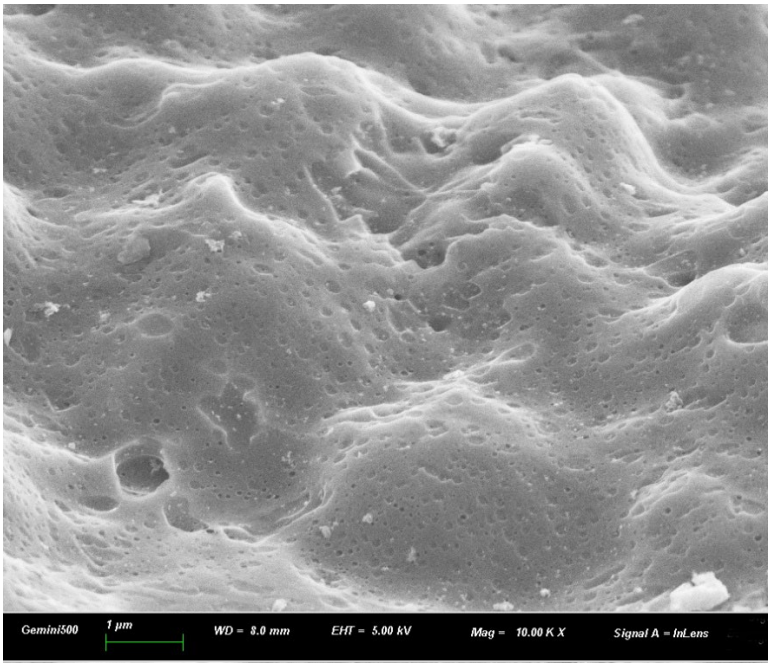

Figure S1. SEM image of PCS-700. There are few observable defects and pores compared with PCS-800.

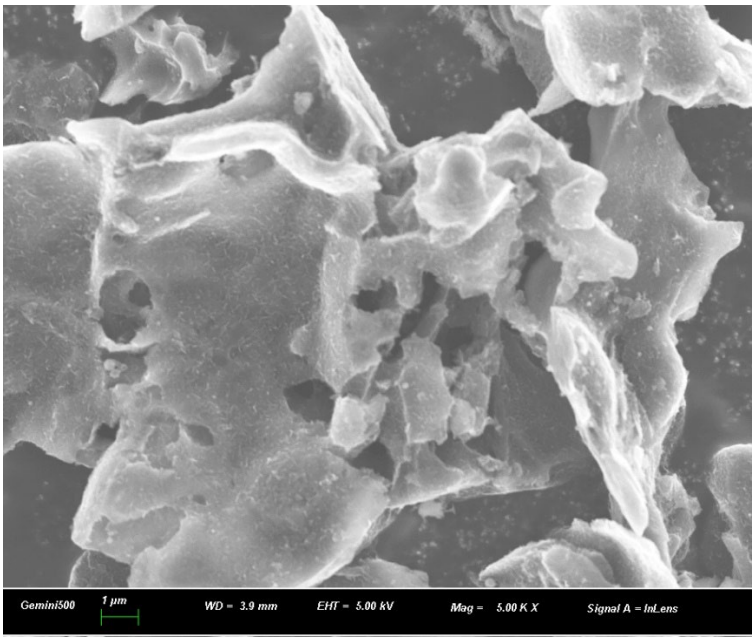

Figure S2. SEM image of PCS-900. The carbon material shows obvious fragmentation.

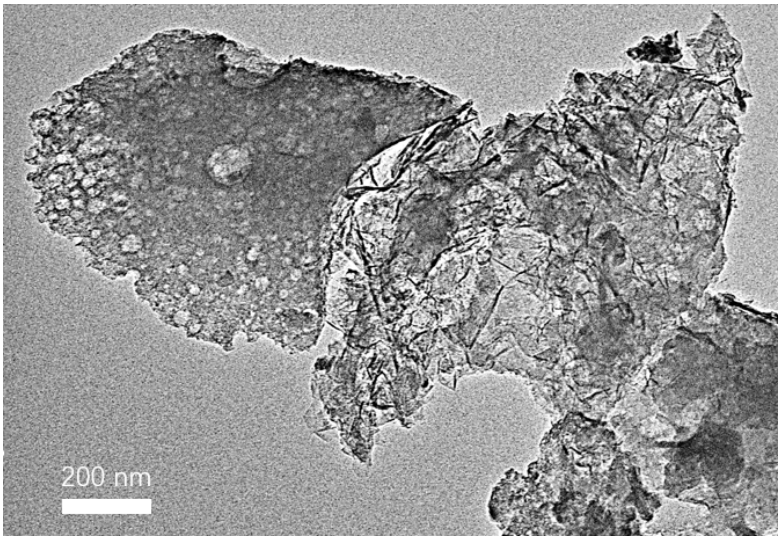

Figure S3. TEM image of PCS-800/S. There are different pores of 20~100 nm in the cathode material and no observable aggregated sulfur particles.

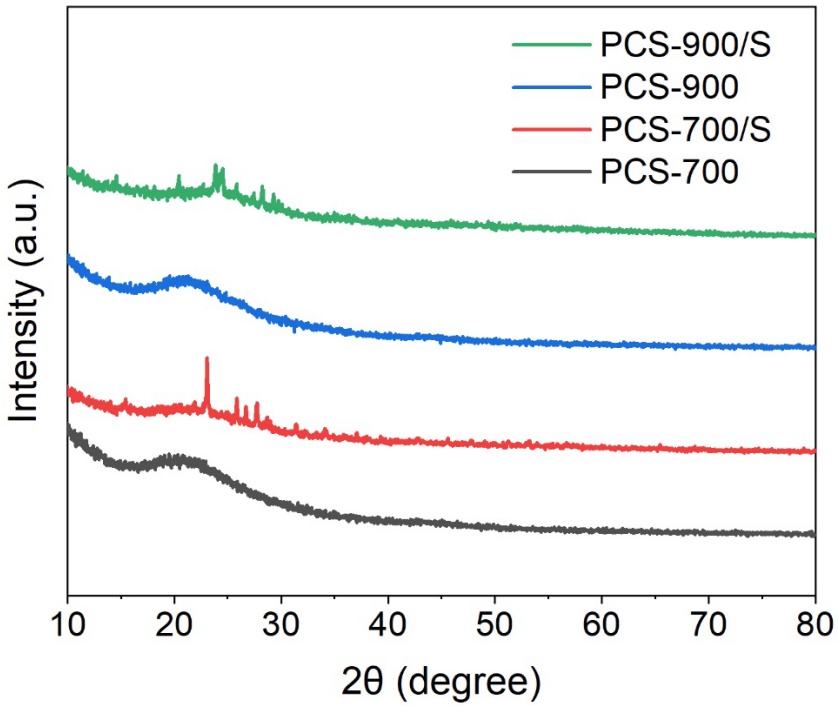

Figure S4. XRD patterns of PCS-700, PCS-700/S, PCS-900, and PCS-900/S. After sulfur melting, the sulfur peaks are protruding.

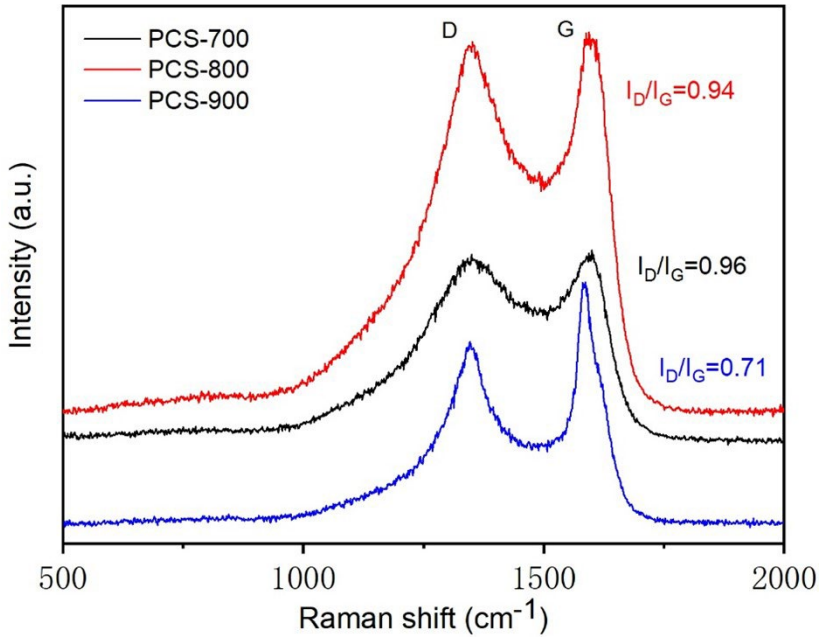

Figure S5. Raman spectra of PCS-700, PCS-800, and PCS-900. As the carbonization temperature increases, the I_D/I_G ratios decreases accordingly.

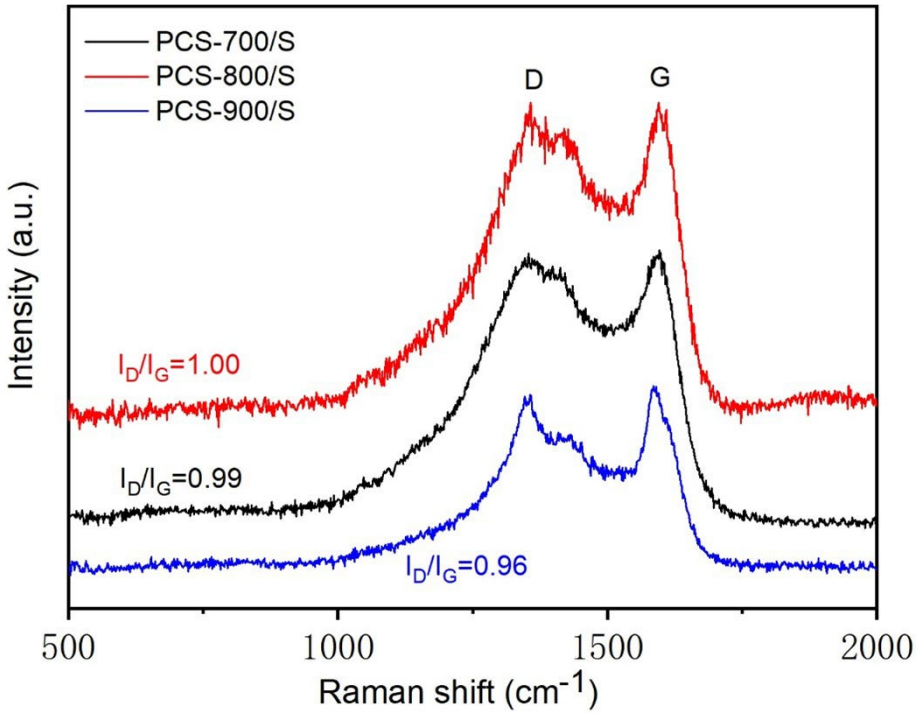

Figure S6. Raman spectra of PCS-700/S, PCS-800/S, and PCS-900/S. After sulfur melting, the I_D/I_G ratio increases and a small shoulder peak to D band at ~1400 cm^{-1} appeared.

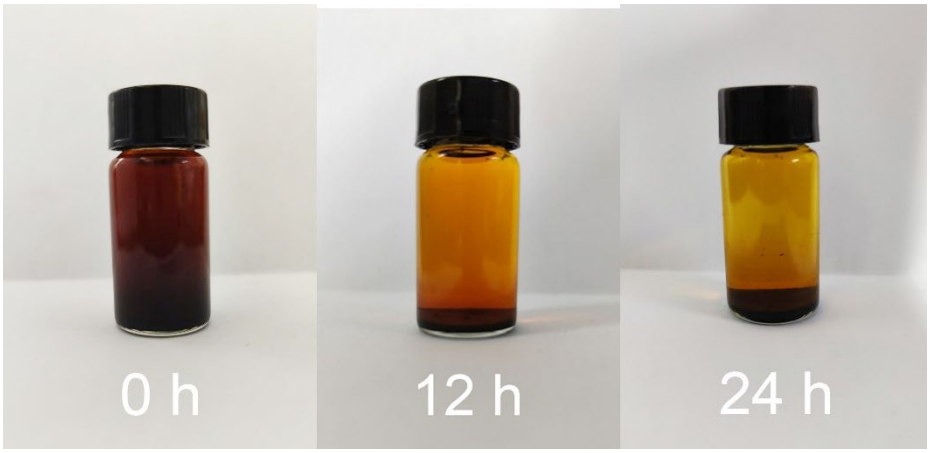

Figure S7. Optical image the absorption of PCS-800 to Li_2S_6 in DOL/DME solution. The polysulfide solution changes from dark brown to light yellow after 12 h.