Composite MIEC cathode infiltrated with pyrochlore / perovskite materials

U.S. Dept of Energy, National Energy Technology Laboratory, Morgantown, WV 26507
Shiwoo Lee, Nicholas Miller, Harry Abernathy, Kirk Gerdes, Mani Manivannanan
Phone: (304)285-4342, Kirk.Gerdes@NETL.DOE.GOV

A typical solid oxide fuel cell constructed from traditional cathode materials such as $La_xSr_{1-x}MnO_3$ or $La_xSr_{1-x}Co_yFe_{1-y}O_3$ exhibits a total cell overpotential of 200-400 mV during normal operations. Approximately half of this overpotential is attributable to oxygen exchange processes occurring on the cathode. One method postulated to diminish the cathode overpotential is infiltration of active compounds into the porous structure. Materials so infiltrated must demonstrate improved electrochemical activity (decreased overpotential), thermo-chemical inertness, and excellent long-term thermo-mechanical stability.

Researchers at NETL are investigating the processes of cathode infiltration and developing infiltration systems to enhance the cathode performance. In particular, the research aims to: 1) identify relevant infiltration process parameters; 2) evaluate performance and stability of fuel cells prepared by infiltration; and 3) characterize electrochemical properties of MIEC cathode materials. This poster will report results from infiltration of a composite cathode of a commercial cell and describe infiltration methodology, temporal overpotential for tested specimen, and describe a recently developed ionic conductivity measurement system.