Supporting Information

Hierarchical TiN Nanoparticles Assembled Nanopillars for Flexible Supercapacitors with High Volumetric Capacitance

Ping Qin,[a†] Xingxing Li,[a†] Biao Gao,[a*] Jijiang Fu,[a] Lu Xia,[a] Xuming Zhang,[a*] Kaifu Huo,[b] Wenli Shen[c] and Paul K. Chu[d]

[a] The State Key Laboratory of Refractories and Metallurgy, Institute of Advanced Materials and Nanotechnology, Wuhan University of Science and Technology, Wuhan 430081, China.

[b] Wuhan National Laboratory for Optoelectronics (WNLO), School of Optical and Electronic Information Huazhong University of Science and Technology Wuhan 430074, China.

[c] Department of Physics, Arizona state University, Tempe 85281, USA.

[d] Department of Physics and Department of Materials Science and Engineering, City University of Hong Kong, Tat Chee Avenue, Kowloon, Hong Kong, China.

* Corresponding author:

E-mail: gaobiao@wust.edu.cn (B. Gao); xumzhang@wust.edu.cn (X. Zhang)

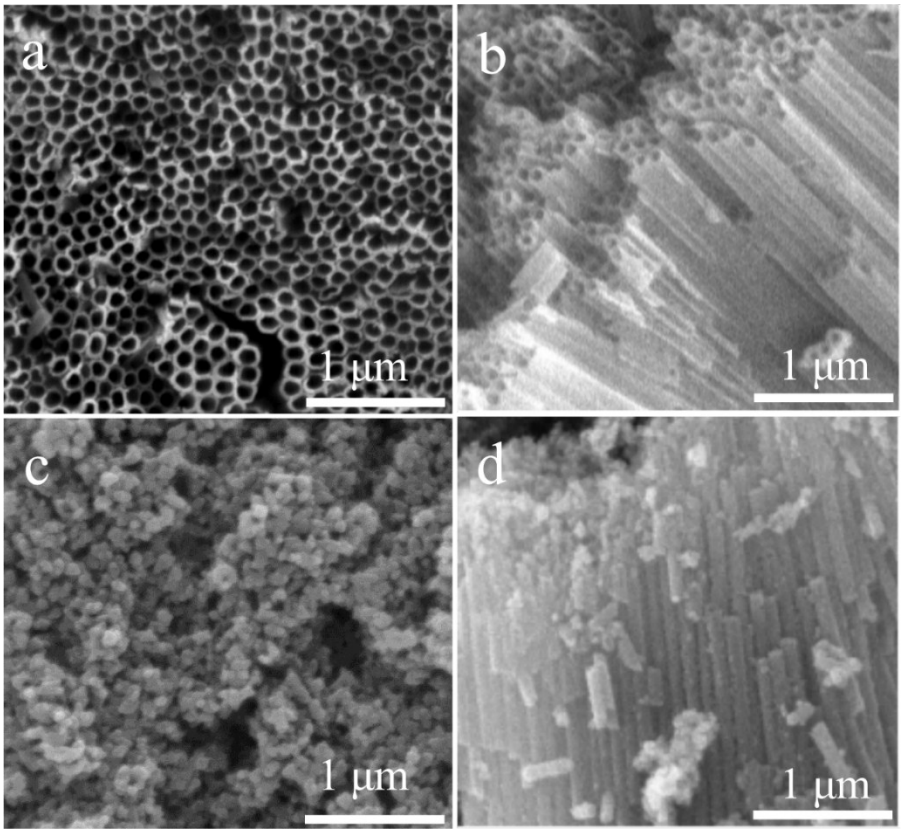

Fig. S1. (a) Top-view and (b) side-view SEM images of the TiO_2 NTs; (c) Top-view and (d) side-view SEM images of the H-TiO_2 NPs.

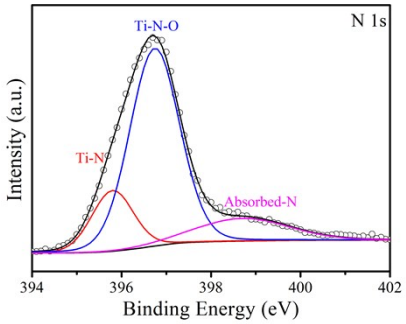

Fig. S2. XPS spectra of N 1s of the H-TiN NPs.

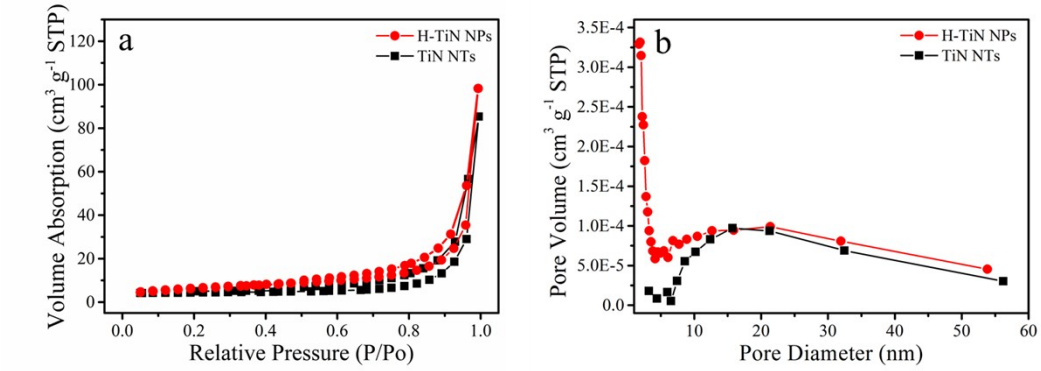

Fig. S3. (a) N_2 adsorption-desorption isotherms and (b) the pore size distribution of the H-TiN NPs and TiN NTs.

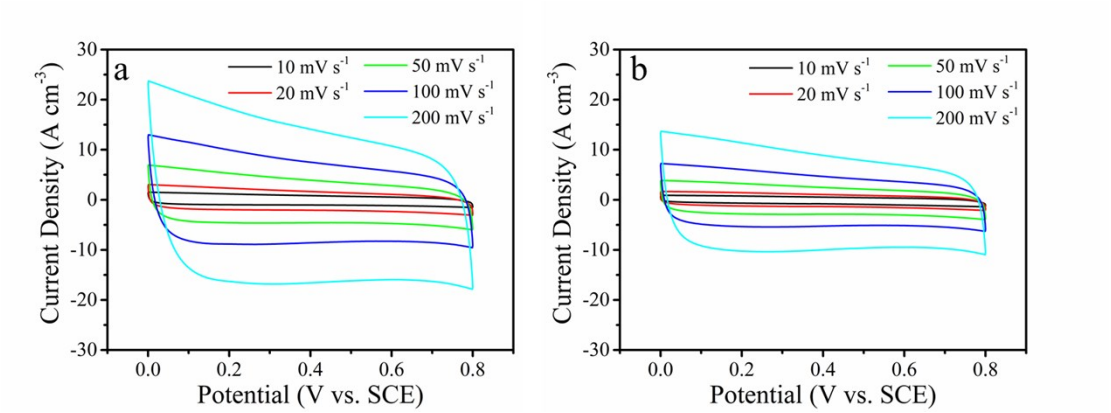

Fig. S4. CV curves of (a) H-TiN NPs and (b) TiN NTs at different scanning rates from 10 to 200 mV s^{-1}.

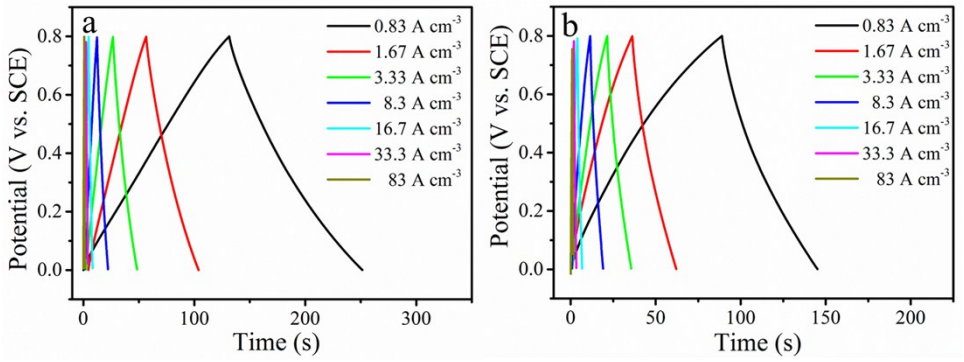

Fig. S5. GCD curves of the (a) H-TiN NPs and (b) TiN NTs at different current densities from 0.83 to 83 A cm^{-3} in 1 M H_2SO_4.

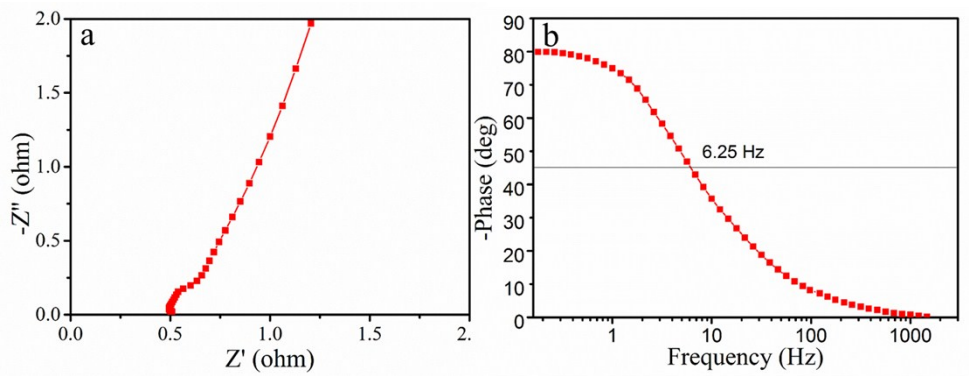

Fig. S6. (a) The electrochemical impedance spectroscopy and (b) the characteristic frequency for a phase angle marks at -45^{o} point of the H-TiN NPs.

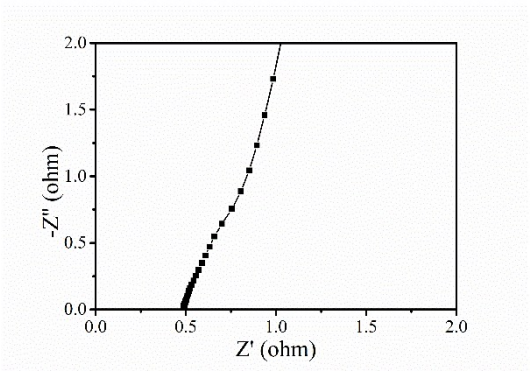

Fig. S7. The electrochemical impedance spectroscopy of the TiN NTs.

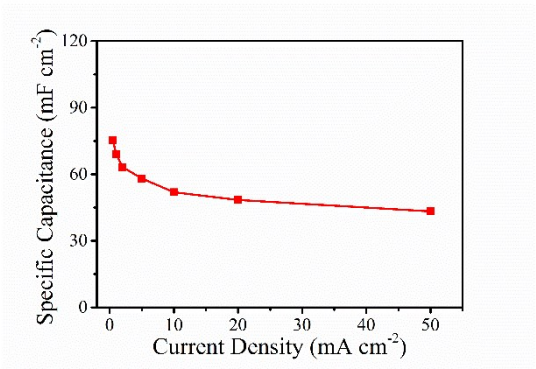

Fig. S8. The areal specific capacitances of H-TiN NPs at different current densities.

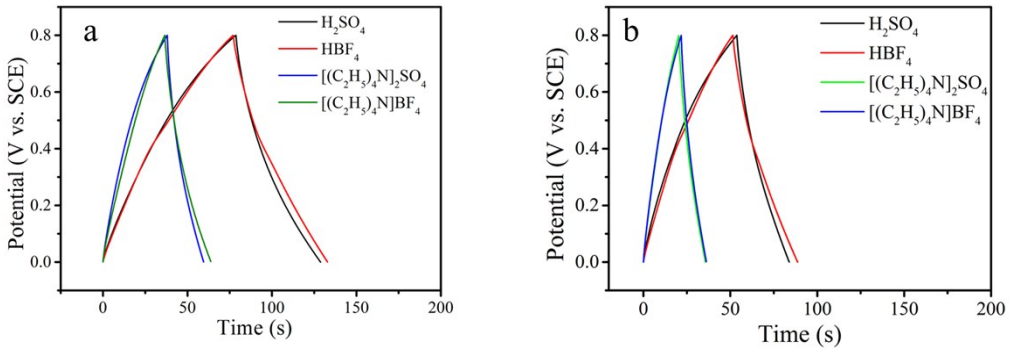

Fig. S9. GCD curves of (a) H-TiN NPs and (b) TiN NTs at a current density of 0.83 A cm^{-3} in 0.1 M H_2SO_4, 0.1 M HBF_4, 0.1 M $[(C_2H_5)_4N]_2SO_4$ and 0.1 M $[(C_2H_5)_4N]BF_4$.

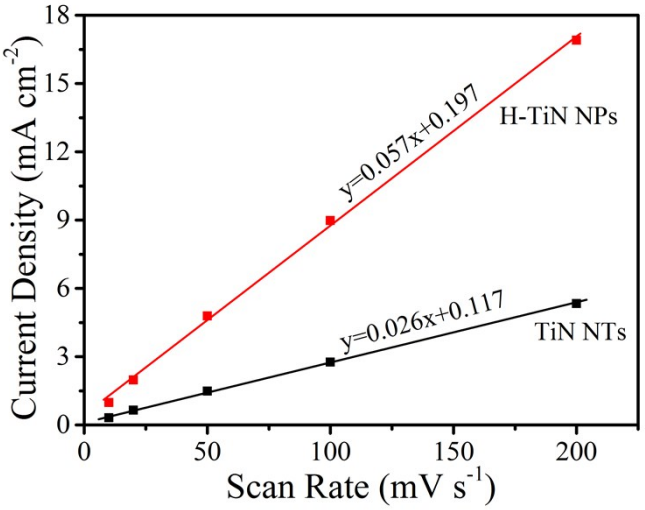

Fig. S10. The relationship of scan rate and current density of H-TiN NPs and TiN NTs collecting from CV curves at a potential of 0.4 V. The slope value represents the effective active surface area.

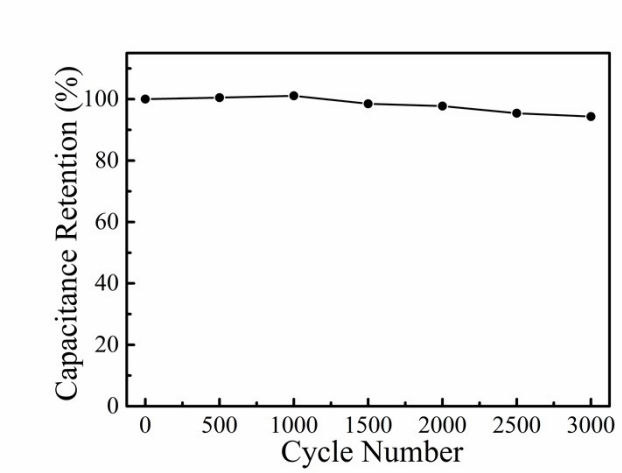

Fig. S11. Cycling stability of the H-TiN NPs electrode measured by CV at a scanning rate of 200 mV s^{-1}.