TITLE: Electrolyte Membranes for Polymer Electrolyte Membrane Fuel Cells

AUTHOR: Marisa Singh

SUPERVISOR: Dr. Harinder Pal Singh Missan

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The direct methanol fuel cell (DMFC) is regarded as a promising power supply candidate for vehicles and small electronic devices, as well as applications in space and military. It has the potential to replace internal combustion engines in automobiles such as cars, buses etc. and lithium-ion batteries in portable electronic devices such as cell phones, laptops, household and electronic appliances etc. This particular fuel cell has the advantage of high power density, high efficiency and zero or ultra-low emissions, which are promising to ease concerns about the fossil energy and the environment. Unfortunately the DMFC experiences significant problems relating to various aspects of the fuel cell especially for membranes as they play a very important role in the output performance and efficiency of the device. This factor is required to be taken care of before commercialization. This present project reviews the current and continuing research and experimental techniques related to the polymer electrolyte membrane (PEM) to produce new PEM's with desirable properties for efficient DMFC operation at low temperatures (30-90^{0}C). These results and recommendations are discussed.