**摘要**

利用固体氧化物电解池电解CO2制备CO，能够将冗余的电力转化CO2为有用的的合成气，不仅能够充分利用大量过剩的可再生能源电力，又能够很好地缓解碳排放造成的生态环境破坏的现况，做到变废为宝。

本文用8mol%氧化钇稳定的氧化锆（8YSZ）为电解质材料，氧化镍（NiO）为燃料极材料，镧锶锰氧（LSM）和镧锶钴铁（LSCF）为氧气极材料，用压片法制备了两种电池，连同用流延法制备的LSM为氧气极的燃料极支撑性电池一起分别在800℃、750℃、700℃三个温度下测试了电池的电化学阻抗谱（EIS）、固体氧化物燃料电池（SOFC）模式下以H2为燃料气的I-V曲线、I-P曲线，以及固体氧化物电解池（SOEC）模式下电解CO2的I-V曲线。通过对比发现，随着工作温度的升高，电池的总阻抗均出现下降的情况，SOFC、SOEC模式下的电流密度均增加，说明温度越高电化学性能越好。LSM和LSCF做为氧气极材料，在700℃至800℃之间电化学性能区别不大，但是LSM的极化阻抗远小于LSCF的极化阻抗，所以LSM作为氧气极材料性能更优。

关键词：固体氧化物电解池；电解CO2；电化学性能

**ABSTRACT**

The use of solid oxide electrolysis cell electrolysis of CO2 to produce CO, can be redundant power conversion of CO2 for the useful syngas, not only can make full use of a large number of excess renewable energy power, but also a good mitigation of carbon emissions caused by the ecological environment Destroy the status quo, so that turning waste into treasure.

In this paper, 8 mol% of yttria stabilized zirconia (8YSZ) was used as the electrolyte material, nickel oxide (NiO) as the fuel electrode material, lanthanum strontium manganese oxide (LSM) and lanthanum strontium cobalt iron (LSCF) were oxygen electrode materials. (EIS) was measured at 800 ℃, 750 ℃ and 700 ℃, respectively. The electrochemical impedance spectroscopy (EIS) of the battery was tested at the temperature of 800 ℃, 750 ℃ and 700 ℃, respectively. The electrochemical impedance spectroscopy (EIS) , IV curves of IP for fuel gas in solid oxide fuel cell (SOFC) mode, and IV curves for electrolysis of CO2 in solid oxide electrolysis cell (SOEC) mode. By comparison, it is found that the current density of the SOFC and SOEC modes increases with the increase of the working temperature, indicating that the higher the temperature, the better the electrochemical performance. LSM and LSCF as oxygen electrode materials, the electrochemical performance difference between 700 ℃ and 800 ℃ is not significant, but LSM polarization resistance is much smaller than the polarization resistance of LSCF, so LSM as oxygen electrode material performance is better.

Key words: solid oxide electrolytic cell; electrolytic CO2; electrochemical performance