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论文

采用凝胶注模工艺低温合成锶掺杂的锰酸镧粉体

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摘要:

以氧化物和碳酸盐为原料,采用凝胶注模工艺成功合成了固体氧化物燃料电池的阴极材料: $(La_{0.8}Sr_{0.2})_{0.9}MnO_{3-\delta}$ (LSM).利用TGA、DTA和XRD等测试手段分析煅烧温度对所得粉体结晶相组成的影响.研究结果表明:由于凝胶湿坯体在干燥过程中三维有机网络结构发生强烈收缩使得原料粉体颗粒紧密接触,这有利于固相扩散反应的进行,因此凝胶注工艺合成的粉体完全形成钙钛矿结构晶相的温度比传统固相反应法合成的粉体低了近150℃.此外,还研究了凝胶注模工艺合成的LSM粉体制备的LSM阴极在不同温度下烧结后的电化学催化性能.

关键词: $(La_{0.8}Sr_{0.2})_{0.9}MnO_{3-\delta}$; 凝胶注模; 固相反应; 固体氧化物燃料电池

Synthesis of $(La_{0.8}Sr_{0.2})_{0.9}MnO_{3-\delta}$ powder by a gel-casting technique as cathodes for solid oxide fuel cells

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Abstract:

$(La_{0.8}Sr_{0.2})_{0.9}MnO_{3-\delta}$ (LSM) powders were successfully synthesized via a gel-casting technique and traditional solid state reaction method by using oxide and carbon as raw materials. The perovskite phase formation temperature of LSM powders synthesized by the gel-casting technique was about 850℃, which is nearly 150℃ lower than that of LSM powders synthesized by the conventional solid-state reaction route. The significantly reduced phase formation temperature of the gel-casting LSM powder was most likely due to the homogeneously distributed and immobilized precursor particles in a polymeric network, which promoted the sintering and crystallization process. Furthermore, the electrochemical catalytic performance of LSM electrodes prepared by LSM powders synthesized gel-casting technique and sintered at different temperature was also investigated in detail.

Keywords: $(La_{0.8}Sr_{0.2})_{0.9}MnO_{3-\delta}$; gel-casting; solid state reaction; solid oxide fuel cell

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