

Development of an Auto-thermal LPG Reformer for High-temperature Fuel Cells

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To develop a fuel processing system for high-temperature fuel cells, we investigated the auto-thermal reforming (ATR) process of LPG. Structured catalysts based upon porous Ni-10% Cr substrates were prepared and used for the reforming reaction. In order to evaporate water and to warm up the reactant gases, a micro-channel heat exchanger equipped with combustion catalysts was designed and prepared.

The ATR reactor was operated in a variety of experimental conditions in order to investigate the characteristics of the reformer. The rate of syngas generation was up to 75 L(STP)/min that can be used to operate a 5kW fuel cells.

The objective of this study was to design and test an improved reformer for high-temperature fuel cells. The micro-channel heat exchanger using the heat of the combustion of LPG was found to be effective in increasing the reformer performance as well as in decreasing the start-up time of the reformer. Ultimately, by integrating micro-reaction technologies, a compact reformer, with lower emission levels and reduced start-up time along with improved temperature control can be achieved.