



Spray Drying-Assisted Synthesis of Na₂FePO₄F/CB and Na₂FePO₄F/CNT Composite Cathodes for Lithium Ion Battery

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Abstract:

Fluorophosphates are considered among the most interesting series of cathode materials for Li/Na-ion batteries. Na₂FePO₄F, with layered structure and two-dimensional pathways for facile Na⁺/Li⁺ transport [1], exhibits minimal structural changes (3.7%) upon reduction/oxidation. The average working voltage is 3.3 V versus Li⁺/Li. However, one of the key drawbacks of Na₂FePO₄F electrodes is their low intrinsic electronic conductivity.

In this work, we report on the synthesis of Na₂FePO₄F by spray-drying, a technique which is easily scaled-up from the lab- to the industrial-scale and ensures a good homogeneity of all precursors. We are investigating the replacement of the grinding step by the addition of conductive carbon (carbon black and carbon nanotubes) to the solution containing the inorganic precursors of the Na₂FePO₄F phase in order to prepare Na₂FePO₄F/CB and Na₂FePO₄F/CNT with different ratios of CB and CNT (10 and 20%) and enhanced conductivity. The electrochemical performance shows that the addition of CNT improves remarkably the capacity of the NFPF electrode material thanks to better CNT dispersion inside and at the surface of the NFPF particles which enhances the electronic conductivity.

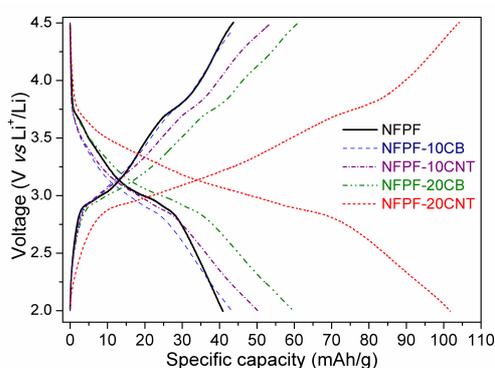


Figure 1. Comparison of selected discharge/charge curves registered during the cycling of NFPF based electrode materials at C/10 at 25 °C in the voltage range of 2.0-4.5V.

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References

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