

Supporting information

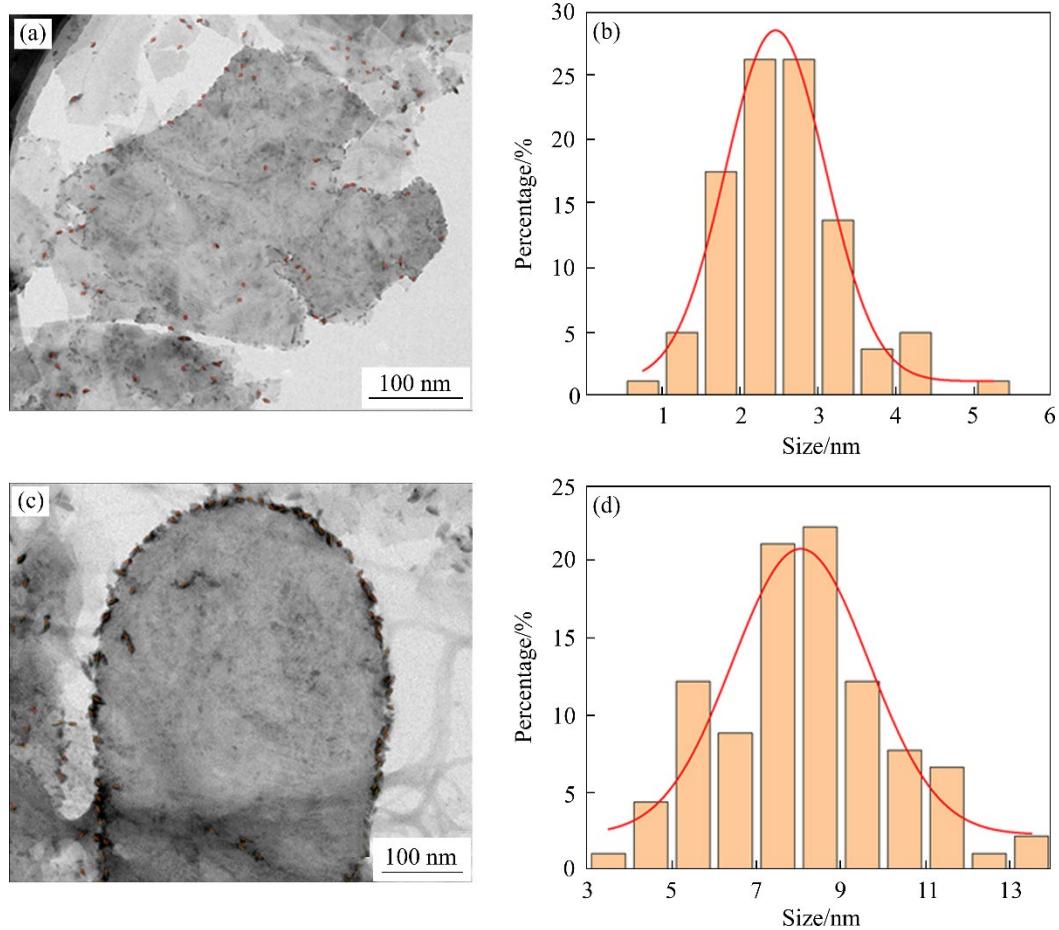


Figure S1 (a) TEM images of $\text{Ti}_3\text{C}_2@ \text{TiO}_2$ -40 min and (b) corresponding statistical TiO_2 particle size distribution; (c) TEM images of $\text{Ti}_3\text{C}_2@ \text{TiO}_2$ -60 min and (d) corresponding statistical TiO_2 particle size distribution

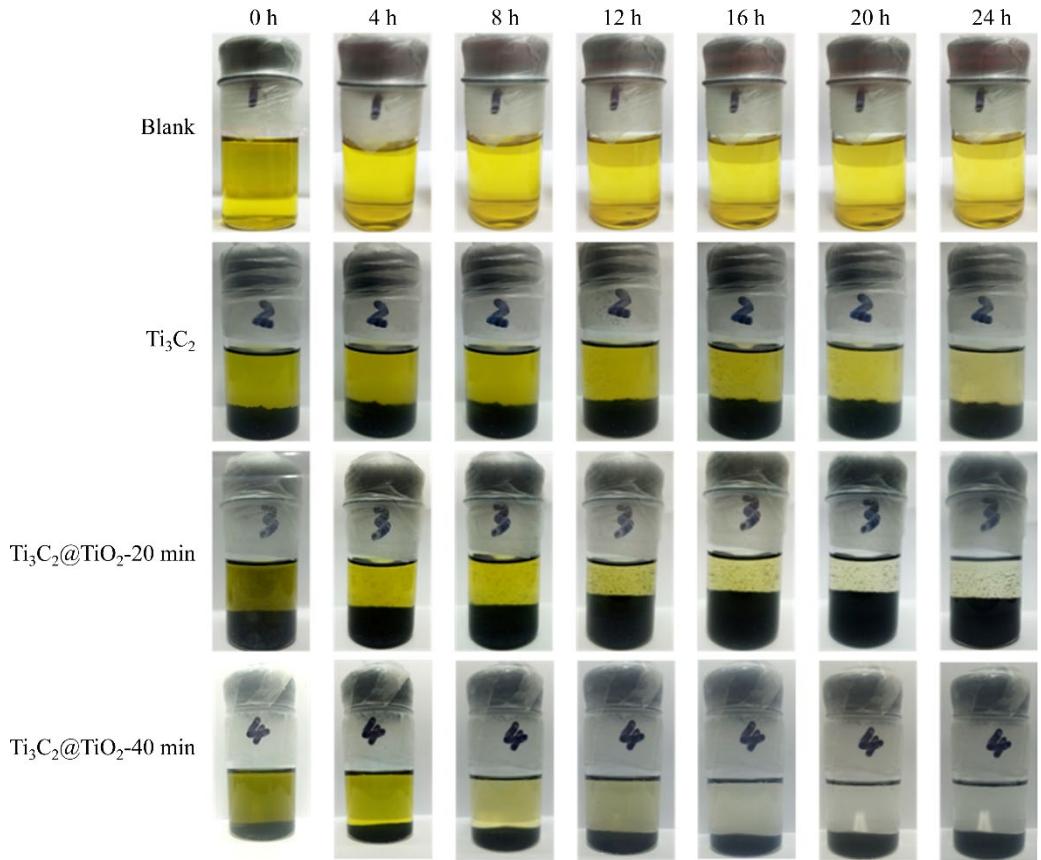


Figure S2 Digital photos of static adsorption experiments for Ti_3C_2 , $\text{Ti}_3\text{C}_2@\text{TiO}_2$ -20 min and $\text{Ti}_3\text{C}_2@\text{TiO}_2$ -40 min in Li_2S_6 solution

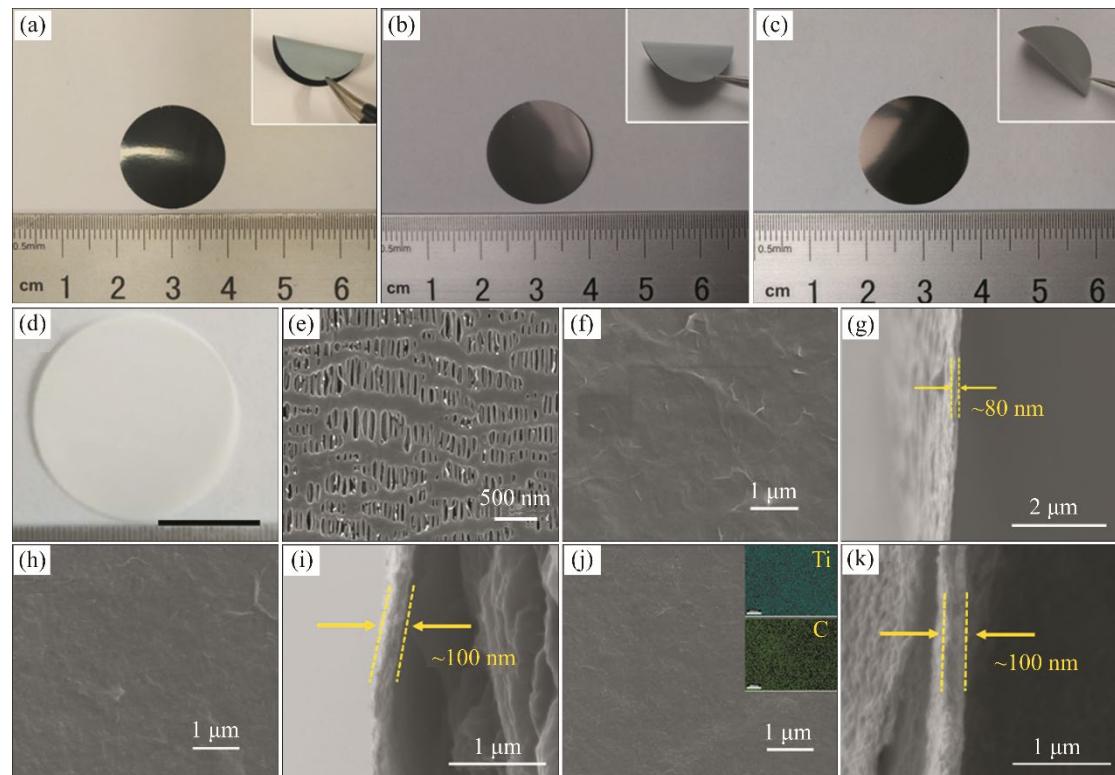


Figure S3 Digital photo of (a) Ti_3C_2 -PP, (b) $\text{Ti}_3\text{C}_2@\text{TiO}_2$ -20 min-PP, (c) $\text{Ti}_3\text{C}_2@\text{TiO}_2$ -60 min-PP and (d) pristine PP separators; SEM images of (e) pristine PP (f, g) Ti_3C_2 -PP, (h, i) $\text{Ti}_3\text{C}_2@\text{TiO}_2$ -20 min-PP

and (j, h) $\text{Ti}_3\text{C}_2@\text{TiO}_2$ -60 min-PP separators

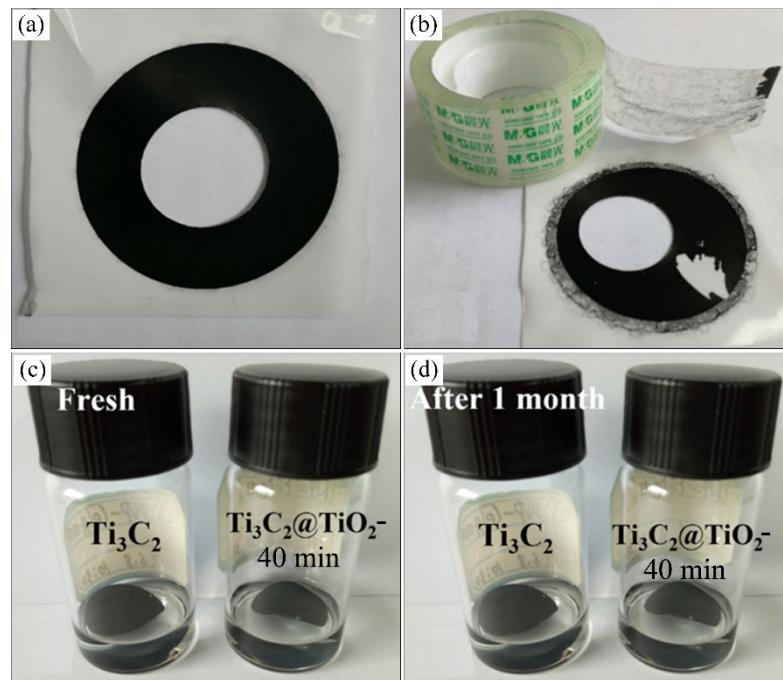


Figure S4 (a, b) Mechanical stability and (c, d) static stability in the electrolyte of the Ti_3C_2 -PP and $\text{Ti}_3\text{C}_2@\text{TiO}_2$ -40 min-PP separators

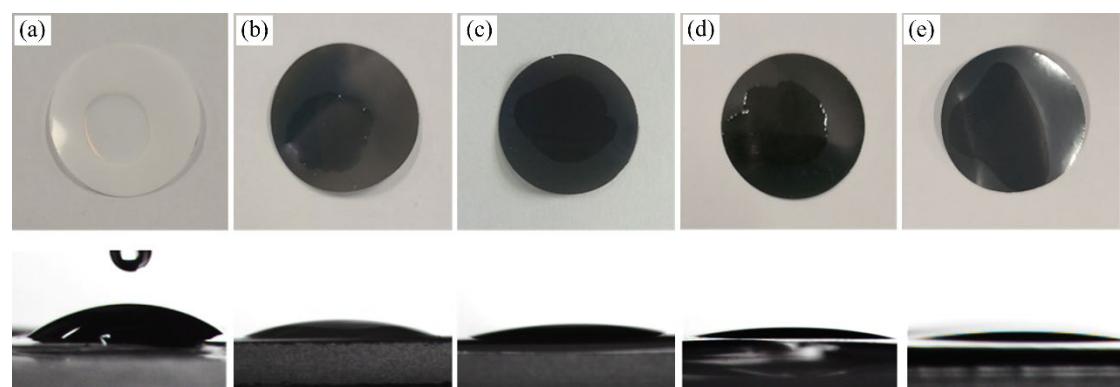


Figure S5 Contact angle measurements with electrolyte for (a) pristine PP, (b) Ti_3C_2 -PP, (c) $\text{Ti}_3\text{C}_2@\text{TiO}_2$ -20 min-PP, (d) $\text{Ti}_3\text{C}_2@\text{TiO}_2$ -40 min-PP and (e) $\text{Ti}_3\text{C}_2@\text{TiO}_2$ -60 min-PP separators

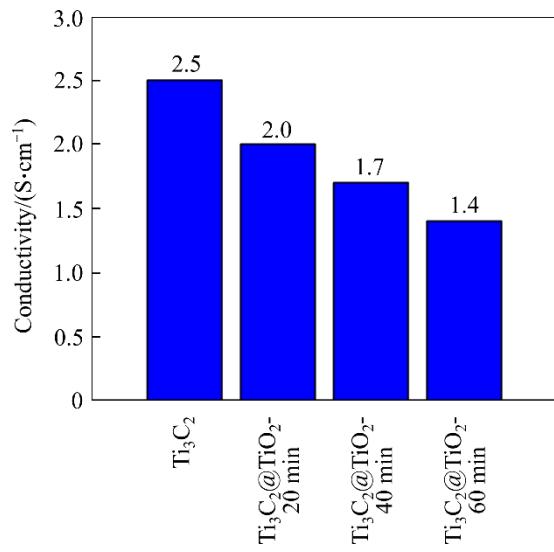


Figure S6 Four probe conductivity tests of the coated separators

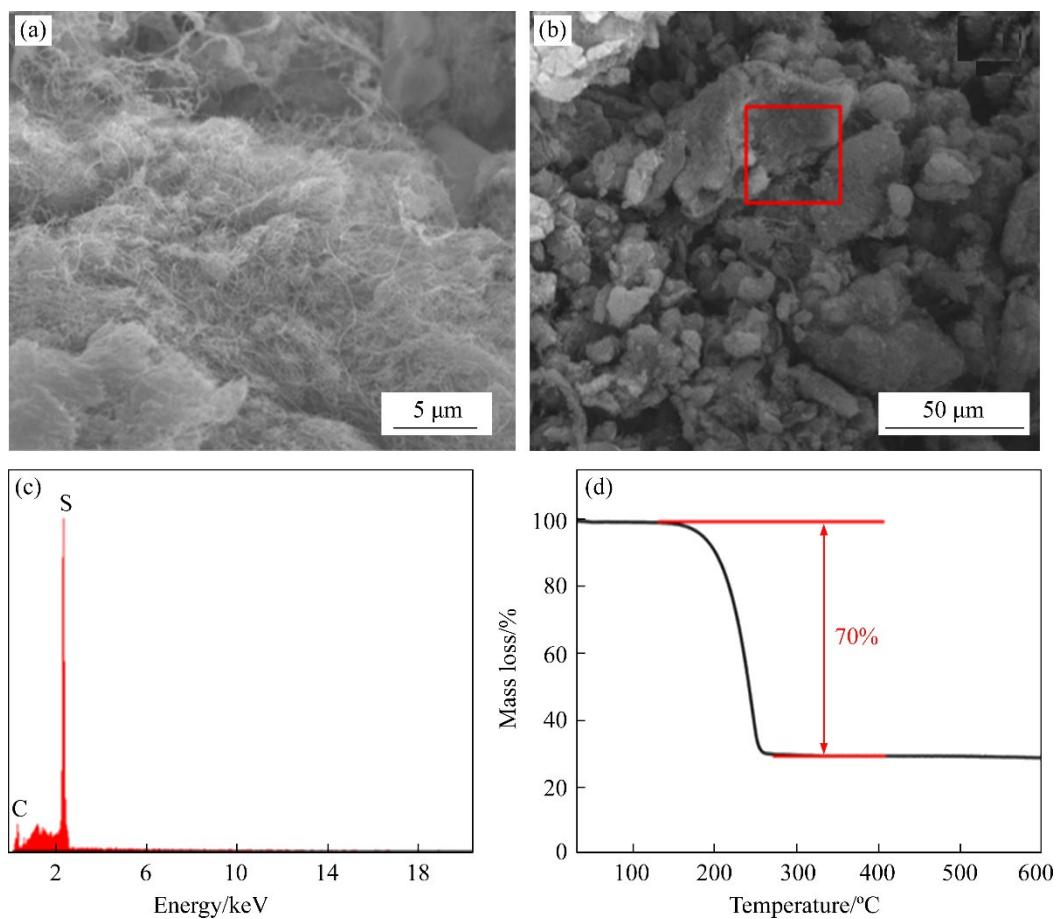


Figure S7 (a, b) SEM images, (c) corresponding area EDX elemental analysis and (d) TG curve of sulfur/carbon nanotube composite cathode

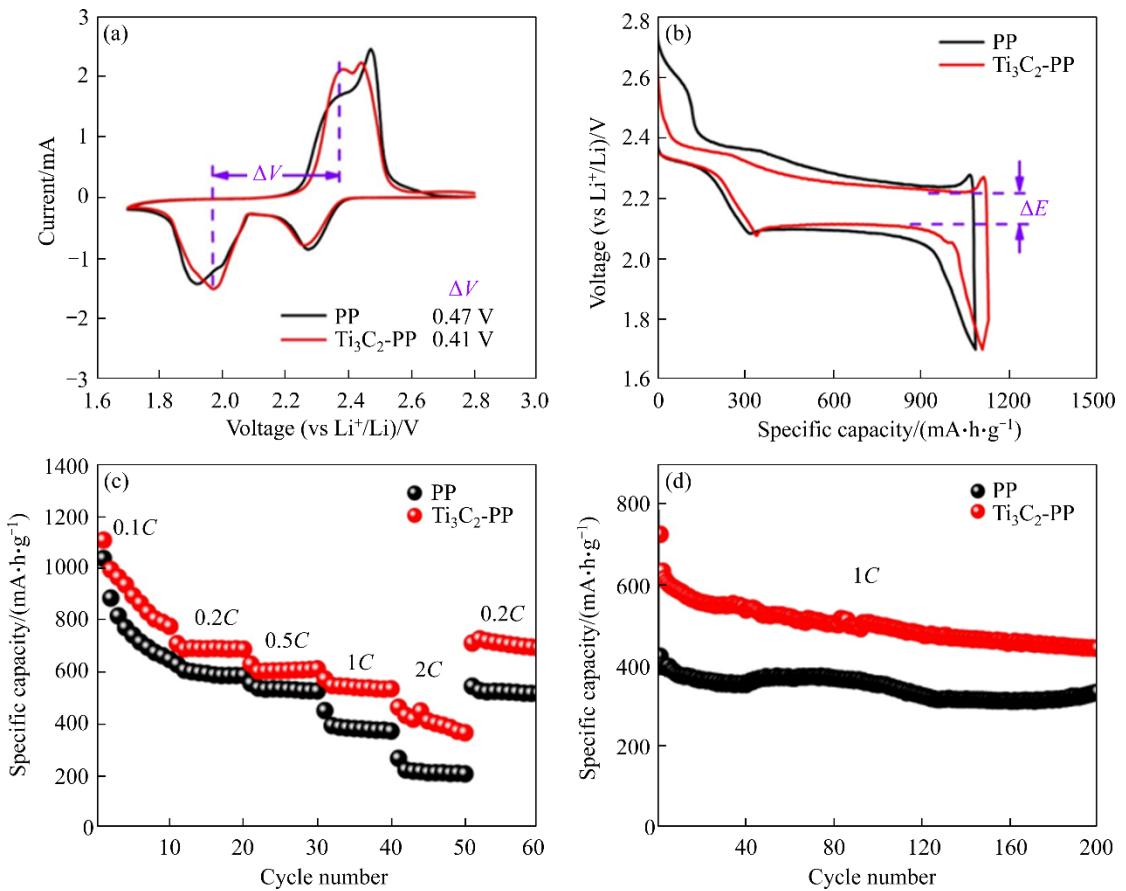


Figure S8 (a) Cyclic voltammogram profiles, (b) charge/discharge voltage profiles, (c) rate performance and (d) long-term cycling performance for Li-S battery with pristine PP and Ti_3C_2 @ TiO_2 -PP separators

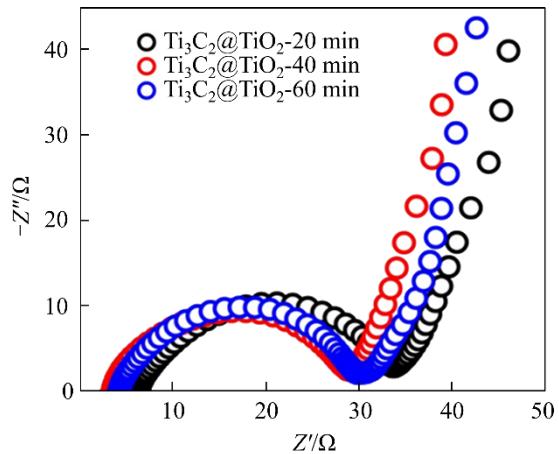


Figure S9 EIS plots of Li-S batteries with Ti_3C_2 @ TiO_2 coated PP separators