

Effects of shut-down operation on the performance at the freeze/thaw cycles for the cold start-up of PEFC

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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. In this work, the various shut-down processes were systematically considered for the successful cold start-up. The influences of shut-down operation were investigated with single cells to understand the start-up ability as well as its durability. Performance and durability of the single cells which have various water removal conditions were evaluated with several times of freeze/thaw cycles. Thermal cycle effects on the characteristics of single cells were investigated with various start-up/shut-down conditions such as degree of freezing temperature, freezing rate and the maintaining time at the sub-freeze temperature. After finishing the freeze/thaw cycles, SEM, EPMA, N₂ adsorption/desorption were checked for the alternation of physical properties. The result shows that the amount of remaining water after shut-down process affects on the performance as well as durability.