**Microstructural Evolution in LSM-YSZ Cathodes**

**Over Two Years of SOFC Operation**

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 (La,Sr)MnO3–yttria-stabilized zirconia (LSM–YSZ) SOFC cathodes gradually degrade during prolonged operation. Detailed studies of microstructural evolution at the cathode-electrolyte interface were performed on SOFCs after operation for up to 17,400 hours at different operating temperatures. Thin foils from the cathode/electrolyte interface were prepared using a focused-ion beam (FIB) milling technique. Transmission electron microscopy (TEM) with energy-dispersive x-ray spectroscopy (EDXS) was employed for chemical analysis and to detect and identify secondary phases. Three-dimensional (3D) reconstruction of the microstructures was performed using the FIB “slice and view” technique to document and understand phase evolution during long-term testing.

Microstructural changes, including densification of the LSM phase near the cathode-electrolyte interface, were observed after two years of testing at 860 oC. Formation of manganese oxides was also detected, tending to concentrate near the cathode-electrolyte interface after one to two years of operation, especially at 860 °C.