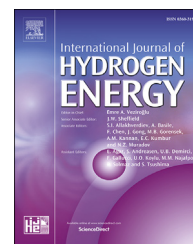


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Short Communication

Specific approaches to dramatic reduction in stack activation time and perfect long-term storage for high-performance air-breathing polymer electrolyte membrane fuel cell



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ABSTRACT

Air-breathing polymer electrolyte membrane fuel cell (PEMFC) systems without the humidifier and air blower have been developed to overcome the cost and complexity of balance of plants (BOPs). Until now, there has been no specific way to improve the stack's initial performance through the specific activation protocol and maintain the initial performance for a very long time. Herein, we studied a technique for finishing the total activation within 1 h by using a pre-activation process (i.e., soaking the stack in a DI-water reservoir) and applying current at 0.65 V. The pre-activation procedure significantly increased the swelling of the polymer membrane and the Nafion binder in the catalyst layer, reducing the total activation time. Also, we showed that long-term storage using humidified N₂ gas in a closed box did not hinder the electrocatalytic activity of the Pt and the drying of the polymer membrane for 60 days.

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