Electronic Supplementary Material (ESI) for Journal of Materials Chemistry A.

Supporting Information

A Conductive Selenized Polyacrylonitrile Cathode Material for Rechargeable Lithium Batteries with Long Cycle Life

Jing Guo, Zhao-Yin Wen, Qing-Song Wang, Jun Jin, Guo-Qiang Ma*

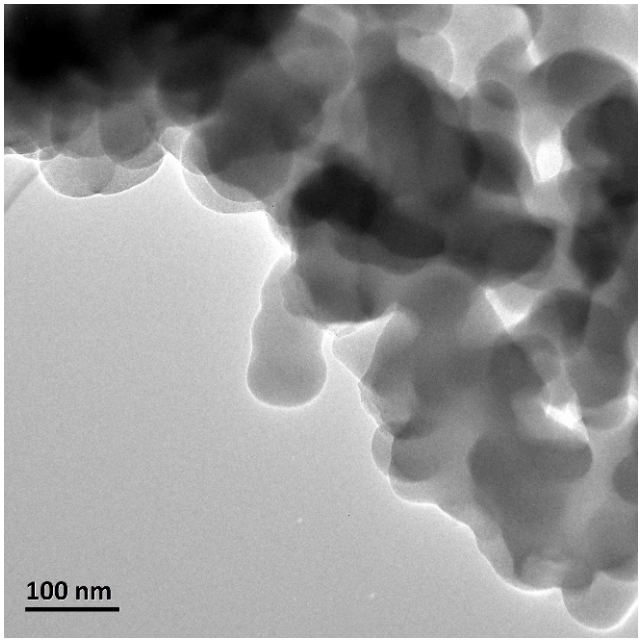

Figure S1. TEM image of the Se/PAN composite.

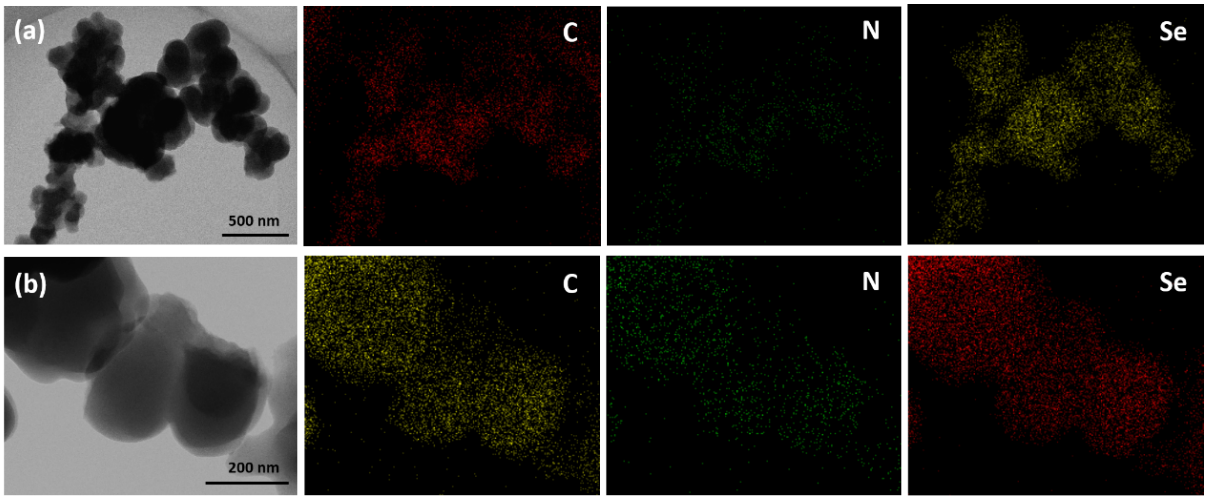

Figure S2. Annular dark-field (ADF)-STEM images and corresponding C, N and Se elemental mapping of Se/PAN composites, (a) lower magnification (b) higher magnification.

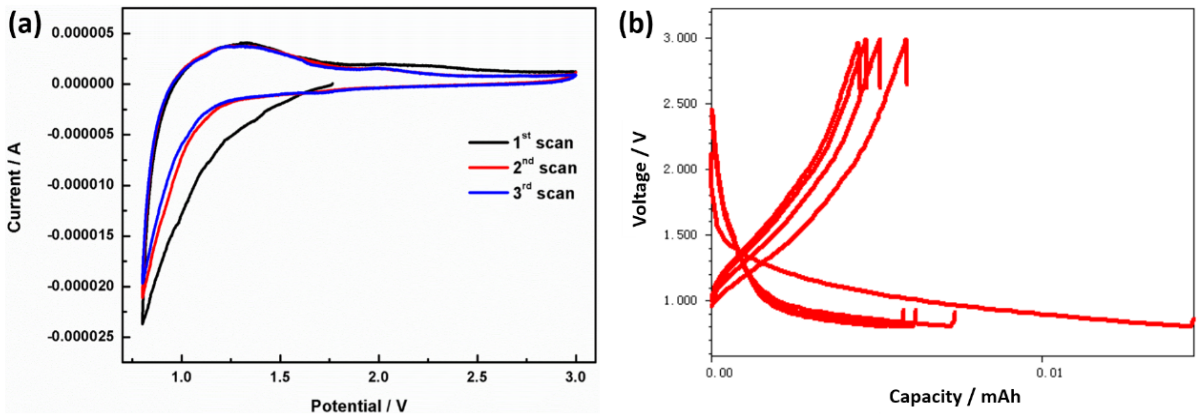

Figure S3. (a) Cyclic voltammograms of pyrolytic PAN measured at 0.1 mV s^{-1} scanning rate in the voltage range of 3.0 - 0.8 V (vs. Li^+/Li). (b) Discharge/charge profiles of pyrolytic PAN for the 1st, 2nd, 3rd and 4th cycles at a constant current density of 0.05 mA cm^{-2}.

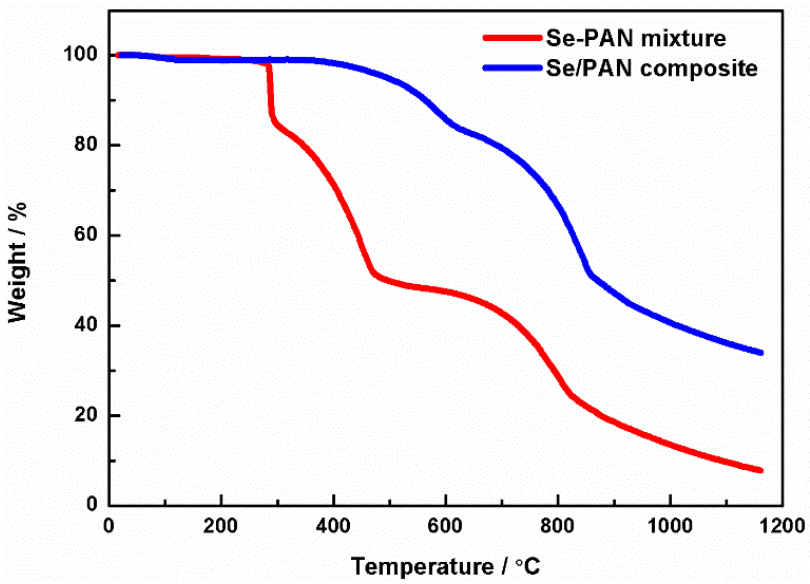

Figure S4. TG profiles of the Se/PAN composite and Se-PAN mixture.

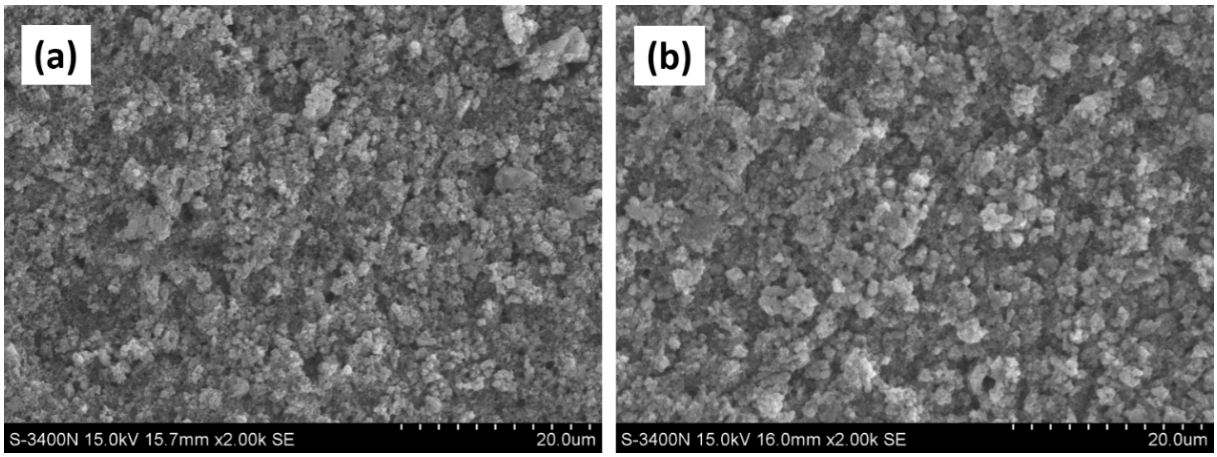

Figure S5. SEM images of Se/PAN composite cathodes (a) before cycling (b) after cycling.

Calculation of C, N, Se contents in the Se/PAN composite after cycling:

For the convenience of calculation, we can assume that the mass of the cycled cathode materials are 100 mg. Then the mass of super P, CMC and SBR is 10 g, 5 g and 5 g, respectively. Given that the carbon content in CMC ($C_8H_{11}O_5Na$) and SBR ($C_{12}H_{14}$) is 51 % and 91 % respectively, the mass of carbon from CMC and SBR is 2.55 g and 4.55 g. So the total weight of carbon from super P and binders is 17.1 g. According to the elemental analysis result for Fig. 6, the mass of carbon, nitrogen and selenium in the cycled cathode materials is 53.47 g, 2.12 g and 44.4 g, respectively. Thus, the mass of the three elements in cycled the Se/PAN composite will be 36.37 g, 2.12 g and 44.4 g, respectively. After normalization, the weight ratio of C, N and Se in the cycled Se/PAN composite would be 43.88 %, 2.56 % and 53.56 %, respectively.