Abstract #3:
Development of Ceramic Interconnect Materials for SOFC

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A-site calcium doped yttrium chromite was additionally doped with various transition metals (Co, Ni, Cu) on the B-site and studied for potential use as an interconnect material in high temperature solid oxide fuel cells (SOFCs). Doped yttrium chromite showed an orthorhombic perovskite structure, and the phase stability was confirmed between 25 and 1200^{o}C over a wide range of oxygen partial pressures by X-ray diffraction. Cu doping remarkably improved the sinterability and allowed full densification in air at 1300^{o}C. The substitution of Co significantly improved the electrical conductivity in both oxidizing and reducing environments, which was explained by an increase of charge carrier density, as confirmed by Seebeck measurements. Ni doping improved stability in reducing atmospheres, which resulted in improved electrical conductivity and reduced isothermal “chemical” expansion in reducing environments. The thermal expansion coefficient (TEC) can be controlled to closely match that of an 8 mol% yttria-stabilized zirconia (YSZ) electrolyte by adjusting the amount of B-site dopants. Undesirable oxygen ion “leakage” current was insignificant in dual atmosphere conditions, and no interfacial interactions with YSZ were detected after firing at 1400^{o}C.