Electronic Supplementary Information

Constructing novel fiber electrodes with porous nickel yarns for all-solid-state flexible wire-shaped supercapacitors

Xuran Han[‡], Jiahao Zhu[‡], Linna Lei, Yue Wang, Tian Lan, Chaoqun Kang, Yi Li* and Yanwen Ma*

Key Laboratory for Organic Electronics and Information Displays & Jiangsu Key Laboratory for Biosensors, Institute of Advanced Materials (IAM), Jiangsu National Synergetic Innovation Center for Advanced Materials (SICAM), Nanjing University of Posts & Telecommunications, 9 Wenyuan Road, Nanjing 210023, China.

*Corresponding Author

E-mail: iamywma@njupt.edu.cn； iamyli@njupt.edu.cn

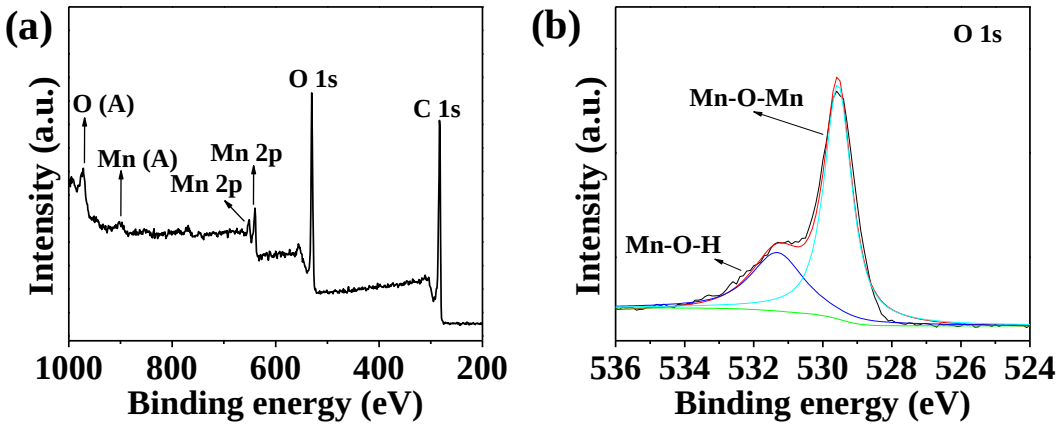

Figure S1 The survey scan and O 1s XPS spectra of MnO_2/rGO/PHNYs.

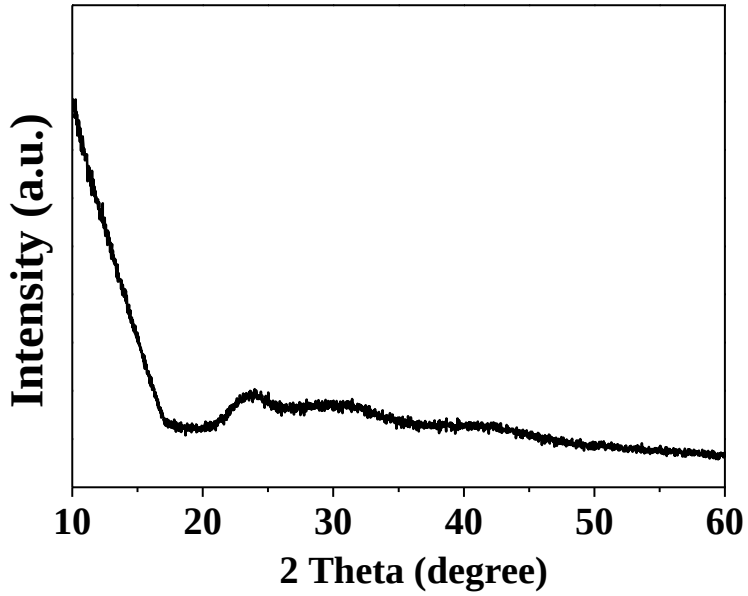

Figure S2 XRD pattern of MnO2/rGO/PNYs. Two broad peaks at 23.9 and 31.5 are observed, corresponding to the graphite (002) and (100) diffraction peak of rGO, respectively.

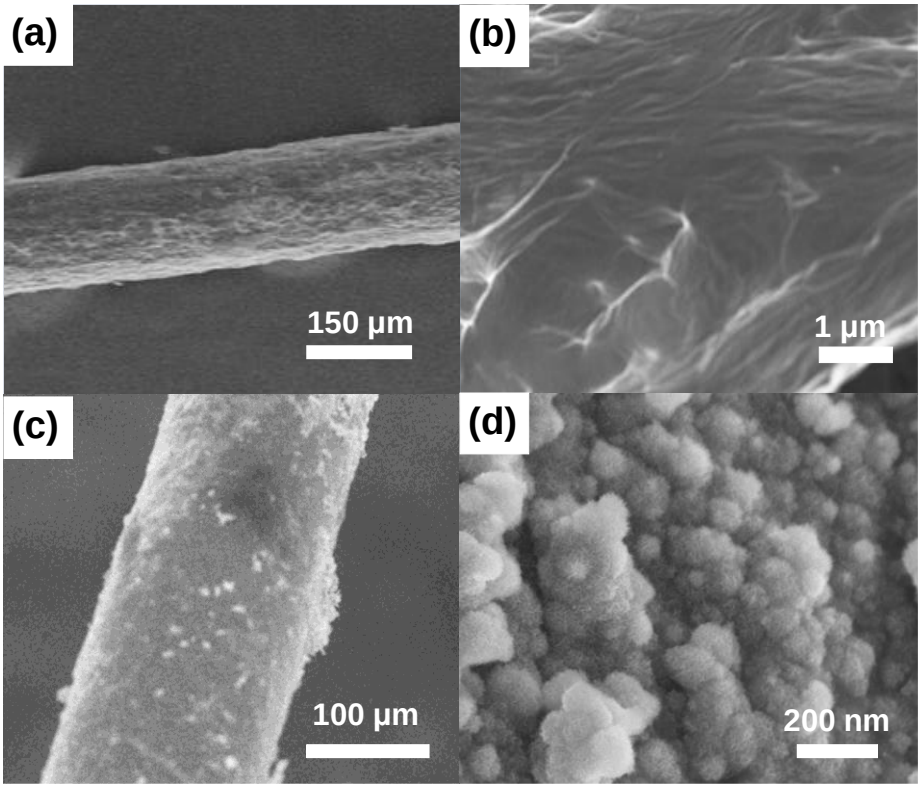

Figure S3 (a, b) Low and high resolution SEM images of rGO/Ni wire. (c, d) SEM images of MnO_2/rGO/Ni wire. The mass loading density of rGO and MnO_2 is 0.029 and 0.056 mg cm^{-1}, respectively.

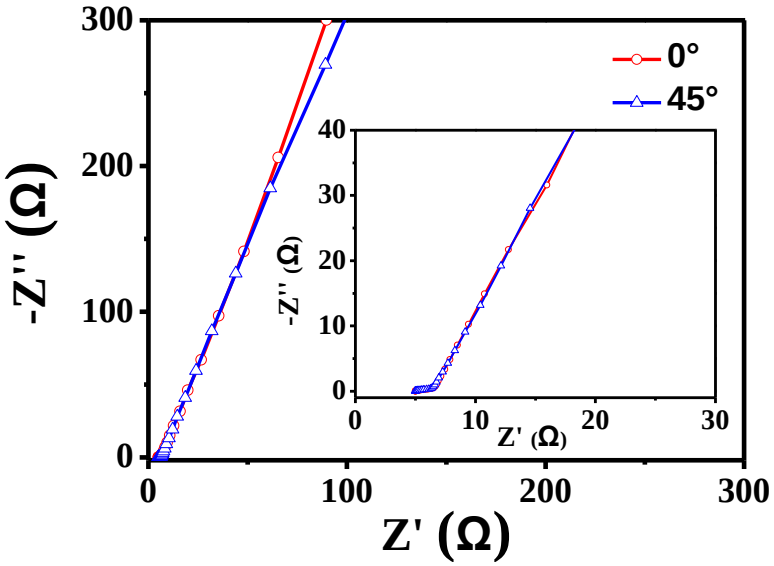

Figure S4 Nyquist plots of WSSCs based on MnO_2/rGO/PNYs electrodes under flat and bending 45° conditions.

Table. S1 Performance of two-electrode fiber-shaped supercapacitors based on MnO_2 materials

Active materials	C_V[a)]	Condition	Reference
MnO_2/MGr@Ni wire	9.8	GCD[b)] at 0.1 mA cm^{-1}	[1]
MnO_2/rGO@Ni wire	7.2	GCD at 0.1 mA cm^{-2}	[2]
MnO_2/CNT@nylon fiber	3.8	CV[c)] at 10 mV s^{-1}	[3]
MnO_2@carbon fiber	2.5	GCD at 0.02 A cm^{-3}	[4]
MnO_2/rGO@carbon fiber	13.7	GCD at 0.5 mA cm^{-2}	[5]
MnO_2/CNT hybrid fiber	74.8	GCD at 0.1 A cm^{-3}	[6]
MnO_2/CNT@CNT coated rubber fiber	0.92	CV at 10 mV s^{-1}	[7]
MnO_2/rGO@Ni coated hair	4.1	CV at 100 mV s^{-1}	[8]
MnO_2@CNT yarn	34.6	CV at 10 mV s^{-1}	[9]
MnO_2/rGO@PHNYs	36.8	GCD at 0.1 A cm^{-3}	This work

a) Volumetric capacitance; b) Galvanostatic charge–discharge test (GCD); c) Cyclic voltammograms (CV).

References

[1] M. Hu, Y. Liu, M. Zhang, H. Wei and Y. Gao, *J. Power Sources*, 2016, **335**, 113–120.

[2] J. Zhou, N. Chen, Y. Ge, H. Zhu, X. Feng, R. Liu, Y. Ma, L. Wang and W. Hou, *Sci. China Mater.*, 2018, **61**, 243–253.

[3] C. Choi, S. H. Kim, H. J. Sim, J. A. Lee, A. Y. Choi, Y. T. Kim, X. Lepro, G. M. Spinks and R. H. Baughman, S. J. Kim, *Sci. Rep.*, 2015, **5**, 9387.

[4] X. Xiao, T. Q. Li, P. H. Yang, Y. Gao, H. Y. Jin, W. J. Ni, W. H. Zhan, X. H. Zhang, Y. Z. Cao, J. W. Zhong, L. Gong, W. C. Yen, W. J. Mai, J. Chen, K. F. Huo, Y. L. Chueh, Z. L. Wang and J. Zhou, *ACS Nano*, 2012, **6**, 9200–9206.

[5] Z. Zhang, F. Xiao and S. Wang, *J. Mater. Chem. A*, 2015, **3**, 11215–11223.

[6] G. Li, P. Hou, J. Luan, J. Li, X. Li, H. Wang, C. Shi, C. Liu and H. Cheng, *Carbon*, 2018, **140**, 634–643.

[7] C. Choi, J. H. Kim, H. J. Sim, J. Di, R. H. Baughman and S. J. Kim, *Adv. Energy Mater*, 2017, **7**, 1602021–1602027.

[8] W. Liu, K. Feng, Y. Zhang, T. Yu, L. Han, G. Lui, M. Li, G. Chiu, P. Fung and A. Yu, *Nano Energy*, 2017, **34**, 491–499.

[9] C. Choi, H. J. Sim, G. M. Spinks, X. Lepró, R. H. Baughman and S. J. Kim, *Adv.*

Energy Mater., 2016, **6**, 1502119–1502126.