

研究论文

以 Fe_2O_3 为原料制备 LiFePO_4/C 复合材料及其性能研究

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摘要 以 Fe_2O_3 为铁源原料, 利用热还原法成功地制备了 LiFePO_4/C 复合材料. 用XRD以及SEM对材料的晶体结构以及表面形貌进行了表征. 通过循环伏安和充放电测试研究了材料的电化学性能. 研究表明, 于 $700\text{ }^\circ\text{C}$ 下制备的 LiFePO_4/C 复合材料在 0.1C 的倍率下可以得到放电容量 $144.8\text{ mA}\cdot\text{h/g}$, 在循环160次后, 容量仍保持在 $141.4\text{ mA}\cdot\text{h/g}$. 这种以廉价的 Fe_2O_3 代替目前常用的二价铁盐原料方法, 具有减少 LiFePO_4 合成成本的优点.

关键词 [Fe₂O₃](#); [LiFePO₄](#); 锂离子电池

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Preparation and Properties of LiFePO_4/C Composite Materials with Fe_2O_3 as Starting Reactant

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Abstract LiFePO_4 was considered as a new kind of cathode material candidate for lithium ion batteries due to its advantages. LiFePO_4/C composites were successfully prepared from Fe_2O_3 via solid state reaction by a thermal reduction method in $\text{Ar}+5\%$ (volume fraction) H_2 atmosphere. The crystal structure and electrochemical behavior of the materials were investigated using XRD, SEM, CV and charge/discharge cycle measurements. Based on the results of TGA-DTA, LiFePO_4/C composites were synthesized at different temperatures, and it was found that the LiFePO_4/C composites synthesized at $700\text{ }^\circ\text{C}$ with 8.76% mass fraction carbon content presented the initial discharge capacity of $144.8\text{ mA}\cdot\text{h/g}$ at 0.1C , and after 160 cycles, the capacity remained as $141.4\text{ mA}\cdot\text{h/g}$. The method is available due to the low cost of Fe_2O_3 instead of using bivalent ferrous compound.

Key words [Fe₂O₃](#)- [LiFePO₄](#)- [Lithium ion battery](#)

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