

5 Conclusions and Future Work

In this work, a novel design of micro bubble separator suitable for portable μ DMFC is presented. It is capable of multi-directional bubble breathing as well as liquid fuel recycling. The bubble separator was fabricated on a piece of water using MEMS fabrication process. It includes a flat region and a microchannel region. In the flat region, there is an array of micro holes with hydrophobic inner surface. The microchannel region contains a set of alternating gas and liquid microchannels. Within the gas microchannels the microholes are further made. The liquid microchannels are hydrophilic, while the gas microchannels, and the micro hole therein are hydrophobic. This bubble separator was experimentally demonstrated to exhale bubbles in multiple directions successfully with fuel recycling capability. Such bubble separators are suitable to deal with the CO_2 bubbles generated at the anode of a micro direct methanol fuel cell (μ DMFC).

Our future work will include two directions. One is to use hydrophobic porous membrane to enhance the leakage pressure. The other is to integrate the micro bubble separator into an actual μ DMFC .