Comparison Between LSCF-CGO and GSC-CGO Composite Cathodes On An CGO Electrolyte for IT-SOFC

Gopiraj Sivasundram[1] and John Kilner[1]

[1]Imperial College of Science, Techonology and Medicine
Department of Materails, Prince Consort Road
London SW7 2BP
UK

High temperature operation causes many serious materials problems; such as degradation of the components, a limited choice of materials, etc. With the drive to lower operating temperatures for the solid oxide fuel cell several critical components within each cell require further improvement. Arguably, the cathode is the component that requires the greatest improvement. Composite cathodes offer the possibility of developing a high performance electrode for intermediate temperature (500°C) SOFC operation. To this end the electrochemical properties of La0.6Sr0.4Co0.2Fe0.8O3-d (LSCF)/Ce0.8Gd0.2O2-d (CGO 20-80) composite cathodes and Gd0.6Sr0.4CoOxide (GSC)/ Ce0.8Gd0.2O2-d (CGO 20-80) on Ce0.9Gd0.1O2-d (CGO 10-90) have been investigated for use in intermediate temperature (500-700°C) solid oxide fuel cells, using AC impedance spectroscopy. Both these composite cathodes were sintered at 1000°C onto the electrolyte, however LSCF/CGO is very dense at 1000°C, hence pore formers (carbon) was used to promote porosity in this cathode. A CGO/LSCF/carbon composite cathode had an ASR value of 5 Wcm2 at 500°C and around 1 Wcm2 at 600°C. In contrast, GSC/CGO composite cathode had an ASR value of 3 Wcm2 at 500°C and around 0.4 Wcm2 at 600°C.