

Study of Direct Methanol Fuel Cell at Various Concentration and Elevated Temperature for Portable Electronic Devices Application

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Technologically advanced human societies require specialized tools and equipment to enable their diverse and mobile activities. Portable electronic devices like laptop, PDA, hand phone, etc. are now an essential tool for many people in their daily lives. The rechargeable batteries used to power the portable electronic devices could be improved upon with regards to its power density, and there is a crucial need for an efficient, renewable and more environmentally friendly power sources. Many researchers have shown that the direct methanol fuel cell (DMFC) is an appropriate alternative to rechargeable battery technology, although many factors must be resolved before it can be commercialized. This paper gives an overview on the possibilities for using the DMFC as portable electronic devices power source along with its optimum operating parameter which include the temperature and methanol concentration that will give significant impact towards efficiency of the DMFC itself. A 5cmX5cm single cell of direct methanol fuel cell(DMFC) which is manufactured by H-Tec Education, a German company is used. The cell is using the standard Nafion membrane.

In this study, the Taguchi method is used to find the optimal process parameters for DMFC. Through this study, not only the optimal process parameters for DMFC can be obtained, but also the main process parameters that affect the whole performance of the DMFC itself. Experimental results are provided to confirm the effectiveness of this approach. It is expected that, by integrating all optimum operating parameters, the tested DMFC's efficiency to be increased to 50-60% compared to current studies which gives only up to 30-40% efficiency. These will approximately producing around 0.6 to 0.7 V for each single cell of DMFC.