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14. ABSTRACT

The U.S. Army is currently developing the Next Generation of Combat Vehicles with additional capabilities, such as silent watch, increased sensor power requirements and exportable power, increasing vehicle power demand. Solid Oxide Fuel Cells (SOFCs), which are highly efficient and fuel flexible, are being considered as supplemental vehicle power. Fuel flexibility will allow for operation using JP-8 (kerosene-based fuel), which can be reformed into hydrogen gas, or use alternative hydrocarbon fuels (methane) scavenged from theater. Both JP-8 and scavenged fuels could contain sulfur, a common SOFC contaminant. As fuels supplied or sourced in theater are not desulfurized and could contain sulfur as high as 3000 ppm, current SOFC catalysts could sustain permanent performance degradation from sulfur. To prevent performance loss an on-board desulfurized is required or the use of advanced sulfur tolerant anode catalysts.
This study continues investigating a previously reported sulfur tolerance catalyst, La0.7Sr0.3VO3.86-• (LSV). Our past work investigated LSVs sulfur tolerance using H2S balance hydrogen gas. This work investigates LSVs sulfur tolerance using H2S balance methane gas when heated at intermediate operating temperatures (400-600°C) in a wide range of H2S concentrations (30ppm, 300ppm and 3000ppm). When previously compared to Ni-YSZ in balance hydrogen gas, LSV had 287x lower sulfur

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Methane Atmosphere Controlled $La_{0.7}Sr_{0.3}VO_{3.86-\delta}$ (LSV) Intermediate-Temperature Solid Oxide Fuel Cell Sulfur Tolerance Explored through Experimental and Modeling Characterization over Time

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