Abstract

Mesoporous copper manganese oxides with high surface areas (>268 m^2/g) were prepared using the redox method and tested in the preferential oxidation of CO. These materials were highly active and selective under typical operating conditions of a proton-exchange membrane fuel cell. The synthesized catalysts preferentially oxidized CO with a stoichiometric amount of oxygen in the feed gas. The presence of CO_2 and H_2O in the feed gas retarded catalytic activity significantly at low (<90 °C) temperatures. The catalysts showed stable activity in long-term (12 h) experiments with realistic feeds. The high catalytic activity was attributed to a combination of factors, including high surface area, low crystallinity, low activation energy for CO oxidation, compositional homogeneity of the copper manganese oxides, and the presence of readily available lattice oxygen for CO oxidation. The high selectivity (100% with stoichiometric reactants) was ascribed to the lower activation energy for CO oxidation compared to the activation energy for H_2 oxidation.