Computational analysis of gas crossover in high-temperature proton exchange membrane fuel cells

김태현, 정치영, 이성철*
한양대학교
(scyi@hanyang.ac.kr*)

A high-temperature proton exchange membrane fuel cell (PEMFC) has been investigated because of lower tolerance of carbon monoxide and better management of water than low-temperature PEMFC. However, a gas crossover through the membrane causes undesired electrochemical reactions which can cause additional voltage drop. In this study, a two-dimensional high-temperature PEMFC model is described to investigate hydrogen and oxygen crossover effect. A parametric study is carried out to investigate the effects of gas permeation coefficient in membrane and membrane thickness. Current voltage characterization curves are shown to predict and compare performance and degradation. Results show that open circuit potential (OCP) is influenced more by hydrogen permeation coefficient than oxygen permeation coefficient. When membrane thickness is reduced, the cell performance is increased by reducing proton resistance. However, the decrease in OCP is occurred by increased the rate of gas crossover as membrane thickness is decrease.