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on August 06, 02:11 PM

for icacc2013

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CONTROL ID: 1479504

CURRENT CATEGORY: Symposium 3: 10th International Symposium on Solid Oxide Fuel Cells (SOFC): Materials, Science & Technology

CURRENT SUB-CATEGORY: Fuel processing; supported/unsupported catalysts; carbon and sulfur fouling, gas separation membranes

PRESENTATION TYPE: Invited (by Invitation Only)

TITLE: Recent developments on direct ethanol solid oxide fuel cells

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ABSTRACT BODY: Direct use of hydrocarbon or alcohol fuels is considered as a major advancement towards solid oxide fuel cell (SOFC) commercialization. Among potential primary fuels, a great deal of attention has recently been given to ethanol as an efficient and cost competitive renewable source of hydrogen. Ethanol is a widely available fuel that has been blended with gasoline for vehicular propulsion in some countries and in Brazil the ethanol derived from sugar cane represents ~40% of the road transportation fuel. However, the direct use of carbon-containing fuels in SOFCs has a number of practical issues that need further development, such as the stability of the standard Ni-based cermet anodes and the optimization of both the exothermic electrochemical and the endothermic reforming reactions. Most of the reported studies on ethanol fueled SOFCs use a mixture of alcohol and water as fuel to suppress carbon formation, decreasing efficiency and adding complexity to the fuel cell system. More recent developments have shown that an adequate catalyst layer can promote the gradual internal reforming of ethanol in which the water released from the electrochemical oxidation of hydrogen is used to the alcohol reforming reaction. By using a ceria-based catalytic layer, standard SOFCs were shown to operate with good stability for more than 100 hours without water addition.

KEYWORDS: ethanol, solid oxide fuel cell, anode .