**ABSTRACT**

Thermal management of a proton exchange membrane fuel cell includes removing waste heat within it in order to avoid non-uniform temperature distribution and utilizing effectively the waste heat. The water and thermal management of a PEMFC stack becomes more complex and important than just a single cell. In the design of thermal management of a PEMFC stack, the cooling methods include internal water or air circulation and fluid evaporation in present applications. However, there are several subjects to be taken into account, e.g., cost of making cooling channels, sealing and additional volume of the fuel cell stack. In the present study, “high thermal conductivity graphite sheet” is used for cooling in a fuel cell for the first time. It is combined with the metal flow channel plate in the cathode and the graphite sheet protrudes the fuel cell as a fin to remove waste heat. The relationship of water production and temperature distribution is also studied. If too much water in the diffusive layer of cathode is produced, the flow channel will be flooded, and blocked from conducting the oxidant. On the other hand, if the temperature in a fuel cell is too high, membrane dehydration is occurred. In the study, the thermocouples are used for measuring temperature inside of a single PEMFC. Water production is visualized by a DV. It is shown the PGS can remove waste heat efficiently and improve the performance of the PEMFC. It provides a promising tool for the thermal management of a PEMFC.

**Keywords**: PEMFC, Thermal Management, High Thermal Conductivity Graphite Sheet