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论文

聚1,5-二氨基蒽醌二次锂电池正极材料研究

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摘要 采用化学氧化方法合成了聚1,5-二氨基蒽醌(PDAAQ)并用于二次锂电池. 借助红外光谱确定其分子结构, 实验测得材料的平均粒径为7. 9μm, 比表面积为8. 9m^2. g^{-1}, 具有0. 8 S. cm^{-1}的电导率, 符合作为电极材料使用的基本要求; 电化学测试表明, 作为二次锂电池正极材料使用时, 聚合物重复单元中除了醌基团与Li^+所发生的电化学氧化还原反应外, 聚苯胺导电骨架也对PDAAQ的能量密度和循环性产生贡献. 充放电曲线则进一步确定了聚苯胺骨架与醌基团协同作用的存在, 实验表明, 在$Li(CF_3SO_2)_2N$/PC+DGDM电解液中, 基于活性材料PDAAQ的首次放电容量达到221 mAh. g^{-1}, 经过40次充放电循环, 容量保持率为80%, 因此聚1,5-二氨基蒽醌具有较大应用潜力.

关键词 聚1 5-二氨基蒽醌 正极 锂电池

分类号

POLY(1,5-DIAMINOANTHRAQUINONE) AS CATHODE MATERIAL IN RECHARGEABLE LITHIUM BATTERIES

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Abstract Poly(1,5-diaminoanthraquinone)(PDAAQ)was synthesized by a chemical oxidation method and used as cathode material in rechargeable lithium batteries. IR spectrum confirms its molecular constitute. Experiment results show that the particle size $d_{0.5}$ is 7. 9 μm and PDAAQ has the specific surface area of 8. 9 $m^2 \cdot g^{-1}$,also its conductivity is 0. 8 $S \cdot cm^{-1}$. All of these properties satisfy the requirement of being used as cathode material. When used in rechargeable lithium batteries,the capacity and cycle performance are contributed by the cooperating effect of the quinonc group and polyaniline skeleton,which is proved troush the charge—discharge experiment. It is found that in $Li(CF_3SO_2)_2N$ / PC-DGDM electrolyte system PDAAQ's first discharge capacity is 221 $mAb \cdot g^{-1}$ which reduces to 177 $mAh \cdot g^{-1}$ with 80% capacity retention after 40 cycles. Therefore PDAAQ is a very promising cathode material for rechergeable lithium batteries.

Key words Poly（1 5-diaminoanthraquinone） Cathode Lithium batteries

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