

Fabrication and characterization of a novel Si-based micro-fuel cell

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Over the past decades, the micro-fuel cell has been increasing interest for current power portable electronics. Although there have been numerous attempts to commercialize the micro-fuel cell, it has proved difficult to develop industrial products. These problems have often been related to the lack of appropriate materials or manufacturing routs. As a part of the efforts to address these problems, we developed a novel Si-based micro-fuel cell system which consists of a micro reformer system and a micro proton exchange membrane fuel cell (PEMFC). This Si-based micro-fuel cell system was designed with the help of 3D-full simulation in order to extract the main design factors such as micro channel geometry, catalyst loading, micro channel aspect ratio and S/C ratio. Furthermore, we developed a novel proton exchange membrane by the conventional semiconductor process and nanoscale catalysts from nanoscience engineering for the work. Finally, we investigated the performance of the developed micro-fuel cell.