Electronic supplementary information

for

Three-dimensional porous V_2O_5 hierarchical spheres as a battery-typed electrode for hybrid supercapacitor with excellent charge storage performance

by

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Fig. S1

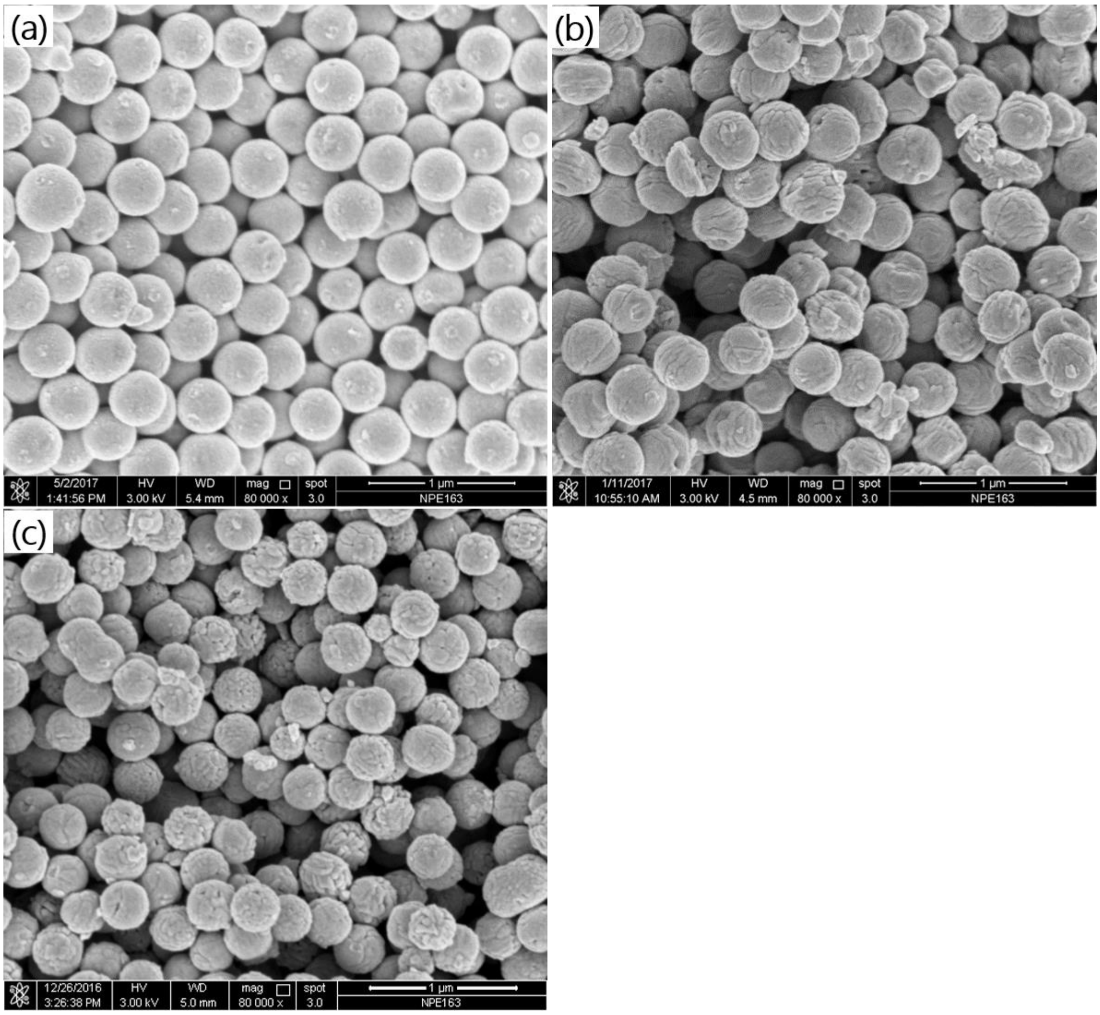


Fig. S1. SEM images of the samples obtained at various times: (a) 1 h; (b) 4 h; (c) 8 h.

Fig. S2

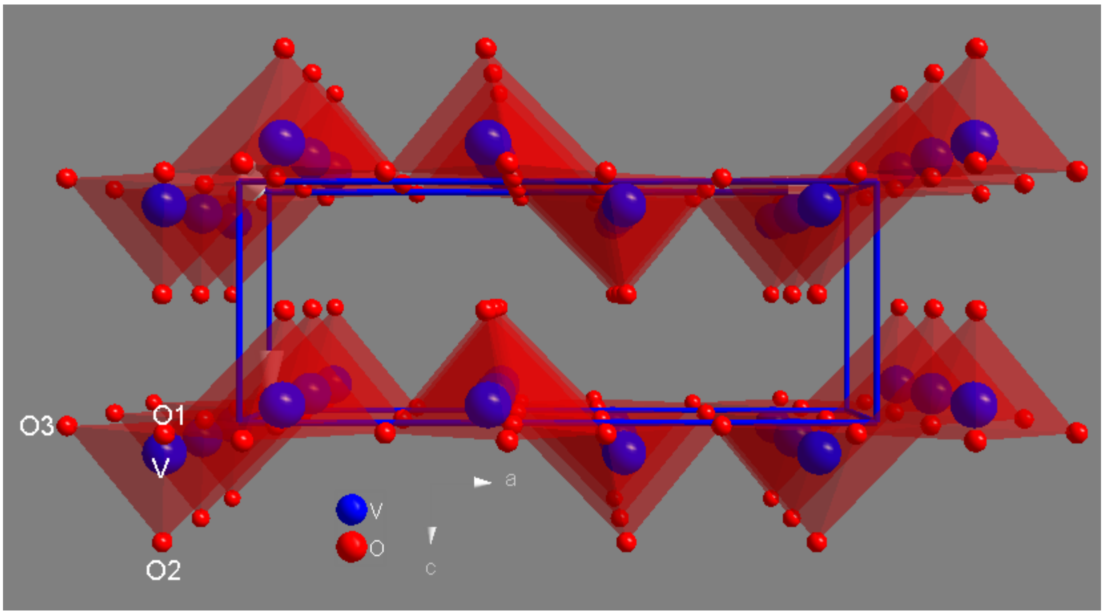


Fig. S2. Crystal structure of V_2O_5.

Fig. S3

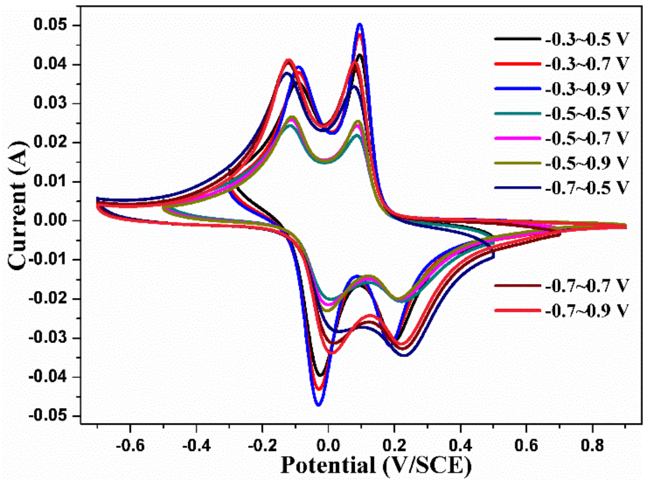


Fig. S3. CV curves of as-obtained porous V_2O_5 hierarchical spheres on various potential limits.

Fig. S4

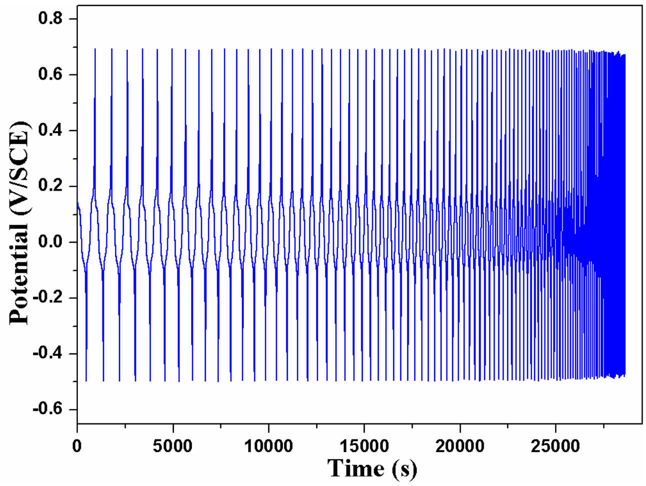


Fig. S4. Cycling behavior of the as-obtained V_2O_5 hierarchical spheres obtained by GCD curves at 1 A g^{-1} after 100 cycles.

Fig. S5

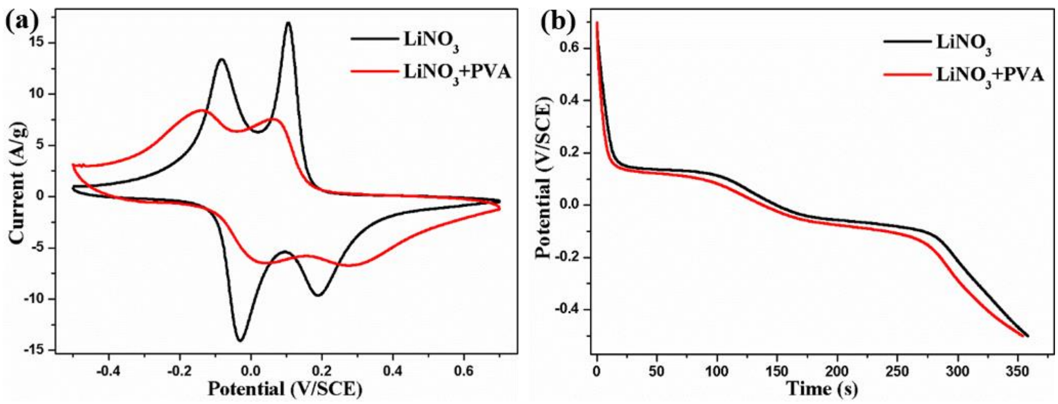


Fig. S5. Electrochemical performance of as-prepared porous V_2O_5 hierarchical spheres as an electrode in ($LiNO_3$ + PVA) electrolyte: (a) CV curves at 10 mV s^{-1}; (b) GCD curves at 1 A g^{-1}.

Fig. S6

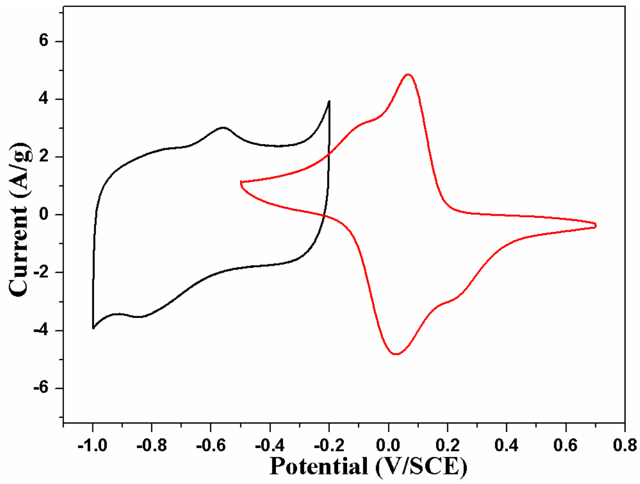


Fig. S6. CV curves of active carbon and V_2O_5 hierarchical spheres.

Fig. S7

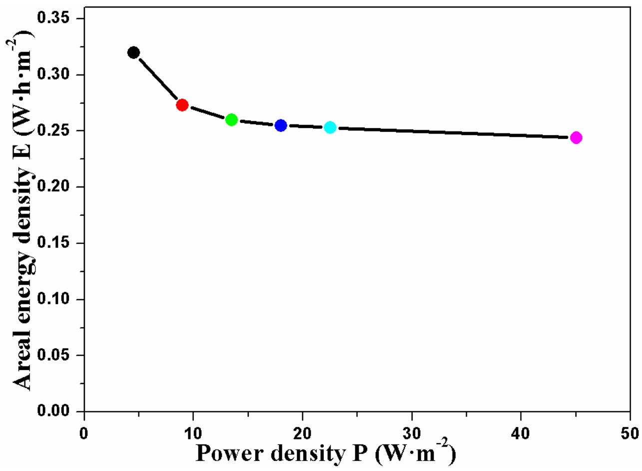


Fig. S7. Ragone plots of AC//V_2O_5 hierarchical spheres HSC device.

Fig. S8

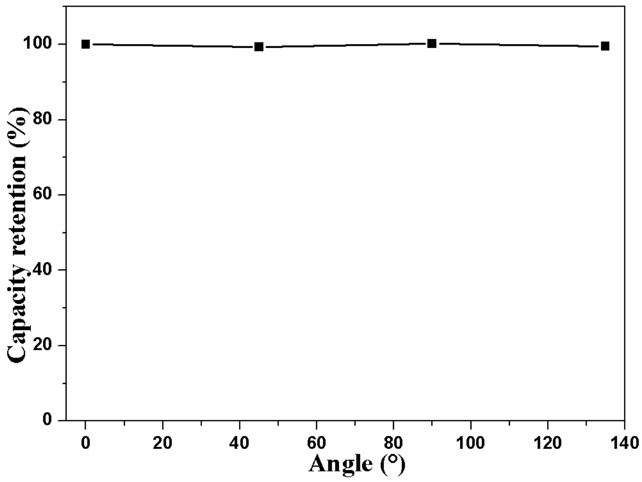
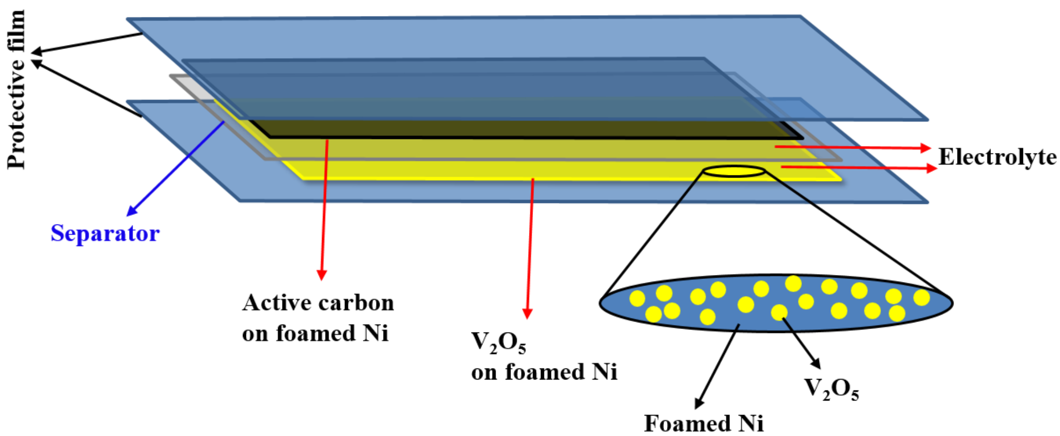


Fig. S8. The capacitive retention of AC//V_2O_5 hierarchical spheres HSC device at straight and bend states.

Scheme S1



Scheme S1. A schematic diagram illustrating AC//V_2O_5 hierarchical spheres HSC device configuration.

Table S1

Table S1. Comparison of the electrochemical performance of SC devices.

Types of device	Electrolyte	Specific capacitance/F cm^{-2}	Reference
V_2O_5 SSCs	1 M $LiClO_4$/PVA	0.38, 1 mV s^{-1}	[1]
PET/Pt/MnO_2 SSCs	H_3PO_4/PVA	0.2, 10 mV s^{-1}	[2]
WO_{3-x}/MoO_{3-x}//PANI/carbon fabric ASCs	H_3PO_4/PVA	0.216, 2 mA cm^{-1}	[3]
PPy@MnO_2@rGO SSCs	H_3PO_4/PVA	0.41, 0.1 mA cm^{-3}	[4]
$NiCo_2O_4$ SSCs	KOH/PVA	0.16, 1 mA cm^{-2}	[5]
SWNT-MnO_2 SSCs	2 M Li_2SO_4	0.41	[6]

ASCs = Asymmetric Supercapacitors; SSCs = Symmetric Supercapacitors; M = mol L^{-1}; PVA = Polyvinyl Alcohol

[1] B. Pandit, D.P. Dubal, B.R. Sankapal, Electrochimica Acta, 242 (2017) 382-389.

[2] X. Long, Z.G. Zeng, E.J. Guo, X.B. Shi, H.J. Zhou, X.H. Wang, Journal of Power Sources, 325 (2016) 264-272.

[3] X. Xiao, T.P. Ding, L.Y. Yuan, Y.Q. Shen, Q. Zhong, X.H. Zhang, Y.Z. Cao, B. Hu, T. Zhai, L. Gong, J. Chen, Y.X. Tong, J. Zhou, Z.L. Wang, Advanced Energy Materials, 2 (2012) 1328-1332.

[4] Y. Huang, H. Hu, Y. Huang, M.S. Zhu, W.J. Meng, C. Liu, Z.X. Pei, C.L. Hao, Z.K. Wang, C.Y. Zhi, ACS Nano, 9 (2015) 4766-4775.

[5] Q. Wang, X. Wang, B. Liu, G. Yu, X. Hou, D. Chen, G. Shen, Journal of Materials Chemistry A, 1 (2013) 2468-2473.

[6] L.B. Hu, M. Pasta, F. La Mantia, L.F. Cui, S. Jeong, H.D. Deshazer, J.W. Choi, S.M. Han, Y. Cui, Nano Letters, 10 (2010) 708-714.