**The influence of cation segregation on SOFC cathode aging behavior**

**National Energy Technology Laboratory-West Virginia University**

Harry Finklea1,2, Harry Abernathy1, David Mebane1,3, Xueyan Song1,3, Yun Chen1,3, Kirk Gerdes1

1U.S. DOE/National Energy Technology Laboratory

2West Virginia University (Dept. Chemistry)

3West Virginia University (Dept. Mechanical & Aerospace Engineering)

e-mail: Harry.Finklea@mail.wvu.edu Phone: (304) 293-4742

The NETL-RUA (Regional University Alliance) Fuel Cell team has recently reported interesting reversible aging behavior of (La0.8Sr0.2)MnO3 (LSM) cathodes at open circuit voltage (OCV): the polarization resistance at OCV of an LSM electrode increases while aging at 700ºC, in contrast with a decrease in polarization resistance with time while aging at 800ºC. The behavior is reversible as the sample is cycled between the two temperatures. This behavior has been attributed to reversible changes in the electrode’s surface composition.

As it difficult to study the composition and nanostructure of a porous electrode surface, commercial LSM powder was sintered into a dense pellet and then thermally aged similarly to the porous electrode samples. The surfaces of the dense pellets were characterized by SEM, TEM, and XPS. Grain surfaces that were smooth after densification became faceted and covered with nanoparticles, depending on the aging cycle. Changes in the La:Sr ratio, as well as the A:B ratio for this ABO3-based material, were also observed. These results, when coupled with the porous electrode electrochemical measurements, indicate thermodynamic driving forces within the studied temperature range that affect the surface composition – and thus the catalytic properties – of LSM.