

## A Pd-impregnated Nafion composite membrane using supercritical CO<sub>2</sub> in direct methanol fuel cell (DMFC)

신우균, 변정연, 강유찬, 석준호, 김화용\*  
서울대학교 화학생물공학부  
(hwayongk@snu.ac.kr\*)

A Pd nanoparticle was deposit on Nafion membrane by the impregnation using supercritical carbon dioxide (scCO<sub>2</sub>) in order to reduce the methanol permeation. Pd(II)(acetylacetonate)<sub>2</sub> was dissolved in supercritical CO<sub>2</sub> and impregnated on Nafion membrane under 80°C and 20 MPa for 4 hours. After the impregnation, the pressure decreased slowly by releasing CO<sub>2</sub>. The impregnated Nafion membrane was converted to Pd deposited Nafion membrane by reducing agent, sodium borohydride (NaBH<sub>4</sub>) with various concentrations under 50°C and 2 hours. The prepared Pd-impregnated Nafion (Pd/Nafion) composite membrane were characterized by measuring their methanol permeability, and ion conductivity. Then the result are compared with those of Nafion. Morphologies of surface and Pd distributions of Pd/Nafion composite membrane were investigated by scanning electron microscopy (SEM) and electron prove micro analyzer (EPMA). Cell performance employing Pd/Nafion composite membrane was evaluated using a DMFC single cell.