Influence of sintering atmosphere on the performance of LiNi\textsubscript{0.75}Co\textsubscript{0.25}O\textsubscript{2} cathode materials for lithium ion batteries

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Abstract: The cathode materials, LiNi\textsubscript{0.75}Co\textsubscript{0.25}O\textsubscript{2}, for lithium ion batteries were synthesized at oxygen and air atmospheres, respectively, by sol-gel method. The materials were studied by powder X-ray diffraction (XRD), analyzed by Rietveld structure refinement method and examined by performing electrochemical charge-discharge measurements. The effects of sintering atmosphere on the structure and electrochemical properties of LiNi\textsubscript{0.75}Co\textsubscript{0.25}O\textsubscript{2} were discussed based on the experimental results. It was confirmed that the electrochemical performance of LiNi\textsubscript{0.75}Co\textsubscript{0.25}O\textsubscript{2} prepared at O\textsubscript{2} atmosphere was better than that of which at air atmosphere. Further interpretation in the influence of atmosphere was provided by carrying out the Rietveld structure refinement analysis.

Key words: lithium ion batteries; cathode materials; Rietveld structure refinement; electrochemical performance
1 实验
1.1 LiNi_{0.5}Co_{0.5}O_2 的合成

1.2 XRD 实验和 Rietveld 结构精修

1.3 电极的制备和电池的组装

1.4 充放电性能测试

2 结果与讨论
电 源 技 术

量衰减率都比氧气中合成的大得多

图

进行全峰拟合

这与结构分析的推测相符

化合物电极首次循环性能衰减的主要原因之一

化学计量比远优于空气气氛中合成的材料

并进一步证实了

材料的循环性能越差

因为中子衍射试验

位置的过渡金属离子是

从而造成嵌锂量减少

所以在空气中合成的电池正极材料

越多其合成的材料越偏离其化学计量

9Q 

8R

8Z

初始放电容量为

3 a

196 mAh/g

1

3 a

3 a

0 0

NiCo

LiNi_{1/3}Co_{2/3}O_2

LiNi_{1/3}Co_{2/3}O_2

(a)

(b)

(c)

(d)

表 1  LiNi_{1/3}Co_{2/3}O_2的XRD Rieveld结构精修结果

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3 结论

XRD Rieveld

LiNi_{1/3}Co_{2/3}O_2

LiNi_{1/3}Co_{2/3}O_2

196 mAh/g

3 a Ni^{2+}

参考文献:

[1] LiNiO

[2] LiNi_{1/3}Co_{2/3}O_2


[7] LiNi_{1/3}Co_{2/3}O_2

[8] LiNi_{1/3}Co_{2/3}O_2

[9] LiNi_{1/3}Co_{2/3}O_2


