Carbon nanotube/Nano-graphene Conductive Additives in Lithium Ion Batteries

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Lithium ion batteries (LIBs)[1] have grown to become the main power storage solution for 3C technologies and electrical vehicles since they were first successful commercialized by Sony in 1991. LIBs generally produce an average cell voltage of 3.7-4.2 V and operate on the relatively simple principle of reversible intercalation of Li ions in the cathode and anode. The electric energy is stored or released by repeating these intercalation reactions reversibly. The common used materials for the cathode are lithium metal oxides and some forms of carbon are generally used for the anode. Conductive additives, such as carbon black, graphite, are necessary in the cathode to improve the conductivity of lithium metal oxides. Recently, carbon nanotube (CNT) and graphene have been considered as good opportunities for LIBs additives due to their excellent conductivities.[2,3]

Graphene New Materials Technology company, based in Shenzhen, China, mainly works on the conductive additives and new nano Si/C anode materials in LIBs. We report here a new conductive additive using CNT/nano-graphene mixture to improve the performance of LIBs using $LiFePO_4$ (LFP) as cathode. The mixture of CNT/nano-graphene constitutes a highly conductive network (Figure 1a) on LFP surface by "line-surface" structure which helps lithium ions transfer through the network rapidly to access LFP materials. Charge/discharge curves of LFP/Li metal cell are shown in Figure 1b.

References

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Figures

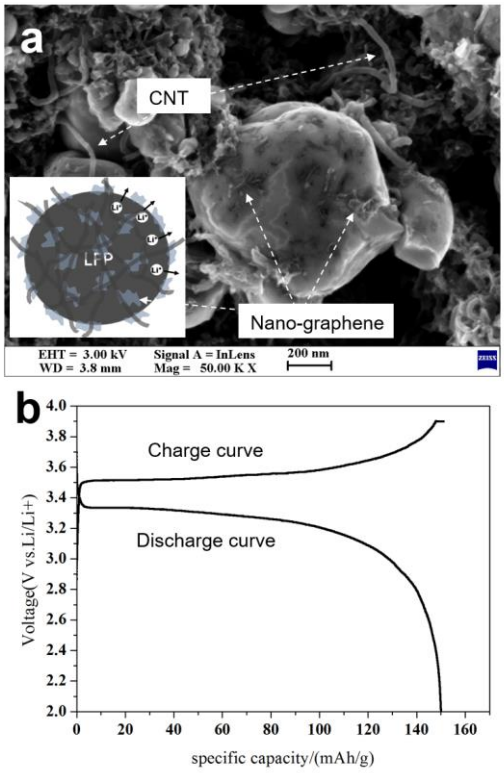

Figure 1: (a) SEM picture of CNT/Nano-graphene conductive additives in LFP cathode. Insert figure shows Li ions transfer through LFP surface rapidly between nano-graphene spaces. (b) Charge-discharge curves of LFP/Li metal cell.