Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

Supporting Information

High performance fiber-shaped PEDOT@MnO_2//C@Fe_3O_4 asymmetric supercapacitor for wearable electronics

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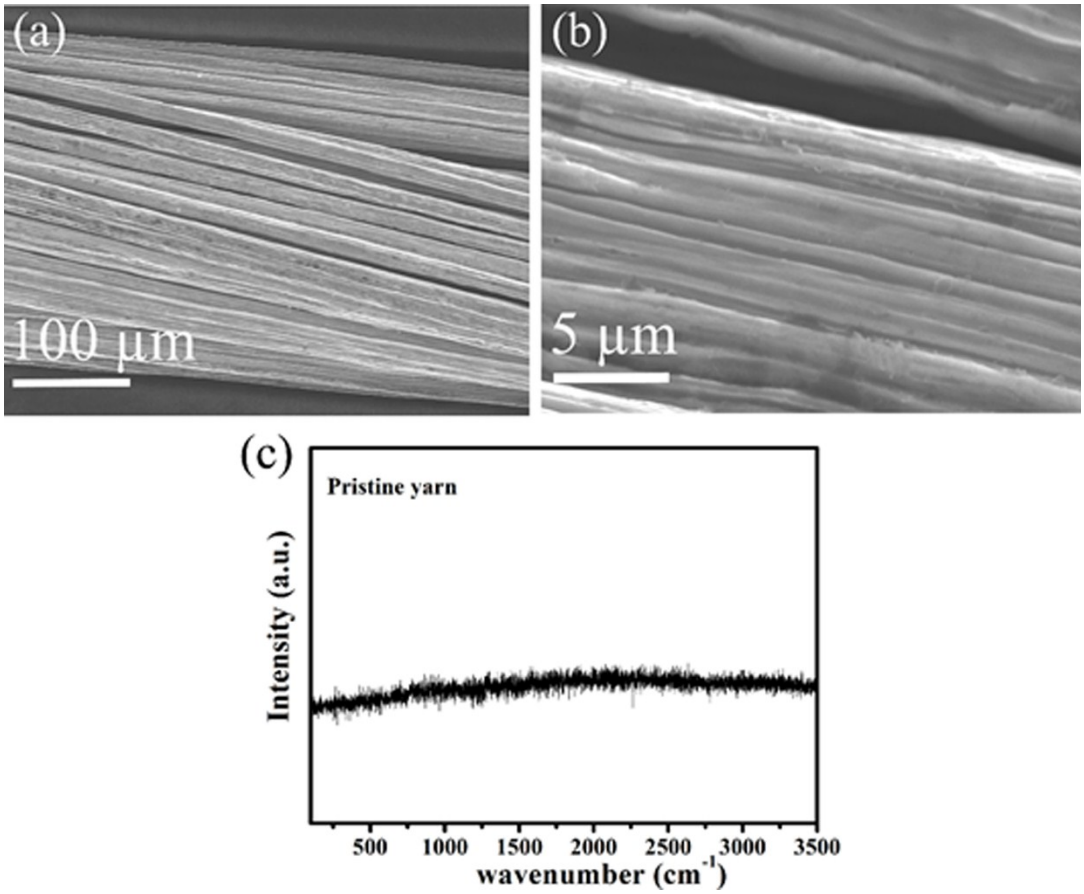

Figure S1 (a) and (b) SEM images of the pristine yarn. (c) Raman spectra of the pristine yarn.

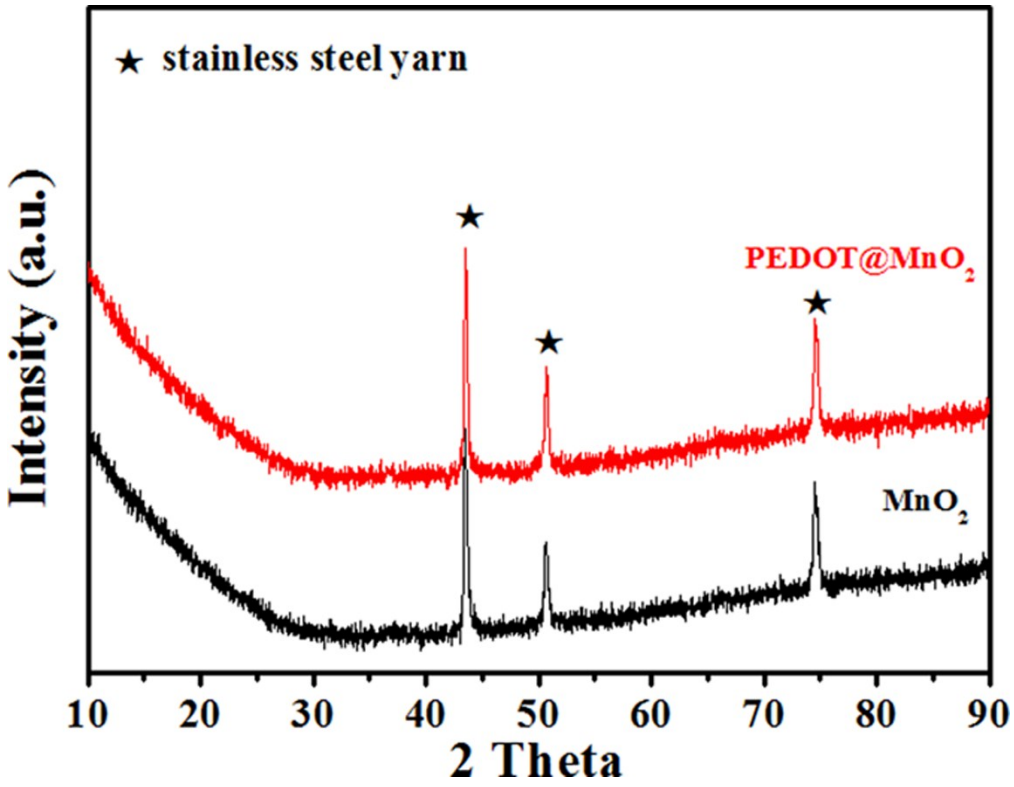

Figure S2 XRD patterns of MnO_2 and PEDOT@MnO_2.

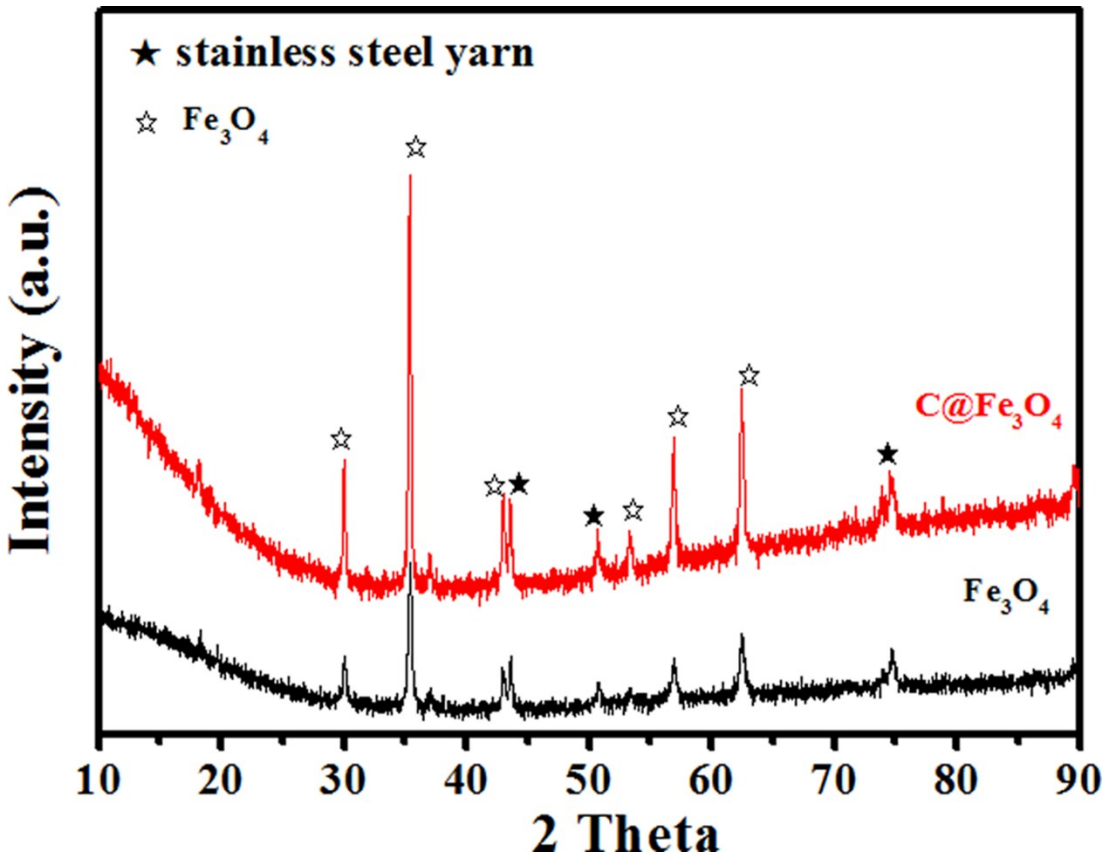

Figure S3 XRD patterns of Fe_3O_4 and C@Fe_3O_4.

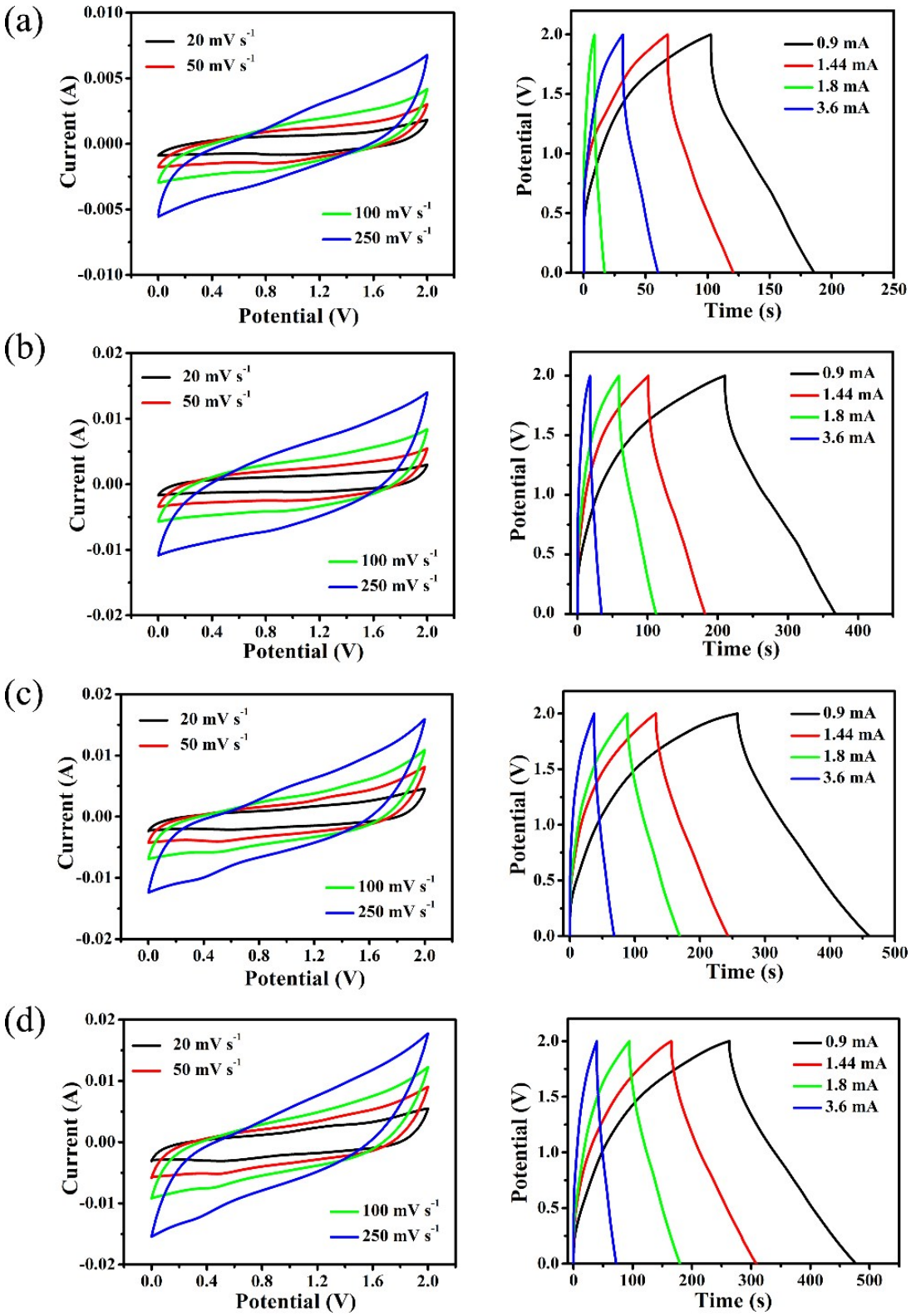
(a)
Current (A)
Potential (V)
20 mV s-1
50 mV s-1
100 mV s-1
250 mV s-1
Potential (V)
Time (s)
0.9 mA
1.44 mA
1.8 mA
3.6 mA
(b)
(c)
(d)

Figure S4 CV and GCD curves of the fiber-shaped asymmetric supercapacitors with different negative/positive (1.27 mg) mass ratios. (a) 0.57, (b) 0.88, (c) 1.52, and (d) 1.87.

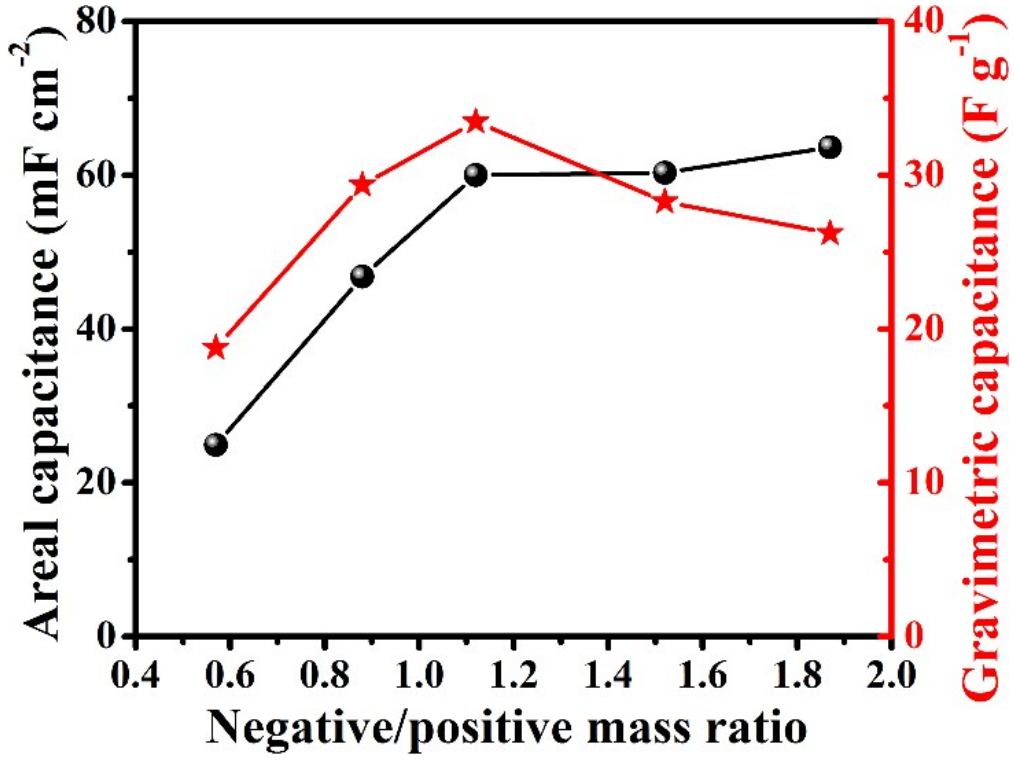

Figure S5 The corresponding areal and gravimetric capacitances of the fiber-shaped ASCs calculated from GCD curves at 0.9 mA as a function of negative/positive mass ratio.

According to the charge-balance equation: q-=q+, the theoretical optimal mass ratio between the positive and negative electrode should be m_n/m_p=1.4:1. In order to determine the optimal m_n/m_p mass ratio, ASCs were fabricated by using different negative/positive mass ratios, 0.57, 0.88, 1.12, 1.52 and 1.87. Corresponding capacitances of 24.9, 46.8, 60, 60.3 and 63.6 mF cm^{-2} (18.77, 29.37, 33.46, 28.27 and 26.21 F g^{-1}) were obtained. It was clearly that the areal and gravimetric capacitance value of ASCs increase rapidly as the negative/positive mass ratio increases up to 1.12. Further increasing the as the negative/positive mass ratio, the areal capacitance values of ASCs increase slightly, but the

gravimetric capacitance decrease. The optimal negative/positive mass ratio (1.12) from experimental results is slightly less than the theoretical value of 1.4. This result is similar to previous reported works which suggested that the maximum electrochemical value for ASCs was obtained at a low positive/negative mass ratio (less than the q balance value) [1-4].

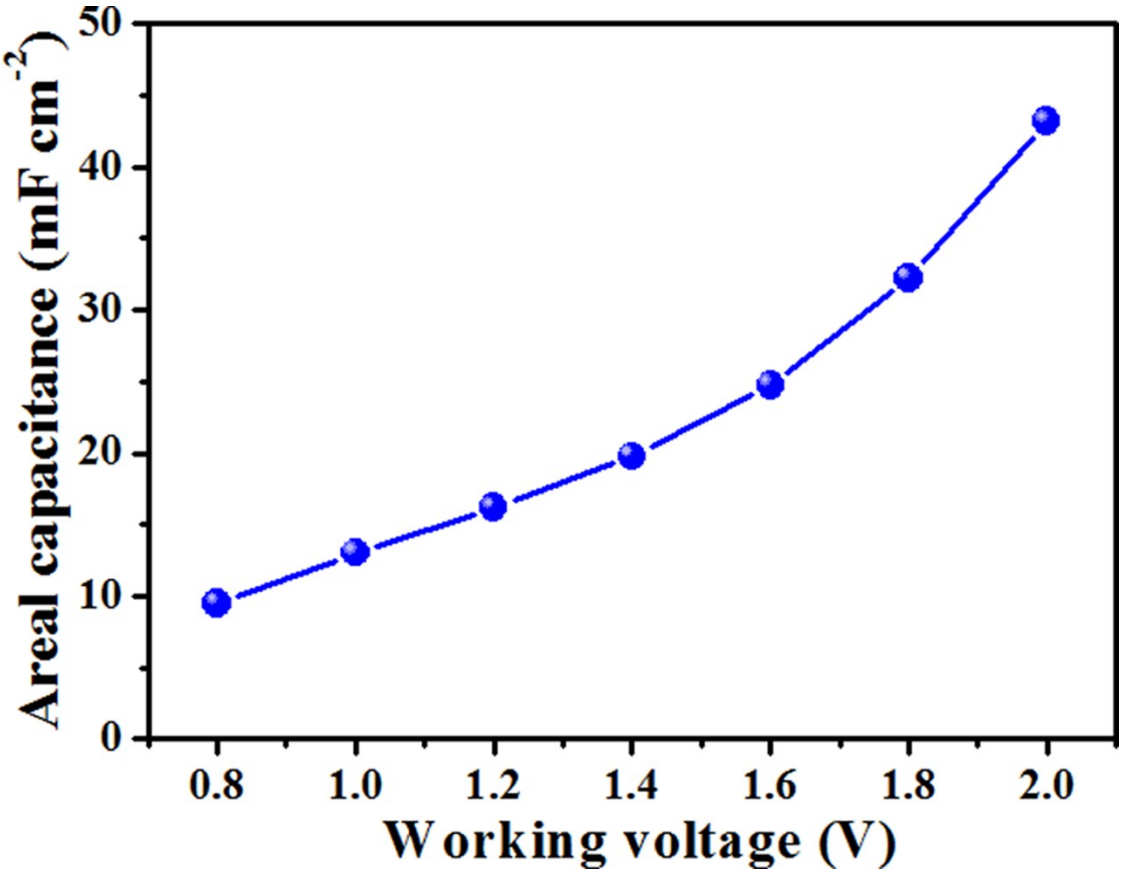

Figure S6 Specific capacitance of the fabricated ASC as a function of voltage window.

References

1. R. Wang, X. Yan, J. Lang, Z. Zheng, P. Zhang, J. Mater. Chem. A, 2014, 2, 12724-12732.
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4. 39 G. A. Snook, G. J.Wilson and A. G. Pandolfo, J. Power Sources, 2009, 186, 216-223.