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Prussian blue analogues: a new class of anode materials for lithium ion batteries

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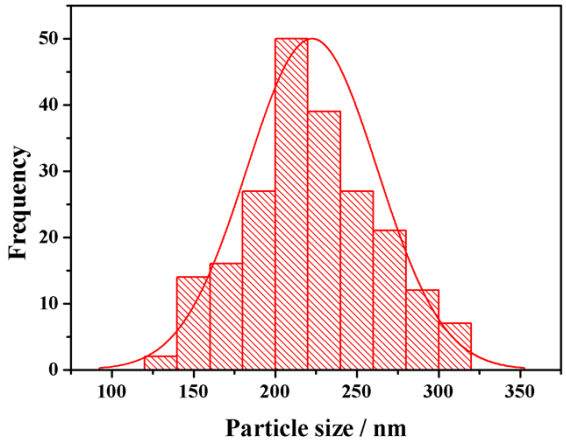

Fig. S1 Size distribution histograms of as-synthesized $Co_3[Co(CN)_6]_2$ nanocubes.

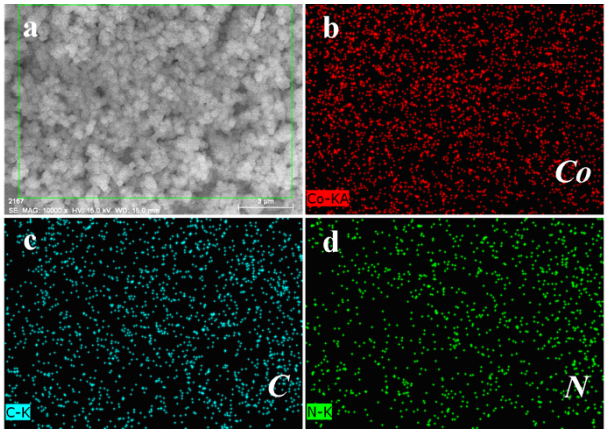

Fig. S2 Elemental mapping images of (b) cobalt, (c) carbon, and (d) nitrogen in $Co_3[Co(CN)_6]_2 \cdot nH_2O$ nanocubes.

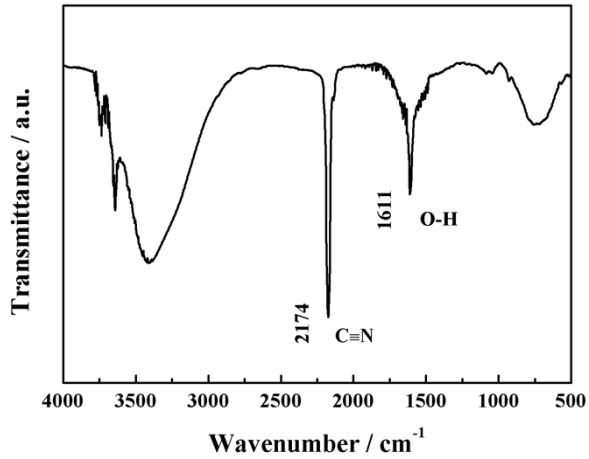

Fig. S3 FTIR spectrum of the $Co_3[Co(CN)_6]_2$ sample.

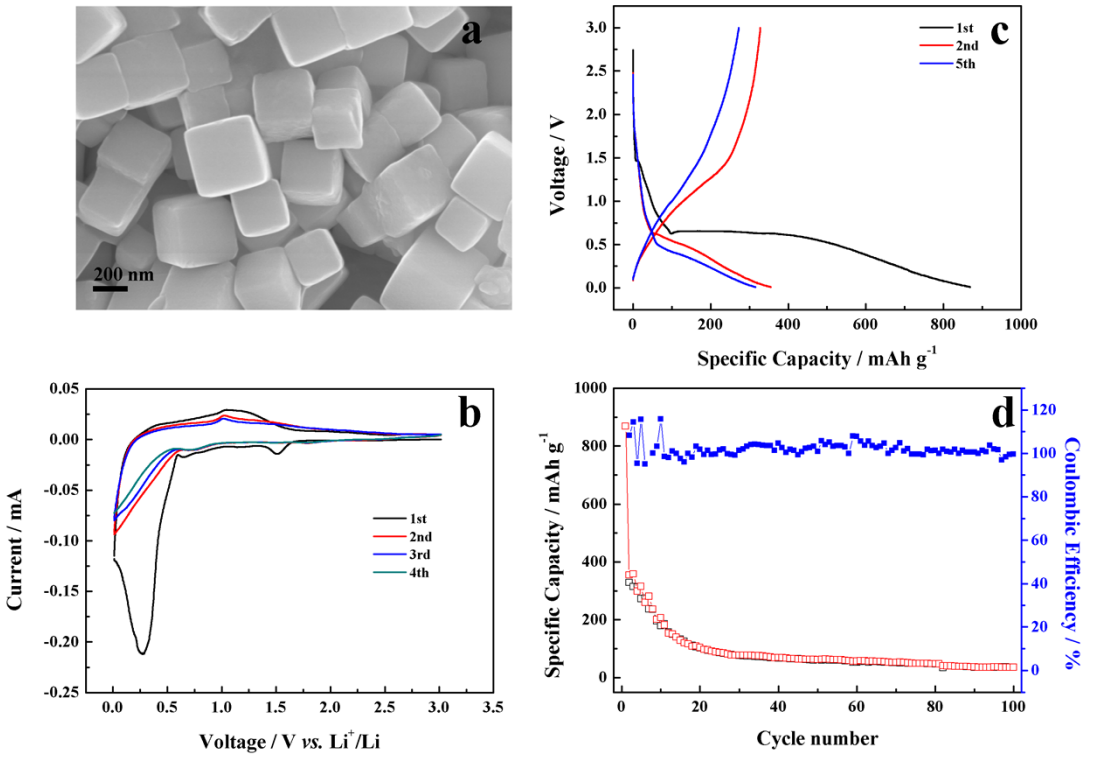

Fig. S4 (a) SEM image, (b) CV curves of the first four cycles between 0.01-3 V at a scanning rate of 0.1 mV s^{-1}, (c) Galvanostatic charge/discharge profiles of the 1st, 2nd, and 5th cycles, and (d) Cycling performance and Coulombic efficiency of $Mn_3[Co(CN)_6]_2 \cdot nH_2O$ electrode under a current density of 50 mA g^{-1}.

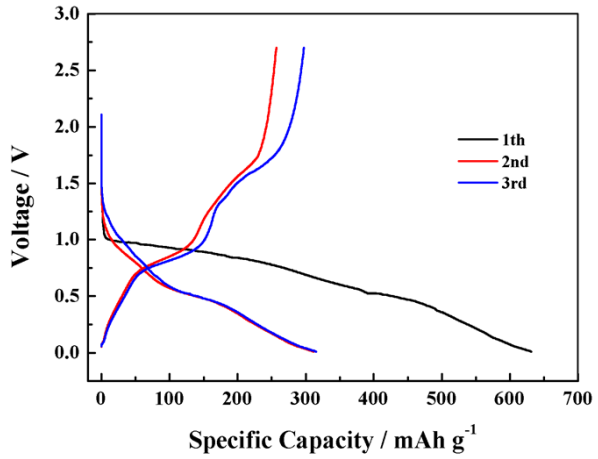

Fig. S5 The 1st, 2nd and 3rd discharge and charge profiles of $Co_3[Co(CN)_6]_2 \cdot nH_2O$ nanocubes between 0.01 and 2.7 V *vs.* Na/Na^+ at a current density 20 mA g^{-1}.

Currently, there exists growing scientific and commercial interest in room-temperature sodium-ion batteries (NIBs) technology owing to abundant supply and

low cost of sodium resources.[1] Herein, we have also investigated the use of $Co_3[Co(CN)_6]_2 \cdot nH_2O$ as anode material for NIBs. Coin cells for sodium-ion batteries were fabricated using the same procedure for Li batteries. The electrolyte was 1 M $NaClO_4$ dissolved in a mixture of ethylene carbonate (EC) and propylene carbonate (PC) with a volume ratio of 1:1. Na metal was used as the reference and counter electrode, and a glass microfiber filter as the separator. Fig. S5 show the discharge/charge profiles of $Co_3[Co(CN)_6]_2 \cdot nH_2O$ electrode between 0.01 and 2.7 V *vs.* Na/Na^+ at current density of 20 mAh g^{-1}. As shown in Fig. S5, the galvanostatic charge-discharge profiles are similar to that in Li-ion batteries except the lower charge/discharge potentials. The initial discharge and charge capacities are about 631.3 and 256.7 mAh g^{-1}, respectively. The reversible capacity in the second cycle is almost stable and maintained at about 311.6 mAh g^{-1}. The results demonstrate that the material can be used as a promising anode candidate for NIBs.

1. H. Pan, Y.-S. Hu and L. Chen, *Energy Environ. Sci.*, 2013, **6**, 2338-2360.