

Figure S1 TGA curve of Li₂S@C composite in air.



Figure S2: (a) Nitrogen adsorption isotherms and (b) pore size distribution for the $Li_2S@C$ composite.



Figure S3: Electron energy loss spectroscopy (EELS) analysis. (a) HAADF-STEM survey image, with EELS performed on highlighted line. (b) EELS spectrum at low energy range, with power-law background fitting and (c) background subtracted Li-K edge. (d) line profile of Li-K edge distribution, indicating the presence of Li in the particle.



Figure S4: Impedance plots of (a) $Li_2S@C$ composite and (b) physical mixture of bulk Li_2S and carbon from pyrolysis of RF gel, before cycling and after 10 cycles.



Figure S5: Ionic conductivities of lithium polysulfide in tetraglyme (with 1M LiTFSI in all cases) at different concentrations and temperatures.

Table S1	: VFT	fitting	parameters	for	ionic	conductivities	of	electrolytes	(with	and
without l	ithium	polysul	fides)							

Sample	VFT fitting parameters				
	$A(S \text{ cm}^{-1})$	B(K)	$T_0(K)$		
1M LiTFSi in tetraglyme	0.0238	302	191		
1M LiTFSi+1.9M Li ₂ S _{3.5} in tetraglyme	0.0577	582	200		
1M LiTFSi+0.38M Li ₂ S _{3.5} in tetraglyme	0.0378	400	185		
1M LiTFSi+0.095M Li ₂ S _{3.5} in tetraglyme	0.0350	357	183		



Figure S6: Cycling performance of (a) carbon pyrolyzed from RF gel and (b) $Li_2S@C$, in 1M LiTFSI+0.095M $Li_2S_{3.5}$ in tetraglyme, at different charging rates.