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# Quaternized PPO/PSF Anion Exchange Membranes Doped with ZnO-Nanoparticles for Fuel Cell Application

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**Abstract :** In view of the projected global energy demand and increasing levels of greenhouse gases and pollutants issues have inspired an intense search for alternative new energy technologies, which will provide clean, low cost and environmentally friendly solutions to meet the end user requirements. Alkaline anion exchange membrane fuel cells (AAEMFC) have been recognized as ideal candidates for the generation of such clean energy for future stationary and mobile applications due to their many advantages. The key component of the AAEMFC is the anion exchange membrane (AEM). In this report, a series of quaternized poly (2.6 dimethyl – 1.4 phenylene oxide)/ polysulfone (QPPO/PSF) blend anionic exchange membranes (AEM) were successfully fabricated and characterized for alkaline fuel cell application. Zinc Oxide (ZnO) nanoparticles were introduced in the polymer matrix to enhance the intrinsic properties of the AEM. The characteristic properties of the QPPO/PSF and QPPO/PSF-ZnO blend membrane were investigated with X-ray diffraction (XRD), thermogravimetric analysis (TGA) scanning electron microscope (SEM) and contact angle (CA). To confirm successful quaternisation, FT-IR spectroscopy and proton nuclear magnetic resonance (1H NMR) were used. Other properties such as ion exchange capacity (IEC), water uptake, contact angle and ion conductivity (IC) were also undertaken to check if the prepared nanocomposite materials are suitable for fuel cell application. The membrane intrinsic properties were found to be enhanced by the addition of ZnO nanoparticles. The addition of ZnO nanoparticles resulted to a highest IEC of 3.72 mmol/g and a 30-fold IC increase of the nanocomposite due to its lower methanol permeability. The above results indicate that QPPO/PSF-ZnO is a good candidate for AAEMFC application.

**Keywords :** anion exchange membrane, fuel cell, zinc oxide nanoparticle, nanocomposite
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