

A review of experiments on cold start of PEM fuel cells

Abstract

This paper evaluate previous experimental studies on sub-freezing start up of proton exchange membrane (PEM) fuel cell system, and identify issues for further investigation. In a successful cold start, product water from electrochemical reaction in the cathode must be removed from the cell before it turns into ice and causing voltage drop and shutdown also leads to permanent damage to fuel cell components. Successful single PEM fuel cell start up was achieved from temperature as low as -30°C. Some researchers found that cold start of a 30 W stack from -20°C was possible only with aid of external energy. Successful self start up a 2 kW stack from temperature -5°C was reported but the time taken was unacceptably long and attempts to start up the stack at lower temperatures were failed. Based on the current state of research, further research is necessary to fully understand the operation and mechanism of PEM fuel cell cold start.

Keywords — PEM fuel cell, sub-freezing start up, cold start, experimental studies.