**Crystallographic structure and stability of Pt-substituted**

**LSCo electrocatalyst for SOFC cathode**

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

Shiwoo Lee1, Yun Chen1,2, Xueyan Song1,2, Kirk Gerdes1

1U.S. DOE/National Energy Technology Laboratory

2West Virginia University

e-mail: [leesn@netl.doe.gov](mailto:leesn@netl.doe.gov) Phone: (304) 285-4594

The NETL-RUA (Regional University Alliance) Fuel Cell team has demonstrated that infiltration of commercial SOFC cathode with oxide electrocatalysts significantly improves cell performance without degrading temporal stability. The electrocatalyst with the particle size of several tens of nanometers, distributed over a cathode active layer, is regarded to effectively increase the population of triple phase boundaries (TPBs) where oxygen reduction reaction occurs. The conceptually simple but structurally sophisticated surface-modifying technique has been successfully upgraded to application for large area cathode with various structure and composition.

As the extended effort of the research and development, we considered a novel electrocatalyst, Pt-substituted LSCo (La0.6Sr0.4CoO3-) as an infiltrate, and focused on the crystallographic structure and stability of the composition through TEM analysis. TEM images along with element analyses indicated that 0.1 mol of Pt is incorporated into B-site of the LSCo lattice, after infiltration into the cathode backbone composed of SDC (Sm2O3-doped CeO2) and LSCF (La0.6Sr0.4Co0.2Fe0.8O3-), followed by calcination at 850°C. The direct comparison between an as-calcined, 0 h tested cathode and a 200 h tested cathode demonstrated that the LSCoPt infiltrates in both cathodes have similar particle size of about 50 nm, and same rhombohedral crystal structure. The LSCO-Pt rhombohedral crystal structure differs from the cubic LSCo observed under these conditions. In addition, cation interdiffusion during a calcination step and/or cell operation was assumed, due to the detection of Fe in LSCoPt infiltrates and Sm in LSCF backbone. The TEM imaging and chemistry examination clearly demonstrated the crystallographic stability of this novel nanostructured SOFC Pt-doped LSCo electrocatalyst.