# Mo-doped CeO 2 Synthesized by the Combustion Method for Carbon-Air Solid Oxide Fuel Cell (CA-SOFC) Applications

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Molybdenum(Mo)-doped ceria (CMO) nanoparticles were synthesized by the combustion method with three different Mo compositions: 5 wt.%, 7 wt.%, and 10 wt.%. The catalytic activity of CMO for wet gasification of carbon was studied in a fluidized bed reactor, while the mechanical and electrical properties of this material were characterized using dense sintered CMO pellets. The Young's modulus was found to increase with the Mo content; the higher value measured was 289.4 GPa for CMO with 10 wt.% Mo. Measurements of Vickers microhardness demonstrated that an increase in the Mo content produces a decrease in the microhardness of the material, suggesting that Mo confers semi-metallic characteristics to CMO. The higher fracture toughness value, determined by the Niihara equation, was 4.39 MPa m 0.5 for CMO with 10 wt.% Mo. In addition, an increase in the molybdenum content produced an increase in the electrical conductivity under air and H 2 atmospheres. The maximum electrical conductivities under air and H 2 were found for CMO with 10 wt.% Mo at 800 °C: 1.87 × 10 ?3 S cm ?1 and 9.37 × 10 ?1 S cm ?1 , correspondingly. Finally, CMO with 10 wt.% Mo exhibited good catalytic activity for carbon gasification, which renders it a promising material for a combined fluidized bed-SOFC system.