Abstract Submitted
for the APR15 Meeting of
The American Physical Society

Characterization and Development of BaZrO3/NiO Composites for use as Anodes in Proton Conducting SOFCs[1] ISLAM KHAN, KELLY DILLON, AMBER GENAU, RENATO CAMATA, Univ of Alabama - Birmingham
— Solid oxide fuel cells (SOFCs) are devices that convert chemical energy to electrical energy directly through oxidation of the fuel. The basic structure of SOFCs consists of three parts: an anode and a cathode that are separated by an electrolyte. The focus of this work is on developing and characterizing anode materials for proton-conducting SOFCs which use ceramic material BaZrO3 as the electrolyte. These anodes are made using a BaZrO3-Ni composite, known as a cermet (ceramic and metal), which has shown potential as anode materials for these devices. The conventional method for making BaZrO3-Ni cermets consist of an intermediate stage composite material BaZrO3-NiO that have a strong influence on the final properties of the anode. Composites consisting of the two phases, BaZrO3 and NiO, with different weight ratios were made into pellets (0.5-inch diameter) using a mechanical mixing method followed by sintering at high temperatures. Optical microscopy image analysis showed grain growth in both phases as well as presence of porosity. The effect of sintering temperature on the densification of the composite powders was analyzed and the results showed that higher temperature enabled higher densification of the composites. Electrochemical impedance spectroscopy indicated there are two factors that contribute to the impedance in the structure of the composite materials, and possible sources for each factor are discussed.

[1]UAB College of Arts and Sciences

Islam Khan
Univ of Alabama - Birmingham

Date submitted: 09 Jan 2015 Electronic form version 1.4