

# Li [Li<sub>1/9</sub>Ni<sub>1/3</sub>Mn<sub>5/9</sub>] O<sub>2</sub> 的制备及性能研究

万新华, 余仲宝, 王 静, 刘庆国

(北京科技大学固体电解质研究室, 北京 100083)

摘要: 用共沉淀工艺制备出锰镍复合氢氧化物 [M(OH)<sub>2</sub>, M=Mn 和 Ni], 利用该复合氢氧化物先驱体和锂盐球磨混均后, 高温焙烧, 然后利用液氮淬火合成出一种新型的锂离子电池正极材料 Li [Li<sub>1/9</sub>Ni<sub>1/3</sub>Mn<sub>5/9</sub>] O<sub>2</sub>。通过 SEM、XRD 和电化学性能测试, 发现该材料具有较大的表面积和层状结构, 同时表现出较高的充放电容量、较佳的循环性能和较好的结构稳定性。用锂片和 Li [Li<sub>1/9</sub>Ni<sub>1/3</sub>Mn<sub>5/9</sub>] O<sub>2</sub> 分别作为负极和正极组装成扣式电池, 在 2.00~4.60 V 之间、充放电电流为 30 mA/g 条件下进行了循环测试, 结果表明: 这种材料首次放电容量可高达 200 mAh/g 以上, 15 次循环后容量保持率为 88.9%。

关键词: 锂离子电池; 正极材料; Li [Li<sub>1/9</sub>Ni<sub>1/3</sub>Mn<sub>5/9</sub>] O<sub>2</sub>; 层状结构; 循环性能

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## Synthesis and performance of Li [Li<sub>1/9</sub>Ni<sub>1/3</sub>Mn<sub>5/9</sub>] O<sub>2</sub> cathode materials

WAN Xin-hua, YU Zhong-bao, WANG Jing, LIU Qing-guo

(Solid Electrolyte Laboratory, University of Science and Technology Beijing, Beijing 100083, China)

**Abstract:** M(OH)<sub>2</sub> (M=Mn, Ni) which could be used as a precursor were prepared by co-precipitation technique. The precursor was mixed uniformly with LiOH and the mixture was sintered at high temperature. Then the Li [Li<sub>1/9</sub>Ni<sub>1/3</sub>Mn<sub>5/9</sub>] O<sub>2</sub> which could be used as a new-type cathode material for lithium-ion batteries was synthesized by quenching with liquid nitrogen. The SEM, XRD and electrochemical performance test results showed that the compound had large surface area, a layered structure, high discharge capacity, excellent cycling performance, and good structure stability. Two-electrode button cells were assembled by using lithium foil and Li [Li<sub>1/9</sub>Ni<sub>1/3</sub>Mn<sub>5/9</sub>] O<sub>2</sub> as the anode and the cathode and cycled between 2.00 V and 4.60 V of a current of 30 mA/g, the synthesized material could deliver over 200 mAh/g in the first cycle and maintain 88.9% capacity retention after 15 cycles.

**Key words:** Li-ion batteries; cathode material; Li [Li<sub>1/9</sub>Ni<sub>1/3</sub>Mn<sub>5/9</sub>] O<sub>2</sub>; layered structure; cycling performance