Supporting Information

Enhanced performance of lithium sulfur battery with conductive polymer modified separator

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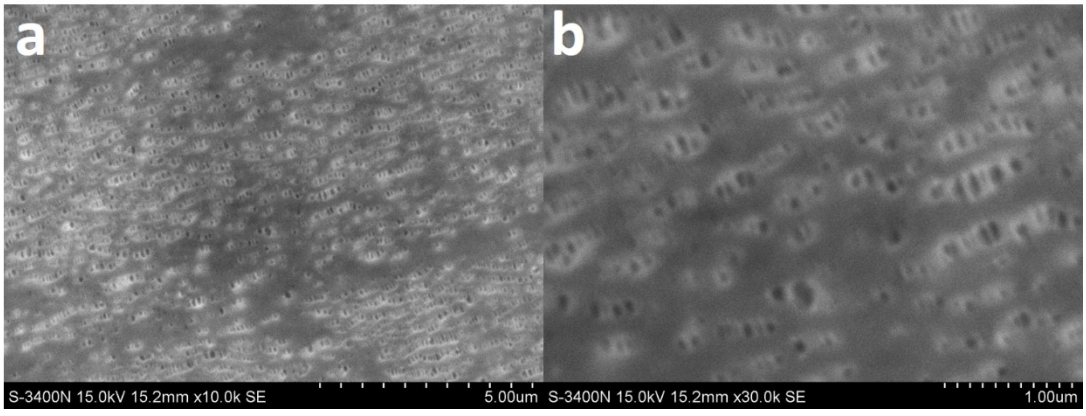

Fig. S1. SEM images of Celgard 2320. According to the technical parameters of Celgard 2320, the pore size of Celgard 2320 is around 40nm, while the diameters of PPy nanotubes and PPy nanowire are 120 nm and 50 nm, respectively. And the size of rGO is as large as 5μm. It is hardly possible the rGO or PPY particles will embed into the separator's pores and affect the crossover of Li_2S_x. Moreover, Li-S battery will become short-circuit if the conductive material can embed into the separator's pores.

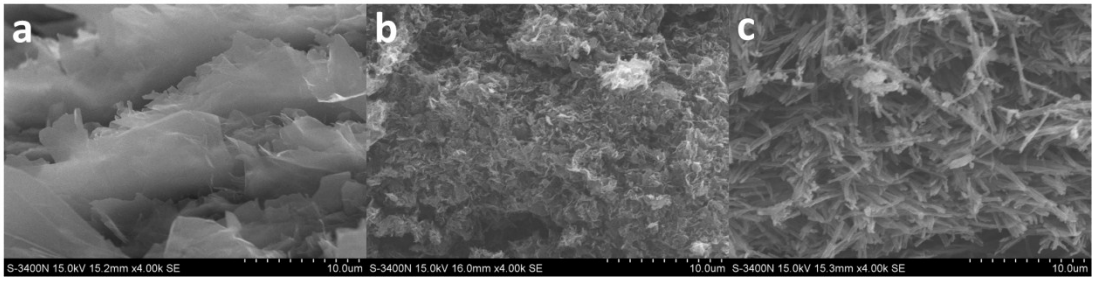

Fig. S2. Cross section morphology of different coating layer, (a) rGO, (b) PPy nanowire, (c) PPy nanotube. As shown, there are more pores for PPy nanotube coating layer compared to those of PPy nanowire. This is beneficial to absorb more lithium polysulfides in the electrolyte.

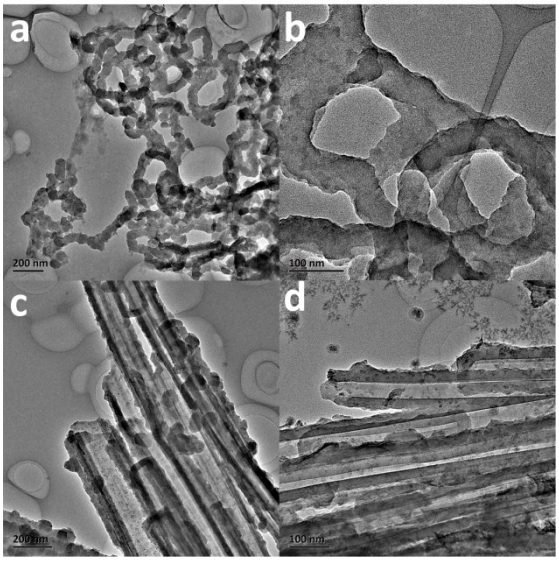

Fig. S3. TEM images of PPy nanowire and PPy nanotube. As shown, the TEM images of PPy nanowire and PPy nanotube are showed here. As shown in Fig. S3, the the diameters of PPy nanotubes and PPy nanowire are 120 nm and 50 nm, respectively. And a hollow structure is observed clearly in Fig.S3c and Fig. S3d, which is beneficial to inhibit the migration of lithium polysulfides in the electrolyte.