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不同碳源对$Li_3V_2(PO_4)_3$正极材料性能的影响

唐安平[1, 2]，王先友[1]，伍 文[1]，曹俊琪[1]，胡 涛[1]

(1. 湘潭大学 化学学院，湘潭 411105； 2. 湖南科技大学 化学化工学院，湘潭 411201)

摘 要： 通过碳热还原法合成掺碳锂离子电池正极材料单斜$Li_3V_2(PO_4)_3$，用XRD、SEM及电化学测试等方法对材料的结构、形貌和电化学性能进行表征和测试，探讨石墨、乙炔黑以及蔗糖3种碳源对材料性能的影响，并分析不同碳源对材料性能影响的原因。结果表明，碳源的选择对产物的结构和电化学性能有很大的影响。以蔗糖为碳源制备的单斜$Li_3V_2(PO_4)_3$正极材料具有粒径小、电荷转移阻抗小等优点，获得了较好的电化学性能，当电压范围为3.0~4.3和3.0~4.8 V时，其初始容量分别为127.8和166.2 mA·h/g，30次循环后放电比容量分别为124.2和143.3 mA·h/g。

关键字： $Li_3V_2(PO_4)_3$；正极材料；碳源

Effects of different carbon sources on performance of $Li_3V_2(PO_4)_3$ cathode materials

TANG An-ping[1, 2], WANG Xian-you[1], WU Wen[1], CAO Jun-qi[1], HU Tao[1]

(1. School of Chemistry, Xiangtan University, Hunan 411105, China; 2. School of Chemistry and Chemical Engineering, Hunan University of Science and Technology, Hunan 411201, China)

Abstract: The carbon-doped monoclinic $Li_3V_2(PO_4)_3$ materials were synthesized by carbothermal reduction method. The crystal structures, morphologies and the electrochemical performances were characterized by XRD, SEM and electrochemical measurement. The effects of different carbon sources, such as graphite, acetylene black and sucrose, on the performance of as-synthesized cathode materials were investigated and the causes were also analyzed by impedance spectra and SEM. The results show that the carbon source exerts a significant influence on the structures and electrochemical properties of the materials. The material carbon-doped by sucrose has the best electrochemical performance due to smaller particles and lower charge-transfer resistance. In the voltage range of 3.0−4.3 and 3.0−4.8 V, the sample displays the initial capacity of 127.8 and 166.2 mA·h/g, respectively, and after 30 cycles, the discharge capacities are 124.2 and 143.3

mA·h/g, respectively.

Key words: $Li_3V_2(PO_4)_3$; cathode materials; carbon sources

地 址：湖南省长沙市岳麓山中南大学内 邮编： 410083

电 话： 0731-8876765，8877197，8830410 传真： 0731-8877197

电子邮箱： f-ysxb@mail.csu.edu.cn