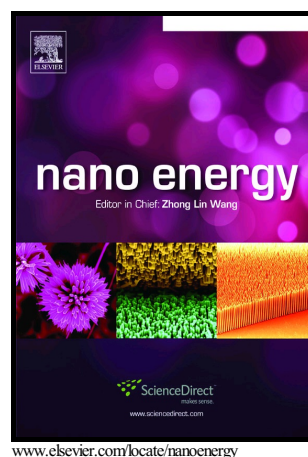


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An Effective Strategy to Enhancing Tolerance to Contaminants Poisoning of Solid Oxide Fuel Cell Cathodes

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Abstract

Commercialization of solid oxide fuel cells (SOFCs) is impeded by severe cathode degradation from the poisoning effect of contaminants commonly encountered in air (such as H₂O and CO₂) and from other cell components (e.g., Cr species from chromium-containing interconnector). Here we report our findings in unraveling the mechanism of Cr poisoning of La_{0.6}Sr_{0.4}Co_{0.2}Fe_{0.8}O₃ (LSCF) cathodes using our unique *in situ/operando* surface enhanced Raman spectroscopy. Further, we present an effective strategy to enhancing the tolerance to contaminants poisoning of LSCF cathode through infiltration of hybrid catalysts coating, which is composed of a conformal film of perovskite PrNi_{0.5}Mn_{0.5}O₃ (PNM) with exsolved PrO_x nanoparticles. The coating is active to oxygen reduction reactions but inert to contaminant poisoning. When subjected to an accelerated Cr-poisoning test, the cells with a hybrid catalyst-coated LSCF cathode show an excellent peak power density (P_{max} of 0.71 Wcm⁻²) and significantly enhanced durability (degradation rate of 0.0434% h⁻¹ at 0.7V), much better than those of cells with a bare LSCF cathode (P_{max} of ~0.46 Wcm⁻² and degradation rate of 0.4% h⁻¹ at 0.7 V). The results

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