

Electronic Supplementary Information

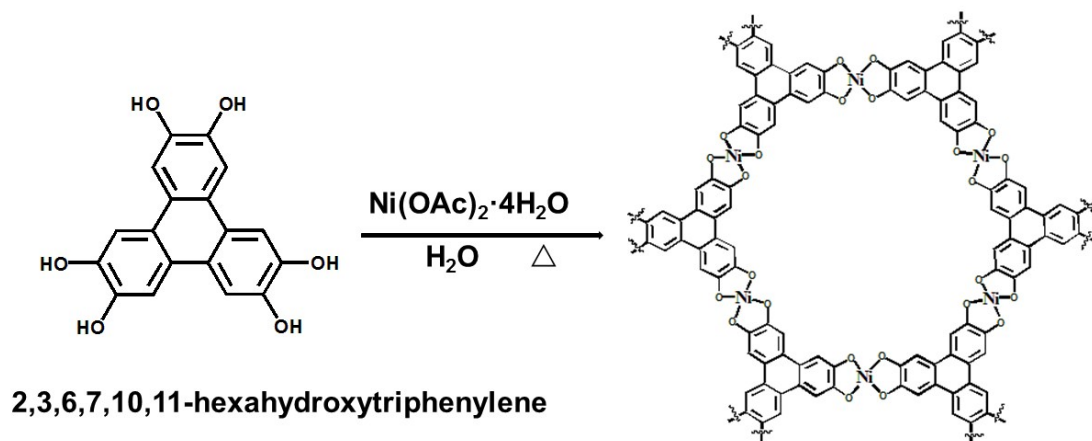
Core-shell assembly of carbon nanofiber and 2D conductive metal-organic framework as flexible free-standing membrane for high-performance supercapacitor

Shihang Zhao,^a Huihui Wu,^b Yanli Li,^a Qin Li,^a Jiaojiao Zhou,^a Xianbo Yu,^a Hongmei Chen,^a Kai Tao,^a and Lei Han^{a,c,*}

^aSchool of Materials Science & Chemical Engineering, Ningbo University, Ningbo, Zhejiang 315211, China. E-mail: hanlei@nbu.edu.cn (L. Han).

^bPan Tianshou Arts and Design Academy, Ningbo University, Ningbo, Zhejiang 315211, China

^cKey Laboratory of Photoelectric Materials and Devices of Zhejiang Province, Ningbo University, Ningbo, Zhejiang 315211, China



Scheme S1 General reaction scheme for the synthesis of Ni-CAT.

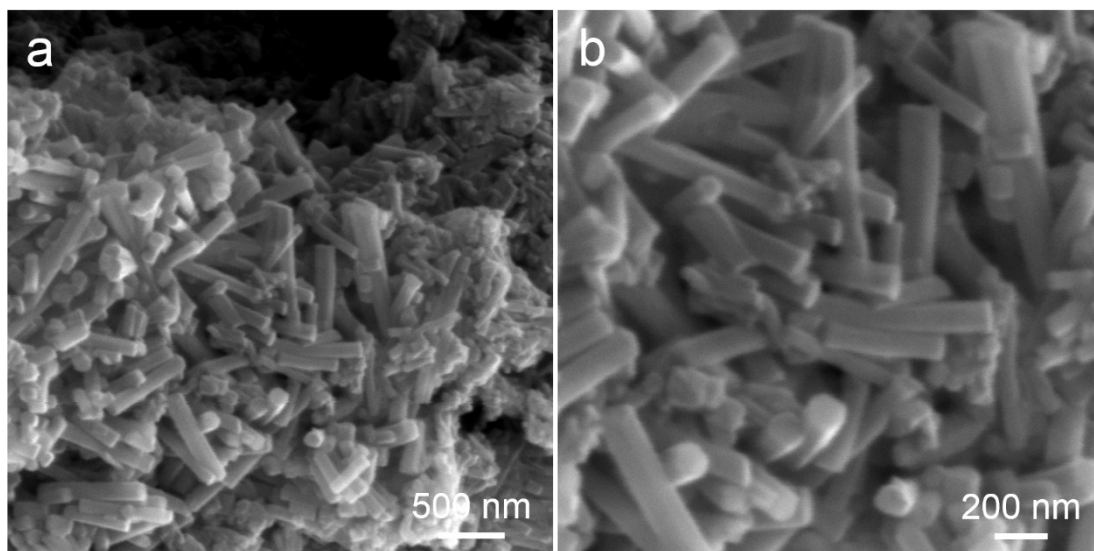


Fig. S1 SEM images of pure Ni-CAT.

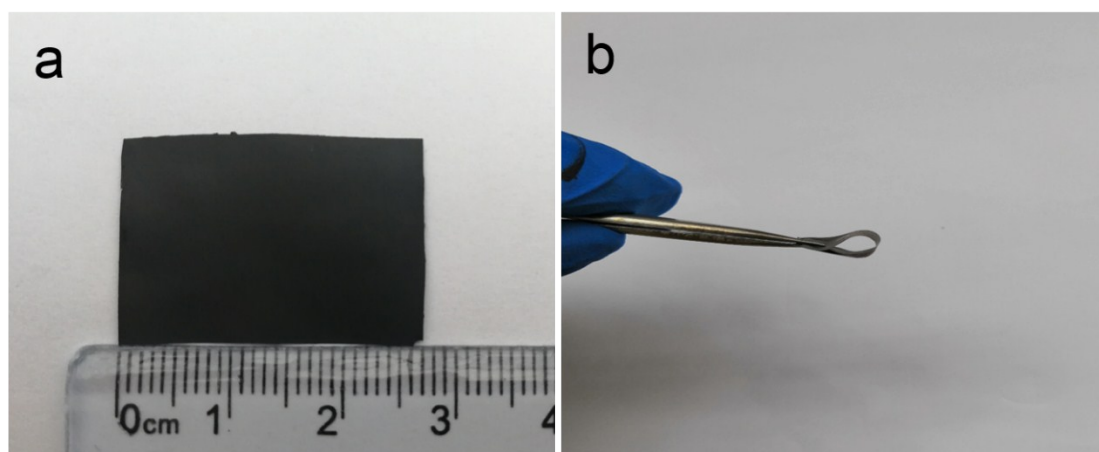


Fig. S2 Representative photographs showing the highly flexible CNF@Ni-CAT membranes.

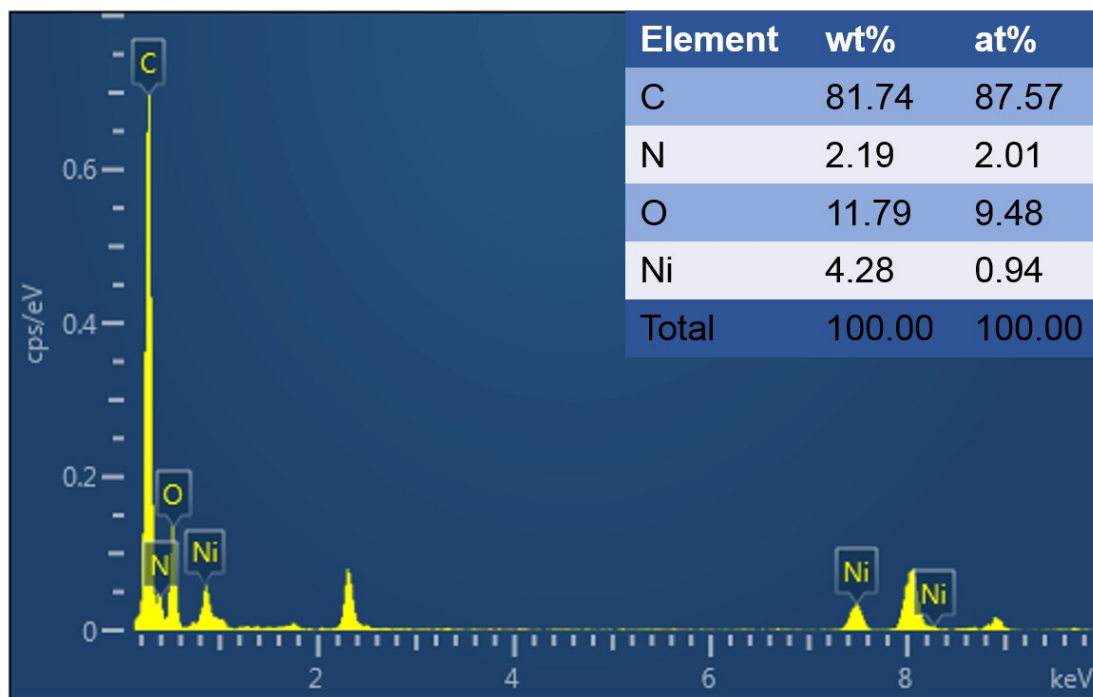


Fig. S3 EDX image of CNF@Ni-CAT.

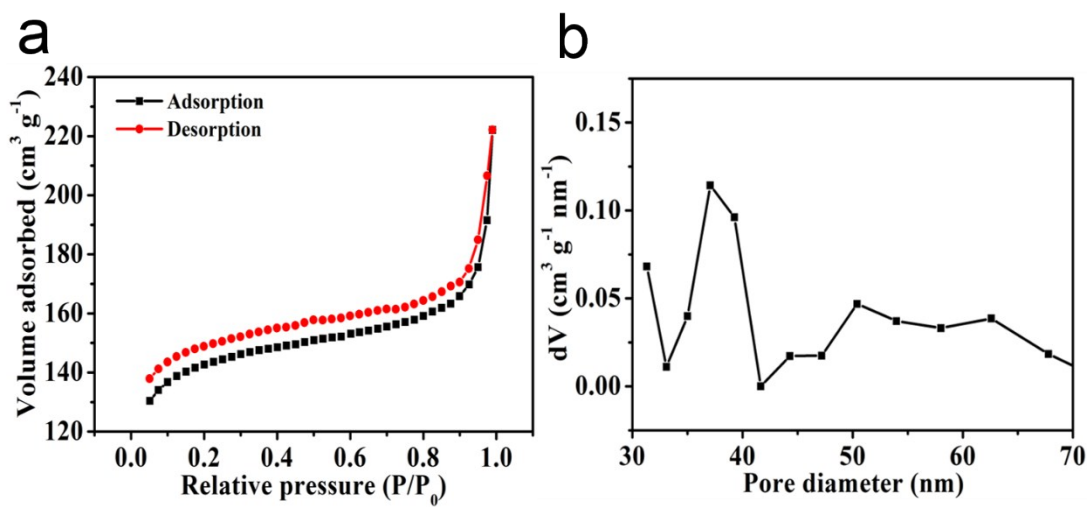


Fig. S4 (a) N₂ adsorption-desorption isotherms and (b) BJH pore size distribution curve of

CNF@Ni-CAT.

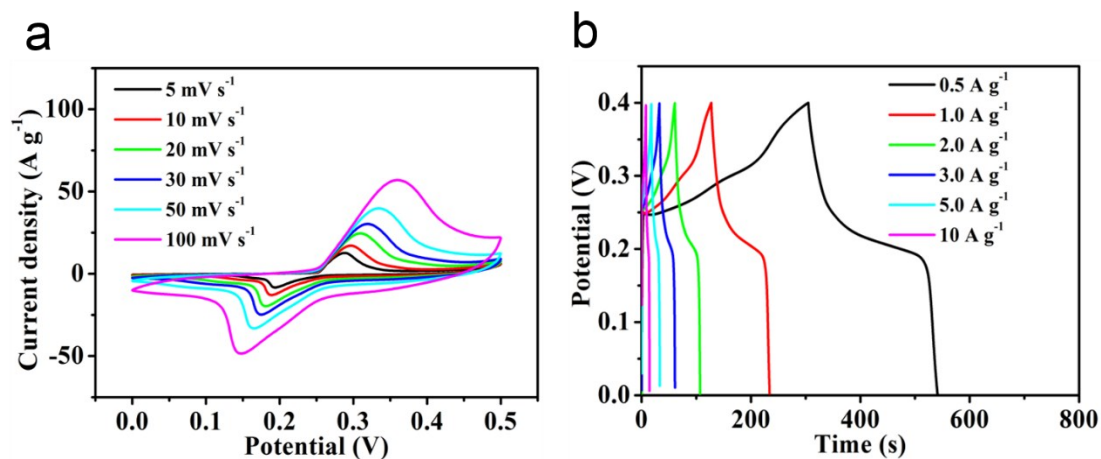


Fig. S5 Electrochemical performance of the Ni-CAT: (a) CV curves at different scan rates. (b) GCD curves at different current densities.

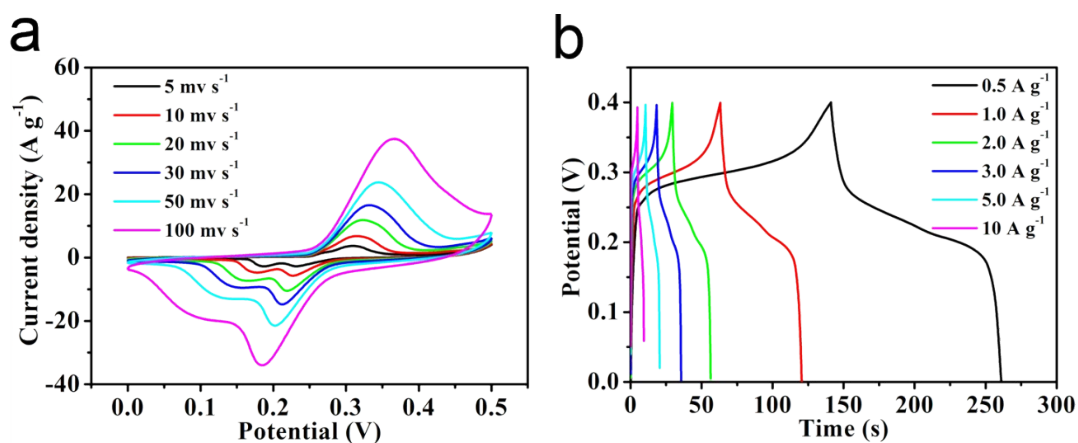


Fig. S6 Electrochemical performance of the CNFs: (a) CV curves at different scan rates. (b) GCD curves at different current densities.

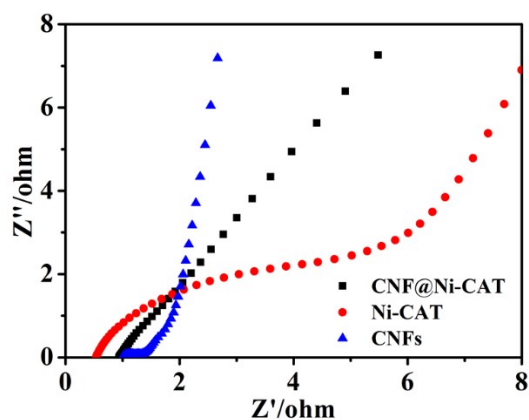


Fig. S7 Nyquist plots of CNFs, Ni-CAT and CNF@Ni-CAT.

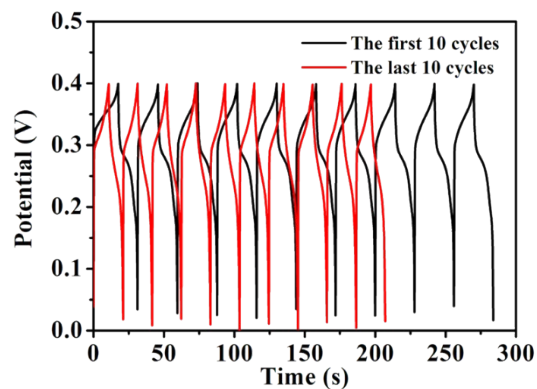


Fig. S8 The first and the last 10 GCD cycles recorded of CNF@Ni-CAT.

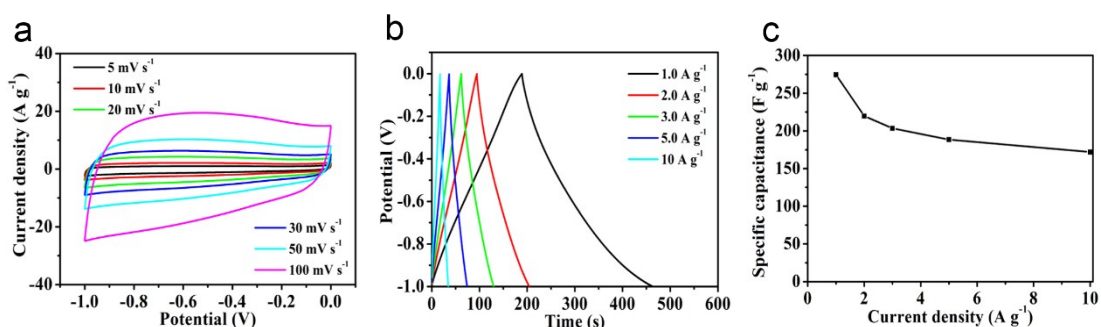


Fig. S9 Electrochemical performance of the AC: (a) CV curves at different scan rates. (b) GCD curves at different current densities. (c) Specific capacitance at different current densities.

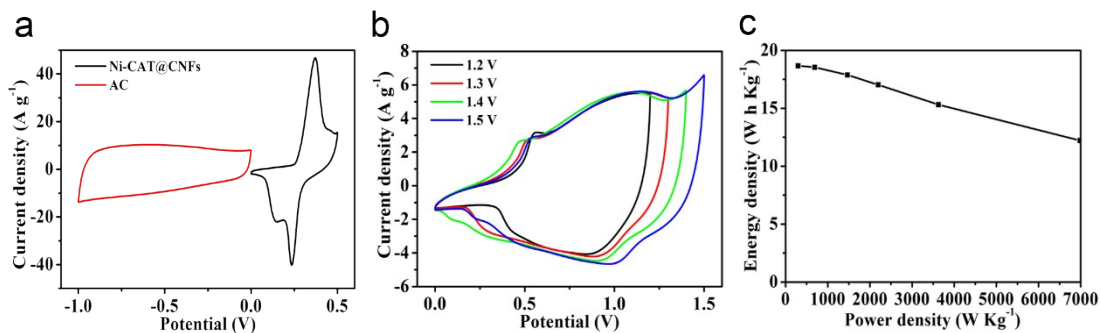


Fig. S10 (a) CV curves of CNF@Ni-CAT and AS electrode obtained in three-electrode system at a scan rate of 50 mV s^{-1} . (b) CV curves with different voltage windows at a scan rate of 50 mV s^{-1} . (c) Ragone plots of the ASC.

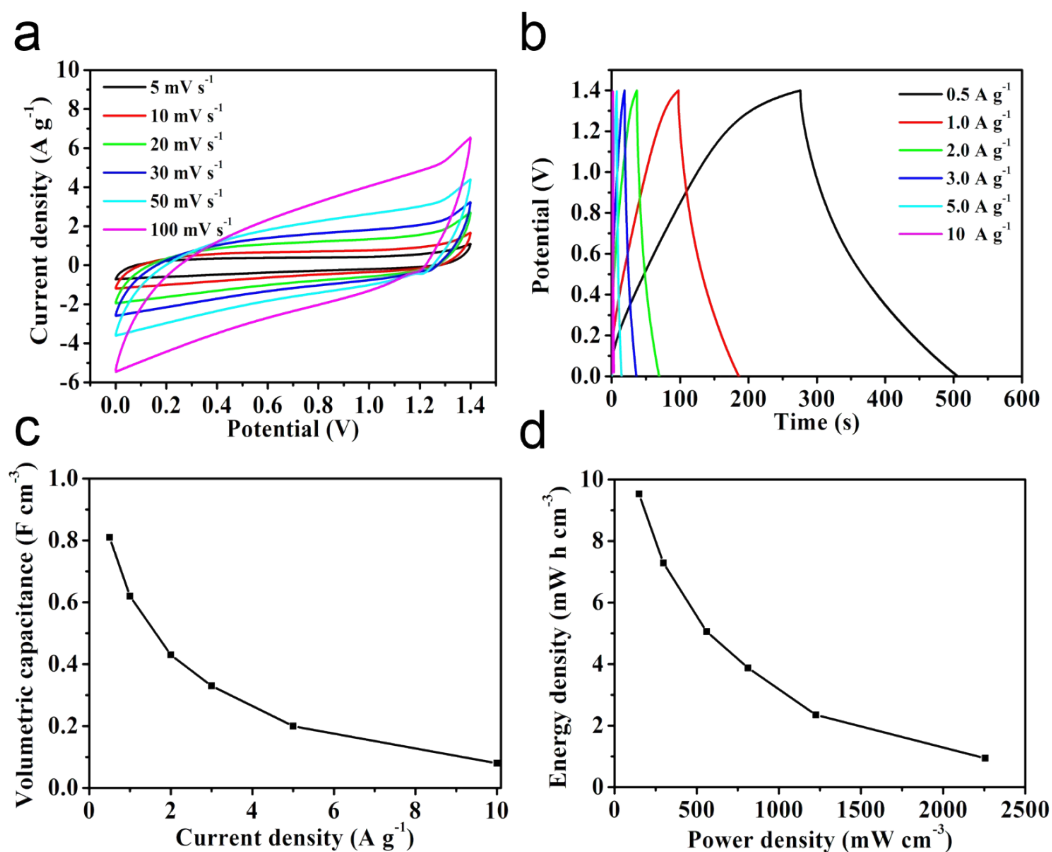


Fig. S11 Electrochemical performance of all-solid-state ASC device of CNF@Ni-CAT//AC: (a) CV curves at different scan rates. (b) GCD curves at different current densities. (c) Volumetric capacitance at different current densities. (d) Ragone plots of the ASC device.

Table S1 Electrochemical performance comparison of CNF@Ni-CAT with related materials previously reported in supercapacitors.

Materials	Electrochemical performance (F g ⁻¹)	Current density (A g ⁻¹)	Cycle retention rate/Cycle numbers	Ref.
CNF@Ni-CAT	413.5	0.5	73%/5000	This work
Ni ₃ (HITP) ₂	107	0.05	90%/10000	34
Cu-CAT NWAs	202	0.5	80%/5000	35
Ni-CAT/NiCo-LDH/NF	1877	1	80%/1000	S1
CNFs/MnOx/RGO	174	0.2	91%/500	S2
CNFs/MnO ₂	292	2.5	76%/3500	S3
CNFs/NiO	288	0.3	89%/3000	S4

References

- S1. L. Y. Li, J. J. Zhou, M. K. Wu, C. Chen, K. Tao, F. Y. Yi and L. Han, *Inorg. Chem*, 2018, **57**, 6202–6205.
- S2. S. Kwon, T. Kim, J. S. Lee, S. J. Park, H. W. Park, M. Kang, J. E. Lee, J. Jang, and H. Yoon, *Small*, 2013, **9**, 248.
- S3. L. Zhao, J. Yu, W. J. Li, S. G. Wang, C. L. Dai, J. W. Wu, X. D. Bai and C. Y. Zhi, *Nano Energy*, 2014, **4**, 39.
- S4. D. H. Shin, J. S. Lee, J. Jun and J. Jang, *J. Mater. Chem. A*, 2014, **2**, 3364.