STRUCTURAL CHARACTERIZATION OF SAMARIA DOPED CERIA PREPARED BY COMBUSTION AND CO-PRECIPITATION SYNTHESES

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Solid oxide fuel cells (SOFCs) is one of the most efficient and environmentally friendly device which transforms chemical energy of fuel into electrical energy. Due to these properties SOFCs systems are being developed for transportation, military and industrial applications. In SOFCs, Samarium doped ceria (SDC), Gadolinium doped ceria (GDC) and Yttria stabilized zirconia (YSZ) are utilized as solid electrolyte materials. Samarium-doped ceria electrolyte is known as most usable as it possesses high ionic conductivity as well as chemical and structural stability. Ceramic powders can be produced by variety of different synthesis methods such as combustion, sol-gel, colloidal, hydrothermal, Pechini and co-precipitation. Since glycine-nitrate precursor (GNP) combustion synthesis saves time and has better stoichiometric control and co-precipitation (CP) synthesis offers low cost and simplicity, these methods were used in this study to form Samarium doped ceria powders, $Sm_xCe_{1-x}O_{2-\delta/2}$ (with samarium content x = 0.26 (26 SDC)). After obtaining ceria based electrolytes they were calcined at different temperature ranges (200, 400, 600, 800 and 1000 ^{o}C) for 5 h. X-ray powder diffractometer (XRD) is a widely employed tool which can investigate chemical, physical and mechanical properties of material. XRD analysis was performed at room temperature and diffraction patterns were recorded in the 2θ angle range of 5-100^{o}. The results showed that 26 SDC prepared by both synthesis routes have pure phase cubic fluorite structure with Fm-3m space group. The crystallite size and lattice parameter were calculated.

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