고체산화물 연료전지용 Strontium Titanate 세라믹 접속자 소재의 소결 거동 및 전기적 특성

*박 범경, **이 종원, 이 승복, 임 탁형, 박 석주, 송 락현, 신 동열

Sintering Behavior and Electrical Properties of Strontium Titanate-Based Ceramic Interconnect Materials for Solid Oxide Fuel Cells

*Beom-Kyeong Park, **Jong-Won Lee, Seung-Bok Lee, Tak-Hyoung Lim, Seok-Joo Park, Rak-Hyun Song, Dong-Ryul Shin

A strontium titanate ($SrTiO_3$)-based material with a perovskite structure is considered to be one of the promising alternatives to $LaCrO_3$-based materials since $SrTiO_3$ perovskite shows a high chemical stability under both oxidizing and reducing atmospheres at high temperatures. $SrTiO_3$ materials exhibit an *n*-type semiconducting behavior when it is donor-doped and/or exposed to a reducing atmosphere. In this work, $Sr_{1-x}La_xTi_{1-y}M_yO_3$ materials doped with La^{3+} in A-sites and aliovalent transition metal ions (M^{n+}) 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 curbic perovskite-type structure without any impurity phases, and are tolerant, to some extent, to cation doping. The sintering behaviors of $Sr_{1-x}La_xTi_{1-y}M_yO_3$ in H_2/N_2 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

고온 PEFC용 수소이온 전도 향상을 위한 가교된 이온성 액체를 갖는 세공충진막

*백 지숙, **최 영우, 이 미순, 양 태현, 김 창수

Pore-filling membrane with ionic liquids immobilized by cross-linking for high temperature PEFCs

*Ji-Suk Baek, **Young-Woo Choi, Mi-Soon Lee, Tae-Hyun Yang, Chang-Soo Kim

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