMCGs at different magnifications and (d) SEM image of OMCs.

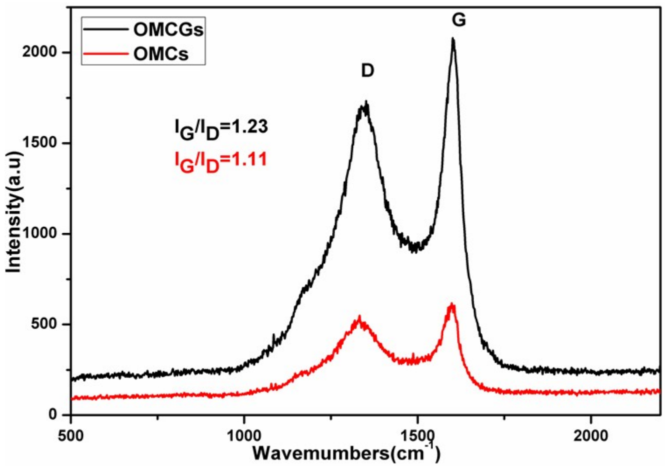

Fig. S2 Raman spectrum of OMCGs (black line) and OMCs (red line)

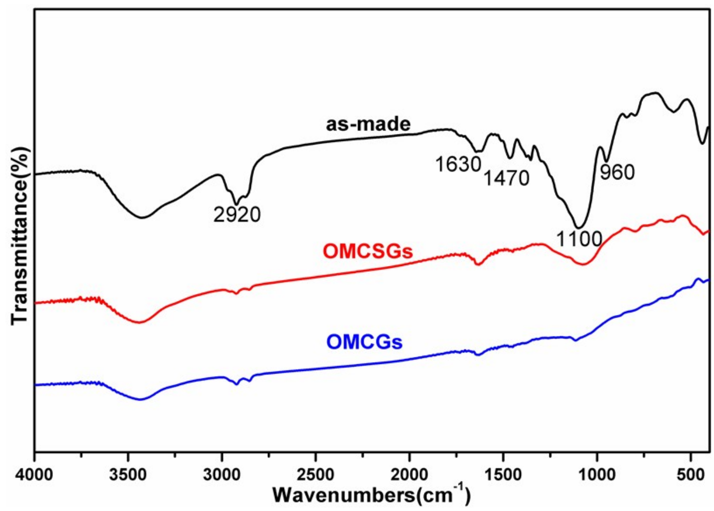

Fig. S3 FT-IR spectra of (a) as-made, (b) OMCSGs and (c) OMCGs

FT-IR spectra (Fig. S3 a) of as-made nanocomposites shows the bands at ~3400 cm^{-1} and weak bands at ~1630, 1470 cm^{-1} attributed to the characteristic stretching vibration of phenolic resins and GO. The bands at around 2920 and 1100 cm^{-1} ascribed to the C-H and C-O stretching of F127 and the overlap with Si-O-Si vibration. The band at ~960 cm^{-1} attributed to Si-OH vibration. After calcination at 800 °C under nitrogen, the intensity of bands at around ~3400, 2900, 1630 and 1470 cm^{-1} decreases dramatically (Fig. S3 b), further suggesting decomposition of F127 templates and calcinations of phenolic resins, the retained band at 1100 cm^{-1} attributed to Si-O-Si indicates the coexistence of carbon and silica. After HF etching, the band of the resulted HCMSs at 1100 cm^{-1} disappears (Fig. S3 c), indicating the complete removal of silica by HF solution (*Chem. Commun*., 2011, **47**, 12364.).

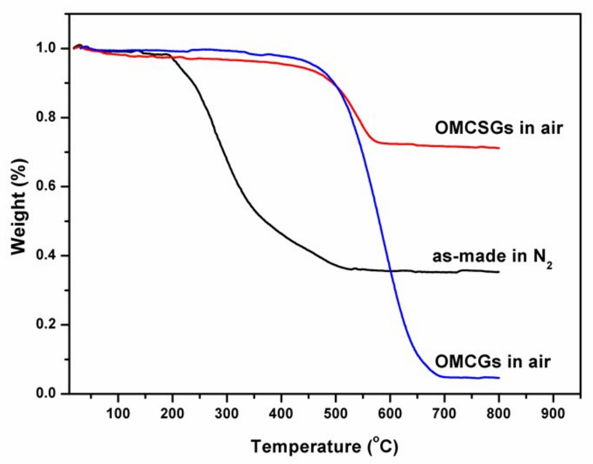

Fig. S4 TGA curves of OMCSGs in air, as-made in N_2 and OMCGs in air

TGA curves show a significant weight loss of 50 wt% in the temperature range from 300 to 400 °C under nitrogen for as-made nanocomposites, corresponding to decomposition of triblock copolymer F127 (*Chem. Commun.*, 2012, **48**, 976.). A little weight loss can be observed at 100-200 and 400-900 ° C, corresponding to removal of adsorbed water in GO (*Chem. Commun.*, **2012**, 48, 976.) and polymerization of phenolic resins and silicate species in the nanocomposites, respectively. TG measurement shows that the OMCGs can completely combust (~95%) in air at temperature range from 600 to 800 °C. It indicates that silica have been successfully removed from the OMCSGs samples, which is accordance with the FT-IR result. The TGA curve of OMCSGs displays an obvious weight loss of 30 wt % in air between 350 and 580 °C. This phenomenon is attributed to the combustion of organic constituents and graphene with residue of inorganic constituent silicates.

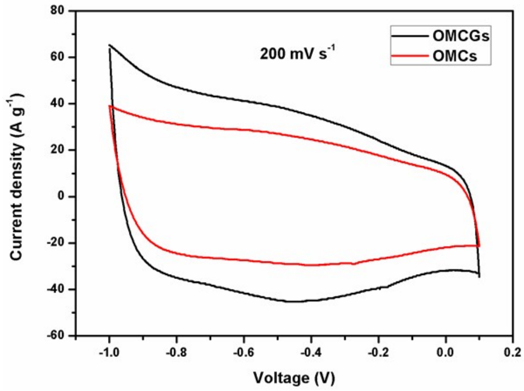

Fig. S5 Cyclic voltammograms of OMCGs (black line) and OMCs (red line) electrodes at a scan rate of 200 mV s^{-1} in 6.0 M KOH.

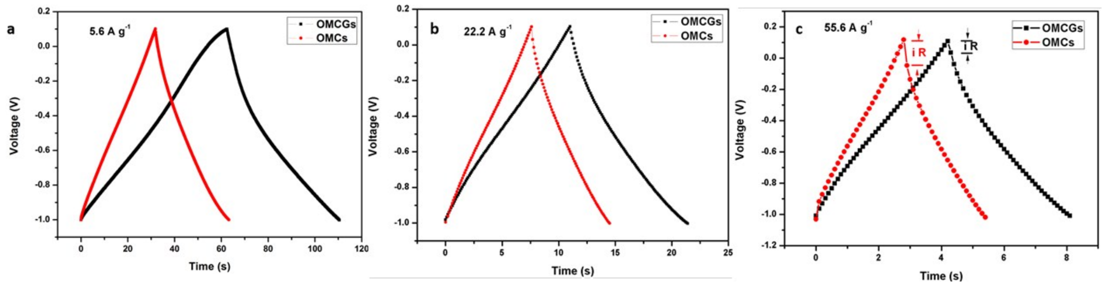

Fig. S6 Galvanostatic charge/discharge curves of OMCGs (black line) and OMCs (red line) electrodes at current density of (a) 5.6 A g^{-1}, (b) 22.2 A g^{-1} and (c) 55.6 A g^{-1}.

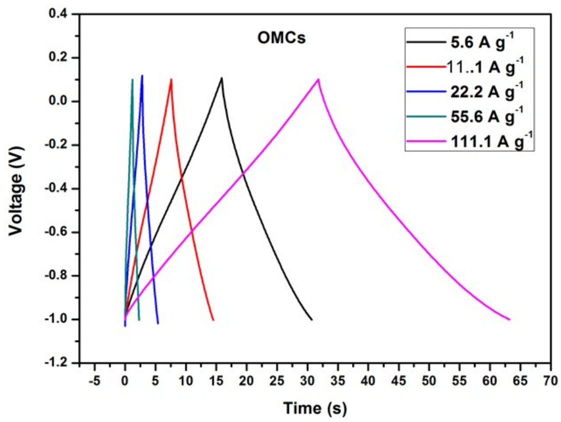

Fig. S7 Galvanostatic charge/discharge curves of OMCs electrodes at different current density.

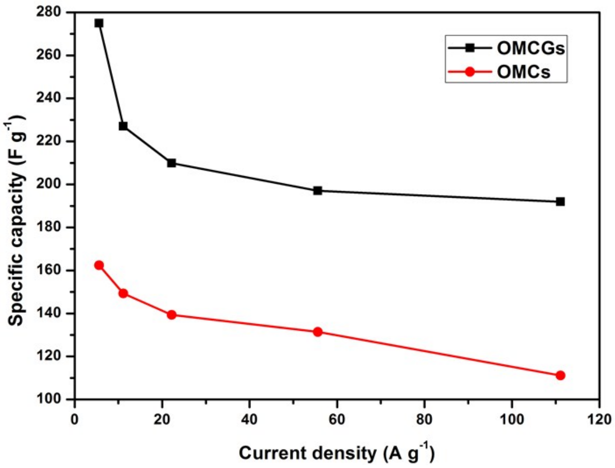

Fig. S8 Galvanstatic specific capacitance of OMCGs (black line) and OMCs (red line) aganist current density.

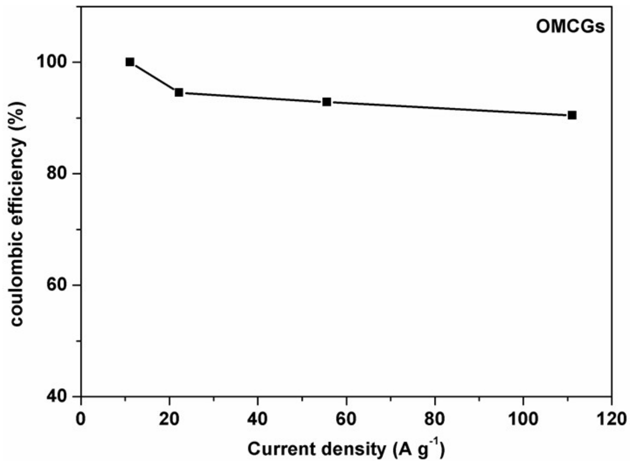

Fig. S9. Coulombic efficiency of OMCGs under different current densities.

Table S1. Typical specific capacitance (Cs) of carbonaceous materials

Item	Electrolyte	Current density and/or scan rate	C_s (F g^{-1})	Ref
OMCGs	**6 M KOH**	**5.5 A g^{-1}** **5-100 mV s^{-1}**	**227** **330-213**	**This work**
3D GA-MC	1 M H_2SO_4	1~100 mV s^{-1}	226~83	S1
HPC6	1 M Na_2SO_4	5 A g^{-1}	~200	S2
NCM900	6 M KOH	100 mV s^{-1}	~110	S3
BN-doped graphene	1 M H_2SO_4/PVA	1 mV s^{-1}	<250	S4
3D polypyrrole-graphene	3M $NaClO_4$	1.5 A g^{-1}	350	S5
N-doped ordered mesoporous carbon	6 M KOH	1.0 A g^{-1}	200	S6
Aligned BCN nanotubes	1 M H_2SO_4	0.2 A g^{-1}	312	S7
N-doped porous carbon nanofibers	6 M KOH	1.0 A g^{-1}	202	S8
Crumpled N-doped graphene	6 M KOH	5 mV s^{-1}	302	S9
Carbonized eggshell membranes	1 M KOH	0.2 A g^{-1}	297	S10
Ionic liquid-derived microporous carbon nanosheets	6 M KOH	0.5 A g^{-1}	213	S11
N/P co-doped carbon fibers	1 M H_2SO_4	0.5 A g^{-1}	224.9	S12
3D macroporous graphene films	1 M H_2SO_4	10 mV s^{-1}	86.7	S13
B-doped graphene	6 M KOH	0.2 A g^{-1}	200	S14
Mn_3O_4 nanorods-graphene	1 M Na_2SO_4	0.5~20 A g^{-1}	121~83	S15
3D N-doped G-CNTs	6 M KOH	0.5 A g^{-1}	180	S16

Supplementary References

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