Poster Title:
Mn valence in lanthanum strontium manganite determined by x-ray photoelectron spectroscopy and electron energy loss spectroscopy

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Brief description of poster contents (no more than 2 paragraphs):
Lanthanum strontium manganite (La1-xSrxMnO3–y) (LSM) is widely used as the cathode in solid oxide fuel cells because of its long-term stability and good performance when operated at higher temperatures (850-900 °C). The Mn valence plays an important part in the electrical conductivity, phase stability, and reaction kinetics of the cathode. The Mn valence in turn depends on the level of strontium doping, the ratio of (La+Sr) to Mn, and the operating environment of the cell (temperature, oxygen and steam). Mn valence is thus one of several important parameters for understanding the relationship between cathode performance and operating conditions. Although the defect chemistry of LSM has been well studied, this is the first study that directly compares measurements of Mn valence from two direct, independent techniques: X-ray photoelectron spectroscopy (XPS) and electron energy loss spectroscopy (EELS). Firstly, both techniques were calibrated against MnO, Mn2O3, and MnO2. Then XPS was used to determine Mn valence in LSM pellets annealed under various conditions. Lastly, EELS was used to measure Mn valences in LSM in cells at the cathode surface and at the cathode-electrolyte interface, with good agreement between the two techniques.