

Formic acid as additive for the preparation of high-performance FePO₄ materials by spray drying method

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ABSTRACT:

High-performance ferric phosphate (FePO₄), with well-defined ellipsoid morphology and uniform particle size distribution, is successfully fabricated via a green spray drying method with formic acid as additive. It is found that the added formic acid plays a crucial role for the formation of the well-distributed FePO₄ particles. Benefited by the outstanding structure and properties of ferric phosphate prepared above, a high performance of lithium iron phosphate (LiFePO₄) has been prepared. It exhibits high capacity, especially at high charging/discharging rate (158.4 mAh g⁻¹ at 0.2 C and 107.3 mAh g⁻¹ at 10 C), and excellent cycling stability (without capacity fading after cycling for 200cycles at 1 C). All these impressive electrochemical performance could be ascribed to the FePO₄ precursor, and further attributed to the addition of formic acid, which may play as a template, resulting in the well-defined morphology, uniform particles size distribution, hierarchical pore structure, and high surface area of the ferric phosphate.