中国有色金属学报
中国有色金属学报(英文版)
中国科学技术协会 主管
中国有色金属学会 主办

论文摘要

中国有色金属学报
ZHONGGUO YOUSEJINSHUXUEBAO XUEBAO
第19卷 第1期 (总第118期) 2009年1月

[PDF全文下载] [全文在线阅读]

文章编号：1004-0609(2009)01-0101-07

正极材料$Li(Ni_{1/3}Co_{1/3-x}Mn_{1/3})M_xO_2$(M=Ti, Mg)的合成及性能

杨 平，张传福，戴 曦，樊友奇，湛 菁，蒋伟燕

(中南大学 冶金科学与工程学院，长沙 410083)

摘 要： 采用草酸盐前驱体合成Ti^{4+}、Mg^{2+}掺杂正极材料$Li(Ni_{1/3}Co_{1/3-x}Mn_{1/3})M_xO_2$(M=Ti, Mg)。利用XRD和SEM对其结构和形貌进行表征，并采用循环伏安、交流阻抗、恒流/恒压充放电测试其电化学性能。结果表明：Ti^{4+}、Mg^{2+}掺杂后晶胞体积增大，大倍率充放电时$LiNi_{1/3}Co_{1/3}Mn_{1/3}O_2$的电化学反应阻抗$R_{ct}$降低，其大倍率充放电性能得到改善，$Ti^{4+}$掺杂效果更好；当掺杂量$x$=0.025时，材料晶型完整，具有单一的$a$-$NaFeO_2$层状结构；1$C$倍率时$Li(Ni_{1/3}Co_{1/3-0.025}Mn_{1/3})Ti_{0.025}O_2$的第二循环放电容量为143.2 mA·h/g，2$C$时为128.0 mA·h/g，经100次循环后容量分别为132.5和115.8 mA·h/g，容量保持率为92.53%和90.47%。

关键字： $LiNi_{1/3}Co_{1/3}Mn_{1/3}O_2$；锂离子电池；正极材料；电化学性能

Synthesis of $Li(Ni_{l/3}Co_{l/3-x}Mn_{l/3})M_xO_2$(M=Ti, Mg) cathode material by oxalate precursor and its properties

YANG Ping, ZHANG Chuan-fu, DAI Xi, FAN You-qi, ZHAN Jing, JIANG Wei-yan

（School of Metallurgical Science and Engineering, Central South University, Changsha 410083, China）

Abstract: Cathode materials of $Li(Ni_{l/3}Co_{l/3-x}Mn_{l/3})M_xO_2$(M=Ti, Mg) were prepared from oxalate precursor. The structures and morphologies of the synthesized samples were characterized by XRD and SEM. The electrochemical performance were tested by cyclic volt-ampere (CV), AC impedance and constant current/constant voltage charge-discharge measurement. The results show that the crystal volume of sample increases with the doping of Ti^{4+} or Mg^{2+}. The electrochemical reaction resistant R_{ct} decreases at high rates, thus improving the high rate charge-discharge properties of the materials. The effect of Ti^{4+} doped is better than that of Mg^{2+} doped. The sample is well crystallized and simple pure phase with a-$NaFeO_2$ layered structure when doping quantity x=0.025. The second specific discharge capacity of Li

($Ni_{1/3}Co_{1/3-0.025}Mn_{1/3}$)$Ti_{0.025}O_2$ is 143.2 mA·h/g at 1*C*, 128.0 mA·h/g at 2*C*, and still remains 132.5 and 115.8 mA·h/g after 100 cycles, respectively, keeping capacity of 92.53% and 90.47%.

Key words: $LiNi_{1/3}Co_{1/3}Mn_{1/3}O_2$; lithium-ion batteries; cathode materials; electrochemical performance

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