Poster Presentation

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Sulfonated polyphenylsulfone-carbon nanaoball composite membranes for fuel cell applications

Swathi Burla[1], Diakanua Nkazi[1]
[1]*Chemical And Metallurgical Engineering, University Of The Witwatersrand, Johannesburg, South Africa*
E-mail: swathi.vasudeva@gmail.com

The paper presents a detailed study on synthesis and preparation of nanocomposite membranes of sulfonated polyphenylsulfone embedded with carbon nanoball fillers. The effect of various synthesis parameters such as temperature, time, and concentration of the sulfonating agent on sulfonation of polyphenylsulfone and; the production of carbon nanoballs by non catalytic chemical vapour deposition method were investigated. The synthesized carbon nanoball were added to the polyphenylsulfone membrane in order to optimize the mechanical properties of the sulfonated membrane. The successful sulfonation of polymeric membrane and production of carbon nanoballs were confirmed by proton nuclear magnetic resonance spectroscopy (1H NMR) and transmission electron microscopic (TEM) analysis, respectively. Nano composite membranes with varying loading levels from 0.25 wt% to 4 wt% were successfully prepared using ultrasonication technique at varying amplitudes of 20%, 60% and 75%, and simple evaporative casting technique was used to cast the composite membrane. The thermogravimetric analysis (TGA) shows that the addition of carbon nanoballs has significantly increased the thermal stability of sulfonated polyphenylsulfone membrane and all the composite membranes prepared with varying carbon nanoball loading showed similar decomposition profile. The nanocomposites prepared at 60% amplitude produced homogenous membranes; and the membrane with 1.75wt% carbon nanoball loading had high % Resilience and satisfactory water uptake capacity than other membranes. The results confirmed that the addition of carbon nanoballs in low volumes increase the thermal stability and % resilience which are very crucial for fuel cell applications.

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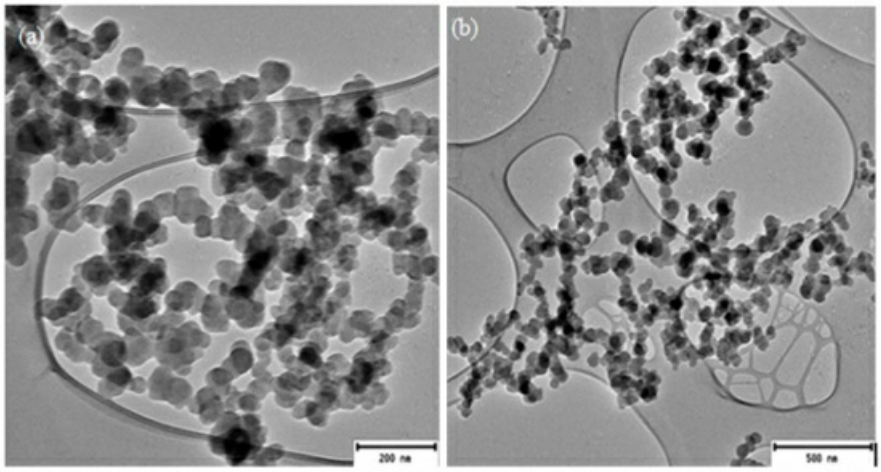

Keywords: sulfonated polyphenylsulfone, nanocomposite, membranes and carbon nanoballs