Electronic Supplementary Information

Architectural design of hierarchically ordered porous carbons on high-rate performance of electrochemical capacitors

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9 pages, 1 experimental section, and 7 figures.

Experimental section

Synthesis of polystyrene (PS) latex spheres. Monodisperse PS latex spheres were prepared by the emulsifier-free emulsion polymerization, carried out in a three-necked bottom flask with KPS as the initiator. Typically, PS spheres were obtained by mixing 84 mL of styrene and 400 mL of deionized water at room temperature with a gentle stir and purged with argon for 1 h. After addition of 1.0 g of KPS, the solution temperature increased gradually to 70 °C, stirred at 70 °C for 24 h. PS latex spheres were havested by centrifugation and washed with deionized water several times to remove the other unreacted chemicals. The resultants were redispersed in ethanol solution to obtain a 50 wt% PS latex spheres solution, and stored at 4 °C until used.

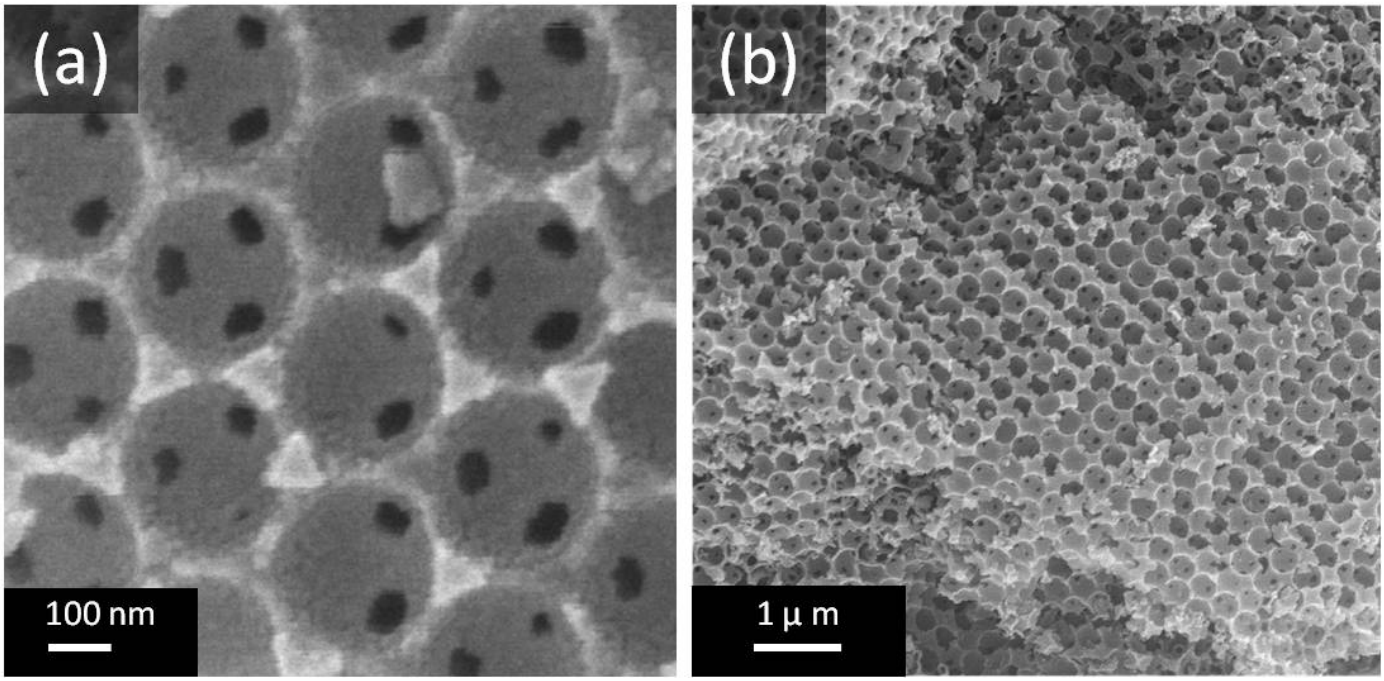

Fig. S1 The (a) high and (b) low magnification SEM image of HOPC-s.

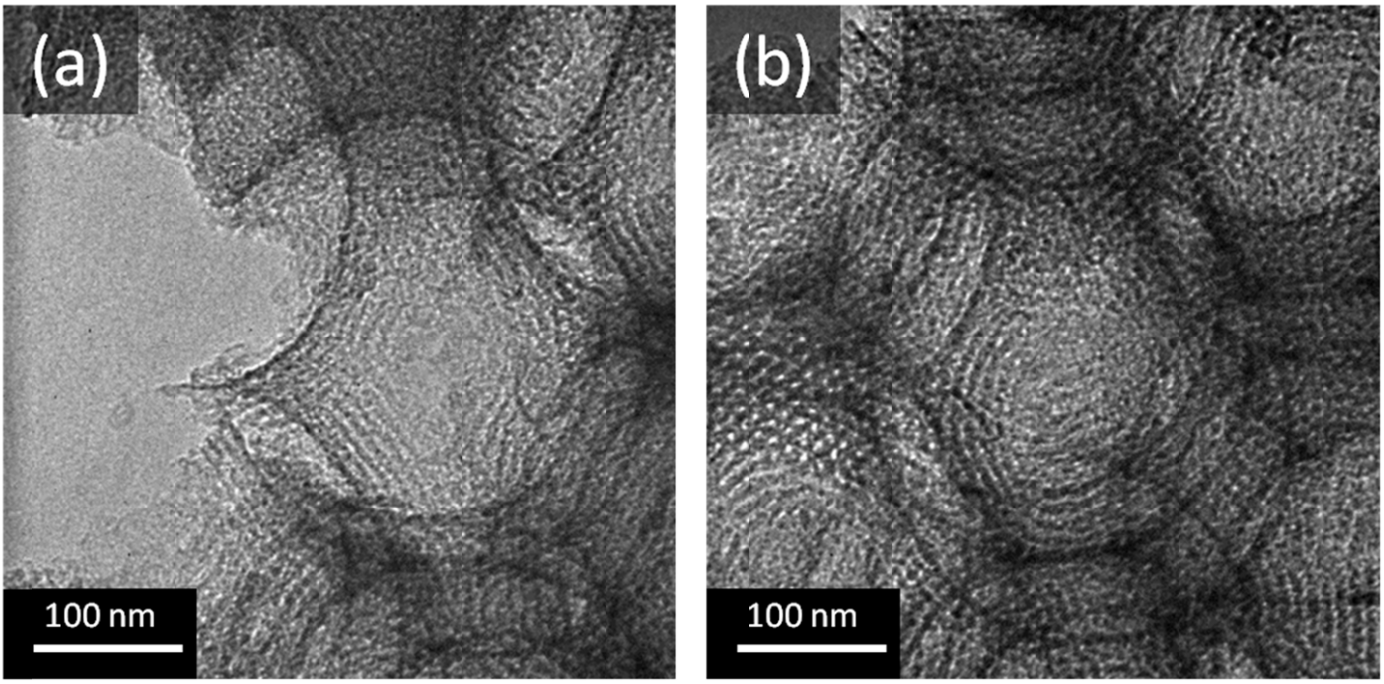

Fig. S2 The TEM images of (a) edge and (b) central parts of HOPC-s.

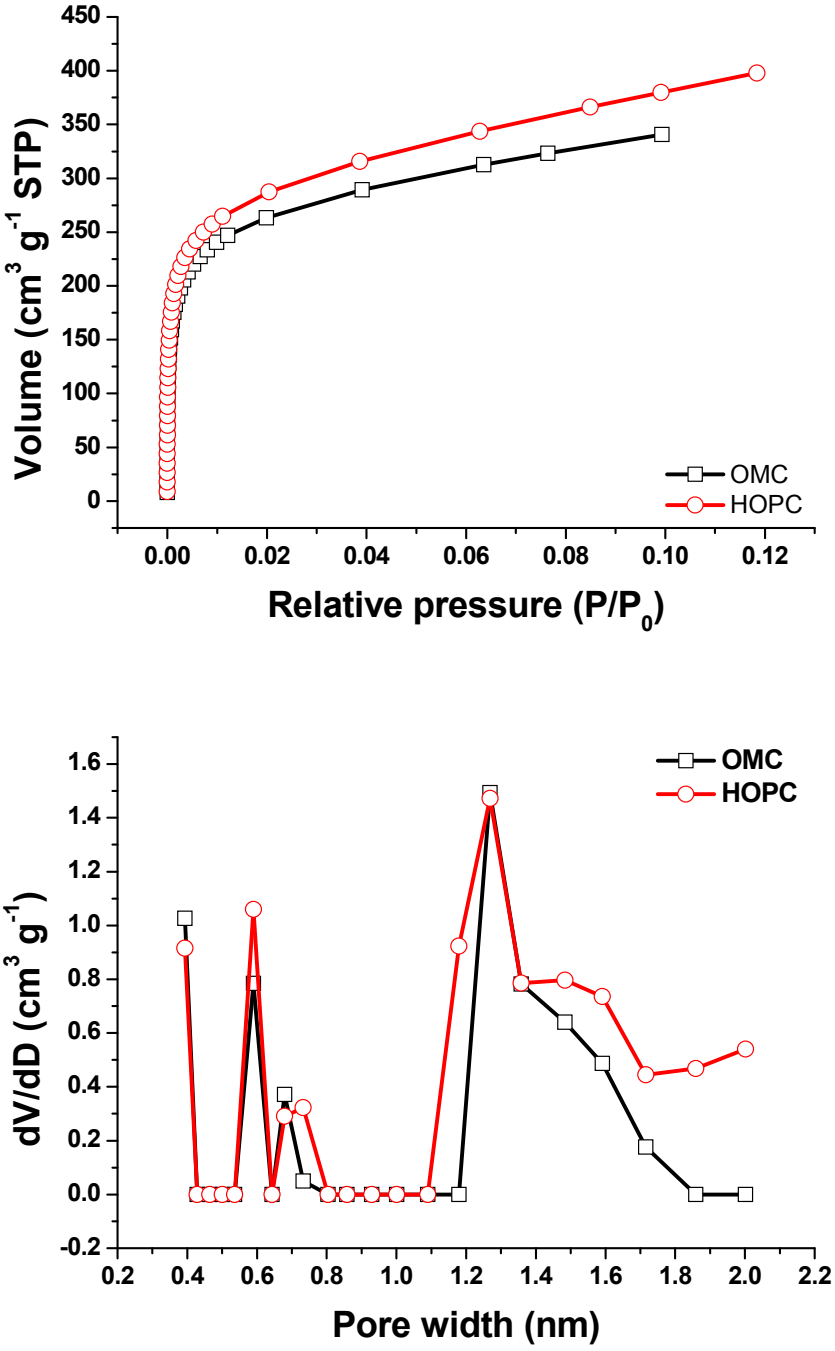

Fig. S3 (a) The nitrogen adsorption isotherms of OMC-s and HOPC-s at the relative pressure of 0.0 – 0.12, and (b) the micropore size distribution of OMC-s and HOPC-s.

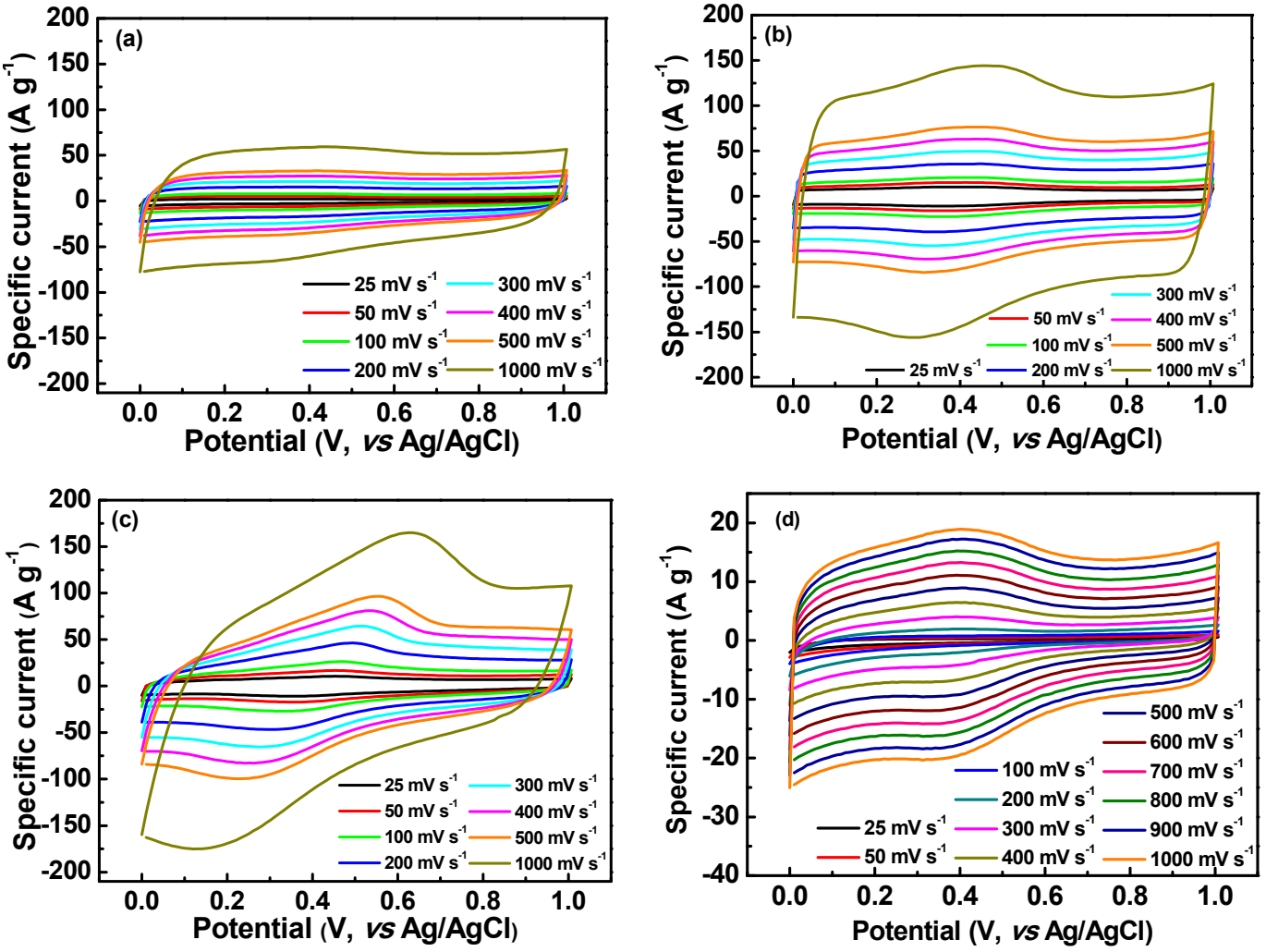

Fig. S4 The cyclic voltammograms of (a) HOPC, (b) HOPC-s, (C) OMC-s and (d) OMaC electrodes in 4M sulfuric acid at various scan rates ranging from 25 to 1000 mV s^{-1}.

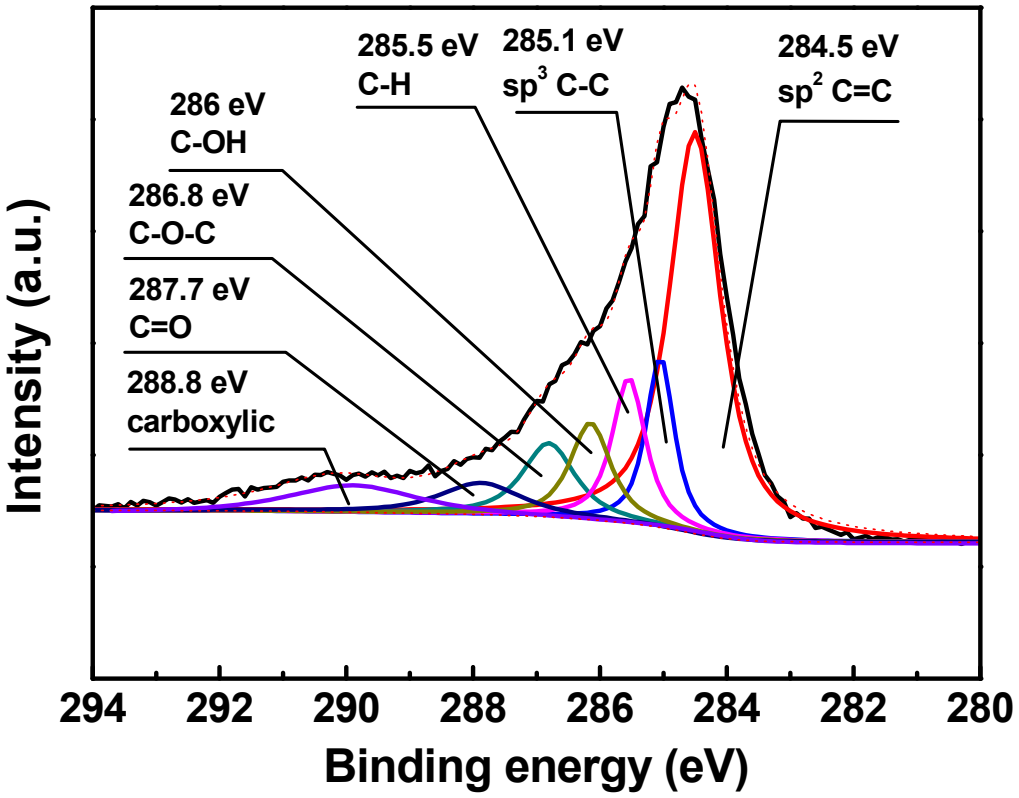

Fig. S5 The XPS deconvolution of C1s of HOPC-s electrode materials. The deconvolution results can be distinguished into C-OH (286 eV), C-O-C (286.8 eV), C=O (287.7 eV) and COOH (288.8 eV) functional groups.[1]

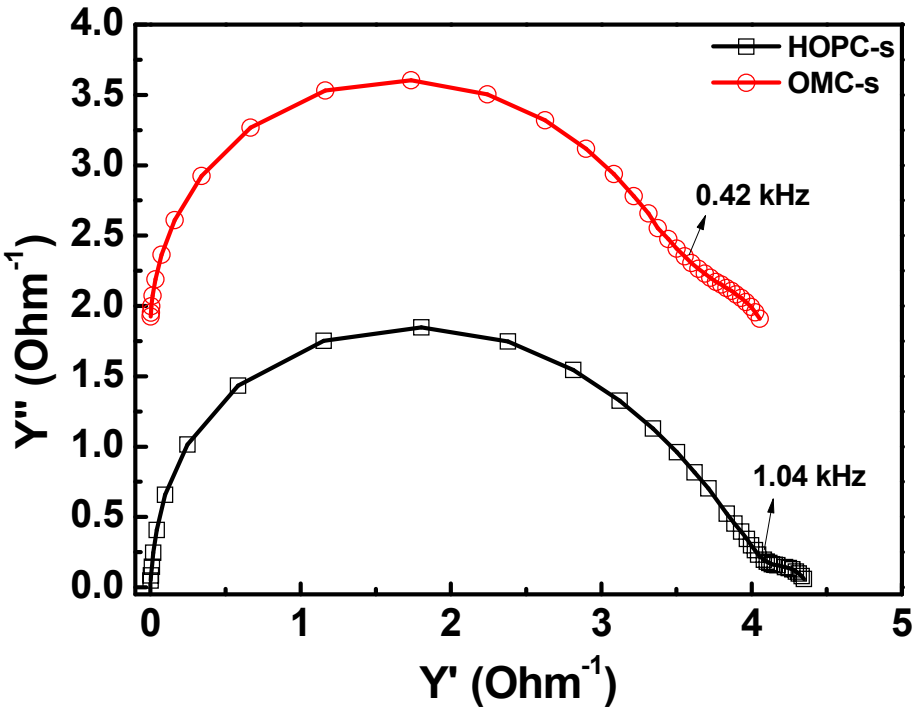

Fig. S6. The admittance plots of HOPC-s and OMC-s electrode materials. The knee frequencies of HOPC-s and OMC-s are 1.04 and 0.42 kHz, respectively.

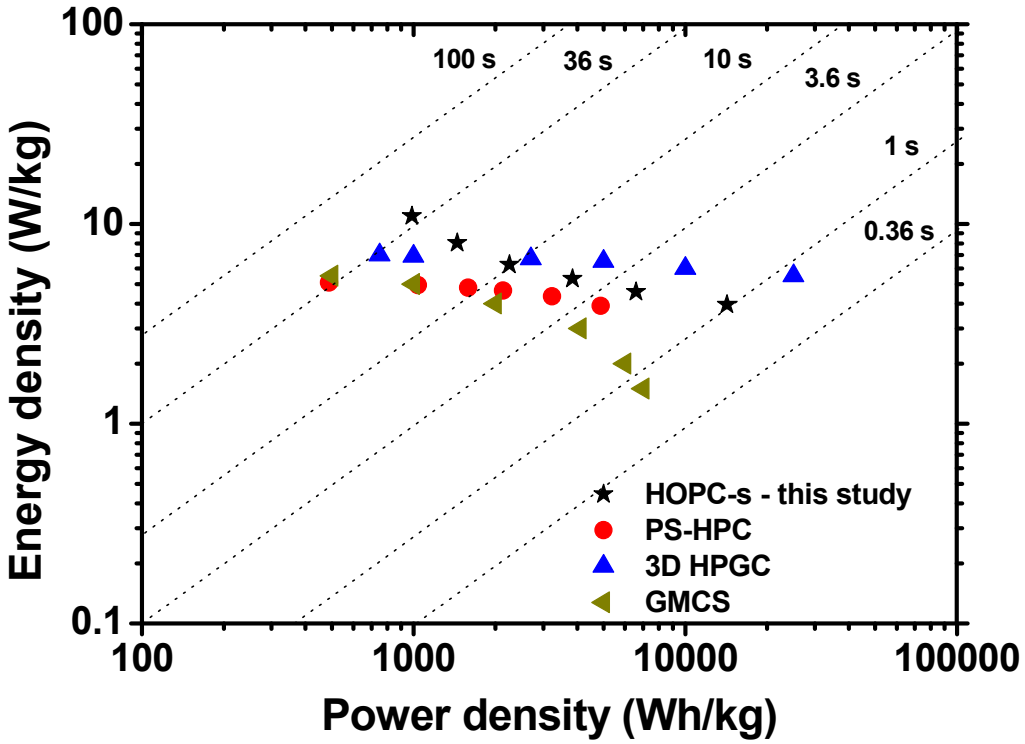

Fig. S7. Ragone plots of symmetric HOPC-s supercapacitors and other hierarchically porous carbon-based electrodes. PS-HPC is polystyrene-based hierarchical porous carbon[2], HPGC is the hierarchically porous graphitic carbon[3], and GMCS is the hierarchical mesoporous carbon sphere in graphene oxide sheets[4].

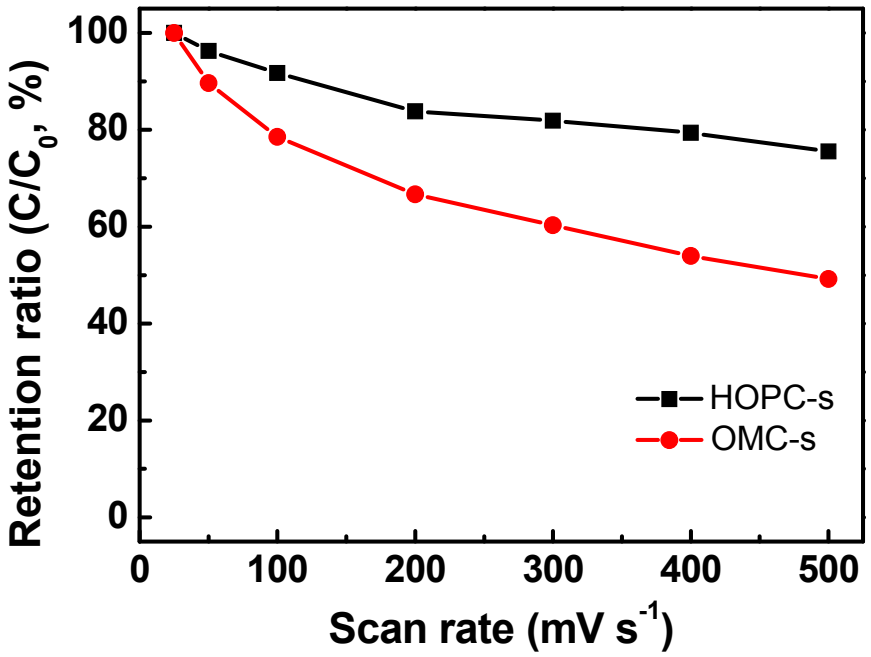

Fig. S8. The retention performance of HOPC-s and OMC-s in 1 M TEA BF_4 (dissolved in PC) as a function of scan rate ranging from 25 to 500 mV s^{-1}.

References

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2. F. Xu, R. J. Cai, Q. C. Zeng, C. Zou, D. C. Wu, F. Li, X. E. Lu, Y. R. Liang and R. W. Fu, *Journal of Materials Chemistry*, 2011, **21**, 1970-1976.
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