

**Development in Direct Methanol Fuel Cells
and Proton Exchange Membrane Fuel Cells**

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Abstract

A Fuel Cell is an electrochemical device in which a fuel and an oxidant react to produce electricity. Fuel cells are globally recognized as a promising power alternative for a wide range of applications, including portable applications for cell phones, laptops and military power systems, transportation applications for automobiles, and stationary applications as power plants.

Some critical issues in direct methanol fuel cells (DMFCs), such as methanol crossover, water management, and gas management, will be addressed, and our innovative solutions will be presented. State-of-the-art development of micro DMFCs, passive DMFCs using pure methanol, and DMFC systems using concentrated methanol solution for high power applications, will be introduced.

Fundamental understanding of water transport and mass transport in proton exchange fuel cells (PEMFCs) is crucial for optimization of cell performance. An advanced PEMFC with segmented construction was fabricated. Experimental results of current distribution and species distribution measured simultaneously in an operating cell will be discussed.