

Stability of air electrode in Solid Oxide Electrolysis Cell

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A steam electrolysis method using Solid Oxide Electrolysis Cell (SOEC) is re-emerging as the state-of-the-art technology since water molecules are easier to split into hydrogen and oxygen molecules at high temperature. SOEC utilizes the heat of high-temperature nuclear reactor. In addition, SOEC and SOFC (Solid Oxide Fuel Cell) can be reversibly operated to generate hydrogen and electricity. Similar cell components of SOFC and SOEC may generally be used. However, the flow of oxygen in opposite direction requires the understanding of different electrochemical reaction. The air electrode such as LSM (La,Sr)MnO₃ is stable in SOFC mode, however, it often delaminates from the electrolyte in SOEC mode. In this study, we have selected LSCF (La_{0.6}Sr_{0.4}Co_{0.2}Fe_{0.8}O_{3-δ}) as an air electrode and tested its possible use in both SOFC and SOEC modes. GDC (Gd_{0.2}CeO_{2-x}) was used interlayer between YSZ (8mol% yttria-stabilized zirconia) and LSCF.