Electronic Supplementary Material (ESI) for Sustainable Energy & Fuels.

Supporting information

Dual Functional $Ti_3C_2T_x$ MXene for Wastewater Treatment and Electrochemical Energy Storage

Xingxing Zhu[a], Xinhua Huang[a, d,*], Ruikun Zhao[b], Kin Liao[c], Vincent Chan[d,*]

[a]School of Materials Science and Engineering, Anhui University of Science and Technology, Huainan, Anhui, 232001, P. R. China.

Email: xhhuang@aust.edu.cn

[b]College of Arts and Sciences, Khalifa University of Science and Technology，PO Box 127788, Abu Dhabi, UAE.

[c]Department of Aerospace Engineering*, Khalifa University of Science and Technology*,

PO Box 127788, Abu Dhabi, UAE.

[d]Department of Biomedical Engineering*, Khalifa University of Science and Technology*,

PO Box 127788, Abu Dhabi, UAE.

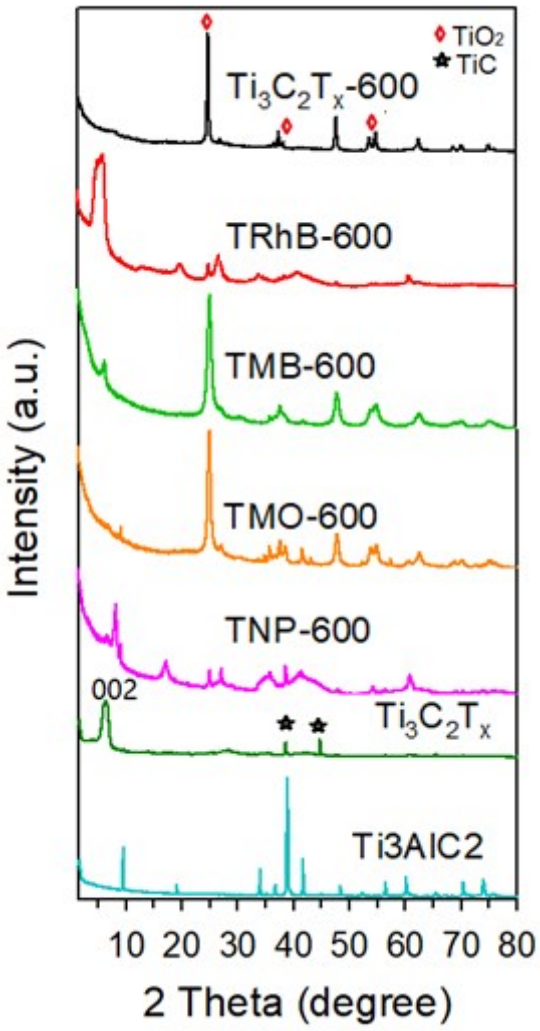

Figure S1. The full XRD spectrum of all samples.

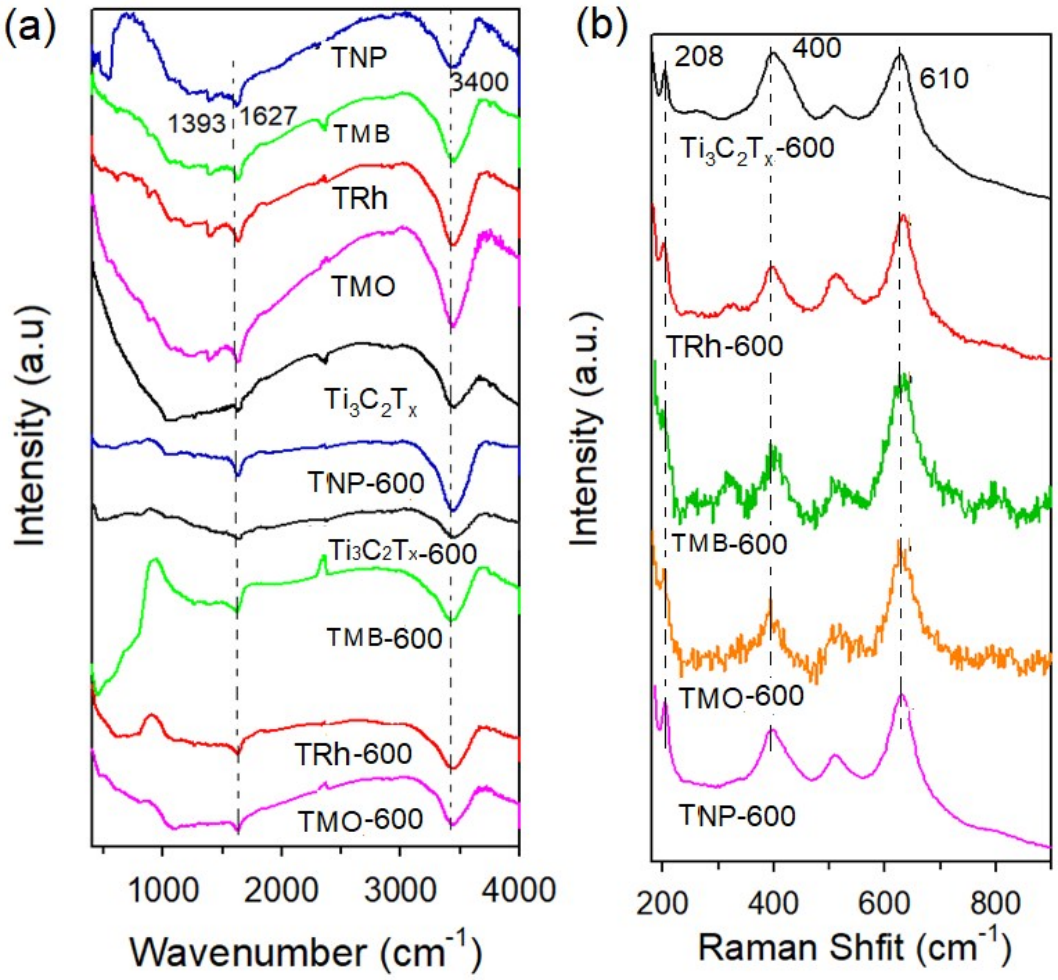

Figure S2 (a) IR transmission spectra of all samples at room temperature in KBr wafer. (b) Raman spectra of TC-600, TMO-600, TMB-600, TR-600, and Ti3C2Tx-600.

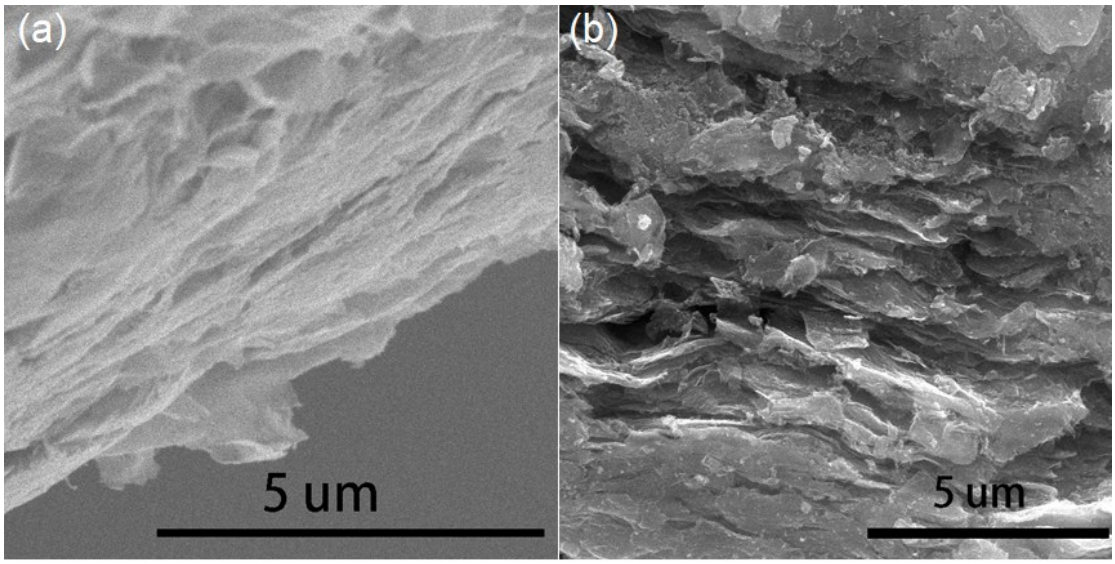

Figure S3 SEM images of purity $Ti_3C_2T_x$ (a) and (b) $Ti_3C_2T_x$ treated by RhB.

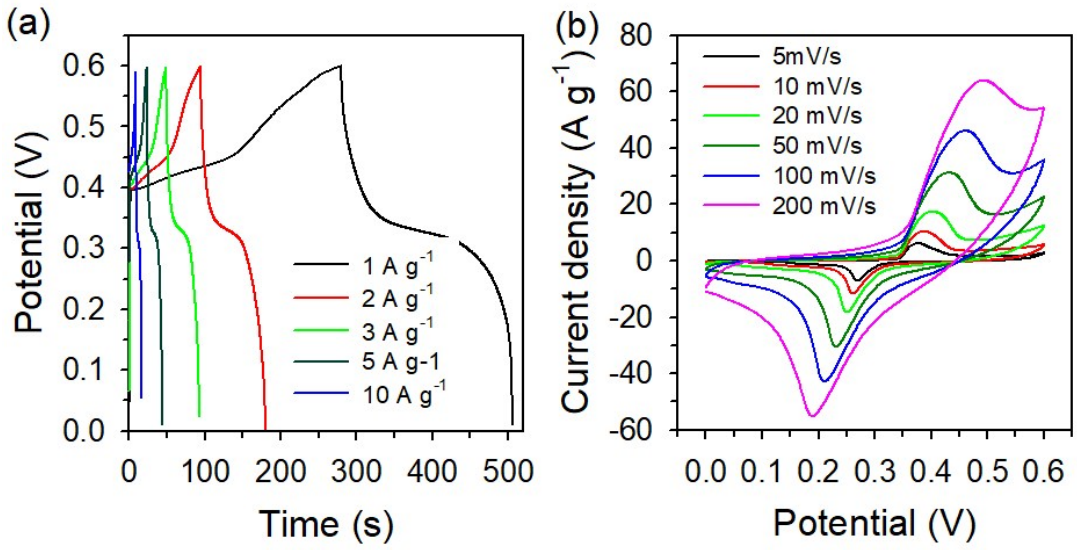

Figure S4 Three electrode (a) GCD curves of the TRhB-600 electrode at current densities of 1, 2,3, 5 and 10 A g^{-1}, respectively. (b) CV curves of the TRhB-600 electrode at scan rates of 5, 10, 20,50, 100 and 200 mV s^{-1}.

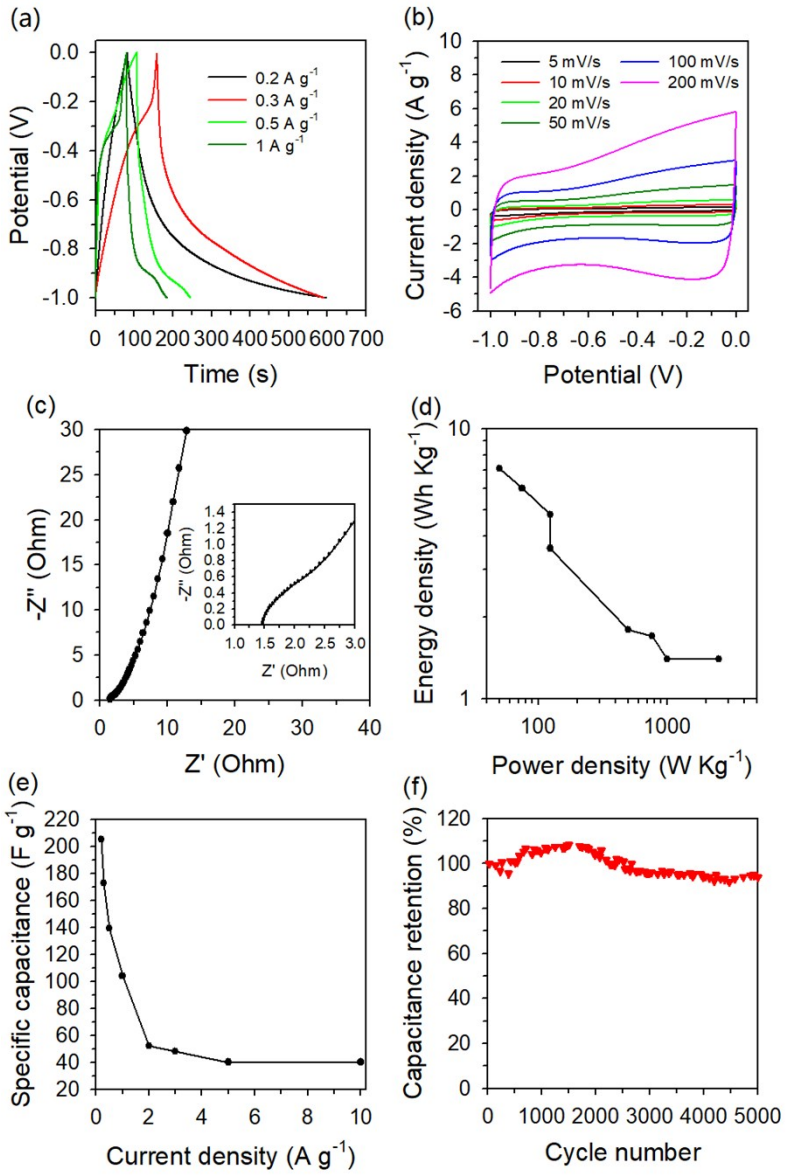

Figure S5 6 M KOH as electrolyte in two-electrode system (a) GCD curves of TRhB-600 electrode at various current density; (b) CV curves of TRhB-600 electrode at various scanning rates; (c) EIS for TRhB-600 electrode; (d) Ragone plot of TRhB-600 electrode; (e) Rate performance of TRhB-600 electrode as a function of scan rate; and (f) cycling stability of TRhB-600 at 3 A g^{-1} over 8000 cycles.

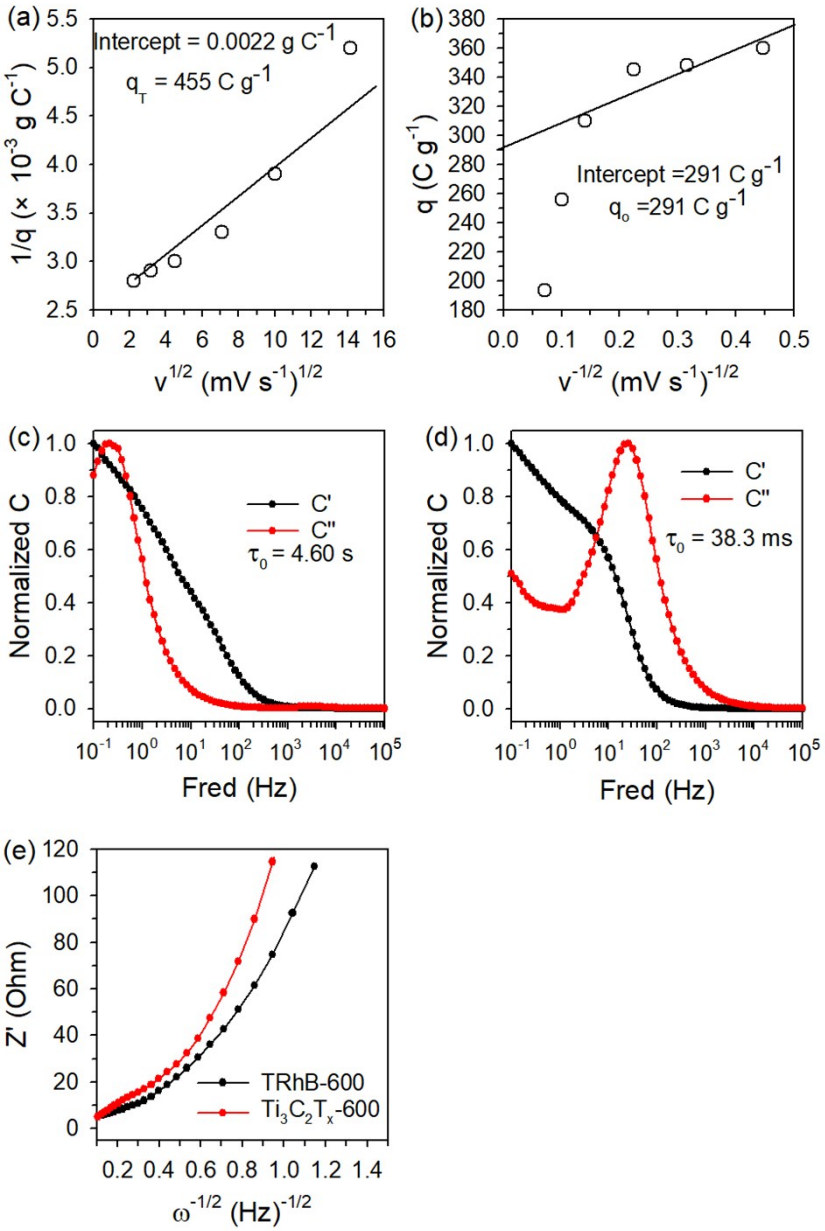

Figure S6 (a) TRhB-600 inverse of stored charge (q) versus square root of the scan rate (v). (b) TRhB-600 stored charge versus inverse of the square root of the scan rate. (c) Normalized real and imaginary capacitances of $Ti_3C_2T_x$-600 electrode. (d) Normalized real and imaginary capacitances of TRhB-600 electrode. (e) Linear fit showing the relationship between Z′ and ω −1/2 in the low-frequency region of $Ti_3C_2T_x$-600 and TRhB-600.