

Accepted Manuscript

Nafion[®] based hybrid composite membrane containing GO and dihydrogen phosphate functionalized ionic liquid for high temperature polymer electrolyte fuel cell

Jatindranath Maiti, Nitul Kakati, Sung Pil Woo, Young Soo Yoon



PII: S0266-3538(17)32403-X

DOI: [10.1016/j.compscitech.2017.11.030](https://doi.org/10.1016/j.compscitech.2017.11.030)

Reference: CSTE 6985

To appear in: *Composites Science and Technology*

Received Date: 24 September 2017

Revised Date: 22 November 2017

Accepted Date: 27 November 2017

Please cite this article as: Maiti J, Kakati N, Woo SP, Yoon YS, Nafion[®] based hybrid composite membrane containing GO and dihydrogen phosphate functionalized ionic liquid for high temperature polymer electrolyte fuel cell, *Composites Science and Technology* (2017), doi: 10.1016/j.compscitech.2017.11.030.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Nafion[®] based hybrid composite membrane containing GO and dihydrogen phosphate functionalized ionic liquid for high temperature polymer electrolyte fuel cell

Jatindranath Maiti[§], Nitul Kakati[§], Sung Pil Woo[⊥], Young Soo Yoon*

Department of Chemical Engineering, Gachon University, Gyeonggi-do 461-701, South Korea.

[⊥]Department of Materials Science and Engineering, Yonsei University, Seoul, 120-749, South Korea.

Abstract

A new hybrid composite proton exchange membrane has been synthesized from dihydrogen phosphate functionalized imidazolium ionic liquid (IL-H₂PO₄), graphene oxide, and Nafion 117 solution. The chemical structure and thermal stability of the dihydrogen phosphate functionalized imidazolium ionic liquid (IL-H₂PO₄) have been analyzed by ¹H nuclear magnetic resonance (NMR) spectroscopy, Fourier transform infrared (FTIR) spectroscopy, and thermogravimetric analysis (TGA). The structural, thermal, and surface properties of synthesized membrane have been confirmed by FTIR spectroscopy, X-ray diffraction, TGA, and scanning electron microscopy. The proton exchange membranes have been characterized by their ionic conductivity and unit cell performance. The incorporation of IL-H₂PO₄ and graphene oxide in the Nafion membrane increases its thermal stability. The ionic conductivity of the membranes increases with temperature and amount of IL-H₂PO₄. The highest ionic conductivity of 0.061 Scm⁻¹ has been achieved at 110°C under anhydrous conditions which is 1.3 times higher than that of commercial Nafion 117. The synthesized membrane, Nafion/IL/GO, shows the best unit cell performance with a power density of 0.02 W cm⁻², which is 13 times higher than that of the commercial Nafion 117 membrane at 110°C.

Download English Version:

<https://daneshyari.com/en/article/7214885>

Download Persian Version:

<https://daneshyari.com/article/7214885>

[Daneshyari.com](https://daneshyari.com)