

06-226

Ionic conductivity of Sr- and Mg-doped lanthanum gallate with La_{1.55}Sr_{0.55}Ga₃O_{7+δ} addition

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Sr- and Mg-doped lanthanum gallates are solid electrolytes with ionic conductivity higher than that of the traditional yttria-stabilized zirconia. Moreover, doped lanthanum gallates exhibit wide electrolytic domain and good chemical stability. The combination of their properties turns this compound a promising candidate for application in solid oxide fuel cells operating at intermediate temperatures (550-750°C). In this work, small amounts of La_{1.55}Sr_{0.55}Ga₃O_{7+δ} was added to doped lanthanum gallate and the effects of the additive on electrical properties of the base material were investigated by the impedance spectroscopy technique. The X-ray diffraction patterns of sintered specimens show the characteristic reflections of the perovskite-type phase, along with low-intensity diffraction peaks of the commonly detected impurity phases. The impedance spectroscopy diagrams reveal the high-frequency arc due to the bulk resistivity besides a strong overlap of the grain boundary arc with that of the electrode. The grain resistivity decreases for increasing amounts of La_{1.55}Sr_{0.55}Ga₃O_{7+δ}.