Crystalline Structure and Electrical Properties of NdM0.5Mn0.5O3, M=Ni,Co,Cu Solid Solutions

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Abstract

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Lanthanum manganites are the best-known ceramic electrode for SOFC cathode application. Nevertheless, it reacts at high temperatures with YSZ electrolytes to form poor-conductivity interfaces. Rare Earth manganites with lower ionic-radius cation show better compatibilities. On the other hand, alkaline earth cations can also react with ZrO2 forming perovskite-type zirconates. For overcome these problems, Rare Earth manganites in which Mn has been replaced by a divalent cation on B sites are proposed.

Solid solutions corresponding to the NdM0.5Mn0.5O3 formula, M=Ni,Co,Cu, have been studied. The powders were prepared by solid-state reaction of the corresponding oxides and carbonates and for the polymeric precursor solution containing the respective metal nitrates. Sintered bodies were obtained by firing between 1050 and 1450C. All the compositions showed single-phased perovskite-type structure with orthorhombic symmetry and Space Group Pbnm. The orthorhombicity factor b/a showed a decrease according the sequence Cu¿Co¿Ni. All the solid solutions crystallised with the same O'-type orthorhombic perovskite structure such as that of pure NdMnO3, except the NdNi0.5Mn0.5O3 compound, which showed a pseudotetragonal symmetry.

Electrical measurements have shown semiconducting behaviour for all the solid solutions. Thermally activated small polaron hopping mechanism controls the conductivity of these perovskite ceramics. The ranges of electrical conductivity are comparable to that of the Sr-modified Lanthanum manganites