

Micro Fuel Processors and Micro Fuel Cells for Consumer Electronics Application

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The demand for high energy density power sources in the future generations of power-hungry portable electronics has intensified the research efforts into micro-fuel cell-based power systems by both academia and industry. Among the various types of micro-fuel cell-based systems, the direct methanol fuel cell (DMFC) emerged early as a strong candidate mainly due to methanol's high energy density, availability, and ease of handling. Although hydrogen-fueled polymer electrolyte membrane fuel cells (PEMFC) have many advantages over DMFCs, for example efficiency, cost, and durability, hydrogen supply remains an obstacle to the use of PEMFC technology in portable power sources. Therefore, development of viable hydrogen storage and generation systems are critical for the commercialization of PEMFCs. To circumvent the problems associated with hydrogen storage, we have developed a micro-PEMFC-based power system composed of a reformer that generates hydrogen, on-demand, from water using an electrochemical reaction and an air-breathing mono-polar PEMFC stack. We have successfully integrated these this system with a mobile phone and exhibited it at the 10th Grove Fuel Cell Symposium and the 2007 Korea Electronics Show.