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Abstract

Perovskite oxides $\text{La}_x\text{Sr}_{1-x}\text{Co}_{0.9}\text{Sb}_{0.1}\text{O}_{3-\delta}$ (LSCSbx, $x=0.0-0.8$) are investigated as IT-SOFC cathodes supported with $\text{La}_{0.9}\text{Sr}_{0.1}\text{Ga}_{0.8}\text{Mg}_{0.2}\text{O}_{3-\delta}$ (LSGM) electrolyte. All LSCSbx oxides have a tetragonal distorted perovskite structure with s.g. $P4/mmm$, while a $\text{La}_2\text{Co}_2\text{O}_5$ impurity phase was observed within La doping levels at $x=0.6-0.8$. The LSCSb0.4 has a good chemical compatibility with LSGM electrolyte for temperatures up to 1050 °C. XPS examinations indicate the existence of $\text{Co}^{3+}/\text{Co}^{4+}$ mixed valence states in LSCSbx. The conductivity increases with La doping and the LSCSbx with $x=0.4$ exhibits the highest electrical conductivity (e.g., 673–1637 S cm^{-1} at 300–850 °C). The thermal expansion coefficient (TEC) decreases from $25.89 \times 10^{-6} \text{ K}^{-1}$ for $x=0.0$ to $18.5 \times 10^{-6} \text{ K}^{-1}$ for $x=0.6$ at 30–900 °C. Among the LSCSbx compositions, the LSCSb0.2 exhibits the lowest polarization resistance (R_p),

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