

Mono-dispersed multi-doped LiFePO₄/C nanoparticles as a cathode material for lithium-ion batteries

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Ni-Co-Mn doped LiFePO₄/C has been prepared from the spent electroless nickel plating bath, ferrous oxalate and lithium carbonate. A plausible formation mechanism of the multi-doped LiFePO₄/C is proposed. XRD and Rietveld refinement confirm that Ni, Co and Mn have been successfully incorporated in the LiFePO₄ crystal. SEM and laser particle size analyses verify that the material synthesized at 700 °C for 10 h consists of narrow-distribution mono-dispersed grape-like nanoparticles. The charge-discharge tests demonstrate that the material delivers initial discharge specific capacities of 167.5, 152.3 and 116.8 mAh·g⁻¹ at 0.2 C, with the capacity retentions of 99.7%, 99.0% and 98.9% after 50 cycles at 25, 0 and -20 °C, respectively.

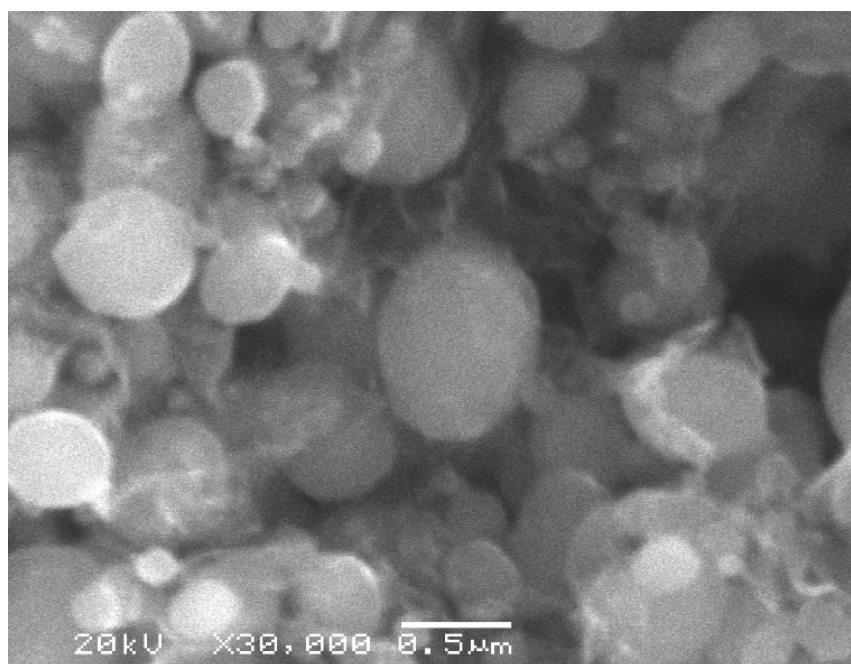


Fig. 1 A SEM image of the sample

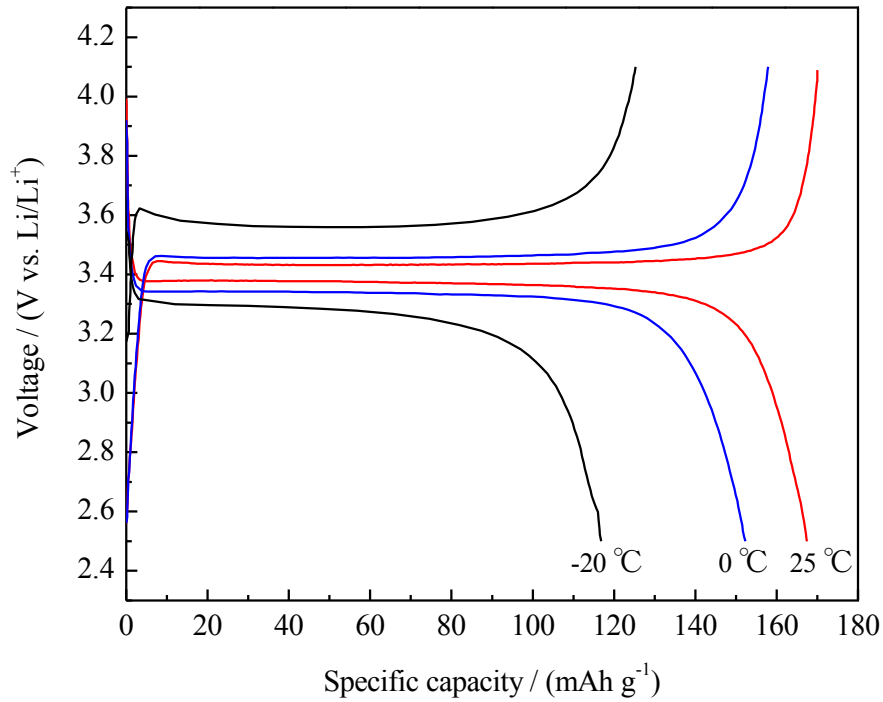


Fig. 2 Initial charge-discharge curves of the sample at 0.2 C at different temperatures.

References.

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