AGING EFFECTS OF NANOSCALE CERIA TOWARD THE ELECTRO-OXIDATION OF METHANOL AND ETHANOL IN DIRECT ALCOHOL FUEL CELLS. Jordan M. Anderson, Ajay Karakoti, Diego J. Diaz, Sudipta Seal, Department of Chemistry, University of Central Florida, 4000 Central Florida Blvd. Orlando, FL 32816.

There is an increasing need to replace current fossil fuel dependency with renewable sources of energy. As an alternative, direct alcohol fuel cells (DAFC) appear to be a promising solution. A common byproduct of the electrochemical oxidation of alcohols in fuel cells is carbon monoxide. Carbon monoxide can bind very strongly to the platinum anode, thus poisoning the electrode. Ceria (CeO_2) has shown a great ability to store and release oxygen since the cerium atom reversibly undergoes oxidation/reduction processes from Ce^{4+} to Ce^{3+}. Results suggest that the ceria's oxygen carrying capacity has a unique ability to reduce CO poisoning. In this study nanocrystalline Pt/CeO_2 composite electrodes were fabricated to investigate the electrochemical oxidation of methanol and ethanol. It was observed that as the ceria was aged the performance oscillated. These results point to a great dependence of the catalytic effect on the redox state of the ceria particles.