

论文

太西煤的石墨化改性及其锂离子电池负极性能

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摘要:

采用石墨化炉对太西煤进行石墨化处理。以沥青为前躯体采用液相包覆的方法实现表面包覆并经高温(1 000 ℃)炭化处理, 制备具有核壳结构的炭石墨复合材料。经过电化学表征, 首次可逆比容量为330.4 mAh/g, 首次库伦效率为90%, 50个循环后容量仍保持在90%。通过对石墨化处理后太西煤的微观结构和包覆炭层的表征分析, 认为石墨化太西煤具有类似微晶石墨的微观结构, 有利于锂离子的嵌入脱出, 包覆炭层减少了比表面积, 减少了表面不可逆反应以及固体电解质中间相膜(SEI膜)的生成, 同时在循环过程中起到缓冲作用, 保证了石墨化太西煤结构的稳定。

关键词: 石墨化太西煤; 沥青包覆; 负极材料

Preparation of graphitized Taixi coal and its electrochemical properties

Abstract:

Graphitized Taixi coal (GC) was performed by a graphitization furnace. The carbon coating GC was prepared by liquid phase mixing of GC with pitch. After carbonization in 1 000 ℃, carbon coating GC has the core shell structure, which means the core is GC and the shell is carbon. As the anode materials in lithium ion rechargeable batteries, carbon coating GC shows a reversible capacity of 330.4 mAh/g and cycle efficiency of 90% in the first cycle, the reversible capacity also reaches 90% after 50 cycles. Base on the SEM results, XRD data and Ramam spectrums of GC and CGC, the results demonstrate that GC has the similar microstructure with microcrystal graphite, intercalation/de-intercalation of lithium ion can be profitable. The higher lithium storage property of carbon coated GC is achieved due to reduced surface area and irreversible action, the cycle performance is improved because the carbon shell can buffer the volumetric change of graphite in cycles, and keep the stability of the core shell structure.

Keywords: graphitized Taixi coal; pitch coating; anode materials

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