World Academy of Science, Engineering and Technology
International Journal of Materials and Metallurgical Engineering
Vol:12, No:12, 2018

Influence of Substitution on Structure of Tin Lantanium Pyrochlore $La_{2-x}Sr_xSn_2O_{7-\delta}(0 \leq x \leq 0.25)$ Solid-Oxide Fuel Cells

Authors : Bounar Nedjemeddine

Abstract : Materials with the pyrochlore lattice structure have attracted much recent attention due to their wide applications in ceramic thermal barrier coatings, high-permittivity dielectrics, and potential solid electrolytes in solid-oxide fuel cells. The work described in this paper is devoted to the synthesis and characterization of a pyrochlore structure based on lanthanum (La_2O_3) and tin (SnO_2) oxides of general formula $La_2Sn_2O_7$, substituted by Sr at the site La. Their structures were determined from X-ray powder diffraction using CELFER analysis. All the compositions present the space group Fd-3m. The substitution of La by Sr in the $La_2Sn_2O_7$ compound causes a variation of the cell parameters. The difference in charge between La^{3+} and Sr^{2+} and the difference in size cause the cell parameters to decrease from a=10.7165 A° to a=10.6848 A° for the substitution rates (x = 0.05, 0.1, 0.15 ...), which leads to a decrease in the volume of the mesh. For a substitution rate x = 0.25, there is an increase in the cell parameters (a=10.7035A°), which can be explained by a competitiveness of the size effect and the presence of a gap in the structure which go in the opposite direction.

Keywords : solid-oxide fuel cells, structure, pyrochlore, X-ray diffraction
Conference Title : ICMSCE 2018 : International Conference on Materials Science and Composite Engineering
Conference Location : Dublin, Ireland
Conference Dates : December 20-21, 2018