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Supplementary Material

A cost-effective approach for practically viable Li-ion capacitors by using Li_2S as an *in-situ* Li-ion source material

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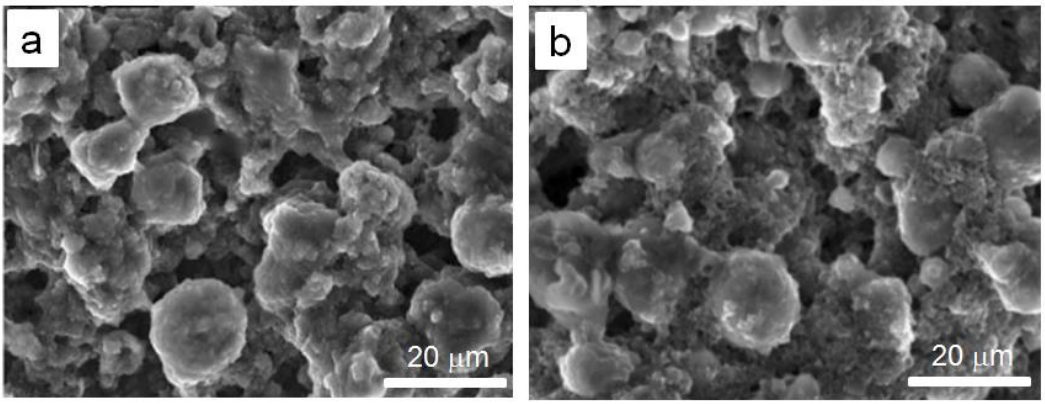

Fig. S1. SEM images of (a) activated carbon, and (b) a 8 wt.% Li_2S-loaded activated carbon.

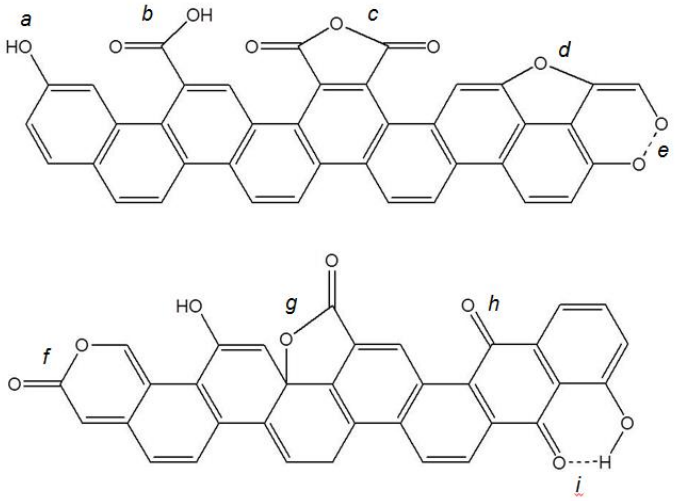

Fig. S2. Possible surface oxygen funtionalities on activated carbon.[1] (a) Phenolic hydroxyl group, (b) carboxylic group, (c) carboxylic acid anhydride group, (d) ether group, (e) cyclic peroxide group, (f) normal lactone group, (g) fluoresceintype lactone group, (h) quinone-type carbonyl group, (i) phenolic/quinone group with hydrogen bonding.

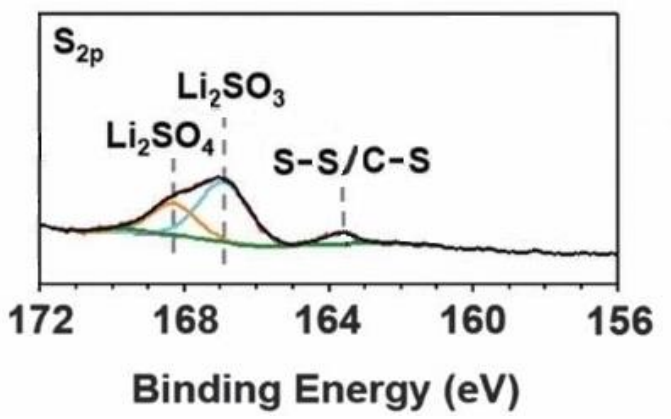

Fig. S3. S2p XPS spectrum of a 8 wt.% Li_2S-loaded activated carbon electrode after initial activation by charging at 0.1 mA cm^{-2} to 4.2 V vs. Li/Li^+.

Reference

1. D. Lennon, D. T. Lundie, S. D. Jackson, G. J. Kelly and S. F. Parker, *Langmuir*, 2002, **18**, 4667–4673.