

The Application of Photo-Lithography Technique
to Micro-DMFC Fabrication

사진 식각공정을 이용한 Micro-DMFC 제조 공정에 관한 연구

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This paper describes the design, fabrication, and the test results for a micro-direct methanol fuel cell(DMFC). Micro fuel cells have emerged recently as a possible power source for applications that range from cell phones and small digital devices to autonomous sensors to embedded monitors or to micro-electro mechanical system(MEMS) devices. Miniaturizing fuel cells for portable applications is not simply a matter of reducing physical dimensions. New designs, materials and manufacturing approaches must be employed.

The miniature fuel cell electrodes used in the present investigation were produced on silicon substrates using traditional silicon micro-fabrication procedures that have many advantages. On the other hand, silicon-based micro-fuel cell has high resistance of adhesion to the membrane. In this work, substrate material is changed to polymer to lower resistance and photo-lithographic technology is simply used by using negative photoresist, SU-8.

The micro-DMFC is made from two identical membrane electrode assemblies(MEA). The MEA consists of two polymer chips that act as the current- collector, floe-field, and catalyst support. An all polymer chip is made of negative photo-resist, SU-8 and is fabricated by using photolithographic process. Each chip has 300m, 2700m holes and its thickness is about 100m. The reatant is fed to 2700m holes and reacts in the 300 m holes that catalyst is spray-coated. And the application of LTCC process prevented that MEA is damaged during the process of membrane swelling.