A strontium titanate (SrTiO₃)-based material with a perovskite structure is considered to be one of the promising alternatives to LaCrO₃-based materials since SrTiO₃ perovskite shows a high chemical stability under both oxidizing and reducing atmospheres at high temperatures. SrTiO₃ materials exhibit an n-type semiconducting behavior when it is donor-doped and/or exposed to a reducing atmosphere. In this work, Sr₁₋ₓLaₓTi₁₋ₓMₓO₃ materials doped with La³⁺ in A-sites and aliovalent transition metal ions (Mⁿ⁺) in B-sites were synthesized by the modified Pechini method. The X-ray diffraction analysis indicated that the materials synthesized by the Pechini process exhibited a single cubic perovskite-type structure without any impurity phases, and are tolerant, to some extent, to cation doping. The sintering behaviors of Sr₁₋ₓLaₓTi₁₋ₓMₓO₃ in H₂/N₂ and air were characterized by dilatometry and microstructural observations. The electrical conduction mechanism and the dopant effect are discussed based on the defect structures and the electrical conductivities measured at various oxygen partial pressures and temperatures.

Key words : Solid oxide fuel cell(고체산화물 연료전지), Interconnects(접속자), Strontium titanate(SrTiO₃ 산화물), Sintering(소결), Electrical conductivity(전기전도도)

E-mail : *qkrqjarud@naver.com, **jjong277@kier.re.kr

The development of high temperature-proton exchange fuel cell (HT-PEFC) is a key in solving the problem of carbon monoxide poisoning of the platinum at anode as well as water management in PEFCs operated below 90℃. In order to overcome these main issues, PEFCs must be operated at high temperature above 120℃. Ionic liquids are available for HT-PEFC due to exhibiting non-volatility and thermal stability. Ionic liquids are however leached out from polymeric matrix resulting in the increase of gas permeability. In this study, we have prepared and characterized the composite membranes with the ionic liquids consisting of 1-(4-vinylbenzyl)-3-butyl imidazolium chloride immobilized by the cross-linkers in pore-filling membrane to prevent to be leached out from the membrane. We confirmed that cross-linked ionic liquids were not leached out from the composite membranes through the various characteristic analyses. It was also verified that the prepared membranes are thermally stable from the result of TG analysis. The pore-filling membranes with the immobilized ionic liquids have a high proton conductivity over 10⁻² S/cm at high temperature (>120℃).

Key words : Ionic liquids(이온성 액체), Polymer electrolyte membrane(고분자 전해질 막), High temperature PEFCs (고온 PEFCs)

E-mail : cozmoz67@kier.re.kr