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研究论文

纳米LiFePO$_{4}$/C复合正极材料的溶剂热合成

田俐[1,2], 黄可龙[1]

1.中南大学化学化工学院 长沙 410083
2.湖南科技大学材料科学与工程系 湘潭 411201

摘要: 采用乙二醇溶剂热法, 以蔗糖为碳源, 制备了橄榄石型纳米级LiFePO4/C复合正极材料, 对其物相、形貌、结构、成分和性能进行了表征。结果表明, 所制备的纳米LiFePO4/C的形貌为棒状, 直径约为100 nm, 结晶度高、分散性好。LiFePO4的粒径细化和掺碳有利于提高LiFePO4正极材料的电化学性能, 其首次充放电比容量(0.1 C)分别为166 mAh•g-1和164 mAh•g-1, 充放电电压平台分别为3.45 V和 3.40 V; 在5 C大倍率放电下, 经过20次循环, 其比容量保持率为95.4%。

关键词: 材料合成与加工工艺 溶剂热 LiFePO4/C 纳米材料 电化学性能

Solvothermal Synthesis of Nanometer LiFePO4/C Composite Cathode Materials

TIAN Li [1,2], HUANG Kelong[1]

1.School of Chemistry and Chemical Engineering, Central South University, Changsha 410083
2.Department of Material Science and Engineering, Hunan University of Science and Technology, Xiangtan 411201

Abstract: Nanosized LiFePO4/C composite cathode materials have been synthesized via solvothermal method, using sucrose as carbon source and glycol as solvent. The phase, morphology, structure, composition and performance of LiFePO4/C powders were characterized. The results show that LiFePO4/C composite has uniform nanorod morphology with the diameter of about 100 nm, well-crystallinity and monodispersion. Galvanostatic charge-discharge tests showed that the size-reducation and carbon-coating of LiFePO4/C nanograins are in favor of optimizing the electrochemical performance of LiFePO4 positive materials. The first charge and discharge specific capacities of 166 mAh • g−1 and 164 mAh • g−1 were obtained at 0.1 C, while the voltage platforms were 3.45 V and 3.40 V, respectively. The nanosized LiFePO4/C composite cathode materials retained high stability after 20 cycles at 5 C, with the specific capacity retention up to 95.4%.

Keywords: synthesizing and processing technics solvothermal synthesis LiFePO4/C nanomaterials electrochemical properties

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通讯作者: 田俐

作者简介:

通讯作者E-mail: tianli_cl@163.com

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