

Thermodynamic Analysis and Evaluation of Direct LOHC (Liquid Organic Hydrogen Carrier) Fuel Cell

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Hydrogen, clean and renewable energy carrier, is considered as an energy source of the future. Researches for production, storage and use of hydrogen is widely carried out to use hydrogen as a fuel. Fuel cell producing electric energy from the oxidation of hydrogen is the most popular method for hydrogen use. However, temperature control of fuel cell is essential because of heat produced from fuel cell which reduces energy efficiency. A lot of energy is consumed to maintain fuel cell temperature. In this study, Direct Liquid organic hydrogen carrier Fuel Cell (DLFC) is suggested to overcome above temperature problem. The electronic energy is generated from simultaneous reactions which are dehydrogenation and oxidation of Liquid hydrogen organic carrier (LOHC). For thermodynamic modeling DLFC, proper LOHCs and fuel cells were screened, and thermodynamic efficiency was evaluated by exergy analysis compared with conventional fuel cell. We expect that this concept and result could be used for further development of fuel cell to maximize energy efficiency.