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Influence of strontium-rich pore-filling phase on the performance of $La_{0.6}Sr_{0.4}CoO_{3-\delta}$ thin-film cathodes

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ABSTRACT

Nanoporous 1-µm thin $La_{0.6}Sr_{0.4}CoO_{3-\delta}$ (LSC) layers are deposited by spray pyrolysis and subsequently sintered at 600℃, 800℃, and 1000℃. A strontium- and oxyge n-rich phase can be found within the pore network, which appears at low sintering temperatures. This so-called “secondary phase” occupies up to 20.7 vol.% of the LSC films for the 600℃ annealing process. It does not hinder the electrochemical activity towards oxygen reduction of such layers that exhibit an area-specific resistance (ASR) as low as 0.13 Ω cm^2 at 600℃ in air. This result makes the spray pyrolysed LSC thin films promising candidates as intermediate-temperature solid oxide fuel cell cathodes. For higher sintering temperatures the secondary phase progressively disappears. A correlation between the inverse of the ASR and the whole LSC surface area (regardless of the presence of the secondary phase or not) is also evidenced. The increase of ASR with increasing sintering temperature is found to be primarily related to the exchange neutral flux density of the Sr-deficient LSC.

Keywords: thin films, spray pyrolysis, mixed ionic-electronic conductors, oxygen reduction, continuous phase size distribution (c-PSD)

[**Insert here table of parameters**]