



溶剂热法合成纳米立方状 Co_3O_4 及其电容特性研究 Solvothermal Synthesis and Capacitance Performance of Co_3O_4 Nanocubes

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中文关键词: 纳米立方状 Co_3O_4 ; 超级电容器; 溶剂热法

英文关键词: Co_3O_4 nanocubes; supercapacitor; solvothermal method

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中文摘要:

以聚乙二醇为分散剂, 在水-正丁醇体系中采用溶剂热法合成纳米立方状 Co_3O_4 。采用IR、XRD和TEM等手段对前驱物及产物的物相和形貌进行表征, 对溶剂热法合成 Co_3O_4 的反应机理进行初步研究, 并以Scherrer公式计算出样品平均晶粒尺寸为21.6 nm。通过循环伏安、恒流充放电、交流阻抗等测试对 Co_3O_4 电极的电化学性能进行表征。结果表明, 在 $2 \text{ mol} \cdot \text{L}^{-1}$

英文摘要:

Co_3O_4 nanocubes were synthesized by solvothermal method using polyethylene glycol 20 000 as dispersant in water and n-butanol solvent system. The structure and morphology of the precursor and product were characterized by IR, X-ray diffraction(XRD) and transmission electron microscopy(TEM). The formation mechanism of Co_3O_4 was also discussed preliminary. The average grain size of the product was 21.6 nm calculated by Scherrer formula. Electrochemical properties of Co_3O_4 electrode were performed by cyclic voltammetry(CV), galvanostatic charge/discharge and alternating current(AC) impedance method. The results indicate that the Co_3O_4 nanocubes show excellent capacitive performance, charge/discharge ability at high current density and cycling stability in $2 \text{ mol} \cdot \text{L}^{-1}$ KOH electrolyte in the potential range of $-0.4 \sim 0.46 \text{ V}$ (vs SCE). The initial specific capacitance of single Co_3O_4 electrode reaches $333.21 \text{ F} \cdot \text{g}^{-1}$ and 69% is maintained after 1 000 cycles. The phase transformation of Co_3O_4 before and after cycling was studied by XRD test. The results indicate that the cubic phase of Co_3O_4 is maintained after 1 000 cycles.

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