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Preparation and Performance of Strontium-doped Lanthanum Ferrite Powder Used in Solid Oxide Electrolysis Cell Composite Anode

Abstract: A sol-gel self-propagating method was utilized to prepare strontium-doped lanthanum ferrite (LSF) powder. The LSF and yttria stabilized ZrO₂ (YSZ) composite materials were fabricated and used as the anodes of solid oxide electrolysis cell (SOEC). Their various properties were also investigated. Their chemical stability and microstructure were analyzed by X-ray diffraction (XRD), transmission electron microscopy (TEM), and scanning electron microscopy (SEM). The electrochemical performances of the materials were evaluated by anodic polarization tests. TEM results showed that the particle size of the prepared LSF powder with regular shape was about 20-50nm. SEM images of LSF-YSZ composite anodes sintered at 1200°C for 2 hours showed that the anode layer combined closely with the electrolyte and regular pores within the anodes were observed. In addition, the YSZ and LSF phases formed interconnected pore structures respectively. Finally, the electrochemical properties and thermal stabilities of the LSF-YSZ anode composites were investigated. The results showed that the composite anodes exhibited better catalysis activity and thermal cycle endurance.

Key words: solid oxide electrolysis cell (SOEC); composite anode; solgel self-propagating; electrochemical performance; laser particle size analyzer; particle size analyzer; aimsizer; as-2011 micron laser particle size analyzer; as-2012 submicron laser particle size analyzer

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