

High-performance fuel cell in low relative humidity condition and its application to drone system

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Abstract

Demands for fuel cells that can operate in ambient conditions are increasing as their applications expand to portable devices and unmanned aircraft system. Particularly, maintaining high-hydration state of membrane electrode assembly (MEA) in the fuel cell in ambient condition is essential for prevention of performance degradation. We successfully improve the MEA performance in low relative humidity condition by introducing patterned thin membrane by etching process and a functional carbon-covering layer onto the catalyst layer. The etched thin membrane in MEA shows extremely high fuel cell performance and carbon-covering layer plays an effective role to retain generated water and shows good compatibility with the MEA without interfering with the electrochemical reaction. And then we successfully construct drone system powered by fuel cell stack composed with the developed MEA.

Keywords: *Fuel cells, Low relative humidity, Multiscale structure, Etched thin membrane, Carbon-covering layer*