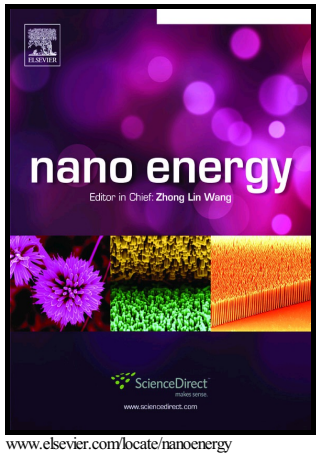


www.elsevier.com/locate/nanoenergy

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

Yu Chen, Seonyoung Yoo, Xiaxi Li, Dong Ding, Kai Pei, Dongchang Chen, Yong Ding, Bote Zhao, Ryan Murphy, Ben deGlee, Jiang Liu, Meilin Liu

PII: S2211-2855(18)30182-4
DOI: https://doi.org/10.1016/j.nanoen.2018.03.043
Reference: NANOEN2591

To appear in: *Nano Energy*

Received date: 24 October 2017
Revised date: 13 March 2018
Accepted date: 13 March 2018

Cite this article as: Yu Chen, Seonyoung Yoo, Xiaxi Li, Dong Ding, Kai Pei, Dongchang Chen, Yong Ding, Bote Zhao, Ryan Murphy, Ben deGlee, Jiang Liu and Meilin Liu, An Effective Strategy to Enhancing Tolerance to Contaminants Poisoning of Solid Oxide Fuel Cell Cathodes, *Nano Energy,* https://doi.org/10.1016/j.nanoen.2018.03.043

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

Yu Chen[1], Seonyoung Yoo[1], Xiaxi Li[1], Dong Ding[1], Kai Pei[1], Dongchang Chen[1], Yong Ding[1], Bote Zhao[1], Ryan Murphy[1], Ben deGlee[1], Jiang Liu[2], Meilin Liu[*1]

[1]School of Materials Science and Engineering, Georgia Institute of Technology, Atlanta, GA 30332-0245, USA

[2]New Energy Institute, School of Environment and Energy, South China University of Technology, Guangzhou 510006, China.

**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 $H_2O$ and $CO_2$) 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 $La_{0.6}Sr_{0.4}Co_{0.2}Fe_{0.8}O_3$ (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 $PrNi_{0.5}Mn_{0.5}O_3$ (PNM) with exsoluted $PrO_x$ nano-particles. 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