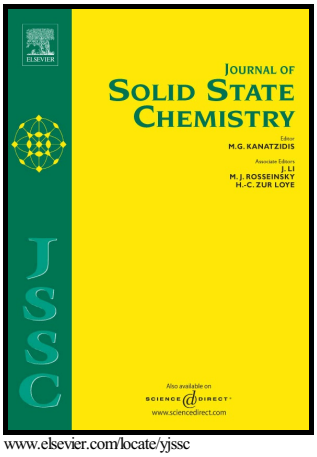

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ROLE OF Sm CONTENT TO THE CRYSTAL STRUCTURE AND PROPERTIES OF $Sr_{1-x}Sm_xFeO_{3-\delta}$

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Abstract:

Single phase $Sr_{1-x}Sm_xFeO_{3-\delta}$ solid solutions were synthesized at 1100°C in air within the two ranges $0.05 \le x \le 0.50$ (with the cubic structure, sp. gr. P*m3m*) and $0.85 \le x \le 1.0$ (with the orthorhombic structure, sp. gr. P*bnm*). The structural parameters were refined by the Rietveld analysis. The influence of samarium content in $Sr_{1-x}Sm_xFeO_{3-\delta}$ on the oxygen nonstoichiometry, thermal expansion and electrical conductivity has been studied. Gradual substitution of strontium by samarium ions leads to the increase in oxygen content. Electrical conductivity and thermal expansion of solid solutions decrease on doping. The maximum conductivity value equal to 240 S/cm was obtained for $Sr_{0.9}Sm_{0.1}FeO_{3-\delta}$ at 300°C in air. The positive value of Seebeck coefficient indicates predominant *p*-type conductivity in $Sr_{1-x}Sm_xFeO_{3-\delta}$. Chemical reactivity of $Sr_{1-x}Sm_xFeO_{3-\delta}$ in contact with the solid electrolyte materials $Ce_{0.8}Sm_{0.2}O_2$ and $Zr_{0.85}Y_{0.15}O_2$ was examined within the temperature range of 800–1100°C in air.

Graphical Abstract

Total conductivity of $Sr_{1-x}Sm_xFeO_{3-\delta}$ (x =0; 0.1; 0.3; 0.5) in air vs. temperature (cooling/heating rate 2°/min).