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Synthesizing CuFe2O4 Spinel Powders by a Combustion-Like Process for Solid Oxide Fuel Cell Interconnects Coating

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Abstract : The synthesis of CuFe2O4 spinel powders by an optimized combustion-like process followed by calcinations is described herein. The samples were characterized by X-ray diffraction (XRD), differential thermal analysis (TG/DTA), scanning electron microscopy (SEM), dilatometry and 4-probe DC methods. Different glycine to nitrate (G/N) ratios of 1 (fuel-deficient), 1.48 (stoichiometric) and 2 (fuel-rich) were employed. Calcining the as-prepared powders at 800 and 1000°C for 5 hours showed that the 2 ratio results in the formation of desired copper spinel single phase at both calcinations temperatures. For G/N=1, formation of CuFe2O4 takes place in three steps. First, iron and copper nitrates decomposes to iron oxide and pure copper. Then, copper transforms to copper oxide and finally, copper and iron oxides react to each other to form copper ferrite spinel phase. The electrical conductivity and the coefficient of thermal expansion of the sintered pelletized samples were obtained 2 S.cm-1 (800°C) and 11×10-6 °C-1 (25-800°C), respectively.

Keywords : SOFC interconnect coatings, Copper ferrite, Spinels, electrical conductivity, Glycine–nitrate process
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