

热能工程

熔融碳酸盐燃料电池烧结电极制备方法

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摘要: 该文探讨一种环保的、可连续生产的适合熔融碳酸盐燃料电池(molten carbonate fuel cell, MCFC)使用要求的烧结电极制备方法, 以泡沫镍和冲孔镀镍钢带为支撑体, 聚乙烯醇与羧甲基纤维素钠的混合溶液作为黏结剂, T255羰基镍粉为导电活性材料, 运用拉浆法在不同的烧结温度下制备MCFC电极。在此基础上, 采用煤油浸入法测量了制备电极的孔隙率, 利用扫描电镜分析电极的微观形貌, 通过热重分析仪测试镍浆的失重和热流变化, 并对组装后MCFC中电极的电化学性能进行测试。测试结果表明, 以镀镍钢带为支撑体的电极较泡沫镍电极具有更好的强度和电化学性能, 在一定的烧结条件下, 采用拉浆工艺能够制备满足MCFC要求的电极。

关键词: 熔融碳酸盐燃料电池 烧结电极 冲孔镀镍钢带 黏结剂 制备方法

A Preparation Method of Electrodes for the Molten Carbonate Fuel Cell

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Abstract: In order to explore an environmentally friendly approach to produce sintered electrodes that could be prepared continuously and could meet the requirements of MCFC, pasting slurry technique was adopted at different sintering temperature with nickel or nickel-plated punched steel sheet being the supporting material in the electrodes, aqueous solution of polyvinyl alcohol (PVA) and Carboxymethyl cellulose sodium (CMC) as the agglomerant, and T255 nickel carbonyl as the active substrate. And then, some testing methods such as kerosene immersing and scanning electron microscope (SEM) were used to test the rate of hole and the pattern of the electrodes. In addition, Thermogravimetric method was employed to test the heat and mass change of nickel slurry and electrochemistry performance of the single cell in assembled molten carbonate fuel cell (MCFC). The testing results show that the punched steel sheet electrode has better strength and electrochemistry performance than that of foam nickel; therefore, pasting slurry technique could prepare excellent electrodes required by MCFC in definite sintering conditions.

Keywords: molten carbonate fuel cell (MCFC) sintered electrodes punched steel sheet agglomerant preparation method

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参考文献:

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2007,27(8): 94-98

2. 刘爱虢 翁一武.熔融碳酸盐燃料电池容阻特性建模与仿真[J]. 中国电机工程学报, 2009,29(29): 96-101
 3. 刘爱虢 翁一武.不同控制方式对熔融碳酸盐燃料电池/ 微型燃气轮机混合动力系统运行特性的影响[J]. 中国电机工程学报, 2009,29(35): 41-47
 4. 缙志斌 许世森 程健.三种流动型式的熔融碳酸盐燃料电池单体性能数值分析[J]. 中国电机工程学报, 2011,31(29): 67-73
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