

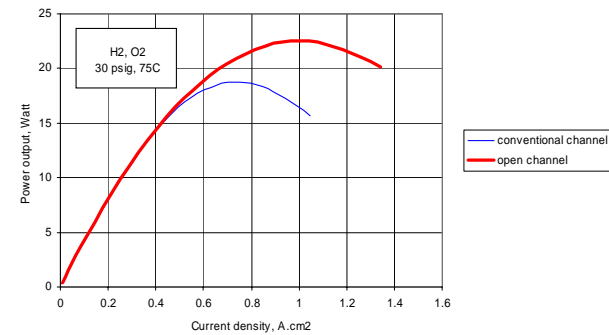
PEM Fuel Cell with Dead-ended Operation

ElectroChem, Inc. has demonstrated a dead-ended fuel cell operating at very low excess oxygen requirement and maintaining very stable performance. The fuel cell not only showed significantly higher voltages at high current density but also demonstrated the gravity-independent operation. The dead-ended operation significantly enhances the fuel cell power density by creating self-humidification and obtaining high efficiency of gas utilization

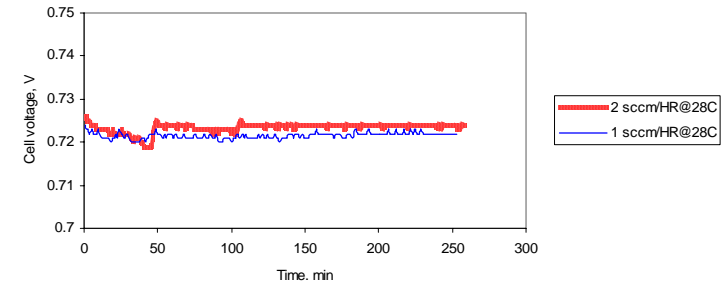
Michael Pien, Marvin Warshay, Steven Lis, Radha Jalan
ElectroChem, Inc., 400 West Cummings Park
Woburn, Massachusetts 01801 USA

In a H_2/O_2 PEM fuel cell, since pure O_2 and H_2 are used, a flow-through operation becomes impractical in terms of the efficiency of gas utilization. While a H_2/O_2 fuel cell can be operated by both hydrogen and oxygen dead-ended operation, it requires a very different scenario of controlling the gas and removal of product water. The rapid circulation of pure O_2 has been used in H_2/O_2 PEM fuel cells but is not desirable because of the potential fire hazards associated with fast moving mechanical components in a pure oxygen atmosphere. ElectroChem has demonstrated a solution that makes the flow channel into an open channel structure with wicking which automatically clears the liquid water from blocking gas passages and moves the water toward the end of the cell.

Fuel cell with open channel demonstrates higher performance than the conventional flow channel cell.



The cell demonstrates Stable Operation at Extremely Low Excess Oxygen Flow Rates—Enabling Passive Operation



The Cell demonstrates no effects of Change in Orientation on performance—Potential for “Zero g” Water Removal

