Electronic Supplementary Material (ESI) for Nanoscale.

Supporting Information

Rationally designing $S/Ti_3C_2T_x$ as cathode material with an interlayer for high-rate and long-cycle lithium-sulfur batteries

Q. Jin,[a] N. Zhang,[b] C.C. Zhu,[a] H. Gao,[a] X.T. Zhang*,[a]

[a] *Key Laboratory for Photonic and Electronic Bandgap Materials, Ministry of Education, School of Physics and Electronic Engineering, Harbin Normal University, Harbin 150025, People's Republic of China.*

[b] *Department of Chemistry and Chemical Biology, Cornell University, Ithaca, NY.*

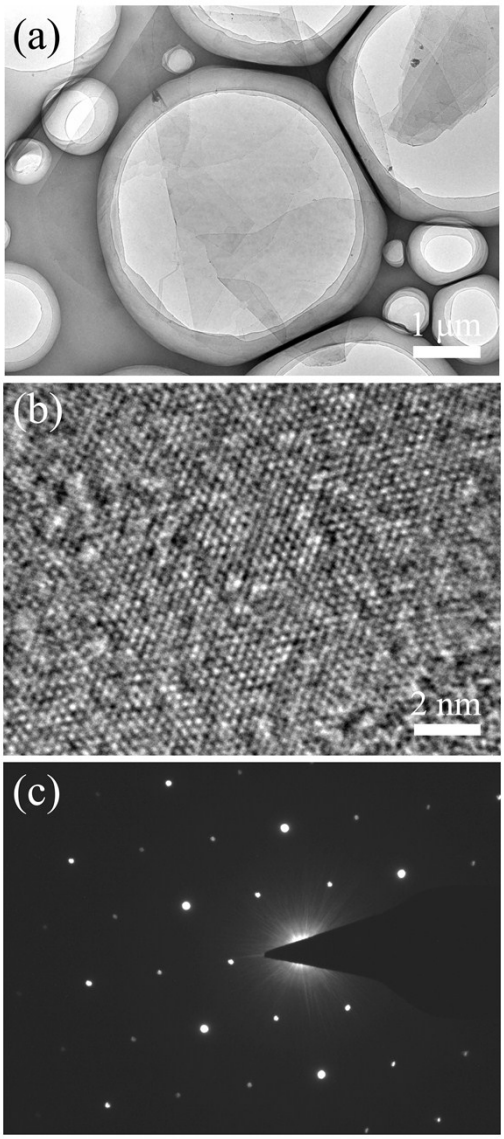

Fig.S1 (a)TEM image take from the as-synthesized $Ti_3C_2T_x$ nanoflake. (b) HRTEM image of a $Ti_3C_2T_x$ nanoflake. (c) SAED pattern of the $Ti_3C_2T_x$ nanoflake.

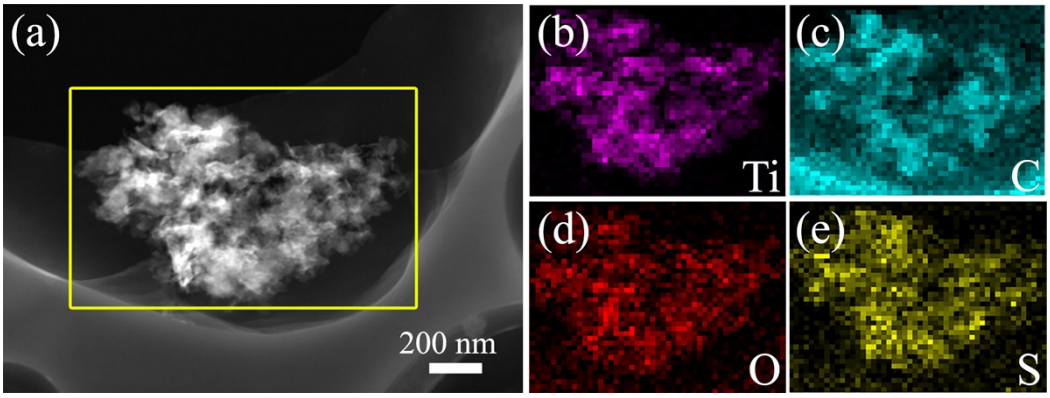

Fig. S2 (a) TEM image of a S/$Ti_3C_2T_x$ nanoflake composite, and (b-e) the corresponding elemental mapping images of Ti, C, O, and S, respectively.

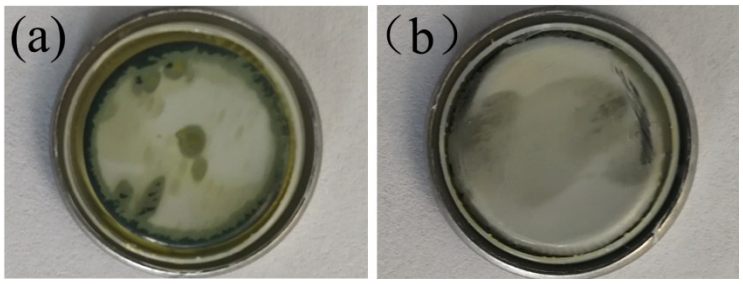

Fig. S3 Digital photos of the separator surfaces closing to the anode for (a) the S/$Ti_3C_2T_x$ and (b) the S/$Ti_3C_2T_x$-I cells.

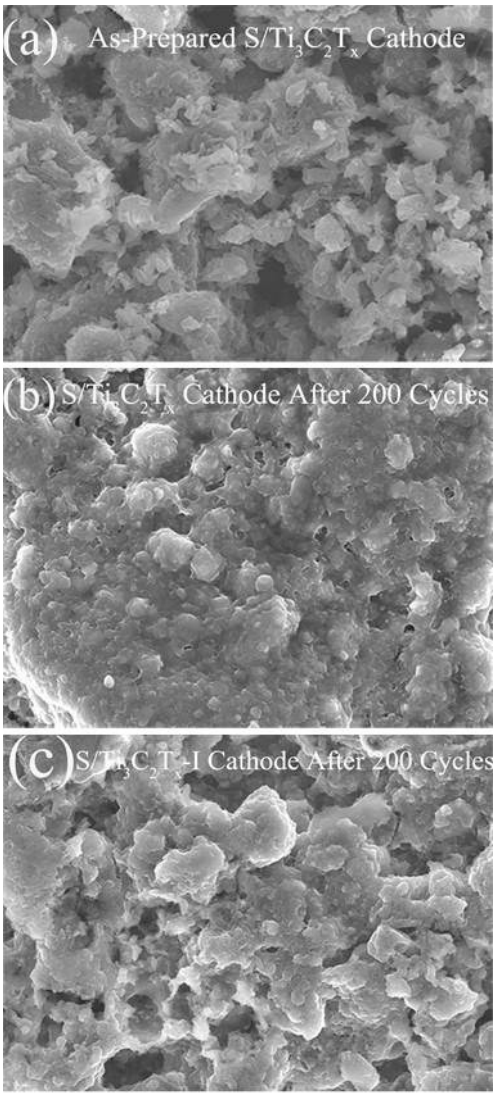

Fig. S4 SEM images of (a) the as-prepared $S/Ti_3C_2T_x$ electrode, (b) the $S/Ti_3C_2T_x$, and (c) the $S/Ti_3C_2T_x$-I electrodes at fully charged state at 0.5 A g^{-1} after 200 cycles.

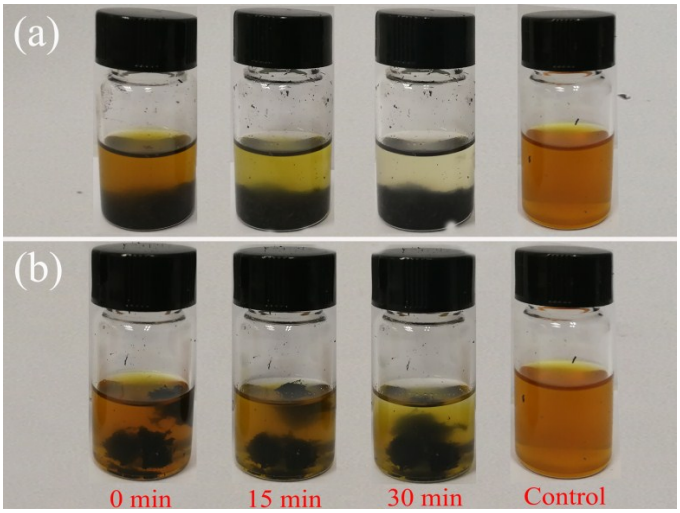

Fig. S5 Digital Photos of (a) the $Ti_3C_2T_x$ powder and (b) the SWCNT powder soaked in Li_2S_6 (0.02 M) solution, respectively.

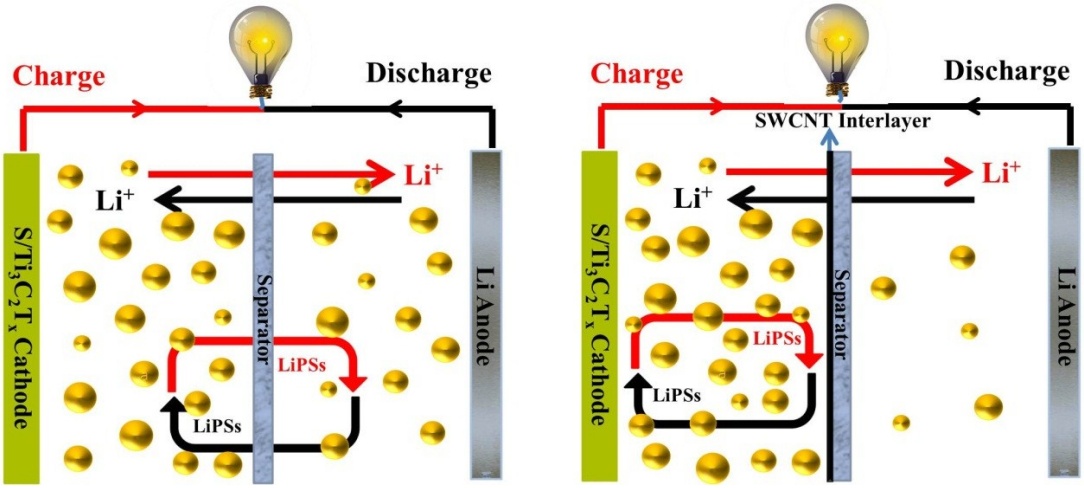

Fig. S6 Schematic configuration of the $S/Ti_3C_2T_x$ and $S/Ti_3C_2T_x$-I cells.