

Track: Hydrogen and Fuel Cells

Title: Development of next generation high efficiency and cost effective polymer electrolyte membrane - Battellion™

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Abstract

Fuel cells have gained popularity in last couple of decades as alternative sources of power that promises cleaner and more efficient alternative to the combustion of gasoline and other fuels. Among several fuel cells, Proton exchange membrane fuel cell (PEMFC) has gained lot of popularity owing to its high efficiency, fast start up time, low sensitivity to orientation, lower temperature of operation and favourable power to weight ratio. PEMFC use a solid polymer membrane as an electrolyte and porous carbon containing a catalyst as electrodes. Some of the major challenges in commercialization of PEMFC despite the acceptable levels of performance are the significantly higher costs of major components, membrane and catalysts and limited performance under low humidity conditions. Battelle, Columbus, Ohio, has developed a low cost sulfonated poly (arylene ether sulfone) based proton exchange membrane, Battellion™ for PEMFC. Battellion™ offers significantly lower cost of manufacturing and provides ionic conductivity comparable to industry standard Nafion® even under low relative humidity conditions. It can sustain temperature up to 150 °C and boasts a 3-fold improvement in current generation at an operating condition of 0.7 V at 120 °C and 40 % RH as compared to Nafion®. Additionally, it has excellent thermo-oxidative stability, Tg (>280°C), reduced fuel cross over, and improved CO tolerance. This paper will cover current and historical aspects in development of Battellion™ membrane as a low cost and high efficiency proton exchange membrane.