Electronic Supplementary Material (ESI) for Chemical Communications
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Supporting Information

Pore morphology: a vital factor in determining electrochemical properties for electrical double layer capacitors

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Experimental

1. Sample preparation

Synthesis of SBA-15. SBA-15 was prepared according to the method described in the reference[1]. Briefly, 10 g of P123, 182 ml of H_2O, and 4.6 ml of HCl (37 wt.%) were mixed and stirred until complete homogenization. Subsequently, 17.3 ml of TEOS was added and continuously stirred at 35 ^oC for 24 h. After that, the mixture was heated at 100 ^oC for 24 h. The product was filtered, dried and then calcined in the air at 550 ^oC for 6 h, leading to formation of SBA-15.

Synthesis of OMC. OMC was prepared according to the procedures reported in the reference[1]. Briefly, 10 g of SBA-15 was added to a solution obtained by dissolving 12.5 g of sucrose and 1.4 g of H_2SO_4 in 50 g of H_2O. The mixture was reacted for 6 h at 100 ^oC and subsequently for 6 h at 160 ^oC. The obtained sample was treated again at 100 and 160 ^oC after the addition of 8 g of sucrose, 0.8 g of H_2SO_4 and 50 g of

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H_2O. Then the sample was heated to 900 ^oC with a heating rate of 5 ^oC/min, and kept at this carbonization temperature for 3 h in N_2 flow. After that, the carbon/silica composites were washed using HF solution to obtain OMC.

Synthesis of WMC. WMC was prepared according to the procedures reported in our previous work[2]. Briefly, 2 g of sucrose was dissolved in 3 ml of H_2SO_4 (pH=2.0), followed by adding 4 ml of tetraethyl orthosilicate (TEOS). The mixture was stirred continuously until complete homogenization. Subsequently, 4 wt.% hydrofluoric acid (HF) solution (HF/TEOS molar ratio = 1/30) was added under stirring. The obtained homogeneous mixture was quickly gelated and aged in an open plastic bottle at 40 ^oC for 2 days. The obtained sample was further reacted for 6 h at 100 ^oC and subsequently for 6 h at 160 ^oC. Then the resulting sucrose/silica gel composite was heated to 900 ^oC with a heating rate of 5 ^oC /min, and kept at this carbonization temperature for 3 h in N_2 flow. After that, the carbon/silica composite was washed using HF solution to obtain WMC.

Synthesis of silica gel. The silica gel template was prepared by calcination of the sucrose/silica gel composite, which was obtained in the section of "Synthesis of WMC", in the air at 550 ^oC for 6 h.

2. Characterization

Low-angle XRD patterns were recorded on a D-MAX 2200 VPC diffractometer using Cu Kα radiation (40 kV, 30 mA). N_2 adsorption measurements were carried out using a Micromeritics ASAP 2010 analyzer at 77 K. The pore size distributions of the samples were derived from the adsorption branch by Barrett-Joyner-Halendar (BJH)

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theory with Kruk-Jaroniec-Sayari correction[3]. The BET surface area (S_{BET}) and the mesopore volume (V_{mes}) were determined by BET theory and BJH method, respectively.

The electrode was obtained by pressing a mixture film of carbon sample (92 wt%) and polytetrafluorethylene (8 wt%) into a nickel foam current collector. 6 mol/L KOH aqueous solution was chosen as the electrolyte. The cyclic voltammetry (CV) and electrochemical impedance spectroscopy (EIS) measurements were carried out in a coin-type cell using an IM6e electrochemical workstation. The galvanostatic charge-discharge behavior was characterized by BT2000 (ARBIN Instruments).

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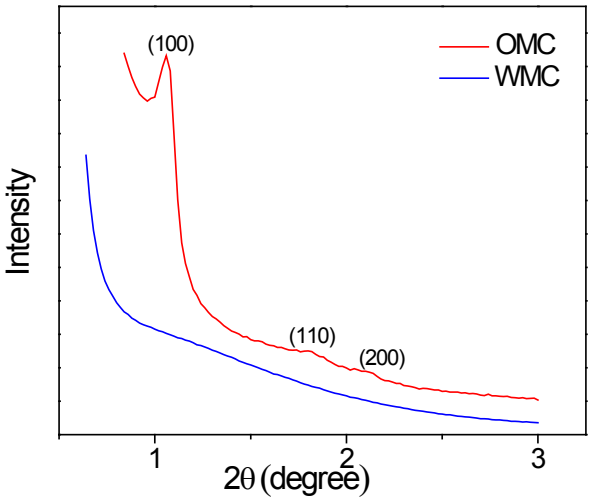

Fig. S1 XRD patterns of OMC and WMC samples.

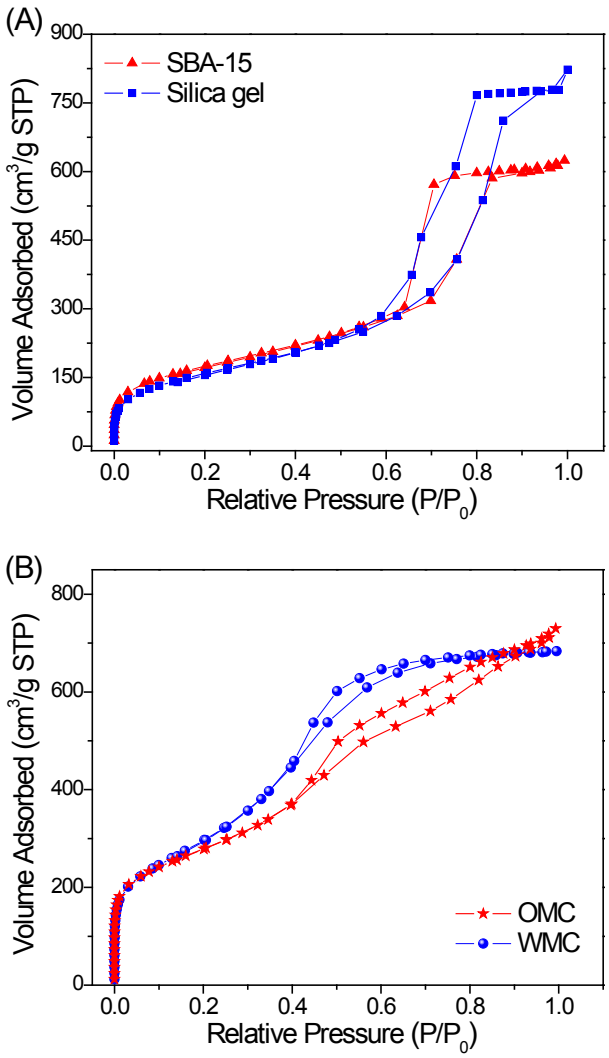

Fig. S2 N_2 adsorption-desorption isotherms of (A) silica templates and (B) porous carbon samples.

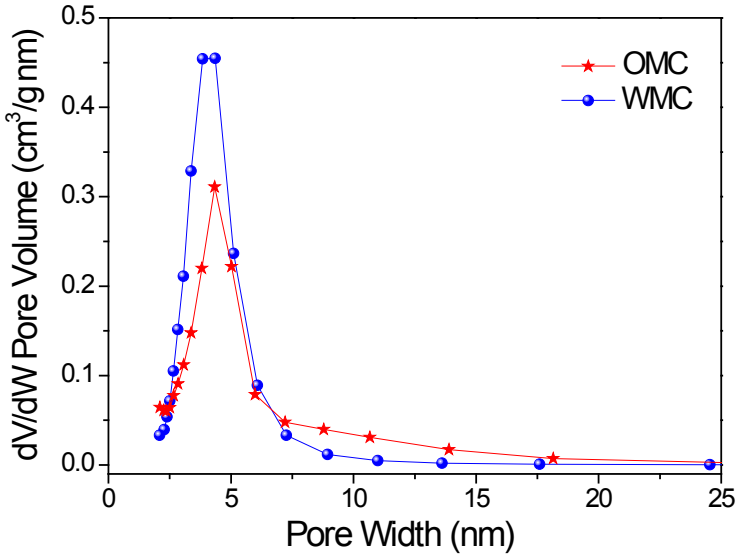

Fig. S3 BJH adsorption dV/dW pore size distributions of OMC and WMC samples.

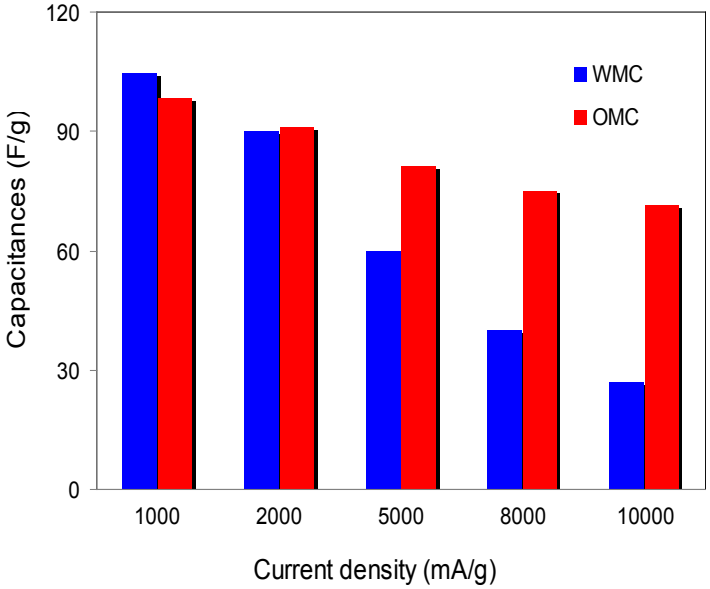

Fig. S4 Mass capacitances of WMC and OMC samples.

References

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