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喷雾干燥-高温固相法制备纳米$LiFePO_4$与$LiFePO_4$/C材料及性能研究（英文）

Preparation and Characterization of Nano-particle $LiFePO_4$ and $LiFePO_4$ /C by Spray-drying and Post-annealing Method

中文关键词：磷酸铁锂；纳米粒子；喷雾干燥；正极材料

英文关键词：$LiFePO_4$; nano-particle; spray-drying; cathode materials

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中文摘要：

采用喷雾干燥-高温固相法制备纳米$LiFePO_4$与$LiFePO_4$/C正极材料，用X-射线衍射，扫描电镜等对合成材料进行了表征，并对以$LiFePO_4$为正极的电池进行了电化学性能测试。结果表明:材料合成最佳煅烧温度为600 ℃;合成过程中由于碳对$LiFePO_4$晶型的生长有一定的抑制作用，相对于纯$LiFePO_4$材料，$LiFePO_4$/C材料粒径更小;并且，在此最佳合成温度下合成的LiF

英文摘要：

Pure, nano-sized $LiFePO_4$ and $LiFePO_4$/C cathode materials were synthesized by spray-drying and post-annealing method. The crystalline structure, morphology of particles were investigated by X-ray diffraction, scanning electron microscopy. The electrochemical performances of the sample were also measured. The results show that the optimum processing conditions are thermal treatment for 10 h at 600 ℃. Compared with $LiFePO_4$, $LiFePO_4$/C particles are smaller in size due to the inhibition of crystal growth to a great extent by the presence of carbon in the reaction mixture. The $LiFePO_4$/C composite compound is also found to exhibit good electrode properties with discharge capacities of 139.4, 137.2, 133.5 and 127.3 $mAh \cdot g^{-1}$ at C/5, 1C, 5C and 10C rates, respectively. In addition, it shows excellent cycle stability at different current density. Even at a high current density of 10C, the discharge capacity of 117.7 $mAh \cdot g^{-1}$ is obtained (92.4% of its initial value) with only a low capacity fading of 0.15% per cycle.

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