Electronic Supplementary Information

Organic positive-electrode material utilizing both an anion and cation: a benzoquinone-tetrathiafulvalene triad molecule, Q-TTF-Q, for rechargeable Li, Na, and K batteries

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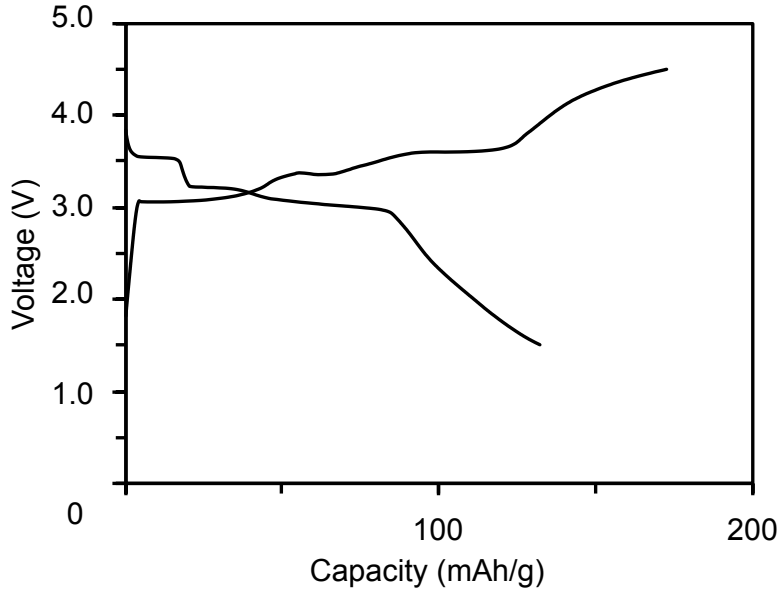

Fig. S1 Charge and discharge curves of the TTF electrode in the 1.0 mol/L $LiPF_6$/(EC/DEC= 1/5) solution.

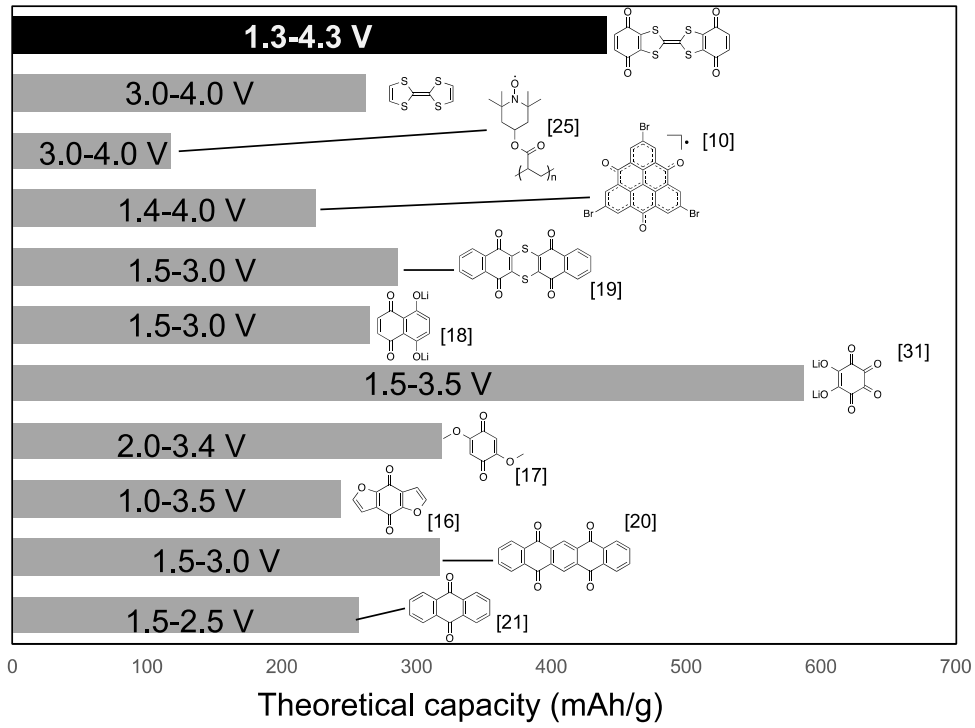

Fig. S2 Comparison of the theoretical capacities of same reported organic active materials. The values in the bar indicate the respective potential ranges.

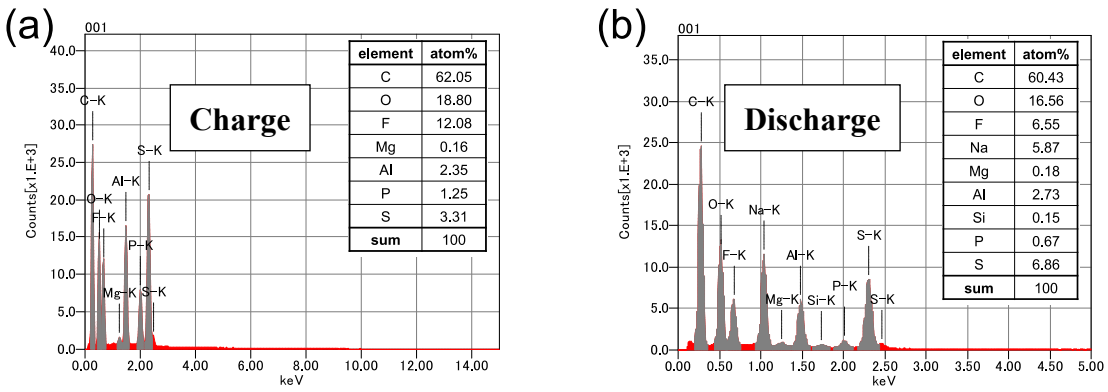

Fig. S3 EDX analysis of the Q-TTF-Q/Na half cells.

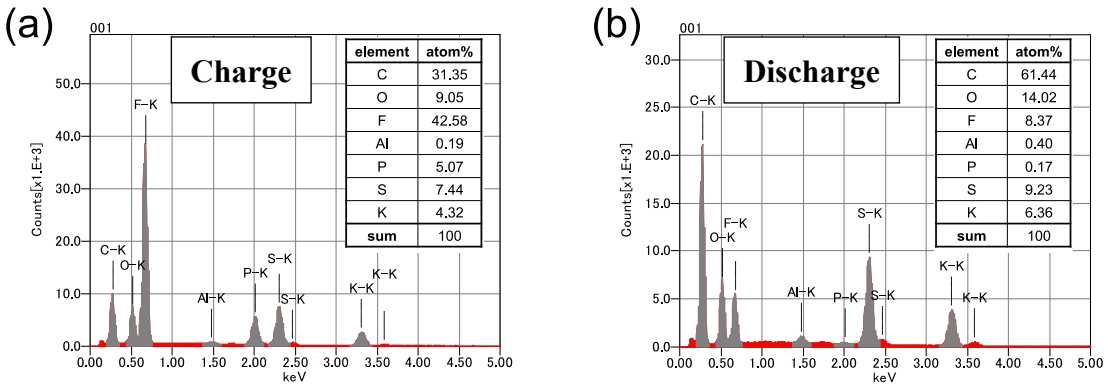

Fig. S4 EDX analysis of the Q-TTF-Q/K half cells.

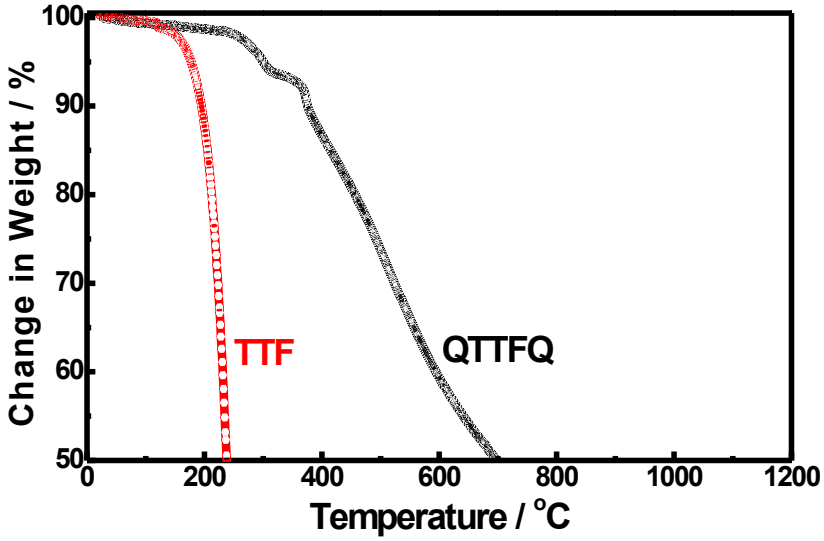

Fig. S5 Thermogravimetric analysis (TGA) of Q-TTF-Q and TTF at 5ºC/min under an Ar atmosphere.

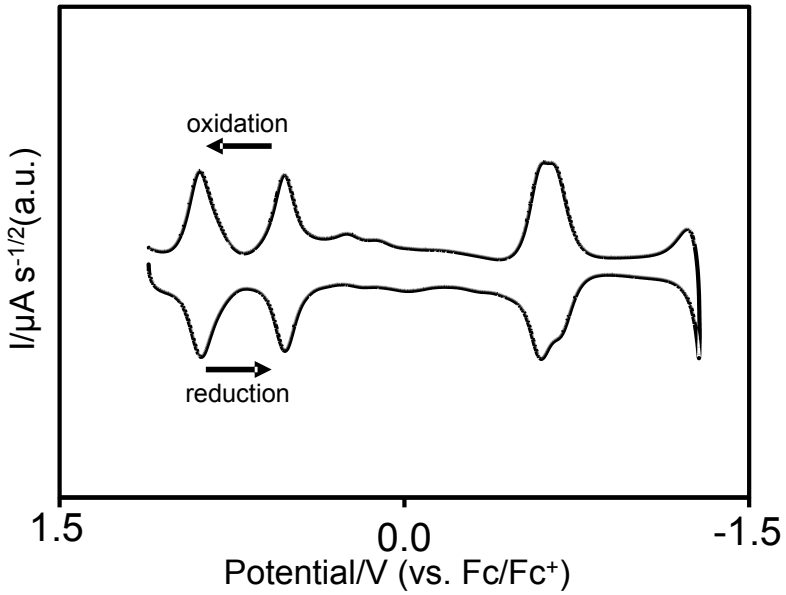

Fig. S6 Deconvoluted cyclic voltammogram of Q-TTF-Q in the acetonitrile solution containing 0.1 mol/L Bu_4NPF_6; scan rate is 50 mV s^{-1}.

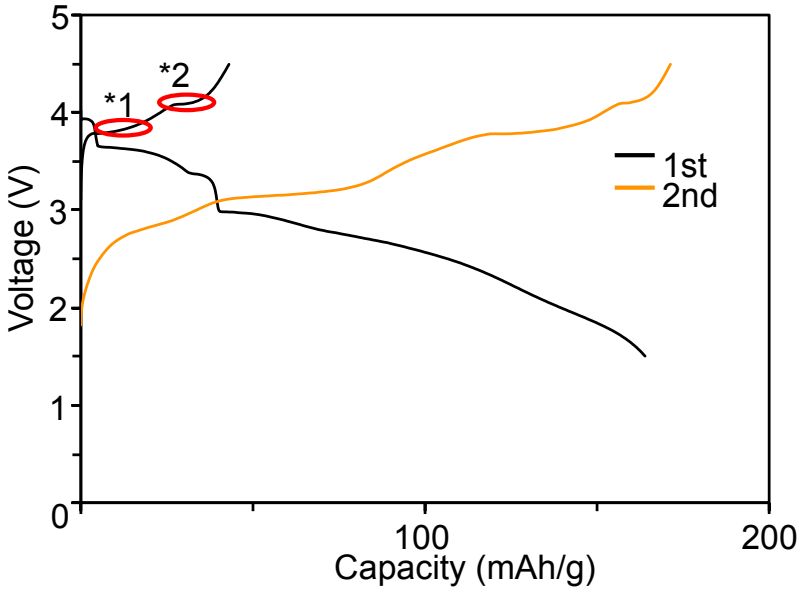

Fig. S7 Initial charge/discharge curves of the QTTFQ/Li cell initiated by the charge process. The marked plateau potential values of 3.7(*1) and 4.1 (*2) V vs. Li^+/Li agree with the reported values for TTF, suggesting the anion insertion reaction to the TTF moiety at these potentials.

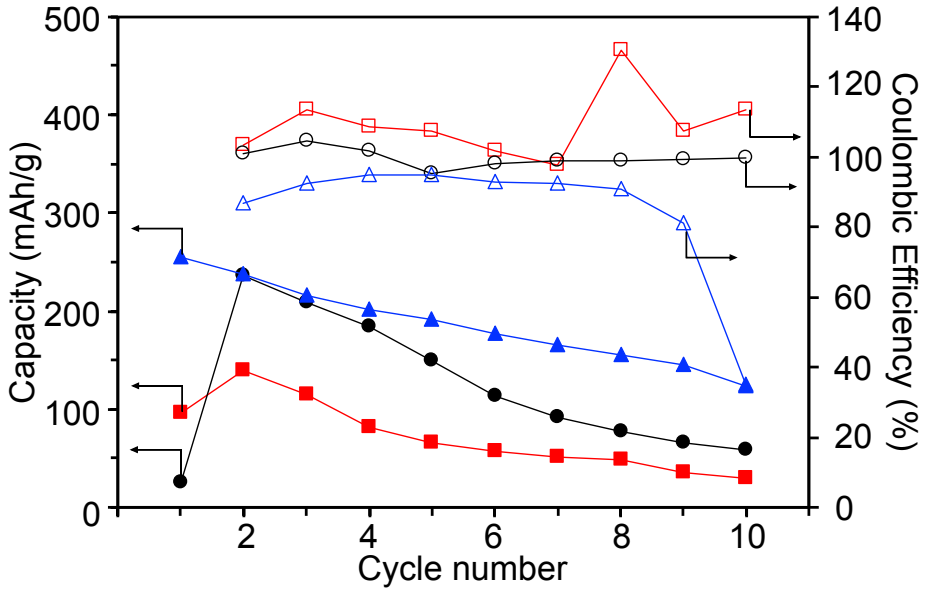

Fig. S8 Cycle performance of the Q-TTF-Q/M (M = Li, Na and K) half cells.

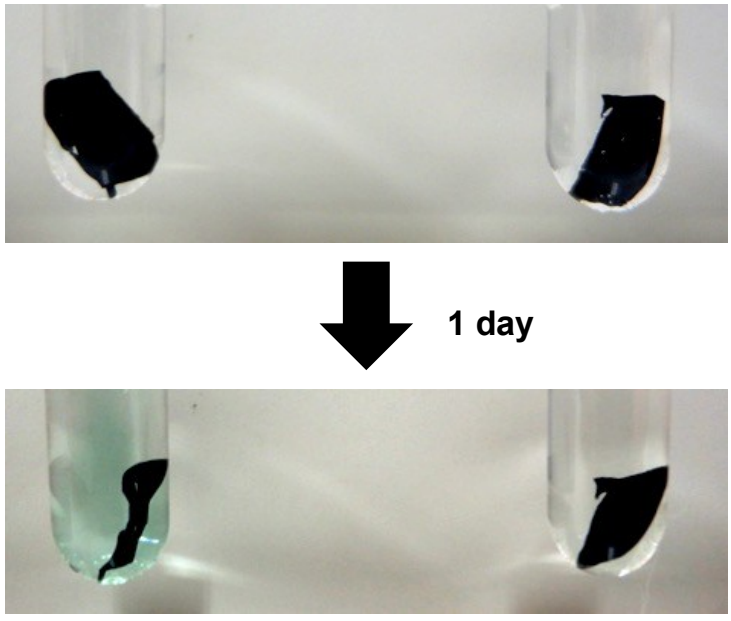

Fig. S9 Dissolution test of the Q-TTF-Q electrodes. In this test, two types of the electrolyte solutions (1.0 mol/L LiTFSI in PC, 2.5 mol/L LiTFSI in PC) to examine the concentration effect of the electrolyte salt.

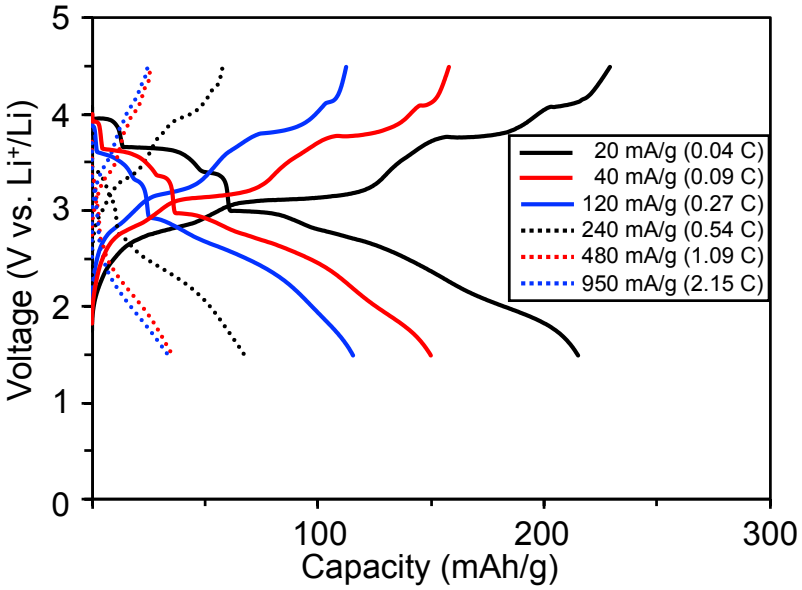

Fig. S10 Rate performance of the Q-TTF-Q/Li half cells.