

Effect of freeze/thaw cycle on the PEF performance

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Water management is one of vital points in PEFC (Polymer Electrolyte Fuel Cell) operation to achieve high performance as well as its durability. This can be considered in the two categories. One is for the ordinary operating condition and the other is for the start-up/shut-down process. Especially start-up problem at the sub-freezing temperature is one of critical issues for the commercialization of PEFC vehicles. In this work, effects of residual water in shut-down processes on GDL/MEAs were investigated for the successful cold start-up of PEFC. The influences of residual water were examined with single cell. Characterizations of the single cells which have various amount of residual water were evaluated with freeze/thaw cycles. The cycled temperatures were from -40 to 80°C. At each cycles, the changes of impedance, internal resistance of cells and electrochemical properties of catalysts were checked.