

High Temperature Electrolysis of Steam Using SOFC System

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Steam electrolysis with solid oxide cells is one of the most promising methods for hydrogen production with high efficiency. Because operating at high temperature reduces the electrical energy requirement for steam electrolysis. However there are some limits in choosing materials because of very high operating temperature. Recently, the developments are focused on the decreasing operation temperature with high ionic conductivity ceramic materials. In this study, the system performs all electrochemical functions using a single stack assembly with single button cell. The cells were made of yttria-stabilized zirconia electrolyte, nickel-zirconia cermet cathode and strontium-doped lanthanum manganite anode. Also some other cathode materials such as strontium-doped lanthanum cobalt ferrite (LSCF), strontium-doped lanthanum ferrite (LSF) and gadolinium doped ceria (GDC) were used for decreasing operating temperature of HTE system. The system performance was investigated in the different feed molar ratio, feed composition and intermediate temperature range (800 – 950 °C).