CHARACTERIZATION OF SULPHONATED POLYETHER ETHER KETONE-CHITOSAN MEMBRANE FOR FUEL CELL

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ABSTRACT

CHARACTERIZATION OF SULPHONATED POLYETHER ETHER KETONE-CHITOSAN MEMBRANE FOR FUEL CELL

The demand for power generation with environmental friendly has increased. Polymer electrolyte membrane fuel cell appears as one of the promising fuel cell that can reduce the fossil fuel dependency. The development on non-perfluorinated hydrocarbon proton exchange membrane material has increase because of their excellent thermal resistance, hydrolytic characteristic and chemical resistance but has lower proton conductivity. A composite membrane of sulfonated polyether ether ketone (SPEEK) polymer with the addition of chitosan (Cs) by varying the ratio of SPEEK and chitosan percentage contained has been prepared using cast technique. Cs has characteristic of hydrophilic and its amino groups may be protonated. Cs has both hydroxyl and amino groups where it can be modified chemically into many forms and can participate in chemical reactions [23]. The degree of sulfonation of SPEEK was determined using hydrogen nuclear magnetic resonance. The proton conductivity of SPEEK-Cs membrane was obtained using electrochemical impedance spectroscopy device. In term of performance, the SPEEK-Cs membrane been examined their characterization on water uptake and degree of swelling. The water uptake and the degree of swelling for the SPEEK-Cs membrane was increasing as the Cs quantity in the membrane increased that caused by hydrophilic characteristic in Cs. The increasing of quantity of Cs in the membrane also influence in increasing proton conductivity.

CHAPTER 1

INTRODUCTION

1.1 Background

Throughout the world, demand for power generation with environmental friendly is increased. This has encouraged research in various aspect of fuel cell. Fuel cells are the energy converting devices with a high efficiency and low or zero emission. They have been attracting more and more attention in recent decades due to the reason that fuel cell is more clean compared to other power source. It can also helps reduce the usage of fossil fuel cell due to the high efficiency of energy conversion, low pollution level, low noise and low maintenance cost[1].

Countries like the United States, United Kingdom, Japan and Canada are currently in the race for the reality makeover of fuel cell technology in multiple fields especially in transportation, stationary power and microelectronic devices[2].Fuel cell is a device that gives energy in form of electric current where it comes from the electrochemical reaction between hydrogen and oxygen. The inventions of fuel cells are due to environmental problems such fossil fuels. Burning fossil fuels cause CO_2 to be produced and damaging the ozone layer which leads to climatic change. As for the solution, the world needs new sources of energy that are clean and safe on the environmental.