化学学报 2007 65 (2): 147～151 ISSN: 0567-7351 CN: 31-1320/06

研究论文

层状$Li(Ni_{1/3}Co_{1/3}Mn_{1/3})O_2$正极材料的合成与电化学性能研究

钟辉*,[1], 许惠[2]

([1]成都理工大学材料与化学工程学院 成都 610059)

([2]重庆工商大学环境与生物工程学院 重庆 400067)

收稿日期 2006-4-14 修回日期 2006-6-13 网络版发布日期 2007-1-12 接受日期 2006-9-14

摘要 采用共沉淀-喷雾造粒法制备前驱体, 于750 ℃在空气中煅烧20 h合成出层状$Li(Ni_{1/3}Co_{1/3}Mn_{1/3})O_2$正极材料, 并用XRD, SEM, 粒度分析和电性能测试考察了所得材料结构、形貌及电化学性能. 本层状$Li(Ni_{1/3}Co_{1/3}Mn_{1/3})O_2$正极材料具有$\alpha$-$NaFeO_2$结构, 六方晶系, $R3m$空间群, 其晶胞参数为a＝0.2865 nm, c＝1.4238 nm. 当材料分别在2.8～4.2, 2.8～4.5 V间进行充放电时, 其首次放电容量分别为173.5和185.4 mAh•g^{-1}, 首次充放电效率分别为90%和83.8%, 40次循环后容量保持率分别为96%和84%.

关键词 锂离子电池 正极材料 $Li(Ni_{1/3}Co_{1/3}Mn_{1/3})O_2$

分类号

Synthesis and Electrochemical Characterization of Layered $Li(Ni_{1/3}Co_{1/3}Mn_{1/3})O_2$ Cathode Material

ZHONG Hui*,[1], XU Hui[2]

([1] *College of Material and Chemical Engineering, Chengdu University of Technology, Chengdu 610059*)

([2] *Chongqing Technology and Business University, Chongqing 400067*)

Abstract The precipitate-spray method was used to prepare the precursor. The layered $Li(Ni_{1/3}Co_{1/3}Mn_{1/3})$-$O_2$ cathode material for lithium ion batteries was synthesized in air atmosphere at 750 ℃ for 20 h from the precursor. XRD analysis, SEM and electrochemical tests were used to characterize the structure, appearance and electrochemical performances of the aimed material. The hexagonal layered $LiNi_{0.5}Mn_{0.5}O_2$ has an α-$NaFeO_2$ structure and space group $R3m$ with lattice parameters of a＝0.2865 nm, c＝1.4238 nm. Initial discharge capacities of 173.5 and 185.4 mAh•g^{-1} were obtained in the range 2.8～4.2, 2.8～4.5 V, respectively. 96% and 84% of the initial discharge capacities were reserved after 40 cycles at each charge-discharge voltage.

Key words lithium-ion battery cathode material layered $Li(Ni_{1/3}Co_{1/3}Mn_{1/3})O_2$

DOI:

通讯作者 钟辉 zhongh@cdut.edu.cn