

研究论文

层状化合物 $\text{La}_2\text{Ni}_{1-y}\text{Co}_y\text{O}_{4+\delta}$ 的合成、结构与性能

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摘要 采用氨基多羧酸配合物法合成 $\text{La}_2\text{Ni}_{1-y}\text{Co}_y\text{O}_{4+\delta}$ ($y=0\sim 0.2$)超细粉料, 研究陶瓷样品的结构和混合导电性能. 研究表明, $\text{La}_2\text{Ni}_{1-y}\text{Co}_y\text{O}_{4+\delta}$ 具有正交结构($Fmmm$ 空间群), Co离子取代增加了钙钛矿层中 ab 平面上Ni/Co—O键的键长、岩盐层中沿 c 轴方向上La—O键的键长和非化学计量氧含量, 并有利于改善材料的烧结性能. 随着Co离子含量的增加, 总电导率的峰值温度向高温移动, 高温段总电导率随温度的变化趋于平缓, 但总电导率水平出现降低; 增加Co离子含量还有利于提高氧离子导电性能. Co离子取代对陶瓷样品混合导电性能的影响与晶体结构参数的变化紧密相关.

关键词 [La₂Ni_{1-y}Co_yO_{4+δ}](#) [氨基多羧酸配合物法](#) [结构](#) [电导率](#)

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Preparation, Structure and Properties of $\text{La}_2\text{Ni}_{1-y}\text{Co}_y\text{O}_{4+\delta}$ Layered Compounds

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Abstract $\text{La}_2\text{Ni}_{1-y}\text{Co}_y\text{O}_{4+\delta}$ ($y=0\sim 0.2$) fine powders were synthesized by a polyaminocarboxylate complex method, and the structure and mixed conducting properties of the resulting ceramics were investigated. X-ray diffraction Rietveld refinement results indicate that $\text{La}_2\text{Ni}_{1-y}\text{Co}_y\text{O}_{4+\delta}$ compositions have an orthorhombic structure with $Fmmm$ space group.

The substitution of partial La^{3+} with Co at the B-site caused an increase in the length of Ni/Co—O₁ bond in the ab plane and La/Sr—O₂ bond along c axis. Moreover, it was detected that the oxygen nonstoichiometry(δ) became larger with increasing Co content. The cobalt substitution resulted in a shift of the temperature for the electrical conductivity maximum to higher temperature direction and a decline of electrical conductivity together with a modification of oxygen ionic conducting properties. The effect of cobalt substitution on the mixed conducting properties of $\text{La}_2\text{NiO}_{4+\delta}$ ceramic can be interpreted with respect to the variation in crystal structure parameters.

Key words [La₂Ni_{1-y}Co_yO_{4+δ}](#); [Polyaminocarboxylate complex method](#); [Structure](#); [Conductivity](#)

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