Supplementary Information

FeS_2 Microspheres with Ether-based Electrolyte for High-Performance Rechargeable Lithium Batteries

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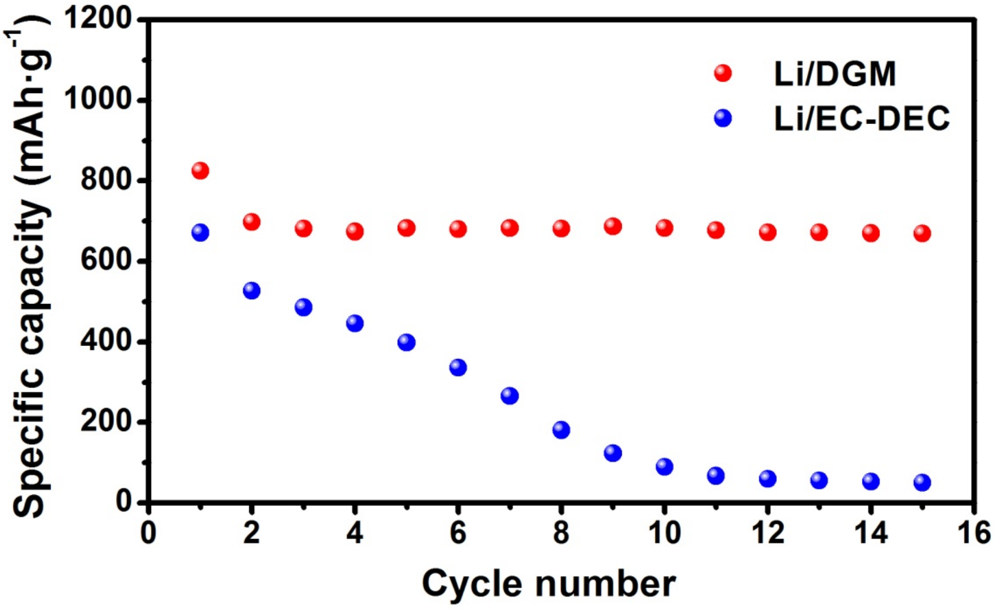

Fig. S1 The cyclic performance of FeS_2 microspheres in Li/DGM and Li/EC-DEC at 100 mA·g^{-1}.

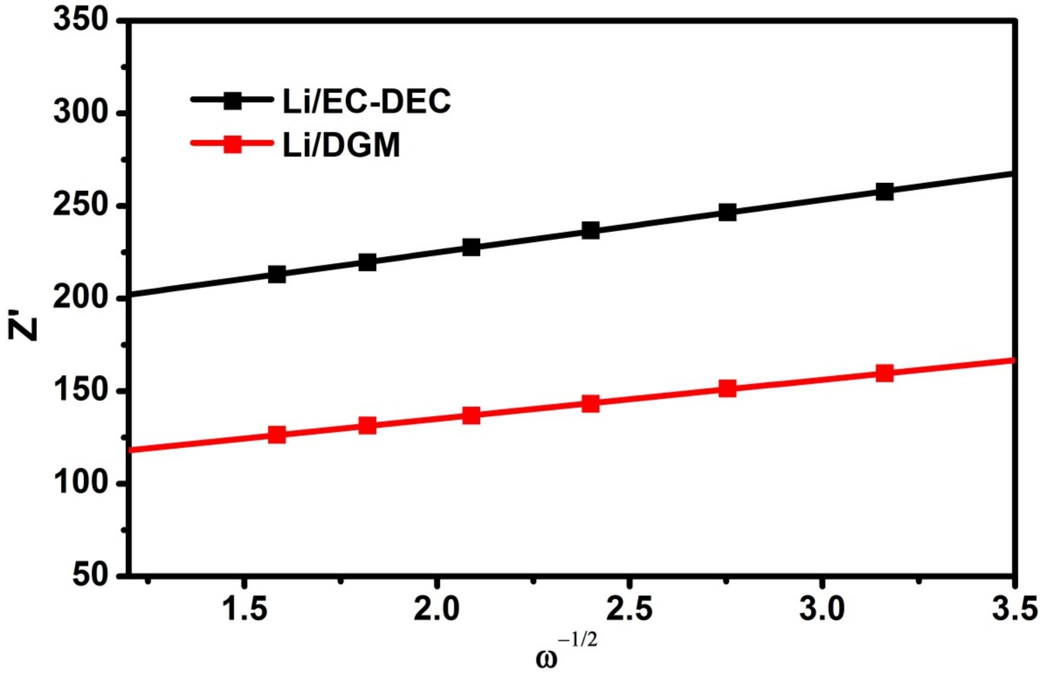

Fig. S2 The relationship between Z' and $\omega^{-1/2}$ of the cell with Li/DGM and Li/EC-DEC.

Table S1 The parameters procured by simulating EIS data.

Electrolyte	Cycle number	R_L (Ω)	R_{ct} (Ω)	R_s (Ω)
Li/DGM	1st	1.3	130.2	–
	5th	1.6	92.1	–
Li/EC-DEC	1st	1.5	186.3	–
	5th	1.9	128.8	128.2

Table S2 The Li^+ transfer coefficient of the cell with Li/DGM and Li/EC-DEC.

Sample	σ	D_{Li+} ($cm^2 \cdot s^{-1}$)
Li/DGM	21.2	2.9×10^{-10}
Li/EC-DEC	28.5	1.6×10^{-10}

Lithium ion transfer coefficient:

$$D_{Li+} = \frac{R^2T^2}{2A^2n^4F^4C^2\sigma^2} \quad \text{(Eq. S1)}$$

$$Z' = R_D + R_L + \sigma\omega^{-1/2} \quad \text{(Eq. S2)}$$

According to the Eq. S1, Eq. S2, and Figure S2, D_{Li+} can be calculated. where R is the gas constant, T is the absolute temperature, A is the surface area of the cathode, n is the number of electrons per molecule during oxidization, F is the Faraday constant, C is the concentration of lithium ion, σ is the Warburg factor which is relative with Z'. From Fig. S2, σ is the slope of each fitted curves. And the transfer coefficient is listed in Table S2.

Power density and energy density:

Power density = Voltage×Current density (Eq. S3)

Energy density = Voltage×Capacity (Eq. S4)

According to the Eq. S3, Eq. S4, the power density and energy density can be calculated. Here we use average voltage to replace the voltage to calculate the result, and read it from the charge and discharge curves.