# The effect of electrical polarization on solid oxide fuel cell cathode thin films

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The energy conversion efficiency of solid oxide fuel cells (SOFCs) can be improved by facilitating the oxygen reduction and exchange reactions at the cathode surface. Owing to the complexity of standard porous cathode structures, thin film cathodes were prepared by pulsed laser deposition as model surfaces. The goal of this research was to understand the sheet resistance and performance of these surfaces under applied cathodic polarization in relation to chemical and structural changes. Multi-variant epitaxial films of strontium-doped lanthanum manganite (LSM) and lanthanum iron cobaltite (LSCF) were grown on single crystal (001) oriented yttrium stablized zirconia (YSZ) or (111) YSZ substrates. A buffer layer of gadolinium-doped ceria (GDC) buffer was included between the LSCF and (001) YSZ. The applied cathodic potential driving the oxygen reduction reaction is limited to short distance from the metallic current collectors (CCs). The cell resistance (i.e., performance) and electrochemical stability are a function of the quality and geometry of the CCs in contact with the film surface. The extent of surface polarization in LSM and LSCF films is compared to investigate the effect of transference number and the performance stability is considered in terms of CCs and film morphology.