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Durability and performance of CGO barriers and LSCF cathode deposited by spray-pyrolysis

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ABSTRACT

$Ce_{0.9}Gd_{0.1}O_{1.95}$ (CGO) protective layers are prepared by two different methods to prevent the reaction between the $Zr_{0.84}Y_{0.16}O_{1.92}$ (YSZ) electrolyte and the $La_{0.6}Sr_{0.4}Co_{0.2}Fe_{0.8}O_{3-\delta}$ (LSCF) cathode. In the first method, the CGO layers are deposited by an airbrushing technique from an ink containing CGO particles without and with cobalt as sintering aids. The second strategy consists in preparing both a dense CGO barrier layer and a porous LSCF cathode by spray-pyrolysis deposition, in order to further reduce the fabrication temperature and minimize the reaction between the cell components. The samples prepared by spray-pyrolysis exhibit better performance and durability than those obtained by conventional sintering methods. The results suggest that the interfacial reactivity between YSZ and LSCF as well as the Sr-enrichment at the cathode surface can be avoided by using low-temperature fabrication methods and by operating at temperatures lower than 650 ºC.

Keywords: Solid Oxide Fuel Cells; $La_{0.6}Sr_{0.4}Co_{0.2}Fe_{0.8}O_{3-\delta}$; $Zr_{0.84}Y_{0.16}O_{1.92}$; CeO_2; spray-pyrolysis