

### Development of MEA for PEM Fuel Cell Stacks under Dead-End Mode

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In dead-end mode, PEMFC can achieve not only high fuel efficiency through minimizing fuel consumption, but the system also can be simplified because gas supply system is not required. Because dead-end stack is the closed system that outlet of anode and cathode side are blocked, the dead-end stack requires periodic venting operation at both sides to prevent decreasing performance from water accumulation. This periodic venting operation causes high pressure drop during vent valve on/off, which is followed by periodical pressure spike on MEA. In additions, because pressurized pure hydrogen and oxygen are used in dead-end mode stack, there exist potential fire hazards caused by H<sub>2</sub>/O<sub>2</sub> gas mixture.

In this study, a 2kW-class PEMFC stack was fabricated and evaluated under dead-end mode. Experimental results indicated that several cells in stack showed low open circuit voltage after 1500hrs dead-ended operation. We drew the conclusion that this was due to the internal crossover leakage by detecting pin-holes from MEA post-mortem test. To prevent MEA failure, sub-gasket areas were extended to vulnerable areas, and its durability over 5000hrs was verified through simulated pressure shock test.