

## Development of Optimal Water Management System for a Proton Exchange Membrane Fuel Cell (PEMFC)

### Abstract

A Proton Exchange Membrane Fuel Cell (PEMFC) is a promising, sustainable energy source for clean energy and environmental future through many applications including automotive, building, and electronic systems. However, poor water management (humidity control) has significantly reduced PEMFC performance, where suffers from limited proton conductivity in PEM by drying water or limited fuel supply by excessive water in fuel system (flooding). Thus, the optimal water management system is crucial to improve the performance. A main challenge in existing water management (humidification) systems is inaccurate humidity control especially at the high humidity and temperature for the optimal operating conditions in PEMFC. Humidified water often condenses before it supplies to the desired place, which results in total failure of the humidity control. In this study, an accurate and robust water management system is developed using a hydrophobic coating in the humidification system to avoid such water-condensation issues. The objectives of the proposed research are two folds as follows. a) To develop the accurate, robust, simple humidity control system for optimal water management systems. b) To successfully implement it to the optimal water management system in PEMFC.

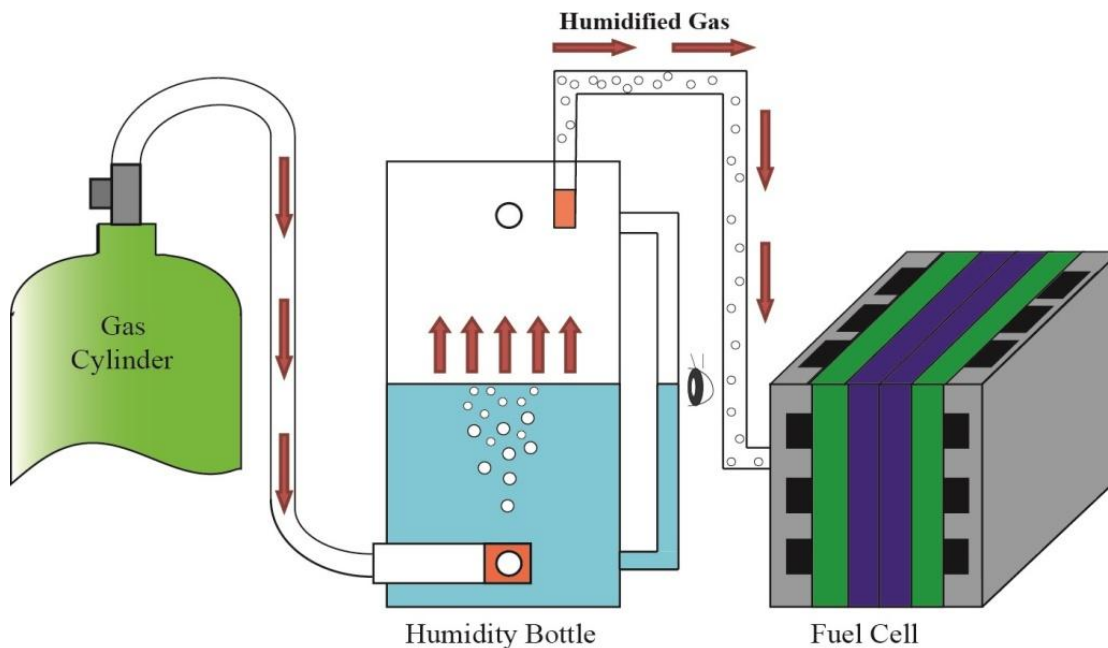


Figure 1. Humidification System for a Proton Exchange Membrane Fuel Cell (PEMFC)